

Pilot Study Report: Straightway and Hyannisport Facilities Hyannis Water System

Town of Barnstable
Department of Public Works
November 2021





Enter your transmittal number

X287209

Transmittal Number

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Massachusetts Department of Environmental Protection

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BRP WS 22D Water Treatment Approvals

- 1. Permit Code: 4 to 7 character code from permit instructions
BRP WS22D Pilot Study Report = or > 1 mgd
2. Name of Permit Category
3. Type of Project or Activity

B. Applicant Information - Firm or Individual

Town of Barnstable DPW

- 1. Name of Firm - Or, if party needing this approval is an individual enter name below:
Collins Nathan
2. Last Name of Individual 3. First Name of Individual 4. MI
382 Falmouth Road
5. Street Address MA 02601 774-377-4934
Hyannis
6. City/Town 7. State 8. Zip Code 9. Telephone # 10. Ext. #
Nathan Collins, PE nathan.collins@town.barnstable.ma.us
11. Contact Person 12. e-mail address

C. Facility, Site or Individual Requiring Approval

Mary Dunn/Airport Facilities and Straightway/Hyannisport Facilities

- 1. Name of Facility, Site Or Individual
47 Old Yarmouth Rd
2. Street Address MA 02601
Hyannis
3. City/Town 4. State 5. Zip Code 6. Telephone # 7. Ext. #
8. DEP Facility Number (if Known) 9. Federal I.D. Number (if Known) 10. BWSC Tracking # (if Known)

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

Kleinfelder

- 1. Name of Firm Or Individual
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Boston
3. City/Town 4. State 5. Zip Code 6. Telephone # 7. Ext. #
Kirsten Ryan
8. Contact Person 9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

- 1. Is this project subject to MEPA review? [] yes [X] no
If yes, enter the project's EOE file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due

Special Provisions:

- 1. [X] Fee Exempt (city, town or municipal housing authority)(state agency if fee is \$100 or less).
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2. [] Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. [] Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. [] Homeowner (according to 310 CMR 4.02).

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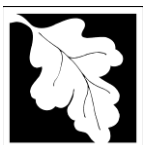
Rec'd Date:

Reviewer:

Check Number

Dollar Amount

Date



BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

A. Application

1. Is this application for an Original or a Resubmittal?

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Applicant:

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Kleinfelder

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Name

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Boston

MA

02105

Kirsten Ryan

617-498-4778

City

State

Zip

Contact

Telephone

B. Permit

Please check the permit or approval for which you are applying:

Zone II Determination for Existing Sources

- BRP WS 07 Approval to Conduct Pump Test for Zone II Delineation
- BRP WS 08 Approval of Zone II Delineation

New Technology

- BRP WS 11 Minor New Technology Approval; where no field test required
 - Drinking Water Additive
 - Cross Connection Device
 - Water Vending Machine
 - Other (specify):
- BRP WS 12 Major New Technology Approval: where field testing is required
- BRP WS 27 New Technology with Third-party Approval
- BRP WS 28 Vending Site/Source Prototype
- BRP WS 31 Vending and POU/POE Devices with Third-party Approval

New Source Approvals <70 gpm

- BRP WS 13 Exploratory Phase, Site Examination, Land Use Survey and Approval to Conduct Pumping Test
- BRP WS 15 Pumping Test Report Approval and Approval to Construct Source
- BRP WS 37 Approval of Transient Non-Community Source Less than 7 Gallons per Minute (combines BRP WS 13 and BRP WS 15 submittals)

New Source Approvals = or > 70 gpm

- BRP WS 17 Exploratory Phase, Site Examination, Land Use Survey, and Conduct Pumping Test
- BRP WS 19 Pumping Test Report Approval
- BRP WS 20 To Construct Source

Water Treatment Approvals

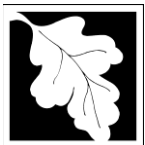
- BRP WS 21A To Conduct Pilot Study < 40,000 gpd
- BRP WS 21B To Conduct Pilot Study = or > 40,000 gpd and < 200,000 gpd
- BRP WS 21C To Conduct Pilot Study = or > 200,000 gpd and < 1 mgd
- BRP WS 21D To Conduct Pilot Study = or > 1 mgd
- BRP WS 22A Pilot Study Report < 40,000 gpd
- BRP WS 22B Pilot Study Report = or > 40,000 gpd and < 200,000 gpd
- BRP WS 22C Pilot Study Report = or > 200,000 gpd and < 1 mgd
- BRP WS 22D Pilot Study Report = or > 1 mgd
- BRP WS 23A To Construct Facility <40,000 gpd
- BRP WS 23B To Construct Facility = or > 40,000 gpd and < 200,000 gpd
- BRP WS 23C To Construct Facility = or > 200,000 gpd and < 1 mgd
- BRP WS 24 To Construct Facility = or > 1 mgd
- BRP WS 25 Treatment Facility Modification
- BRP WS 29 Water Treatment: Chemical Addition Retrofits of Water Systems > 3,300 people
- BRP WS 30A Vending Installation Approval
- BRP WS 30B POU/POE Installation Approval
- BRP WS 34 Water Treatment: Chemical Addition Retrofits of Water Systems = or < 3,300 people
- BRP WS 35A Multiple Vending Installation Approval
- BRP WS 35B Multiple POU/POE Installation Approval

Water Quality Assurance

- BRP WS 26 Sale or Acquisition of Land for Water Source
- BRP WS 36 Abandonment of Water Source

Distribution System Modifications

- BRP WS 32 Systems > 3,300 people
- BRP WS 33 Systems = or < 3,300 people



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Drinking Water Program

X287209

Transmittal Number

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

Facility ID# (if known)

C. Certification

"I certify, under penalty of law, that this application and all attachments were prepared under my supervision, in accordance with a system designed to ensure 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 submitted in this application, the information submitted is, to the best of my knowledge and belief, true, accurate and complete."

Authorized Signature

Date

Print Name

Position/Title



**PILOT STUDY REPORT:
STRAIGHTWAY AND HYANNISPORT FACILITIES
HYANNIS WATER SYSTEM
BRP WS 22D
BARNSTABLE, MA
KLEINFELDER PROJECT 20212329.001A**

NOVEMBER, 2021



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A Report Prepared for:

Mr. Hans Keijser
Barnstable Department of Public Works – Water Supply Division
Town of Barnstable
47 Old Yarmouth Road
Hyannis, MA 02601

**BARNSTABLE PILOT STUDY REPORT:
STRAIGHTWAY AND HYANNISPORT FACILITIES
BRP WS 22D
BARNSTABLE, MA
KLEINFELDER PROJECT 20212329.001A**

Prepared by:



Alexander B. Bishop, P.E.
Project Professional

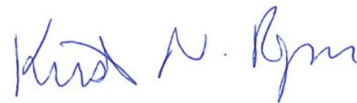


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LIST OF ACRONYMS and ABBREVIATIONS

Association for the Advancement of Cost Engineering	-----	AACE
Massachusetts Department of Environmental Protection	-----	MassDEP
United States Environmental Protection Agency	-----	EPA
Contaminant of Concern	-----	COC
Per- and Polyfluorinated Compounds	-----	PFAS
1,4-Dioxane	-----	1,4-D
Hydrogen Peroxide	-----	H ₂ O ₂
Iron	-----	Fe
Manganese	-----	Mn
Sodium Hypochlorite	-----	NaOCl
Total Organic Carbon	-----	TOC
Manganese Greensand Plus	-----	Greensand
Contaminant of Concern	-----	COC
Massachusetts Maximum Contaminant Level	-----	MMCL
Secondary Maximum Contaminant Level	-----	SMCL
National Secondary Drinking Water Regulations	-----	NSDWR
Office of Research and Standards	-----	ORG
Office of Research and Standards Guidelines	-----	ORSG
Operation and Maintenance	-----	O&M
Opinion of Probable Capital Costs	-----	OPCC
Granular Activated Carbon	-----	GAC
Ballast Power Level	-----	BPL
Contact Time	-----	CT
Concrete Masonry Unit	-----	CMU
Empty Bed Contact Time	-----	EBCT
Filter Surface Loading Rate	-----	FSLR
Department of Public Works	-----	DPW
Hyannis Water System	-----	HWS
Hyannisport Well	-----	HP
Simmons Pond Well	-----	SP
Straightway 1 Well	-----	STWY 1
Straightway 2 Well	-----	STWY 2

Maher Treatment Facility ----- MTF
Straightway Treatment Facility----- SWTF
Hyannisport Treatment Facility ----- HPTF
Evaluation of Treatment options for Straightway and
Hyannisport Facilities-----Alternative Analysis
Pilot Study Report By Blueleaf, Inc. ----- Blueleaf Report

1 EXECUTIVE SUMMARY

The Town of Barnstable, Hyannis Water System (HWS) has completed piloting of treatment processes for the removal of targeted contaminants of concern for the wells at the Straightway and Hyannisport Water Treatment Facilities in accordance with the MassDEP approval conditions (BRPWS21D Approval to Conduct Pilot Study, February 9, 2021). The Hyannis Water System cannot meet its projected future maximum day demand with any single wellfield or treatment facility out of service (Weston & Sampson, 2019). Therefore, HWS requires system improvements which allow for maximum flexibility and reliability to protect against disruption at any single location. The long-term treatment solution at these sites is two separate plants, each treating two wells; consistent with ongoing HWS strategy.

The purpose of this report is to present the results from the pilot testing program which verified the efficacy of proposed treatment processes and inform full scale treatment process design. The piloted treatment processes include Greensand filtration for iron and manganese (Fe/Mn) removal, Ultraviolet-Advanced Oxidation Process (UV-AOP) for destruction of 1,4-Dioxane (1,4-D), and granular activated carbon (GAC) for adsorption of per- and polyfluoroalkyl substances (PFAS). All treatment processes piloted were successful in reducing contaminant concentrations to meet treatment goals of non-detectable (ND) for PFAS and 1,4-D per current MassDEP-approved analytical methods.

With the planned addition of Greensand filtration, the current practice of adding polyphosphate to sequester iron and manganese will no longer be needed. A desktop corrosion analysis comparing the piloted treatment processes with the existing treatment indicated that there would likely be no significant change in the corrosion tendency of treated water. The current corrosion control practice using zinc orthophosphate and target pH of 7.4 should be continued. The pilot testing provided information for the conceptual basis of process design for the full-scale treatment facilities at the Straightway and Hyannisport sites. This piloting study has confirmed the validity of and further refined the basis of conceptual design and opinions of probable capital cost (OPCC) presented in the *Evaluation of Treatment Options for Straightway and Hyannisport Facilities* (Kleinfelder, 2020).

For each site, the treatment system would require: four (4) Greensand filters with three working and one in backwash or standby for iron and manganese removal; three (3) UV-AOP reactors each sized to treat 50% of the design flow for 1,4-D destruction; and three (3) GAC trains each composed of two contactors in a lead/lag configuration for PFAS adsorption. The lead GAC contactor will provide

minimum 10-minutes of EBCT providing 100% redundancy in the lag contactor. Additional conclusions and recommendations are provided for each treatment facility below.

Straightway Facility: The existing interim seasonal GAC filters at Straightway will need to remain operational in their current configuration for treating all four of the wells during the construction of the Straightway facility. The potential for relocating these interim filters and chemical storage and feed systems into the Hyannisport facility or utilizing in a future (e.g. Mary Dunn) plant should be evaluated during design. The existing Straightway tank will be used for achieving the contact time required for disinfection and the existing booster pump station will be used to pump the treated water to the distribution system. The updated OPCC assumes a pre-engineered metal building and includes a 25 to 35% contingency range to accommodate for heightened market volatility. The updated OPCC for the 1,500-gpm facility is estimated to be in the range of \$19.8 to \$21.2 million (2021 dollars). The OPCC should be re-evaluated as the design progresses and prior to appropriation of funds for construction. The first year of operation and maintenance (O&M) costs are estimated at \$650,000.

Hyannisport Facility: Replacement wells will be needed to restore yield and reduce flooding vulnerability and a pipe loop will be required for disinfection of the treated water. The cost associated with the Hyannisport & Simmons Pond Replacement Wells includes exploratory drilling, regulatory approvals, and design and installation of new wells and pump stations is estimated to be \$2.4 million (including a 20% contingency). The updated OPCC associated with the Hyannisport Water Treatment Facility is estimated to be \$21.5 to \$23 million (2021 dollars) which assumes a pre-engineered metal building and includes a 25 to 35% contingency range for construction of the 1,200-gpm facility. The cost estimates should be re-evaluated as the design progresses and prior to appropriation of funds for construction. The first year of O&M costs is estimated at \$410,000.

Recommended Implementation & Phasing: Given the declining yield of the Hyannisport Well and the proximity of Simmons Pond to flood prone areas, both wells should be replaced prior to construction of the Hyannisport WTF. The process of exploring for, permitting, designing and constructing replacement wells typically takes at least two years. Prior to preliminary design of the Hyannisport Treatment Facility, a replacement well exploration program should be conducted for both wells.

Implementation of the proposed project should be in stages, with the higher capacity Straightway Facility proceeding first, since the required improvement for the wells supplying the Hyannisport facility must predate that facility.

2 INTRODUCTION

2.1 PURPOSE

The purpose of this report is to present the results from the pilot testing program conducted at the Straightway and Hyannisport Facilities for the Town of Barnstable Department of Public Works (DPW) – Water Supply Division, also known as the Hyannis Water System (HWS – PWS 4020004). This report presents the pilot test processes for removal of iron/manganese, per and poly-fluoroalkyl substances (PFAS), and 1,4-Dioxane (1,4-D) and provides recommendations for major equipment for full scale treatment systems at the Straightway Treatment Facility (SWTF) and the Hyannisport Treatment Facility (HPTF) based on the results of the pilot testing program conducted between March 16 and June 15, 2021. The results verify the efficacy of proposed treatment processes and inform full scale treatment process design. This report adheres to the piloting testing proposal (Appendix A) and the requirements outlined in the MassDEP Piloting Proposal Approval letter dated, February 9, 2021, provided in Appendix B. The conditional approval requires a discussion of changes in treatment processes and its impact on corrosion control which is provided in Appendix C, and a discussion on the formation of oxidation byproducts for 1,4-D and per-fluorinated compounds provided in Appendix D.

The pilot testing results were used to update design criteria for the proposed treatment processes to reduce the concentrations of contaminants of concern (COCs; Fe, Mn, 1,4-D, and PFAS) to levels that meet treatment goals and adhere to federal and state drinking water standards. The Pilot Study Report produced by Blueleaf, Inc. is provided in Appendix E and referred to in this report as the “Blueleaf Report”. Kleinfelder’s analysis and recommendations for the proposed full scale treatment methods and operations are based on the results of the Blueleaf Report.

2.2 BACKGROUND

The Town of Barnstable has a population that fluctuates between the summer and winter of approximately 18,000 and 35,000. The HWS contains approximately 100 miles of water main, four water storage tanks with a total capacity of 2.57 million gallons, and interconnections with the Centerville-Osterville-Marstons Mills water system and the Town of Yarmouth water system for back up supply. The HWS currently has 12 wells (11 of which are active) pumping to three treatment facilities:

- Maher Water Treatment Facility (MTF): Maher Wells 1, 2, and 3
- Mary Dunn Treatment Facility: Mary Dunn Wells 1, 2, 3, and 4, Airport Well

- Straightway Treatment Facility: Straightway Wells 1 and 2, Hyannisport Well, Simmons Pond Well (STWY 1, STWY 2, HP, SP, respectively)

Over the past several decades, land use practices have been impacting wells in the HWS with various contaminants of concern (COCs) at different locations within the Town of Barnstable. Typical contaminants such as iron and manganese (Fe/Mn) have existed in many of the Town’s wells and are currently sequestered through chemical treatment. With the more recent discovery and growing concern with elevated concentrations of PFAS and 1,4-D, HWS needs to incorporate more robust treatment systems at the Mary Dunn and Straightway facilities to continue providing consumers with high quality safe drinking water that consistently complies with Massachusetts Maximum Contaminant Levels (MMCLs) and Office of Research and Standards Guidelines (ORSGs). This report focuses on piloting test results, design criteria updates, and recommendations for the proposed drinking water treatment facilities at the Straightway and Hyannisport Facilities only. The results and recommendations for the Mary Dunn pilot testing and treatment will be presented in a separate report following pilot testing which is expected to be completed in Winter/Spring 2022.

Prior to the pilot testing program, Kleinfelder conducted a conceptual design of the proposed Straightway and Hyannisport facilities in the August 2020 “*Evaluation of Treatment options for Straightway and Hyannisport Facilities*” (Alternatives Analysis). The Alternative Analysis defined the site and facilities existing conditions, proposed treatment alternatives, and provided recommendations for pilot testing.

The town also completed the new MTF in October 2020 to remove COCs including elevated levels of Fe, Mn, 1,4-D, and PFAS. Through the permitting and piloting processes, the MTF has successfully demonstrated and implemented the following treatment processes to remove the COCs to below regulatory limits:

- Manganese Greensand Plus (Greensand) filtration for the removal of iron and manganese
- Ultraviolet – Advanced Oxidation Process with Hydrogen Peroxide (UV-AOP) for destruction of 1,4-D
- Granular Activated Carbon (GAC) for the removal of PFAS.

2.2.1 Existing Wells, Treatment Facilities and Processes

The Hyannis Water System cannot meet its projected future maximum day demand with any single wellfield or treatment facility out of service (Weston & Sampson, 2019). Therefore, HWS requires system improvements which allow for maximum flexibility and reliability which protect against

disruption at any single location. With the current Straightway / Hyannisport site configuration, all four wells serve a single-entry point into the distribution system. In the event of a disruption at the Straightway site, the HWS would be unable to meet summer maximum day demand with its own sources. The Hyannisport Well has been retrofitted with a smaller diameter screen; it is producing at about 80% of its MassDEP approved pumping rate of 500 gpm and is difficult to clean and maintain. The Simmons Pond Well is producing at about 65% of its MassDEP approved pumping rate of 700 gpm. The treatment solution at these sites is two separate plants of approximately 1,500 gpm capacity, each treating two wells; consistent with the HWS strategy employed at Mary Dunn.

All four wells associated with the Straightway and Hyannisport facilities currently receive the same treatment: C5 (SLI-7425 - polyphosphate) to sequester iron and manganese, followed by sodium hydroxide for pH adjustment, C9 (SLI321 - zinc orthophosphate) for corrosion control, and sodium hypochlorite for disinfection.

The Straightway facilities include the SWTF (which houses both wells STWY 1 and STWY 2), the Straightway Tank, and the booster pumping station. Raw water from STWY 1 and STWY 2 is treated as described above and then flows to the Straightway Tank.



Figure 2-1: Existing Straightway Treatment Facility

The HPTF treats the HP and SP wells as described above with C5, C9, sodium hydroxide, and sodium hypochlorite (with the exception that the SP well has C5 injected at the well pump house). The

Hyannisport finished water flows through the transmission main leaving the building and runs north to the Straightway Tank.



Figure 2-2: Existing Hyannisport Treatment Facility

Finished water from all four wells (STWY 1, STWY 2, HP, SP) blends in the Straightway tank to receive the contact time (CT) for 4-log disinfection requirement and is then pumped into the distribution main on Straightway (Road) by means of the booster station. As of Spring 2020, the Town has operated a seasonal interim GAC filter to remove PFAS from blended water from all wells prior to entering the Straightway Tank. The new GAC filters are installed adjacent to the Straightway Tank along with a new hypochlorite feed system to inject hypochlorite to the GAC treated water and a backwash lagoon that will hold and infiltrate the GAC backwash water.



Figure 2-3: Installation of Seasonal Interim GAC Filters at Straightway

3 WATER QUALITY AND TREATMENT PROCESSES

This section defines regulatory standards and treatment goals regarding water quality, existing COC concentrations during pilot testing, and an overview of water quality sampling during piloting.

Regulatory agencies, including the MassDEP and the United States Environmental Protection Agency (EPA), have developed existing water quality standards and guidelines for COCs to ensure clean and safe drinking water is provided by public water systems. The COCs that exceeded the regulated or recommended levels in the raw water samples taken at HWS's STWY 1 and STWY 2, HP, and SP wells are Fe, Mn, 1,4-D, and PFAS.

MassDEP has a Secondary Maximum Contaminant Level (SMCL) for Fe of 0.3 mg/L. The EPA has a National Secondary Drinking Water Regulations (NSDWR) (or secondary standard) for Fe of 0.3 mg/L and for Mn of 0.05 mg/L. The Massachusetts Office of Research and Standards (ORS) has a recommended ORSG of 0.3 ug/L for 1,4-D. In addition, the MassDEP has issued a MMCL for six (6) PFAS compounds (PFAS-6) at a total combined concentration of 20 ng/L. The MMCL for PFAS summated total of the following six (6) PFAS congeners:

- Perfluorooctane sulfonic acid (PFOS)
- Perfluorooctanoic acid (PFOA)
- Perfluorohexane sulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorodecanoic acid (PFDA)

3.1 EXISTING CONDITIONS AND TREATMENT GOALS

Table 3-1 summarizes the relevant regulatory levels of concern and presents the raw water quality results compiled in the Blueleaf Report for each well. The table was originally provided in the Pilot Testing Proposal (attached in Appendix A) but has been updated to reflect the current existing conditions observed during piloting.

Table 3-1: Summary of Source Raw Water Quality for Contaminants of Concern

Well	Fe (mg/L)	Mn (mg/L)	1,4 Dioxane (ug/L)	PFAS-6* (ng/L)
Level of Concern ¹	0.3	0.05	0.3	20
Straightway 1	<0.30	0.112	<0.30	44
Straightway 2	0.42 - 0.46	0.765 – 0.961	0.40 - 0.66	85 – 93
Hyannisport	<0.30	0.126	<0.30	45
Simmons Pond	<0.30	0.129 – 0.148	0.15 – 0.40	79 – 80

Results that are bolded represent concentrations that exceed the Level of Concern

¹ Lowest level of existing or proposed regulation or guidance

* PFAS-6 refers to the MA MMCL compounds: PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA.

The three treatment technologies selected for this pilot study were Manganese Greensand Filtration (Greensand), Advanced Oxidation Process with ultraviolet light and hydrogen peroxide (UV-AOP) and Granular Activated Carbon (GAC). A more detailed overview of each treatment process is provided in Sections 4, 5, and 6. Table 3-2 shows the treatment objectives for each health-related COC (PFAS-6 and 1,4-Dioxane) and the associated treatment process used to achieve that objective. The Greensand process will be used to remove iron and manganese in order to maximize the efficiency of PFAS6 and 1,4-dioxane removal, with a treatment goal of as low as is practicable, or at least half of the levels of concern of 0.3 mg/L and 0.05 mg/L, respectively.

An additional objective of this pilot study was to evaluate if the addition of treatment processes would affect finished water corrosivity and corrosion in the distribution system. Discussion on the corrosion control parameters and possible impacts based on the pilot testing and sampling results is in Appendix C.

Table 3-2: Proposed Treatment Facility – Health-Based Treatment Objectives and Processes

Contaminants of Concern	Health-Based Level of Concern ¹	Treatment Goal ²	Treatment Process
1,4-dioxane (ug/L)	0.3	Non-detect	UV-AOP
PFAS-6 (ng/L)	20	Non-detect	GAC

¹ Lowest level of existing or proposed regulation or guidance (EPA or MassDEP)

² The treatment goal is to reduce the listed contaminants to below detection limits of MassDEP approved analytical methods.

3.2 SYSTEM FLEXIBILITY AND OTHER CONSIDERATIONS

The Hyannis Water System cannot meet its projected future maximum day demand with any single wellfield or treatment facility out of service (Weston & Sampson, 2019). Therefore, HWS requires system improvements which allow for maximum flexibility and reliability to protect against disruption at any single location. The long-term treatment solution at these sites is two separate plants, each treating two wells; consistent with the HWS strategy.

Given the declining yield of the Hyannisport Well and the proximity of Simmons Pond to flood prone areas, both wells should be replaced prior to construction of the Hyannisport WTF. Implementation of the proposed project should be in stages, with Straightway proceeding first, since the required improvement for the wells supplying the Hyannisport facility must predate that facility.

From a construction sequencing standpoint, the Straightway treatment facility will be built first. The new Straightway treatment facility will be supplied by STWY 1 and STWY2 wells primarily. The existing interim seasonal GAC filters at Straightway will need to remain operational in their current configuration for treating all four of the wells during the construction of the Straightway facility. The potential for relocating these interim filters into the Hyannisport facility or utilizing in a future (e.g. Mary Dunn) plant should be evaluated during the next phase of design.

3.3 WATER QUALITY SAMPLING

During pilot testing, samples were collected and tested to demonstrate the effectiveness of COC removal with each treatment process. Other parameters important to the treatment process such as free chlorine, pH, and turbidity were also measured. Field and laboratory samples at the influent and effluent for each of the three (3) treatment process technologies were analyzed. Additional samples for the corrosion evaluation were analyzed and presented separately in Appendix C.

Table 3-3 shows the field sampling schedule during pilot testing. All field samples were collected and analyzed in accordance with generally accepted field methods (refer to Section 2.3 of the Blueleaf Report for “Field Analytics Methods”).

Table 3-3: Field Sampling Parameters and Schedule

Parameter	Minimum Field Sampling Frequency			
	Source Water	Pretreated	UV Treated	GAC
Total Iron	3 per source	3 per run	2 per Day	2 per day
Dissolved Iron	3 per source	3 per run	2 per Day	2 per day
Total Manganese	3 per source	3 per run	2 per Day	2 per day
Dissolved Manganese	3 per source	3 per run	2 per Day	2 per day
Free Chlorine	None	3 per run	1 per Day	----
Total Chlorine	None	3 per run	1 per Day	----
pH	2 per day	3 per run	1 per Day	2 per day
Turbidity	3 per Source	3 per run*	1 per Day	2 per day*

**also recorded results by a continuous automated monitor*

Two laboratories were used for laboratory sampling and analyses: Absolute Resources Associates and Alpha Analytics. Absolute Resources Associates (a women-owned business enterprise) provided a majority of the analytical testing during piloting. Table 3-4 outlines the water quality sampling schedule for the COCs and other groups of analytes sampled at each well and treatment process. The major water quality sampling groups are defined as follows:

- Field Parameters – includes field sampling and analytical methods defined in Table 3-3.
- Fe/Mn Piloting Analytes – includes Fe and Mn along with other analytes required by MassDEP to meet piloting requirements defined in the MassDEP DWS Policy #90-04. Samples and analytes tested are further defined in the piloting proposal and the Blueleaf report.
- Corrosion Water Quality Parameters (WQPs) - includes analytes required by the conditional piloting approval. Samples and analytes tested are further defined in the piloting proposal and results are presented and discussed in the Appendix C: Corrosion Evaluation.
- 1,4-D
- TOC – Total Organic Carbon
- PFAS

A more detailed list of the samples collected is provided in the piloting proposal and the Blueleaf report.

Table 3-4: Water Quality Sampling Schedule Summary

Well	Sampling Point	Field Parameters	Fe/Mn Piloing	Corrosion WQPs	1,4-Dioxane	TOC	PFAS
Straightway 1	Raw	✓	✓	✓	✓	✓	✓
	Greensand (post)	✓	✓	✓	---	✓	---
Straightway 2	Raw	✓	✓	✓	✓	✓	✓
	Greensand (post)	✓	✓	✓	✓	---	---
	UV-AOP (post)	---	---	✓	✓	---	---
	GAC (post)	---	---	✓	---	✓	✓
Hyannisport	Raw	✓	✓	✓	✓	✓	✓
	Greensand (post)	✓	✓	✓	---	---	---
	GAC (post)	---	---	✓	---	✓	✓
Simmons Pond	Raw	✓	✓	✓	✓	✓	✓
	Greensand (post)	✓	✓	✓	✓	---	---
	UV-AOP (post)	---	---	✓	✓	---	---
	GAC (post)	---	---	✓	---	✓	✓

4 GREENSAND FILTRATION

4.1 PROCESS OVERVIEW

This pilot study used GreensandPlus™ media, manufactured by Inversand, in the Greensand filtration process, for removal of Fe/Mn. Filtration requires dual-media pressure filters that are filled with Greensand media and anthracite. The process requires pretreatment with sodium hypochlorite for pre-oxidation of Fe/Mn and Greensand media regeneration, and sodium hydroxide for pH adjustment. Greensand is effective at removing oxidized iron through filtration, while manganese (dissolved) is adsorbed to the media and precipitated forms (to a lesser extent) through filtration. As precipitated forms of Fe/Mn buildup within the filter media, headloss across the filters increases and consequently must be backwashed to remove the solids. The backwashed solids are typically collected in a holding tank.

Important parameters that impact the operation of Greensand filters include the pH and the Filter Surface Loading Rate (FSLR), as well as sufficient sodium hypochlorite dose in the pretreatment. Typical pH operating ranges are between 6.2 to 8.5 and FSLR operating ranges are between 2 to 12 gallons per minute per square feet (gpm/ft²). A detectable free chlorine residual in the Greensand effluent is required to keep the Greensand media in the regenerated form. This process will eliminate the current system operation of sequestering iron and manganese and decrease chlorine demand for disinfection purposes.

4.2 PILOTING OVERVIEW

Pilot testing for the Greensand filter included two phases of testing, first with a smaller diameter trial on each of the four wells (initial testing), and second with a larger diameter trial on STWY 2 and SP wells only to satisfy the UV-AOP reactor minimum flow rate of 20 gpm (high-capacity testing). In addition, STWY 2 was piloted for an extended run of two weeks to determine if a fouling potential exists on the UV lamps following Greensand filtration.

The dates pilot testing was conducted at each of the 4 well sites, for initial testing and high-capacity testing, are provided in Table 4-1 below.

Table 4-1: Greensand Pilot Testing Dates

Well	Initial Testing	High-Capacity Testing
Straightway 1	March 15 – 23	---
Straightway 2	April 12 – 19	May 18 – June 7
Simmons Pond	April 19 – 26	June 7 – 15
Hyannisport	April 26 – May 3	----

GreensandPlus™ media was proven to be effective for iron and manganese removal by previous pilot testing and full scale operation at the Town’s MTF. Therefore, in this pilot study only GreensandPlus™ media was piloted for iron and manganese removal at each site.

4.3 PILOT DESCRIPTION

Treatment parameters that impact the removal of iron and manganese by Greensand are pH and FSLR. During the initial testing trials, Blueleaf evaluated and compared two pH conditions through the Greensand filters. Two filters were operated at a pH of 6.8 s.u. and two were operated at a pH of 7.4 s.u. Operating the filters at the higher pH condition allows the treatment facility to have a single point of pH adjustment since a pH of 7.4 s.u. is the Town’s current pH target for corrosion control. In addition, two different FSLRs were tested to determine the effect on filter run times in the treatment system. Two filters were operated at 4 gpm/sf and two filters were operated at 8 gpm/sf to span the range of FSLRs likely to be used at the full-scale WTFs.

The parameters used to define the Greensand filtration piloting system, for both the initial testing and the high-capacity testing are in Table 4-2 and Process flow diagrams are attached in the Blueleaf Report in Appendix E. The four (4) 6-inch diameter filters used for the initial testing and the two (2) 21-inch diameter filters used for high-capacity testing all contain a 24-inch bed of Greensand media and 12-inch bed of anthracite on top of the Greensand media. The Greensand media’s absorptive oxide-coated surface, made with a silica base sand core substrate, acts as a catalyst in the oxidation of Fe/Mn. Greensand is effective at removal of oxidized iron by physical filtration and oxidized manganese by absorption. The anthracite layer also works as a physical filter for iron.

Table 4-2: Parameters for Greensand Filtration Pilot

Parameter	Initial Testing	High-Capacity Testing
Number of Filters:	4	2
Depth of GreensandPlus Media:	24 inches	24 inches
Depth of Anthracite Media:	12 inches	12 inches
Filter Diameter:	6 inches	21 inches
Filter Surface Area:	0.20 ft ²	2.40 ft ²
Total Filter Media Volume:	0.6 ft ³	7.2 ft ³
Freeboard Above Filter Surface:	24 inches	24 inches
Regeneration Mode:	Continuous Regeneration	Continuous Regeneration

Greensand Filtration requires the addition of pretreatment chemicals. The first pretreatment chemical needed is sodium hydroxide (also called caustic) for pH adjustment. The caustic feed solution was prepared using a 50% sodium hydroxide (NaOH) stock solution. A second pretreatment chemical is required for the oxidation of the Fe/Mn and as a media regeneration agent. The oxidant feed was prepared from a 7.5% sodium hypochlorite (NaOCl) solution. Blueleaf calibrated the chemical feed rates during the pilot study, and calculated chemical doses (as 100% active ingredient) based upon the feed rates and the chemical dilutions. Oxidant dosing also accounted for raw water Fe/Mn oxidation and filter media regeneration demand. Rates at which chemical feed stocks were consumed were monitored to verify calculated feed rates. All chemical feeds were injected to the pilot system upstream of a static mixer.



Figure 4-1: Initial Testing Greensand Filters (left), High-Capacity Greensand Filters (right)

Blueleaf mobilized a high-capacity Greensand system to produce sufficient treated water to operate the UV-AOP and GAC processes at STWY 2 and SP. The high-capacity Greensand Filtration unit operated under conditions informed by the Greensand 6-inch pilot sizing runs and were used to confirm treatment at each source. Parameters such as pH control, FSLR, filter headloss and effluent turbidity were monitored with online instrumentation and data logging equipment.

Filter effluent was stored for use in filter backwashing and to provide sufficient water to feed downstream processes during backwashing. Backwash water was stored on site and testing evaluated the impact of supernatant recycling into the feed water of the pilot system. All the filters were backwashed at a flow rate of 2.4 gpm (12 gpm/ft²) for a period of 10 minutes. Backwash was conducted until 24-gallons were collected in a 30-gallon tank. The backwash water was discharged either as waste or to a backwash tank for future recycle trials.

4.4 WATER QUALITY SAMPLING

Water quality samples taken during initial testing included raw water, pretreated water, filtered effluent, combined backwash, and settled supernatant for each of the four different operating conditions (high/low pH with high/low FSLR) at each of the four wells. Blueleaf also took pre- and post-Greensand treatment samples during the high-capacity test.

Water quality field samples important for monitoring the Greensand filters included measurements for free and total chlorine, pH, turbidity, iron, manganese, dissolved oxygen, and ORP. Laboratory samples taken for the filter effluent include total and dissolved iron and manganese, 1,4-D, and disinfection byproducts. Samples were collected as outlined in the schedule presented in Table 3-4.

5 ULTRAVIOLET – ADVANCED OXIDATION PROCESS

5.1 PROCESS OVERVIEW

UV-AOP is an advanced oxidation process used to treat 1,4-D in the presence of UV light and hydrogen peroxide. The water is pretreated with hydrogen peroxide, which photochemically reacts to form hydroxyl radicals in the presence of UV light. Hydroxyl radicals breakdown 1,4-D through oxidation. Key operational parameters for this treatment process include UV strength (ballast power), hydrogen peroxide dosing, and the extent of lamp fouling occurring during the process.



Figure 5-1: Trojan UV Phox 12AL30 UV-Oxidation System Being Piloted

5.2 PILOT DESCRIPTION

Blueleaf performed UV-AOP pilot testing at the STWY 2 and SP wells because each had the highest concentrations of 1,4-D for their respective treatment facilities. The pilot testing system used UV-AOP to breakdown 1,4-D through oxidation with hydrogen peroxide pretreatment under ultraviolet light. Blueleaf ran the UV-AOP pilot test on STWY 2 for 14 days from May 24 to June 07, 2021 and at SP for seven (7) days from June 07 to June 15, 2021.

The Greensand filters used during the initial piloting runs did not satisfy the 20 gpm flow necessary for the UV-AOP reactor. Therefore, the pilot test study for UV-AOP required a separate high-capacity test to satisfy flow demand. Blueleaf provided a Trojan UV reactor, Trojan UV Phox 12AL30 UV-Oxidation System, which is representative of the UV reactor proposed for the full-scale operation. The reactor included flow measurement, ballast power control, UV transmittance readings and automatic cleaning/wiper operation. The piloting operator provided a hydrogen peroxide storage and feed system for controlling and monitoring the hydrogen peroxide feed dose.

The UV reactor vendor, Trojan, recommended testing two UV ballast power levels (BPL) (a "high BPL" and "low BPL"), and two hydrogen peroxide doses ("high H₂O₂", "low H₂O₂"). The four combinations of UV strength and H₂O₂ dose (i – high H₂O₂/high BPL, ii- low H₂O₂/high BPL, iii – high H₂O₂/low BPL, iv- low H₂O₂/low BPL), were evaluated at each of the two sites for UV-AOP testing. Refer to Table 5-1 for the UV strength and hydrogen peroxide doses at the STWY 2 and SP wells.

Table 5-1: UV Ballast Strength and Hydrogen Peroxide Trial Doses

Well	Trial Conditions BPL/H ₂ O ₂ Dose	UV Ballast Power Level (BPL)	Target H ₂ O ₂ Dose (ppm)	Measured H ₂ O ₂ Concentration in UV influent ¹ (mg/L)
Straightway 2	High/High	100%	10	9.0
	Low/High	60%	10	9.0
	High/Low	100%	5	3.5
	Low/Low	60%	5	4.5
Simmons Pond	High/High	100%	8	7.0
	Low/High	60%	8	7.0
	High/Low	100%	3.5	3.0
	Low/Low	60%	3.5	3.5

¹ From Blueleaf Report

An extended run was conducted for the STWY 2 well to test for fouling of the UV sleeves. Blueleaf conducted this run over the course of two-weeks with the sample collection schedule adjusted to space the sampling events evenly over the entire extended run. At the beginning and conclusion of the extended run, the UV lamp was tested for fouling parameters including UV transmittance and a visual inspection.

5.3 WATER QUALITY SAMPLING

Water quality samples were collected from the raw water, pretreated water and UV-AOP effluent water. Analytes tested included hydrogen peroxide, pH, and UV transmittance. Efficacy of the treatment process was based on ballast strength, hydrogen peroxide concentration (pre- and post-UV-AOP), influent UV transmittance, and effluent turbidity, and laboratory results for 1,4-D concentrations. Additionally, UV-AOP treated water quality were analyzed for disinfection byproducts.

6 GRANULAR ACTIVATED CARBON

6.1 PROCESS OVERVIEW

GAC filtration uses carbon media to absorb drinking water contaminants, including PFAS. Contaminants are trapped at the porous surface of the GAC media during the absorption process. The GAC filter follows the UV-AOP treatment in the process chain and quenches any residual hydrogen peroxide from the UV-AOP process. The GAC media acts as a catalyst to convert residual hydrogen peroxide into water for removal. Literature and practical experience suggest that GAC is the best media for quenching residual hydrogen peroxide as compared with using chemicals. The capacity of GAC for PFAS adsorption is slightly impacted. Therefore, excessive overdosing of hydrogen peroxide in the UV-AOP process should be avoided. GAC for removal of PFAS typically requires an Empty Bed Contact Time (EBCT) of 10 minutes.



Figure 6-1: GAC Contactors for Initial Testing (left), GAC Contactors Downstream of UV-AOP (right)

6.2 PILOT DESCRIPTION

The purpose of the GAC in the pilot testing system is to remove PFAS, along with other COCs, from the drinking water of the HP, STWY 2 and SP Wells. Blueleaf performed GAC pilot testing with Greensand at the HP well from April 26 to May 3, 2021 and performed GAC pilot testing with Greensand and UV-AOP at STWY 2 from May 24 to June 7, 2021 and at SP from June 7 to June 15, 2021.

Blueleaf provided three (3) 5-foot high, 6-inch diameter GAC contactor vessels for the pilot testing at the HP, STWY 2, and SP wells. Table 6-1 shows the designed for the GAC contactor vessels. The filters were operated in series so that effluent from the Greensand filters (during the initial phase) or effluent from the UV-AOP reactor (during the high-capacity phase) entered the first GAC contactor (GAC #1A) and was subsequently pumped through the second, and then third GAC contactors (GAC #1B and GAC #1C). The total volume of media was approximately 2.0 cubic feet, or 14.7 gallons, and the contactor operated at 10 minutes EBCT at a flow rate of 1.5 gallons/minute.

Table 6-1: Parameters for GAC Pilot (STWY 2, SP, and HP)

Parameter	GAC Contactor
	Total
Calgon F400 Media Depth:	120-inches (10-ft)
Contactor Diameter:	6-Inches
Surface Area	0.2 ft ²
Media Volume:	2 ft ³
Freeboard Above Media:	60-inches
Total Contactor Height:	15-feet

Calgon FILTRASORB 400 media was used in pilot testing and is similar to the filter media type used at the Town's existing GAC filtration facilities. The GAC media is also effective at adsorbing other dissolved organic compounds and various contaminants including taste and odor compounds, organic color, total organic carbon (TOC), industrial organic such as TCE and PCE. The GAC filter was equipped with a flow control assembly, which includes an effluent turbidimeter, 0-60 pressure gauges for differential pressure readings, globe valve, rotameter, and totalizer.

6.3 WATER QUALITY SAMPLING

Blueleaf collected water quality samples pre- and post-GAC treatment to evaluate GAC treatment effectiveness at removing PFAS. Other field water quality parameters measured included iron, manganese, and pH. Laboratory sampling tests for PFAS in the GAC effluent were collected, tested, and compared to the Raw Water PFAS concentrations. Blueleaf also collected samples for disinfection byproducts in the filter effluent.

7 PILOTING RESULTS

This section summarizes and discusses results of the piloting tests and water quality sampling completed. Detailed discussions of the results for each of the treatment processes piloted are presented in the Blueleaf Report attached in Appendix E.

7.1 RAW WATER QUALITY

Raw water samples were collected from all wells over the course of each pilot run. The full water quality sampling results are available in the Blueleaf Report in Table 3.01 (field analyses) and Table 3.02 (laboratory analyses). The following subsections summarize the piloting findings.

7.1.1 Iron

Field analyses - total iron concentrations exceeded regulatory limits only in the raw water of STWY 2. Average total iron concentrations during Greensand low-capacity runs and high-capacity runs were 0.42 and 0.46 mg/L, respectively. Dissolved iron was the principal component of STWY 2's total iron in raw water. Raw water from other wells showed average total iron concentrations around 0.04 mg/L. Laboratory analyses – yielded similar results to field analyses as expected with STWY 2 being the only well that exceeded regulatory limits. The average total iron concentration from three rounds of sampling was 0.68 mg/L that was composed principally of dissolved iron (0.44 mg/L). STWY 1 and HP wells total iron (and dissolved) were below reporting limits, and SP had one detection of total and dissolved iron at 0.044 and 0.023 mg/L, respectively.

7.1.2 Manganese

Field analyses – showed that total manganese concentrations exceeded regulatory limits in all wells. Average total manganese concentrations across all wells ranged between 0.112 mg/L - 0.961 mg/L. The maximum manganese concentration of 1.32 mg/L was detected at STWY 2 during low-capacity greensand testing. Across all wells, total manganese was principally composed of dissolved manganese. Laboratory analyses – yielded similar results to field analyses as expected with results from all wells exceeding regulatory limits and ranging between 0.096 to 1.2 mg/L. Across all wells, total manganese was principally composed of dissolved manganese.

7.1.3 PFAS

PFAS-6 exceeded regulatory limits in all wells with results ranging from 44 ng/L (STWY 1) to 93 ng/L (STWY 2). PFOS was the principal contaminant of PFAS-6 in all wells except STWY 1. In STWY 1, PFHxS had the highest concentration. Of the PFAS compounds measured as part of Method 537 not included in the six principal PFAS compounds in PFAS-6, PFHxA had the highest concentration in all wells.

7.1.4 1,4-Dioxane

1,4-D was detected in STWY 2 and SP ranging between 0.66-1.0 ug/L and 0.2-0.4 ug/L, respectively. STWY 1 and HP wells were below the reporting limit of 0.25 ug/L.



Figure 7-1: Engineer Recording Raw Water Quality Results

7.2 GREENSAND FILTRATION AND PRE-TREATMENT

The objective of the greensand filtration piloting was to determine the processes effectiveness in the removal of Fe/Mn. As stated in Section 4, the initial testing (low-capacity pilot runs) was setup to test removal capabilities of Fe/Mn at each of the four wells. The objective of the high-capacity greensand filter runs was to provide adequate supply of Fe/Mn free water for the operation of the UV-AOP reactors. All filter trials met treatment goals of reducing the concentration of total iron and manganese to below the SMCL. STWY 2, with the highest manganese concentration, will be the limiting condition for the Straightway facility design and operation.

- Pre-oxidation – Sodium hypochlorite was used to oxidize iron and to a lesser extent manganese prior to the pH adjustment and the greensand filters.
 - STWY 1 and STWY 2 wells required NaOCl dosing was 0.9 and 3.7 mg/L, respectively.
 - HP and SP wells required NaOCl dosing was 2.1 and 2.8 mg/L, respectively.
- pH adjustment – Sodium hydroxide was used to raise the raw water pH to an optimal range for the greensand filters and existing corrosion control purposes. The two pH ranges targeted were 6.8 s.u. and 7.4. s.u. with dosing rates dependent on the source. A detailed discussion of the dosing rates is presented in the Blueleaf Report, Section 3.2.1.2.
- Filter surface loading rates (FSLR) – two FSLR were tested as part of the greensand piloting runs which included 4, and 8 gpm/ft². Piloting demonstrated that all greensand filters effectively removed Fe/Mn concentrations to below SMCLs for both loading rates and pH conditions, with the exception of manganese in STWY 2. For STWY 2, the higher FSLR of 8 gpm/ft² and lower influent pH (6.8 s.u.) resulted in exceedances of the SMCL; higher FSLR and higher pH (7.4) combination proved effective. Under the lower loading rate, manganese removal proved to be effective at both pH tested.
- Filter runtimes - were determined by either contaminant breakthrough or achieving a 10 psi differential pressure across the filter. STWY 1, HP, and SP wells, all with low iron concentrations proved to have filter runtimes that exceeded 100 hours. STWY 2, with the highest Fe/Mn contaminant loading showed breakthrough after 30 hours of operation at the high FSLR and lower pH. The 10 psi headloss condition was met when operated at the low FSLR/high pH for near 50 hours and at the low FSLR/low pH for 100 hours.
- Backwashing – was completed at a rate of 12 gpm/ft² for 10 minutes and proved effective without air scour.

7.3 UV-AOP

The objective of UV-AOP piloting was to determine the effectiveness of the reactor's destruction of 1,4-D to meet treatment goals and Massachusetts ORSG of 0.3 µg/L. UV-AOP was only piloted on the STWY 2 and SP Wells. The reactor required a flowrate of 20 gpm, which necessitated the use of the high-capacity greensand filter upstream. In addition, all combinations of high/low ballast power levels (BPL) and high/low H₂O₂ dosing parameters were tested to confirm 1,4-D destruction; these parameters are presented in Section 5 Table 5-1.

Destruction of 1,4-D to below treatment goals was successful in all operating scenarios for both the STWY 2 and SP wells. Only one scenario at STWY 2, low BPL/high H₂O₂ dose conditions, yielded a detectable 1,4-D concentration of 0.19 ug/L in the reactor effluent which is still below the regulatory limit. All other combinations yielded results below detectable limits. For the full-scale system, the preferred operation is higher ballast power and avoid overdosing hydrogen peroxide.

UV lamp fouling was investigated at the completion of the piloting study after 23-days of continuous operation of the reactor. A UV lamp sleeve removed from the reactor was visually inspected and compared to an unused sleeve. The visual inspection of the lamp sleeves indicated no visible evidence of fouling. The sleeve was also sent to the manufacturer, Trojan, who performed a UV transmissivity analysis and reported the sleeve to have 99.3% of the UV transmittance of a new (and unused) sleeve.



Figure 7-2: UV Lamp Fouling Sleeve Comparison: Sleeve with Black O-ring was Used in Pilot Study

7.4 GAC

The objective of the GAC pilot test was to determine the effectiveness of PFAS-6 removal to meet treatment goals and the MassDEP MMCL of 20 ng/L. The GAC contactors piloted contained a total of 120-inches of Calgon F400 media and provided an EBCT of 10 minutes. All final effluent samples demonstrated adsorption of all PFAS-6 compounds to non-detectable limits with the exception of one, which was below regulatory limits. Blueleaf reported that the detection may be a result of sample contamination.

Over the course of the piloting, less than 1 psi in headloss was observed in the lead GAC vessel. Backwashing of GAC contactors is generally done after 10 psi of headloss is observed. No backwashing conditions were observed over the course of the pilot study.

8 MASSDEP REQUIREMENTS AND COMPLIANCE

MassDEP issued specific approval conditions that are included in the pilot test approval attached in Appendix B, which cites items 5-10:

5. *The findings and evaluation of the pilot study results shall be submitted to the department under BRP space WS 22: approval of pilot study report, within one (1) year of completing the pilot study. The pilot study report shall evaluate the chloride to sulfate ratio following guidance contained in EPS "Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Privacy Agencies and Public Water Systems," March 2016, publication number EPA 816-B-16-003 (with 2019 update); and "Impact of Chloride Sulfate Mass Ratio Changes on Lead Leaching In Potable Water", © 2010, Water Research Foundation, ISBN 978-1-6053-110-0. The report shall discuss simultaneous compliance effects of treated water with the existing conditions of the distribution system and household plumbing. The discussion shall include historical lead and copper sampling, the presence of lead service lines and the condition of chemical coating existing within the currently stable system plumbing. The report shall also discuss continuing compliance with applicable rules such as the Revised Total Coliform Rule, Groundwater Rule, and Disinfection Byproducts Rule.*
6. *Include a discussion in the pilot report of the corrosion control impact of removing orthophosphate for the treatment of existing source.*
7. *Include a discussion in the pilot report of information available from the vendor and the EPA's Treatability Database on the formation of oxidation byproducts for 1,4-D and perfluorinated compounds*
8. *Treatment systems used for the combination of hydrogen peroxide and UV treatment require the department's new technology approval prior to installation and any proposed treatment facility.*

8.1 CORROSION EVALUATION

Items 5, 6, and 7 of the MassDEP Pilot Proposal Approval Letter are addressed in the Appendix C: Corrosion Evaluation and Appendix D: Oxidation Byproducts Discussion. The technical memorandum fulfills all requirements and details Kleinfelder's process and recommendations for the facility to provide continued compliance with the Lead and Copper Rule, along with simultaneous compliance with the Revised Total Coliform Rule, Groundwater Rule, and the Disinfection By-Products Rule.

8.2 NEW TECHNOLOGY APPROVAL

According to the MassDEP's new technology database, Trojan UVPhox, described as "*UV-Photolysis coupled with peroxide oxidation for the removal of 1,4-Dioxane*" was approved on February 13, 2018. This technology is also currently deployed in a similar capacity at the existing Maher Treatment Facility in Barnstable.

9 DESIGN CRITERIA UPDATES

The purpose of this section is to update design criteria using the results from the Blueleaf Report. The original design criteria were presented in the August 2020 conceptual design alternatives analysis report entitled “Evaluation of Treatment Options for Straightway and Hyannisport Facilities”. The Alternatives Analysis focused on separate facility concepts for the Straightway and Hyannisport facilities in order to align with the HWS priority on system resiliency.

9.1 STRAIGHTWAY TREATMENT FACILITY

The recommended alternative for the proposed Straightway Treatment Facility is the “Straightway 1500-3” design. This alternative facility will treat water from the STWY 1 and STWY 2 wells. The design flow is limited by the existing Straightway Storage Tank (used for CT and 4-Log Compliance) and the 1,500 GPM booster station. The proposed treatment facility includes Greensand filtration for iron and manganese removal, UV-AOP for destruction of 1,4-D, and GAC for removal of PFAS.

The proposed SWTF will contain the major treatment processes while also maximizing usage of existing facilities for chemical injection and storage where appropriate. The proposed treatment building will be a prefabricated steel building measuring 102 feet by 80 feet with a total area of 8,160 square feet. Finished treated water from the new treatment facility will achieve the necessary contact time for 4-log inactivation of viruses through the existing 0.4 MGD baffled contact tank and be pumped to the existing distribution system entry point on Straightway via existing booster station.

The polyphosphate chemical addition for iron and manganese sequestration will no longer be required due to the proposed greensand filtration. The possibility of re-use of existing chemical injection facilities and equipment will be evaluated in the preliminary design. Since the existing treatment facility needs to remain in operation during construction, new chemical storage and metering systems should be planned for the new treatment facility. The existing chemicals systems could be salvaged for replacement parts or to be used in future treatment plants.

9.1.1 Greensand Filtration

Greensand filtration is proposed for the removal of iron and manganese. Pretreatment of raw water will be done via pre-oxidation with sodium hypochlorite and pH adjustment with sodium hydroxide. The

Blueleaf Report demonstrated that to achieve effective oxidation and removal of Fe/Mn, the higher target pH (7.4 s.u.) should be used. Final effluent pH during piloting from the GAC also showed that the higher target pH more closely resembles existing distribution system pH levels. Table 9-1 shows the pre-treatment chemical dosing requirements for raw water to meet the 7.4 s.u. target pH.

Table 9-1: Straightway Greensand Filter Pretreatment Chemical Dosing

	NaOCl Dose (mg/L)	NaOH Dose (mg/L)
Straightway 1	0.9	47.5
Straightway 2	3.7	28.0

As proposed in the Alternatives Analysis, the facility requires four (4) 12-foot diameter filters arranged in parallel with three online and one on standby. Results from the Blueleaf Report suggests that the lower loading rate tested, 4 gpm/ft², is preferred to achieve treatment goals.

Table 9-2: Straightway Greensand Pressure Filtration Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,500 gpm (2.16 MGD)
Flow rate per filter (three online, one in backwash)	500 gpm/filter
Filter Vessel Diameter	12 feet
Normal Filter Surface Loading Rate with four filters operating	3.32 gpm/ft ²
Maximum Filter Surface Loading Rate with three filters operating	4.42 gpm/ft ²
Total Number of Pressure Filters	4
Filter Configuration	Parallel 3 online, 1 backwash
Total Filter Surface Area	452 ft ²
Pre-treatment	
Target NaOCl Dose	0.9-3.7 mg/L
Target pH	7.4 s.u.
Media Type and Depths:	
Anthracite	12-inches
Greensand – Inversand GreensandPlus™	24 inches
Gravel	12 inches

Backwash of the Greensand filters will be required periodically to removed precipitated solids from the filters. Typically, it is standard practice to backwash Greensand filters when a 10-psi differential pressure across the filters is observed. The updated backwashing design criteria is specified in Table 9-3.

Table 9-3: Straightway Backwash Design Criteria for Greensand Filters

Parameter	Design Criteria
Design Backwash Cycle Frequency	>10 psi headloss
Backwash frequency*	50 hours
Backwash Process Durations Per Contactors	15 minutes
Backwash Cycle Duration (All Four Contactors)	60 minutes
Backwash Rate per Contactors ¹	1,350 gpm
Backwash Loading Rate per Contactors ¹	12 gpm/ft ²
Backwash Volume per Filter	20,400 gallons
Total Backwash Volume (All Four Contactors)	82,000 gallons

** as determined from the Blueleaf Report based upon worst case conditions for STWY 2 well only. Actual backwash frequency may be less during actual operations as the wells are blended*

¹ Backwash filter loading rate recommended by vendor Hungerford and Terry. Alternatives to include air scour will be evaluated in the preliminary design.

Several backwash supply system alternatives are considered below, and a final selection will be made during preliminary design:

- 1) Backwash supply from the product of the on-line Greensand filters for backwash of offline unit. This option requires sufficient pressure and flow is available at the Greensand filter effluent.
- 2) Use dedicated backwash pumps with a storage tank. The tank can be filled with Greensand filtered water or GAC filtered water. Two backwash pumps (one working, one standby) will be required. Each pump will be equipped with a VFD to accommodate the flow required by backwash both Greensand and GAC filters. The storage tank will minimize impact to the system operation. The size of the storage tank, if required, will be determined in detail design.
- 3) Supplied by distribution system pressure or existing booster pumps.
- 4) Dedicated backwash pumps taking water from distribution system or finished water tank

Spent backwash water will need to be stored onsite in a holding tank. The backwash holding tank needs to be sized to accommodate one full backwash from all four filters plus additional volume (depth) for sludge accumulation. A target backwash holding tank volume of 100,000 gallons will also accommodate the volume of all filters plus a 25% contingency volume. This is volume is also capable of handling a higher backwash loading rate of up to 15 gpm/ft². The proposed building size is large enough to locate

the backwash storage tank beneath the treatment facility building. It is also possible to include air scour in the backwash sequence. With air scour, the backwash water volume can be reduced. However, the cost of the filters is higher with the air supply headers. In addition, a blower system will also be required to supply air to the filters during backwash. This alternative will be further evaluated in the next phase of design.

The Blueleaf Report indicated that introduction of supernatant recycle water up to 10% did result in an increase in Turbidity to 0.1 NTU and manganese between 0.012 and 0.023 mg/L in the filtered water. While the filtered water manganese is below the SMCL of 0.05 mg/L during supernatant recycle, it may increase the pressure loss in the filter and the need for more frequent backwashes. Barnstable prefers not to recycle supernatant directly to the treatment facility due to the measured increase of turbidity and iron and manganese during pilot testing.

An alternative to supernatant recycling is to use the backwash lagoon installed for the interim seasonal GAC system on the south end of the Straightway site for onsite infiltration to the well's zone of contribution. This form of recycling simplifies treatment operations and improves filter run times. It is believed to be an unlined infiltration lagoon capable of holding approximately 100,000 gallons which will be more than capable of holding the total backwash volume from all four filters. Direct discharge of backwash water to an unlined lagoon may require a discharge permit. MassDEP's preferred method would be to first discharge the backwash water to a lined lagoon (or in this case a holding tank to remove settleable solids) and then pump the supernatant to the unlined lagoon for onsite infiltration. A discharge permit in this case may not be required but is subject to approval by the Drinking Water Program. A more detailed investigation into the residuals management will be completed as part of the preliminary design.

9.1.2 UV-AOP

UV-AOP is proposed for the destruction of 1,4-D. The treatment process will include injecting hydrogen peroxide upstream of the reactors. Three (3) Trojan Flex 100 – four bank reactors will be arranged in parallel, each capable of treating 50% of the design flow to allow maintenance of one reactor while the other two can treat 100% of the design flow. During Blueleaf piloting, high and low Ballast Power levels were tested in combinations with high and low hydrogen peroxide dosing. All combinations proved to be effective for the destruction of 1,4-D except with the low BPL and high H₂O₂ dosing, which resulted in 0.19 ug/L of 1,4-D in the reactor effluent.

Table 9-4: Straightway UV-AOP Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,500 gpm (2.16 MGD)
Reactor	Trojan Flex 100
Reactor Quantity/arrangement	Three/parallel
Lamp Power	500 watts
Lamps per Bank	32
Banks per Train	4
Total Number of Lamps	384
Ballast Power	High (100%)
H ₂ O ₂ Dose	3.5-8 mg/L ¹
H ₂ O ₂ Storage Tanks	3,000 Gallons

¹ H₂O₂ dose should be optimized during operation with preference to minimize H₂O₂ concentration

9.1.3 GAC

GAC is proposed for the removal of PFAS. The facility will require a total of three trains of 10-foot diameter GAC contactors in parallel. Each train consists of two (2) 10-diameter contactors each containing 20,000 lbs of media.

The total flow of 1,500 gpm will be split evenly between the three trains for a flowrate of 500 gpm each and a maximum surface loading rate of 6.4 gpm/ft². The lead-lag filter design allows for water quality sampling for PFAS from the lead filters to monitor for PFAS breakthrough, which indicates the media has reached its useful life. The lead contactor will provide an EBCT of 10-minutes required for PFAS removal, and a total of 20 minutes per train. The lag contactor therefore provides 100% redundancy in the process. Having the lag filters ensures continued removal of PFAS and allows the lead filters to operate till breakthrough to fully utilize the GAC media before replacement. Additional design criteria for the pressure filtration system are provided in Table 9.5.

Table 9-5: Straightway GAC Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,500 gpm (2.16 MGD)
Filter Surface Loading Rate - (assumes flow to two lead filters and two lag filters)	6.4 gpm/ft ²
Number of GAC contactors	6
Number of Skids (2 Contactors per Skid –	3
Skid Contactor Configuration	Lead/Lag
Empty Bed Contact Time (per train)	20 min
Empty Bed Contact Time (per contactor)	10 min
Total Filter Surface Area (10' dia. contactors)	471 ft ²
Media Type	Calgon F400 type
Total Media Volume	4,000 ft ³
Total Media Weight (20,00 lbs/per contactor)	120,000 lbs

GAC typically requires periodic backwashing, but is largely dependent on the water quality and solids loading that lead to increases in differential pressure across the filters. GAC does require backwashing upon initial loading of the vessels or after carbon replacement. As with Greensand filter, typical operations call for backwashing when a 10-psi differential pressure is observed. In this case, the backwash requirements would be similar to the Greensand, however, a lower surface loading rate of 9 gpm/ft² is required for the lighter F400 type GAC media. With the greensand filtration upstream of the GAC it is likely that the contactors may only need backwashing once per year and during carbon change outs. GAC Backwash Design criteria is presented below in Table 9-6. Spent GAC backwash water will be discharged to the onsite holding tank and then the supernatant pumped to the unlined lagoon for onsite infiltration.

Table 9-6: Straightway Backwash Design Criteria – Calgon F400 Carbon

Parameter	Design Criteria
Design Backwash Cycle Frequency	>10 psi headloss
Backwash Process Durations Per Contactors	15 minutes
Backwash Cycle Duration (All Six Contactors)	90 minutes
Backwash Rate per Contactors	710 gpm (max)
Backwash Loading Rate per Contactors	9 gpm/ft ²
Total Backwash Volume (All Six Contactors)	64,000 gallons

After GAC treatment, sodium hypochlorite will be added for disinfection and orthophosphate will be added for corrosion control before the water is pumped to the distribution system from the existing Straightway tank by the existing 1,500 gpm booster pump station.

9.2 HYANNISPORT TREATMENT FACILITY

The Alternative Analysis presented one design for the proposed Hyannisport Treatment Facility (HPTF) to treat water from the HP and SP wells with a design flow of 1,200 GPM. The proposed treatment facility includes greensand filtration for iron and manganese removal, UV-AOP for destruction of 1,4-D, and GAC for removal of PFAS. The proposed treatment building will be the same size and construction as the SWTF. The building will be constructed from prefabricated metal and be 102 feet by 80 feet for a building footprint of 8,160 square feet.

Finished water from the new treatment facility will achieve sufficient contact time for 4-log inactivation of viruses for Groundwater Rule compliance through either of the following two options, to be determined during design:

1. Constructing a new pipe loop.
2. Constructing a new concrete contactor tank/clearwell.

For option 1, the new well pumps will be sized to pump water through the treatment system and directly to the distribution system. For option 2, the finished water would be pumped into the distribution system by a new 1,200 gpm booster station. New ductile iron water main and entry point is required for either option. Further evaluation of the alternatives will be conducted in the preliminary design.

The possibility of re-use of existing chemical injection facilities and equipment will be evaluated in the preliminary design. Since the existing treatment facility needs to remain in operation during treatment facility construction, the design should plan on including new chemical systems for the treatment facility. The existing chemicals systems could be salvaged for replacement parts or used in future treatment plants. The polyphosphate chemical addition for Fe/Mn sequestration will no longer be required due to the proposed greensand filtration.

9.2.1 Replacement Wells at Hyannisport Site

The HP well has been retrofitted with a smaller diameter screen; it is producing at about 80% of its MassDEP approved pumping rate of 500 gpm and is difficult to clean and maintain. The SP Well is producing at about 65% of its MassDEP approved pumping rate of 700 gpm. The process of exploring for, permitting, designing and constructing replacement wells typically takes at least two years. As a next phase of the project and prior to preliminary design of the HPTF, a replacement well exploration program should be conducted for both wells.

MassDEP policy for replacement wells allows them to be installed within a 250-foot radius of the existing wells provided there is a justification for the relocation (e.g. improved water quality or reduced impact on environment). Given the potential for climate change to increase flooding susceptibility, a replacement well for SP should move the well away from the Pond, potentially improving water quality, and relocating the HP Well to move it out of the 500-year flood zone. A replacement well investigation utilizing a series of small diameter test wells is recommended as a next step to identify replacement locations providing adequate yield and not in conflict with future WTP construction. Following the investigation, installation of replacement wells would include drilling new wells, construction of a new well pump station, and startup and testing.

9.2.2 Greensand Filtration

Greensand filtration is proposed for the removal of Fe/Mn. Pretreatment of raw water will be done via pre-oxidation with sodium hypochlorite and pH adjustment via sodium hydroxide. The Blueleaf report demonstrated that both wells achieved removal under both low and high pHs (6.8 and 7.4 s.u.) and both FSLR (4 and 8 gpm/ft²). The higher target pH should be used as it more closely resembles existing distribution system pH levels. Table 9-7 shows the pre-treatment chemical dosing requirements for raw water to meet the 7.4 s.u. target pH.

Table 9-7: Hyannisport Greensand Filter Pretreatment Chemical Dosing

	NaOCl Dose (mg/L)	NaOH Dose (mg/L)
Hyannisport	2.1	13
Simmons Pond	2.8	32

As with the original design, the facility requires four (4) 10.5-foot diameter filters arranged in parallel with all three online and one on standby. Results from the Blueleaf Report suggest that the filters can be run with FSLR between 4 and 8 gpm/ft².

Table 9-8: Hyannisport Greensand Pressure Filtration Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,200 gpm (1.73 MGD)
Flow rate per filter (three online, one in backwash)	400 gpm/filter
Filter Vessel Diameter	10.5 feet
Filter Surface Loading Rate with four filters	3.46 gpm/ft ²
Maximum Filter Surface Loading Rate with three filters and one filter in backwash	4.62 gpm/ft ²
Number of Pressure Filters	4
Filter Configuration	Parallel 3 online, 1 backwash
Total Filter Surface Area	346 ft ²
Pre-treatment	
Target NaOCl Dose	2.1-2.8 mg/L
Target pH	7.4 s.u.
Media Type and Depths:	
Anthracite	12-inches
Greensand – Inversand GreensandPlus™	24 inches
Gravel	12 inches

Backwash of the greensand filters will be required periodically to removed precipitated solids from the filters. The updated backwashing design criteria is specified in Table 9-9. The Blueleaf Report also noted that the lower concentration in iron makes it more difficult to predict filter runtimes as the precipitated iron is the main driver of headloss development.

Table 9-9: Hyannisport Backwash Design Criteria for Greensand Filters

Parameter	Design Criteria
Design Backwash Cycle Frequency	>10 psi headloss
Backwash frequency*	400 hours
Backwash Process Durations Per Contactors	15 minutes
Backwash Cycle Duration (All Four Contactors)	60 minutes
Backwash Rate per Contactors	1,038 gpm
Backwash Loading Rate per Contactors	12 gpm/ft ²
Backwash Volume per Filter	15,600 gallons
Total Backwash Volume (All Four Contactors)	62,500 gallons

** as determined from the Blueleaf Report based upon the HP Well at a Low FSLR (4 gpm/ft²) and High pH (7.4 s.u.)*

Alternatives for backwash supply system are the same as presented above for STWY, and a final selection will be made during the preliminary design.

Spent backwash water will need to be stored onsite in a holding tank and have recycle pumps for settled backwash water supernatant to be recycled. The Blueleaf Report indicated that introduction of supernatant recycle water up to 10% resulted in no statistically significant changes in water quality parameters. These results therefore allow supernatant to be recycled and minimize process water losses and eliminate the need to discharge backwash water to a lagoon. Periodically, accumulated sludge in the holding tank will need to be pumped out.

The backwash holding tank needs to be sized to accommodate one full backwash from all four filters plus additional volume (depth) for sludge accumulation. A target backwash holding tank volume of 80,000 gallons will also accommodate a backwash loading rate up to 15 gpm/ft². The proposed building size is large enough to locate the backwash storage tank beneath the treatment facility building. A more

detailed investigation into the backwash and residuals management will be completed as part of the preliminary design.

9.2.3 UV-AOP

UV-AOP is proposed for the destruction of 1,4-D. The treatment process will include chemical injection of hydrogen peroxide upstream of the reactors. Three (3) Trojan flex 100 – one bank reactors will be arranged in parallel, each sized to treat 50% of the total design flow to allow maintenance on one reactor while the other two treats 100% of the design flow. During Blueleaf piloting, high and low Ballast Power levels were tested in combinations with high and low hydrogen peroxide dosing. All combinations proved to be effective for the destruction of 1,4-D.

Table 9-10: Hyannisport UV-AOP Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,200 gpm (1.73 MGD)
Reactor	Trojan Flex 100
Reactor Quantity/arrangement	Three/parallel
Lamp Power	500 watts
Lamps per Banks	32
Banks per Train	1
Total Number of Lamps	96
Ballast Power	High (100%)
H ₂ O ₂ Dose	3.5-8 mg/L ¹
H ₂ O ₂ Storage Tanks	3,000 Gallons

¹ H₂O₂ dose should be optimized during operation with preference to minimize H₂O₂ concentration

9.2.4 GAC

GAC is proposed for the removal of PFAS. The facility will require a total of three trains arranged in parallel. Each train consists of two (2) 10-diameter contactors each containing 20,000 lbs of media. The original conceptual design proposed four trains (with two contactors per train) but piloting results demonstrated GACs effective removal of PFAS and three trains will be able to meet demands.

The total flow of 1,200 gpm will be split evenly between the three trains for a flowrate of 400 gpm each and a maximum filter surface loading rate (FSLR) of 5.1 gpm/ft². Each train will provide an EBCT of 24.9 min, equal to 12.5 minutes per contactor which exceeds the recommended 10-minutes of EBCT for PFAS removal. The lead-lag filter design allows for water quality sampling for PFAS from the lead filters to monitor for PFAS breakthrough, which indicates the media has reached its useful life. Having the lag filters provides 100% redundancy in the process and ensures continued treatment removal of PFAS and allow the lead filter to operate till breakthrough to fully utilize the capacity of the GAC. Each vessel will contain GAC media to capture PFAS compounds in the raw water. Additional design criteria for the pressure filtration system are provided in Table 9.5.

Table 9-11: Hyannisport GAC Design Criteria

Parameter	Design Criteria
Design Flow Rate	1,200 gpm (1.73 MGD)
Filter Surface Loading Rate - (assumes flow to two lead filters and two lag filters)	5.1 gpm/ft ²
Number of GAC contactors	6
Number of Skids – (2 Contactors per Skid)	3
Skid Contactor Configuration	Lead/Lag
Empty Bed Contact Time (per train)	24.9 min
Empty Bed Contact Time (per contactor)	12.5 min
Total Filter Surface Area (10' dia. contactors)	471 ft ²
Media Type	Calgon F400 type
Total Media Volume	4,000 ft ³
Total Media Weight (20,00 lbs/per contactor)	120,000 lbs

GAC typically requires periodic backwashing, but this is largely dependent on the water quality and solids loading that lead to increases in differential pressure across the filters. GAC does require backwashing upon initial loading of the vessels or after carbon replacement. A lower FSLR or 9 gpm/ft² would be required for the lighter F400 type GAC Media. With the greensand filtration upstream of the

GAC it is likely that the contactors may only need backwashing once per year and during carbon change outs. GAC Backwash Design criteria is presented below in Table 9-12.

Table 9-12: Hyannisport Backwash Design Criteria – Calgon F400 Carbon

Parameter	Design Criteria
Design Backwash Cycle Frequency	>10 psi headloss
Backwash Process Durations Per Contactors	15 minutes
Backwash Cycle Duration (All Six Contactors)	90 minutes
Backwash Rate per Contactors	710 gpm (max)
Backwash Loading Rate per Contactors	9 gpm/ft ²
Total Backwash Volume (All Six Contactors)	64,000 gallons

GAC treated water disinfection will be achieved in a new pipe loop. The well pumps will have to be upgraded to supply the additional pressure through the treatment process and distribution system pressure. As an alternative, disinfection can be achieved in a new clearwell and a new pump station will be required to supply the distribution system.

10 COST ANALYSIS

This section provides revised Opinion of Probable Capital Costs (OPCC) and anticipated operational and maintenance (O&M) costs for the first year of operation. Revisions presented were updated using the piloting results and design criteria in Section 9 for the proposed Straightway Treatment Facility (SWTF) and Hyannisport Treatment Facility (HPTF). The cost estimates for the two treatment facilities were prepared in accordance with the guidelines of the Association for the Advancement of Cost Engineering (AACE) International for the Class 5 Estimate. Given the conceptual level of the evaluation, the engineer's OPCC include contingencies.

It should be noted that material costs have risen steeply in recent years and the construction market has been volatile and remains so for the foreseeable future. Availability of labor also contributes to the rise and volatility of the construction project costs. Given the current status of the construction market, additional contingency factors were applied as discussed below.

10.1 CAPITAL COSTS

The OPCC for the proposed SWTF is presented in Table 10-1, and the proposed HPTF is presented in Table 10-2.

Straightway Treatment Facility Cost Updates:

Updated costs are shown in Table 10-1 and revisions made to the OPCC from the 2020 report are detailed as follows:

- **Greensand** – the Blueleaf report confirmed that design criteria for the originally specified greensand filtration units were acceptable and therefore not changed. However, piloting results provided valuable information regarding the backwashing frequency and recycle criteria. The required backwash holding tank volume is estimated to be 100,000 gallons. Both the backwash holding tank sizing and pricing were updated in the cost estimate.
- **UV-AOP** – Trojan Technologies, the manufacturer of the UV-AOP unit used in piloting, was forwarded results from the Blueleaf Report to confirm the reactor sizing and ancillary equipment pricing. The price will be based on three (3) reactors each sized to treat 50% of the design flow.
- **GAC** - Three new GAC trains of the same size and hydraulic design parameters as the existing two interim Tetrasolv GAC trains will be required so that the interim GAC units remain

operational during the new plant construction. The GAC train estimate was based on Calgon budget proposal.

- Building – the cost was updated to utilize a metal building instead of CMU.

Hyannisport Treatment Facility Cost Updates:

Updated costs are shown in Table 10-2 and revisions made to the OPCC are detailed as follows:

- Greensand – the Blueleaf report confirmed that design criteria for the originally specified greensand filtration units were acceptable and therefore not changed. However, the required backwash holding tank volume is estimated to be 80,000 gallons. The backwash holding tank sizing was updated in the cost estimate.
- UV-AOP – Trojan Technologies, the manufacturer of the UV-AOP unit used in piloting was forwarded results of Blueleaf report to confirm the reactor sizing and ancillary equipment pricing. The price was based on three (3) reactors each sized to treat 50% of the design flow.
- GAC – The original alternative design proposed four GAC trains, however, clarification on redundancy requirements and removal efficacy verification through piloting determined that only three GAC trains are required. The Calgon contactor price is carried in the cost estimate. Due to the elimination of one GAC train, the building size was able to be reduced to match the dimensions of the proposed SWTF.
- Disinfection – A new pipe loop is included for disinfection. The cost included upgrading the well supply pumps.
- Building – the cost was updated to utilize a metal building instead of CMU.
- Well Replacement – Costs associated to conduct a replacement well investigation and permitting and installation of replacement wells (with new vertical turbine pumps and pumping stations) of both the Hyannisport and Simmons Pond wells.

Table 10-1: Proposed Straightway Treatment Facility Opinion of Probable Capital Cost

Item/Description	Quantity	Unit/Basis	Unit Budgetary Cost	Item Budgetary Cost
Major Equipment & Systems				
Greensand filters (Hungerford Terry quote)	1	LS	\$ 750,000	\$ 750,000
Granular Activated Carbon - (3 new trains, Calgon quote)	3	LS	\$ 400,000	\$ 1,200,000
UV-AOP (Trojan quote)	1	LS	\$ 2,173,000	\$ 2,173,000
Process piping #1: Raw water to greensand filter	100	LF	\$ 250	\$ 25,000
Process piping #2: Greensand to AOP to GAC to storage	150	LF	\$ 250	\$ 38,000
Sludge & Supernatant pumps	4	LS	\$ 15,000	\$ 60,000
Chemical feed systems	3	LS	\$ 50,000	\$ 150,000
Valves, fittings and accessories - 15%	1	LS	\$ -	\$ 660,000
<i>Subtotal</i>				\$ 5,056,000
Installation			25%	\$ 1,264,000
Major Equipment & Systems Subtotal				6,320,000
Unit Price & Other Items				
Concrete Base Slab - Backwash Tank; Building	503	CY	\$ 650	\$ 328,000
Concrete Side Walls - Backwash Tank	84	CY	\$ 950	\$ 81,000
Excavation, Backfill, compaction, grading, seeding	906	CY	\$ 45	\$ 41,000
Unit Price & Other Item Subtotal				450,000
Buildings				
Pre-Engineered Metal Building (102 x 80) (w/ Mech, HVAC)	8160	SF	\$ 250	\$ 2,040,000
Buildings Subtotal				\$ 2,040,000
Bulk Work Percentage and Other Items				
Site civil			10%	\$ 881,000
Electrical			18%	\$ 1,586,000
Instrumentation & Controls			5%	\$ 441,000
Yard Piping			2%	\$ 180,000
Bulk Work Subtotal				3,088,000
Subtotal STWY WTF Direct Costs				\$ 11,898,000
GC Overhead and Profit			20%	\$ 2,380,000
Contingency			25%	\$ 2,975,000
TOTAL STWY WTF BUDGETARY CONSTRUCTION COST				\$ 17,253,000
Design, Permitting and Construction Administration			15%	\$ 2,588,000
TOTAL STWY WTF BUDGETARY CAPITAL COST (w/ 25% contingency)				\$19,841,000
TOTAL STWY WTF BUDGETARY CAPITAL COST (w/ 35% contingency)				\$21,209,000

Notes: Costs in 2021 dollars. 25-35% contingency shown to account for heightened market volatility

Table 10-2: Proposed Hyannisport Treatment Facility Opinion of Probable Cost

Item/Description	Quantity	Unit/Basis	Unit Budgetary Cost	Item Budgetary Cost
Hyannisport & Simmons Pond Replacement Wells				
Replacement Wells - Exploratory / Approval Phase	2	LS	\$ 125,000	\$ 250,000
Installation (new wells, pumps, motors, station) – includes engineering and 20% contingency	2	LS	\$ 1,090,000	\$ 2,180,000
Well Replacement Subtotal				\$ 2,430,000
Hyannisport Water Treatment Facility				
Major Equipment & Systems				
Greensand filters (Hungerford Terry quote)	1	LS	\$ 730,000	\$ 730,000
Granular Activated Carbon (3 new trains, Calgon quote)	3	LS	\$ 400,000	\$ 1,200,000
UV-AOP (Trojan quote)	1	LS	\$ 1,500,000	\$ 1,500,000
4-log inactivation contactor (create pipe loop by adding 2500 ft of 12" DI to existing 8" HYPT-STWY transmission)	2500	LF	\$ 225	\$ 563,000
Process piping #1: Raw water to greensand filter	200	LF	\$ 250	\$ 50,000
Process piping #2: Greensand to AOP to GAC to storage	150	LF	\$ 250	\$ 38,000
Process piping #4: New entry point to Straightway	500	LF	\$ 250	\$ 125,000
Sludge & Supernatant pumps	4	LS	\$ 15,000	\$ 60,000
1,200 gpm Booster Pump	1	LS	\$ 81,000	\$ 81,000
Booster Pump station Building	1	LS	\$ 45,000	\$ 45,000
Chemical feed systems	3	LS	\$ 50,000	\$ 150,000
Mixing system inside water tank	4	LF	\$ 5,000	\$ 20,000
Valves, fittings and accessories - 15%	1	LS	\$ -	\$ 682,000
<i>Subtotal</i>				\$ 5,244,000
Installation		25%		\$ 1,311,000
Major Equipment & Systems Subtotal				6,555,000
Unit Price & Other Items				
Concrete Base Slab	468	CY	\$ 650	\$ 304,000
Concrete Side Walls	80	CY	\$ 950	\$ 76,000
Excavation, Backfill, compaction, grading, seeding	906	CY	\$ 45	\$ 41,000
Unit Price & Other Item Subtotal				421,000
Buildings				
Pre-Engineered Metal Building (102 x 80) (w/ Mech, HVAC)	8160	SF	\$ 250	\$ 2,040,000
Buildings Subtotal				\$ 2,040,000
Bulk Work Percentage and Other Items				
Site civil		10%		\$ 902,000
Electrical		18%		\$ 1,623,000
Instrumentation & Controls		10%		\$ 902,000
Yard Piping		5%		\$ 460,000
Bulk Work Subtotal				3,887,000
Subtotal HYPT WTF Direct Costs				\$ 12,903,000
GC Overhead and Profit		20%		\$ 2,581,000
Contingency		25%		\$ 3,226,000
HYPT WTF - TOTAL BUDGETARY CONSTRUCTION COST				\$ 18,710,000
Design, Permitting and Construction Administration		15%		\$ 2,807,000
TOTAL HYPT WTF BUDGETARY CAPITAL COST (25% contingency)				\$ 21,517,000
TOTAL HYPT WTF BUDGETARY CAPITAL COST (35% contingency)				\$ 23,000,000
TOTAL HYANNISPORT BUDGETARY CAPITAL COST- WELLS & WTP (25% contingency)				\$ 23,947,000
TOTAL HYANNISPORT BUDGETARY CAPITAL COST- WELLS & WTP (35% contingency)				\$ 25,430,000

Notes: Costs in 2021 dollars. 25-35% contingency shown to account for heightened market volatility

10.2 OPERATIONS AND MAINTENANCE COSTS

Operations and Maintenance (O&M) costs estimates for the first year of service were updated from the original Alternative Analysis report using data from the piloting study and design criteria updates. The estimates are detailed along with assumptions used in the estimate below. The O&M costs are presented in Table 10-3.

Power: HWS provided the current electrical prices from their supplier, equal to \$0.165/kWh. Electrical estimates for the treatment facility equipment includes major equipment such as Pumps and HVAC equipment.

Chemistry: The flow data collected from Annual Statistical Report database was not reliable for estimating an average daily demand as the wells have been infrequently used or shut down. It is expected that with the installation of new treatment facilities, usage will be greater. Therefore, the average daily flow was estimated to equal the design yield for each facility divided by a factor of 1.5. The average daily flow for the SWTF is therefore 1.44 MGD and 1.152 for the HPTF.

- NaOCl (12.5%) - assumes a chemical cost of \$1.70/gallon. Calculations account for pre-oxidation and disinfection. The STWY wells with an average dose on 2.3 mg/L of active ingredient, at average flow will require 27.6 lbs/day. The HP and SP wells with an average dose on 2.45 mg/L of active ingredient, at average flow will require 23.5 lbs/day.
- NaOH (25%) – assumes a chemical cost of \$1.56/gallon. The STWY wells with an average dose on 37.75 mg/L of active ingredient, at average flow will require flow approximately 453 lbs/day. The HP and SP wells with an average dose on 22.5 mg/L of active ingredient, at average flow will require flow approximately 216 lbs/day.
- H₂O₂ – Assumes a chemical cost for 50% H₂O₂ cost is estimated to be \$0.55/lbs. The STWY wells with an average dose on 7.7 mg/L at average flow will use approximately 90 lbs/day. The HP and SP wells with an average dose on 5.75 mg/L at average flow will use approximately 55 lbs/day.
- Orthophosphate – Assumes a chemical cost of \$13.47/gallon. Both treatment facilities will target a dosage of 1.5 mg/L. Assuming an average flow rate, The SWTF is estimated to use 18 lbs/day, and the HPTF is estimated to use 14 lbs/day

UV-AOP: Typical energy usage and lamp replacement costs were provided by the UV -AOP reactor piloting vendor Trojan. These costs were used to estimates annual O&M as follows:

- Electricity – energy costs are specific to each unit recommended in the by the vendor. The STWY Flex 100, four bank reactors each use 67 kilowatts per hour of operation; the HYPT Flex 100, one bank reactors each use 17 kilowatts per hour of operation. Usage is estimated to be 12 hours per day.

- Lamp Replacement** – is shown as an annual cost and is calculated based upon replacement of all lamps in all trains according to the vendor specified lamp life. The total lamp replacement cost for STWY is \$83,200 and \$20,800 for HYPT. The vendor specified lamp life is 15,000 hours. Using the estimated energy cost per reactor and an assumed usage of 12 hour per day, the lamps are estimated to last 3.42 years. The lamp replacement cost in Table 10-3 is therefore the total lamp replacement cost divided by the estimated life lamp lifespan.

GAC: HWS provided 2018 carbon replacement contract prices from their agreement with Carbon Activation Corporation. Contract prices for reactivated media (\$0.70/lbs) and virgin media (\$1.50/lbs) were used to estimate the price of carbon replacement on an annual basis. The estimate assumes replacing five contactors with reactivated carbon and one contactor with virgin carbon to make up any lost during replacement or reactivation.

Residual’s removal: Residual’s disposal will be primarily for the Fe/Mn settled sludge that will collect in the holding tanks beneath each treatment facility. Removal cost assumes that each holding tank will need to be pumped out on an annual basis. The O&M cost estimate is based upon the Maher Treatment Facility Piloting estimate.

Table 10-3: Estimated Annual O&M Costs for Proposed Straightway and Hyannisport Treatment Facilities

Item	Estimated Annual Cost Straightway	Estimated Annual Cost Hyannisport
Electrical	\$180,000	\$130,000
Chemistry		
NaOCl	\$20,000	\$20,000
NaOH	\$100,000	\$50,000
Orthophosphate	\$10,000	\$10,000
UV-AOP		
Electricity	\$150,000	\$40,000
Lamps Replacement	\$30,000	\$10,000
H ₂ O ₂	\$40,000	\$30,000
GAC replacement	\$100,000	\$100,000
Residuals Removal	\$20,000	\$20,000
Total	\$650,000	\$410,000

*Costs do not include additional labor costs.

11 SUMMARY & RECOMMENDATIONS

11.1 STRAIGHTWAY FACILITY

STWY 1 and STWY 2 wells piloted greensand filtration for Fe/Mn removal, UV- AOP for destruction of 1,4-D, and GAC for adsorption of PFAS. All treatment processes piloted were successful in reducing contaminant concentrations to meet treatment goals and below regulatory limits. Additional conclusions and recommendations are provided for each treatment process below:

Iron and Manganese Removal: Small diameter Greensand filters for Fe/Mn removal were piloted for the STWY 1 and STWY 2 wells. The STWY 2 well was also tested with a high-capacity greensand filter to accommodate the UV-AOP reactor at the higher 20 GPM flow rate. Application of these pilot results to the Design Criteria in Section 9 showed that the filter sizing in the 2020 Alternatives Analysis Report is still valid. That is to use - Four (4), 12-foot diameter pressure filters configured in parallel with three filters in filtration mode and one in backwash or standby.

One of the other major takeaways from the piloting report was determination of the backwash holding tanks and supernatant recycle capabilities. The backwash holding tank storage volume should be 100,000 gallons of usable storage. The supernatant recycle caused detectable concentrations of manganese (although below the treatment goal) in the filtered water. Barnstable prefers not to recycle supernatant directly to the treatment facility. Exploration into the alternative of using the holding tank to store backwash and discharge supernatant to the existing unlined lagoon should be explored further as part of the preliminary design.

1,4-Dioxane Destruction: The UV-AOP reactor was piloted only on the STWY 2 well, as it had the higher detectable concentrations of 1,4-D. High and low ballast power level (BPL) and hydrogen peroxide dosing concentrations (10 mg/L and 5 mg/L) were piloted. The reactor demonstrated destruction of 1,4-D to below detectable limits. Except in the low BPL/high H₂O₂ dose conditions yielded a detectable 1,4-D concentration of 0.19 ug/L in the reactor effluent. After 23-days of operation, the UV lamp sleeve was removed and determined to have 99.3% of the original UV transmittance demonstrating a low lamp fouling potential. The design criteria was updated to reflect the BPL and dosing levels used in the piloting study. Optimization of operation should favor lower H₂O₂ dosing (5 mg/L or lower) while keeping the treated water 1,4-D below the detection limit.

PFAS adsorption: GAC was also only piloted on Straightway 2 as it has the higher concentrations of PFAS. This piloting run also successfully demonstrated the entire proposed treatment process, as it was downstream of the pre-oxidation and pH adjustment, the high-capacity greensand filter, and the hydrogen peroxide dosing and UV-AOP reactor. GAC removed PFAS for all piloting runs with the exception of one, which was reported to likely be sample contamination.

Piloting confirmed that 10 minutes of EBCT was sufficient to remove PFAS-6 to meet treatment goals and regulatory limits. The treatment facility will require a total of three GAC trains composed of two contactors each in a lead/lag configuration. The trains operated in parallel will provide 10-minutes of EBCT in the lead contactor providing 100% redundancy in the lag contactor. The piloting report also showed that with the GAC filters located downstream of the Greensand filtration, less than 1 psi of headloss development over the course of the entire study. Backwashing may only be required on an annual basis.

Overall, very few changes were made to the original design criteria presented in the Alternatives analysis report. The major changes made with capital cost implications was the determination of the backwash holding tank size. Additionally, the two interim GAC trains will remain in operation during the construction of the treatment facility and will be re-used in a future project.

Disinfection of treated water will be achieved in the existing Straightway tank and supplied to the distribution system via the existing booster pump station.

11.2 HYANNISPORT FACILITY

The HP and SP wells piloted greensand filtration for Fe/Mn removal, UV- AOP for destruction of 1-4,D, and GAC for adsorption of PFAS. All treatment processes piloted were successful in reducing contaminant concentrations to meet treatment goals and below regulatory limits. Additional conclusions and recommendations are provided for each treatment process below:

Iron and Manganese Removal: Small diameter Greensand filters for Fe/Mn removal were piloted for both the HP and SP wells. The SP well was also tested with a high-capacity greensand filter to accommodate the UV-AOP reactor at the higher 20 GPM flow rate. Application of the pilot results to the Design Criteria in Section 9 showed that the filter sizing in the Alternatives Analysis Report is still valid. That is to use - Four (4), 10.5-foot diameter pressure filters configured in parallel each with 12-inches of Anthracite and 24 inches of greensand media.

Based upon the piloting results and filter design criteria, the backwash holding tank storage volume should be approximately 80,000 gallons of usable storage. The supernatant recycle showed no impact on the filtered water quality and a recycle rate of up to 10% of the inlet flow will be acceptable.

1,4-Dioxane Destruction: The UV-AOP reactor was piloted only on the STWY 2 well, as it had the higher detectable concentrations of 1,4-D. Several BPL (high and low power) and hydrogen peroxide dosing concentrations (8.5 mg/L and 3 mg/L) were piloted. The reactor demonstrated destruction of 1,4-D to below detectable limits under all scenarios. The design criteria were updated to reflect the BPL and dosing levels used in the piloting study. Optimization of operation should favor lower H₂O₂ dosing (5 mg/L or lower) while keeping the treated water 1,4-D below the detection limit.

PFAS adsorption: GAC was piloted on the HP well to serve as a control for the corrosion evaluation; i.e. this piloting run had only greensand filtration (low capacity) and GAC. GAC was also piloted on SP well with the entire proposed treatment process (Greensand, UV-AOP, GAC). Piloting confirmed that 10-minutes of EBCT was sufficient to remove PFAS-6 to meet treatment goals and regulatory limits. The original Alternative Design Report recommended four GAC trains; and piloting results have determined that only three trains will be required to meet process and hydraulic requirements. The three GAC trains will be composed of two contactors each in a lead/lag configuration. The trains operated in parallel will provide 12.5 minutes of EBCT in the lead contactor providing 100% redundancy in the lag contactor. The piloting report also showed that less than 1 psi of headloss development over the course of the entire study and therefore backwashing may only be required on an annual basis.

The major updates to the original design criteria were opting for three GAC trains (rather than four) and determination of the holding tank size. Disinfection will be achieved in a new pipe loop. The well pumps will require upgrades to supply the additional pressure through the treatment process and distribution system pressure. As an alternative, disinfection can be achieved in a new clearwell and a new pump station to supply the distribution system. Further evaluation of alternatives should be conducted in the next phase of design.

11.3 RECOMMENDED CAPITAL PLAN & SCHEDULE

The Hyannis Water System cannot meet its projected future maximum day demand with any single wellfield or treatment facility out of service (Weston & Sampson, 2019). Therefore, HWS requires system improvements which allow for maximum flexibility and reliability to protect against disruption at

any single location. The long-term treatment solution at these sites is two separate plants, each treating two wells; consistent with the HWS strategy.

Given the declining yield of the Hyannisport Well and the proximity of Simmons Pond to flood prone areas, both wells should be replaced prior to construction of the Hyannisport WTF. Implementation of the proposed project should be in stages, with Straightway proceeding first, since the required improvement for the wells supplying the Hyannisport facility must predate that facility.

The existing interim seasonal GAC filters at Straightway will need to remain operational in their current configuration for treating all four of the wells during the construction of the Straightway facility. The potential for relocating these interim filters into the Hyannisport facility, winterizing them in place, or utilizing in a future (e.g. Mary Dunn) plant should be evaluated during the next phase of design.

For the implementation of treatment upgrades at both Straightway and Hyannisport, Table 11-1 presents major project milestones and approximate anticipated timetable.

Table 11-1: Project Milestones and Estimated Schedule

Design - Straightway & Hyannisport WTF	2022 - 2023
Hyannisport /Simmons Pond Well Exploration, Permitting, and Design	2022 - 2023
Construction – Straightway WTF	2024 – 2025
Construction - Hyannisport /Simmons Pond Replacement Well and Pumpstation	2025-2026
Construction – Hyannisport WTF	2026-2027

APPENDIX A
PILOT TESTING PROPOSAL

APPENDIX B
MASSDEP PILOT PROPOSAL APPROVAL LETTER

APPENDIX C
CORROSION EVALUATION

APPENDIX D
OXIDATION BYPRODUCTS DISCUSSION

APPENDIX E
BLUELEAF PILOT STUDY REPORT

APPENDIX F
PROCESS FLOW DIAGRAMS

APPENDIX A
PILOT TESTING PROPOSAL



Enter your transmittal number

X287209

Transmittal Number

Your unique Transmittal Number can be accessed online:

http://www.mass.gov/eea/agencies/massdep/service/approvals/transmittal-form-for-payment.html

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

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

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

3. Three copies of this form will be needed.

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

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

MassDEP
P.O. Box 4062
Boston, MA
02211

* Note: For BWSC Permits, enter the LSP.

A. Permit Information

BRP WS 21D Water Treatment Approvals

- 1. Permit Code: 4 to 7 character code from permit instructions
2. Name of Permit Category
BRP WS21D to Conduct Pilot Study = or > 1 mgd
3. Type of Project or Activity

B. Applicant Information - Firm or Individual

Town of Barnstable DPW

- 1. Name of Firm - Or, if party needing this approval is an individual enter name below:
Collins Nathan
2. Last Name of Individual 3. First Name of Individual 4. MI
382 Falmouth Road
5. Street Address MA 02601 774-377-4934
Hyannis
6. City/Town 7. State 8. Zip Code 9. Telephone # 10. Ext. #
Nathan Collins, PE nathan.collins@town.barnstable.ma.us
11. Contact Person 12. e-mail address

C. Facility, Site or Individual Requiring Approval

Mary Dunn/Airport Facilities and Straightway/Hyannisport Facilities

- 1. Name of Facility, Site Or Individual
47 Old Yarmouth Rd
2. Street Address MA 02601
Hyannis
3. City/Town 4. State 5. Zip Code 6. Telephone # 7. Ext. #
8. DEP Facility Number (if Known) 9. Federal I.D. Number (if Known) 10. BWSC Tracking # (if Known)

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

Kleinfelder

- 1. Name of Firm Or Individual
One Beacon Street
2. Address MA 02105 617-498-4778
Boston
3. City/Town 4. State 5. Zip Code 6. Telephone # 7. Ext. #
Kirsten Ryan
8. Contact Person 9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

- 1. Is this project subject to MEPA review? [] yes [x] no
If yes, enter the project's EOE file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due

Special Provisions:

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

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Check Number

Dollar Amount

Date



BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

A. Application

1. Is this application for an Original or a Resubmittal?

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Applicant: Town of Barnstable DPW
- Water Supply Division

382 Falmouth Road

Name
Hyannis MA 02601
City State Zip

Address
Nathan Collins, PE 774-487-8390
Contact Telephone

3. Consultant:

Kleinfelder

One Beacon Street

Name
Boston MA 02105
City State Zip

Address
Kirsten Ryan 617-498-4778
Contact Telephone

B. Permit

Please check the permit or approval for which you are applying:

Zone II Determination for Existing Sources

- BRP WS 07 Approval to Conduct Pump Test for Zone II Delineation
- BRP WS 08 Approval of Zone II Delineation

New Technology

- BRP WS 11 Minor New Technology Approval; where no field test required
 - Drinking Water Additive
 - Cross Connection Device
 - Water Vending Machine
 - Other (specify):
- BRP WS 12 Major New Technology Approval: where field testing is required
- BRP WS 27 New Technology with Third-party Approval
- BRP WS 28 Vending Site/Source Prototype
- BRP WS 31 Vending and POU/POE Devices with Third-party Approval

New Source Approvals <70 gpm

- BRP WS 13 Exploratory Phase, Site Examination, Land Use Survey and Approval to Conduct Pumping Test
- BRP WS 15 Pumping Test Report Approval and Approval to Construct Source
- BRP WS 37 Approval of Transient Non-Community Source Less than 7 Gallons per Minute (combines BRP WS 13 and BRP WS 15 submittals)

New Source Approvals = or > 70 gpm

- BRP WS 17 Exploratory Phase, Site Examination, Land Use Survey, and Conduct Pumping Test
- BRP WS 19 Pumping Test Report Approval
- BRP WS 20 To Construct Source

Water Treatment Approvals

- BRP WS 21A To Conduct Pilot Study < 40,000 gpd
- BRP WS 21B To Conduct Pilot Study = or > 40,000 gpd and < 200,000 gpd
- BRP WS 21C To Conduct Pilot Study = or > 200,000 gpd and < 1 mgd
- BRP WS 21D To Conduct Pilot Study = or > 1 mgd
- BRP WS 22A Pilot Study Report < 40,000 gpd
- BRP WS 22B Pilot Study Report = or > 40,000 gpd and < 200,000 gpd
- BRP WS 22C Pilot Study Report = or > 200,000 gpd and < 1 mgd
- BRP WS 22D Pilot Study Report = or > 1 mgd
- BRP WS 23A To Construct Facility <40,000 gpd
- BRP WS 23B To Construct Facility = or > 40,000 gpd and < 200,000 gpd
- BRP WS 23C To Construct Facility = or > 200,000 gpd and < 1 mgd
- BRP WS 24 To Construct Facility = or > 1 mgd
- BRP WS 25 Treatment Facility Modification
- BRP WS 29 Water Treatment: Chemical Addition Retrofits of Water Systems > 3,300 people
- BRP WS 30A Vending Installation Approval
- BRP WS 30B POU/POE Installation Approval
- BRP WS 34 Water Treatment: Chemical Addition Retrofits of Water Systems = or < 3,300 people
- BRP WS 35A Multiple Vending Installation Approval
- BRP WS 35B Multiple POU/POE Installation Approval

Water Quality Assurance

- BRP WS 26 Sale or Acquisition of Land for Water Source
- BRP WS 36 Abandonment of Water Source

Distribution System Modifications

- BRP WS 32 Systems > 3,300 people
- BRP WS 33 Systems = or < 3,300 people



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Drinking Water Program

X287209

Transmittal Number

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

Facility ID# (if known)

C. Certification

"I certify, under penalty of law, that this application and all attachments were prepared under my supervision, in accordance with a system designed to ensure 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 submitted in this application, the information submitted is, to the best of my knowledge and belief, true, accurate and complete."

Authorized Signature: *Hans Keijser*

Date: 01/06/2021

Print Name: Hans Keijser

Supervisor, Water Supply Division

Hyannis Water System
Town of Barnstable DPW
Water Supply Division
47 Old Yarmouth Road
Hyannis, MA 02601

Position/Title



January 18, 2021

Mr. James McLaughlin
MA Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347

SUBJECT: Town of Barnstable, Hyannis Water System Pilot Test Proposal
Straightway / Hyannisport Facilities
Mary Dunn / Airport Facilities
DWSRF #6681
DEP Transmittal No. X287209
DEP BRP WS 21D
Kleinfelder Project No.: 20212329.001A

Dear Mr. McLaughlin:

On behalf of the Town of Barnstable's Hyannis Water System, Kleinfelder has prepared this pilot test proposal for the Straightway/Hyannisport Facilities and Mary Dunn/Airport Facilities for your review and approval. The purpose of this proposal is to outline the Hyannis Water System's plan to pilot processes for removal of iron/manganese, PFAS, and 1-4, dioxane. The proposal has been written in accordance with the Massachusetts Department of Environmental Protection (MassDEP) DWS Policy #90-04, "Pilot Study Requirements for Proposed Treatment".

1. BACKGROUND

Over the past several decades, land use practices have been impacting wells in the Hyannis Water System (HWS – PWS 4020004) with various contaminants of concern (COCs) at different locations within the Town of Barnstable (the Town). Typical contaminants including iron and manganese have existed in many of the Town's wells and are sequestered through chemical treatment. With the more recent discovery and growing concern with elevated concentrations of per and poly-fluoroalkyl substances (PFAS) and 1,4-dioxane, HWS needs to incorporate more robust treatment systems at the Mary Dunn and Straightway facilities to continue providing consumers with high quality safe drinking water which consistently complies with Massachusetts Maximum Contaminant Levels (MMCLS) and Office of Research and Standards Guidelines (ORSG).

The Town currently has 12 wells (11 of which are active) pumping to three treatment plants:

- Maher Filtration Plant: Maher Wells 1, 2, and 3
- Mary Dunn Treatment Plant: Mary Dunn Wells 1, 2, 3, and 4, Airport Well
- Straightway Treatment Plant: Straightway Wells 1 and 2, Hyannisport Well, Simmons Pond Well

The town completed the new Maher Filtration Plant in October 2020 to remove COCs including elevated levels of iron, manganese, 1,4-dioxane, and PFAS. Through the permitting and piloting processes, the Maher Filtration Plant has successfully demonstrated and implemented the following treatment processes to remove the COCs to below regulatory limits:

- Manganese Greensand Plus (MnGS) filtration for the removal of iron and manganese
- Ultraviolet – Advanced Oxidation Process with Ozone (UV-AOP) for destruction of 1,4-dioxane
- Granular Activated Carbon (GAC) for the removal of PFAS.

In 2019, HWS commissioned Tata and Howard, and Kleinfelder, to complete preliminary treatment evaluations of the Mary Dunn/Airport Facilities, and the Straightway and Hyannisport Facilities, respectively. The following summarizes the existing conditions and findings at each site.

Straightway/Hyannisport Facilities

In 2020, Kleinfelder completed the Evaluation of Treatment Options for Straightway and Hyannisport Facilities report for the Town. The report presents proposed alternatives for intended modifications for treatment of drinking water from the existing four wells: Straightway #1 and #2, (STW1, STW2), Hyannisport (HP) and Simmons Pond (SP). All four of the wells associated with these two facilities currently receive the same treatment: C5 (SLI-7425 - polyphosphate) to sequester iron and manganese, followed by sodium hydroxide for pH adjustment, C9 (SLI321 - zinc orthophosphate) for corrosion control, and sodium hypochlorite for disinfection.

The Straightway facilities include the Straightway Water Treatment Facility (which houses both Straightway Wells No. 1 and No. 2), the Straightway Tank, and the booster pumping station. Raw water from Straightway Wells No. 1 and No. 2 is treated at the Straightway Facility as described above and then pumped to the Straightway Tank.

The Hyannisport Water Treatment Facility treats the Hyannisport and Simmons Pond Wells as described above with C5, C9, sodium hydroxide, and sodium hypochlorite (with the exception that the Simmons Pond Well has C5 injected at the well pump house). The Hyannisport finished water transmission main leaving the building runs north to the Straightway Tank.

Finished water from all four wells (STW1, STW2, HP, SP) blends in the Straightway tank to achieve necessary contact time and is then pumped into the distribution main on Straightway (Road) by means of the booster station. As of Spring 2020, the Town has operated a seasonal interim GAC filter to remove PFAS from blended water from all wells prior to entering the Straightway Tank. The new GAC filters are installed adjacent to the Straightway Tank along with a new hypochlorite feed system (following GAC) and backwash lagoon. Finished water samples from Straightway Booster Station point of entry sampling demonstrate PFAS-6 removal to below the MassDEP MMCL of 20 ng/L PFAS-6 and prove that the GAC filters effectively remove PFAS from the sources at this Straightway/Hyannisport site.

Table 1 summarizes the raw water quality results compiled in the Straightway-Hyannisport Report.

Table 1: Summary of Source Raw Water Quality for Contaminants of Concern

Well	Fe (mg/L)	Mn (mg/L)	1,4 Dioxane (ug/L)	PFAS -6* (ng/L)
Level of Concern¹	<i>0.3</i>	<i>0.05</i>	<i>0.3</i>	<i>20</i>
Straightway 1	1.96	0.084	ND	20
Straightway 2	0.52	0.87	0.85	86
Hyannisport	ND	0.31	0.1	36
Simmons Pond	0.12	0.16	0.22	69

Results that are bolded represent concentrations that exceed the Level of Concern

¹ *Lowest level of existing or proposed regulation or guidance*

** PFAS-6 refers to the MA MCL compounds: PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA,*

To meet the Town’s long term goals for water quality, while maximizing system flexibility and resiliency, the Straightway/Hyannisport Report proposes two water treatment plants: Straightway which will treat the Straightway 1 and 2 wells; and the Hyannisport facility which will treat the Hyannisport and Simmons Pond Wells. Each plant is proposed to include treatment for removal of iron, manganese, PFAS, and 1,4-dioxane, as detailed further in Section 2.

Mary Dunn/Airport Facilities

The recently completed Preliminary Evaluation of Treatment Options for the Mary Dunn Wells and Airport Well report (Tata & Howard, August 2020) presents proposed alternatives for the filtration and treatment of drinking water from the existing Mary Dunn Wells 1 through 4 (MD-1, MD-2, MD-3, MD-4), and the Airport Well (AP).

Raw water at each well pump station (except at Well MD-1) is injected with C5 (SLI-7425 - polyphosphate to sequester iron and manganese prior to GAC filtration. Raw water from Well MD-1 is currently treated first for PFAS with GAC in a filter building at the well before the C-5 is added downstream at the Mary Dunn Water Filtration Plant (WFP). Chemically treated water (Raw water containing C-5) from Wells MD-2 and MD-3 is further treated for PFAS removal with GAC filters incorporated into the existing Mary Dunn WFP.

MD-4 is offline and is in the process of being replaced, with an anticipated completion date of late summer to fall 2021. Following GAC filtration at the existing Mary Dunn WFP, all of the wells receive treatment for corrosion control (C9 SLI321 - zinc orthophosphate), pH adjustment (sodium hydroxide), and disinfection (sodium hypochlorite) before entering the distribution system.

Table 2 summarizes the water quality results compiled in the Mary Dunn – Airport Report.

Table 2: Summary of Source Raw Water Quality for Contaminants of Concern

	Fe (mg/L)	Mn (mg/L)	1,4 Dioxane (ug/L)	PFAS-6* (ng/L)
<i>Level of Concern¹</i>	0.3	0.05	0.3	20
Mary Dunn 1	0.47	0.06	0.07	21
Mary Dunn 2	0.15	0.19	0.07	249
Mary Dunn 3	0.22	0.08	0.2	438
Mary Dunn 4	0.29	0.03	0.2	86
Airport	4.44	0.47	0.07	327

Results that are bolded represent concentrations that exceed the Level of Concern

¹ Lowest level of existing or proposed regulation or guidance

* PFAS-6 refers to the sum of the MA MCL compounds: PFOS, PFOA, PFHxS, PFNA, PFHpA, PFDA

Mary Dunn 1 has a GAC filter installed in a filter building at the well. Mary Dunn 2 and 3 both have GAC filters installed within the Mary Dunn WTP building for year-round use for removal of PFAS. (Note that Mary Dunn 4 [inactive] shares a raw water main with Mary Dunn 3). Mary Dunn 2, 3, and 4 are piped to run through filters 2 and 3 for system flexibility. The Airport well has GAC filters installed outside which are used in a seasonal interim capacity for PFAS removal. High levels of iron and manganese, particularly at Airport Well, require that the Airport GAC filters be backwashed up to three times per week. Installation of upstream MnGS filtration will greatly improve water quality and performance of downstream processes. Finished water samples show PFAS-6 removal to below the MassDEP MMCL and prove that the GAC filters effectively remove PFAS-6 in their current size and configuration.

To meet the Town’s long term goals for water quality, while maximizing system flexibility and resiliency, the Mary Dunn-Airport Report proposes two water treatment plants: Mary Dunn North which will treat Mary Dunn 2, 3, 4 wells; and Mary Dunn South which will treat Mary Dunn 1 and the Airport Wells. Each plant is proposed to include treatment for removal of iron, manganese, PFAS, and 1,4-dioxane, as detailed further in Section 2.

2. PROPOSED TREATMENT, OBJECTIVES, AND PILOTING

The treatment objectives for each COC and the associated treatment process is listed in Table 3. A secondary objective will be to evaluate that inclusion of treatment will largely produce a water quality with respect to corrosion control parameters that is similar to existing full-scale practice.

Table 3: Proposed Treatment Plant Treatment Objectives and Processes

Contaminants of Concern	Level of Concern ¹	Treatment Goal	Treatment Process
Fe (mg/L)	0.3	Non-detect to <0.3	MnGS
Mn (mg/L)	0.05	Non-detect to <0.05	
1,4-dioxane (ug/L)	0.3	Non-detect to <0.3	UV-AOP
PFAS-6 (ng/L)	20	Non-detect to <20	GAC

¹ Lowest level of existing or proposed regulation or guidance (EPA or MassDEP)

On December 11th, 2020 a pre-application meeting was held between Kleinfelder, Barnstable, and MassDEP to discuss the following piloting plan presented herein. Several of the following key items were agreed upon, although subject to final DEP approval of this plan:

- The use of Manganese Greensand Plus media at the Maher WFP has proven effective removal of iron and manganese through piloting and full scale implementation. Therefore, only Manganese Greensand Plus media will be piloted for iron and manganese removal at each site.
- Mary Dunn 2, 3, and 4 are currently treated year-round by full sized GAC systems while seasonal systems are utilized for Mary Dunn 1, Airport and the Straightway (1 &2), Hyannisport and Simmons Pond wells . In addition, the Maher Treatment Facility is in operation with full-scale GAC. Therefore, GAC has already proven effective for removal of PFAS-6 and consequently will not be piloted for each source. Instead, a limited number of runs using GAC will be piloted to document if any changes in water quality parameters related to corrosion control as a result of treatment occur. Corrosion Control Water quality parameters are presented in Attachment A.
- UV-AOP has demonstrated effective destruction of 1,4-dioxane through pilot testing and full scale implementation at the Maher Filtration Plant since October 2020.
 - Straightway 2 has the highest level of 1,4-dioxane and will therefore be piloted following greensand filtration. Simmons Pond will also be piloted to demonstrate low concentration destruction.
 - Mary Dunn and Airport wells have levels of 1,4-dioxane below the regulatory threshold (0.3 ug/L) and the wells share similar water quality parameters to the Maher Wells, which have full-scale UV-AOP operational. Therefore, UV-AOP will not be piloted at the Mary Dunn or Airport Wells.

3. PILOT TEST PROPOSAL

Kleinfelder is proposing the following piloting approach based upon the pre-application discussions, analysis of the existing water quality, and treatment objectives. Piloting will be conducted over two mobilizations to avoid service disruptions during the higher summer demands.

The Straightway/Hyannisport wells will be piloted first in early spring 2021. Upon approval of the piloting plan, the piloting contractor, Blueleaf, Inc., will begin setup of piping and electrical connections at the Straightway Facility. The Mary Dunn and Airport wells will be piloted in fall 2021 with setup including piping and electrical connections setup in late summer early fall. A complete schedule of the piloting plan is included in Attachment C. Table 4 details the processes to be piloted at each source.

Piloting will be conducted to evaluate process parameters such as filter system pH, filter surface loading rates, doses, UV system ballast strength, and GAC empty bed contact time (EBCT) that may be used for the design of the full scale treatment system as follows:

NaOH dose - Two pH conditions will be evaluated and compared through the GreensandPlus filters, with two filters to operate at a pH of 6.8 s.u., and two filters to operate at 7.4 s.u. Operating the filters at the higher pH condition will allow the treatment plant to have a single point of pH adjustment.

Filter Surface Loading Rate – Two filters will be operated at 4 gpm/sf and two filters will be operated at 8 gpm/sf to span the range of FSLRs likely to be used at the full-scale WTP.

UV System Ballast Strength and Hydrogen Peroxide Dose – The UV reactor vendor will recommend two UV ballast strength (a "high UV" and "low UV"), and two hydrogen peroxide doses ("high H2O2", "low H2O2"). The four combinations of UV Ballast strength and hydrogen peroxide dose (i – high H2O2/high ballast, ii- low H2O2/high ballast, iii – high H2O2/low ballast, iv- low H2O2/low ballast), will be evaluated at each of the two sites for UV-AOP testing.

GAC EBCT – The GAC adsorption process will be evaluated at only the 10 minute EBCT setting.

The piloting operator (Blueleaf, Inc.) will monitor flow rates, filter head loss and water quality using generally accepted field test methods. Laboratory analyses will comply with the requirements of the MassDEP Approved Pilot Study Protocol.

Table 4: Piloting Treatment Process Matrix

Proposed Treatment Plant	Wells	1. MnGS - 6-inch filters	2. MnGS – High Capacity	3. UV-AOP	4. GAC
Straightway	Straightway 1	✓	---	---	---
	Straightway 2	✓	✓*	✓*	✓*
Hyannisport	Hyannisport	✓		---	✓
	Simmons Pond	✓	✓	✓	✓
Mary Dunn South	Airport	✓	---	---	---
	Mary Dunn 1	✓	---	---	---
Mary Dunn North	Mary Dunn 2	✓	---	---	---
	Mary Dunn 3	✓	---	---	---
	Mary Dunn 4	✓	---	---	---

✓ Indicates proposed piloting run

--- indicates no proposed piloting of associated process.

* indicates an extended piloting run for up to two (2) weeks to test for UV Lamp fouling.

3.1 Manganese GreensandPlus Iron (Fe) and Manganese (Mn) Pilot Studies with 6" Pilot Filters

Pilot studies for the MnGS process will be conducted at each of the nine (9) sources using four 6" diameter filters operated in parallel, as seen in Figure 1. Each study will include at least 5 individual filter runs over a seven (7) day period with laboratory sample events at each source in accordance with the sampling schedule in Attachment B. The MnGs studies at Straightway 1 and Simmons Pond will also be

used to size a high- capacity MnGs pilot system capable of producing a sufficient volume of water to feed the UV-AOP pilot system for additional subsequent studies including MnGs + UV-AOP + GAC. In addition, Straightway 2 will be piloted for an extended run of two weeks to determine if a fouling potential exists on the UV lamps following MnGS filtration.

Raw water will be chemically pretreated in the pilot trailer for oxidation and pH control. An appropriate caustic feed solution will be prepared using a 50% sodium hydroxide (NaOH) stock solution; the Maher facilities currently use 25% NaOH. The oxidant feed will be prepared from 12.5% sodium hypochlorite (NaOCl) as is currently used at the Maher facilities, and potassium permanganate solution (if needed) will be prepared using solid granular potassium permanganate (KMnO4). Chemical feed rates are to be determined by calibration during the pilot study, and chemical doses will be calculated based on the calibrated feed rates and the chemical dilutions. The rates at which chemical feed stocks are consumed will be monitored as a check on the calculated feed rates. All chemical feeds will be injected upstream of a static mixer.

Field samples are to be collected and analyzed in accordance with generally accepted field methods. The frequency of the field samples will be determined by field conditions, with the minimum number of samples detailed in Table 5.

Table 5: Field Sampling Parameters and Schedule

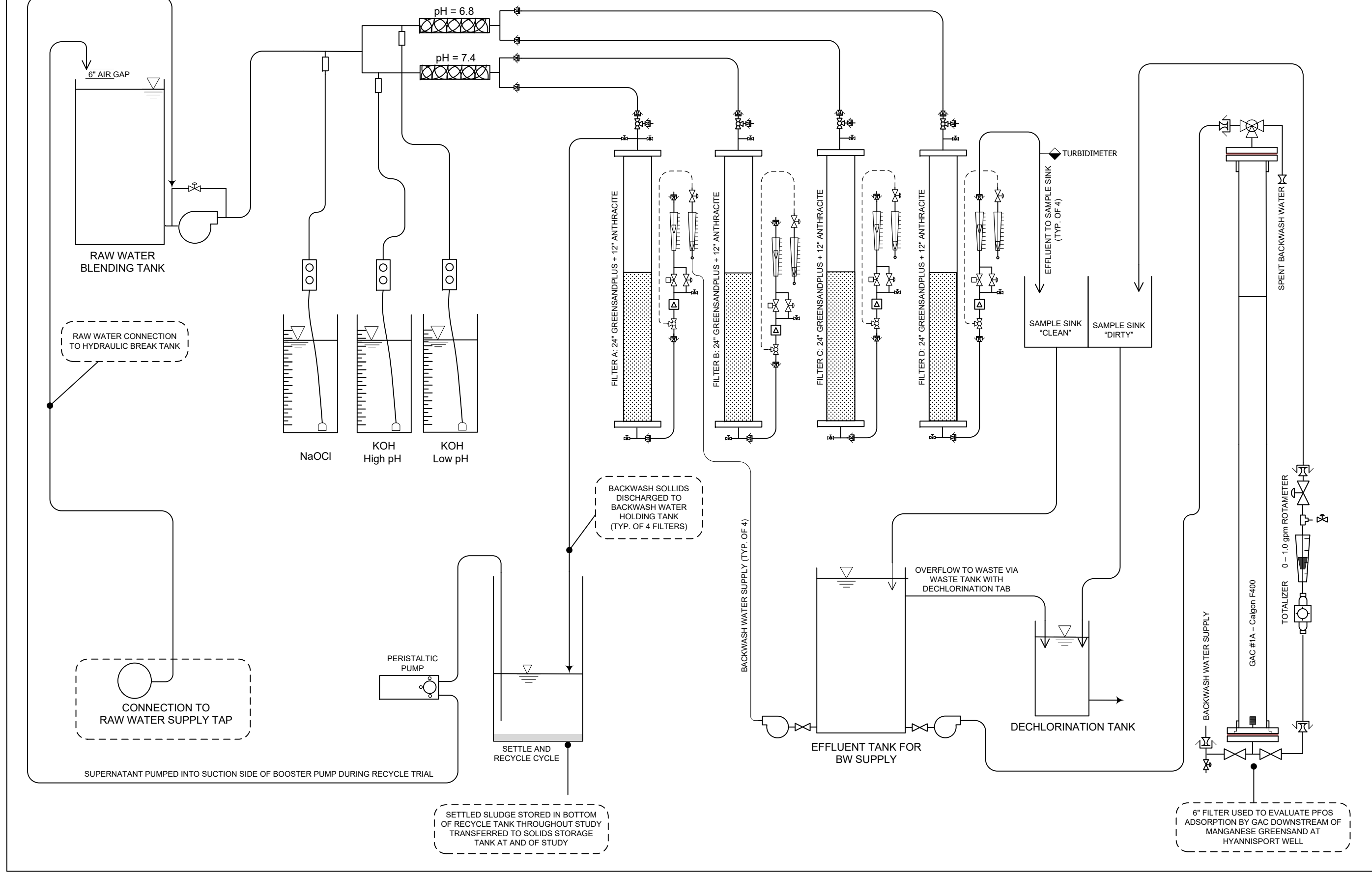
Parameter	Minimum Field Sampling Frequency			
	Source Water	Pretreated	UV Treated	GAC
Total Iron	3 per source	3 per run	2 per Day	2 per day
Dissolved Iron	3 per source	3 per run	2 per Day	2 per day
Total Manganese	3 per source	3 per run	2 per Day	2 per day
Dissolved Manganese	3 per source	3 per run	2 per Day	2 per day
Free Chlorine	None	3 per run	1 per Day	----
Total Chlorine	None	3 per run	1 per Day	----
pH	2 per day	3 per run	1 per Day	2 per day
Turbidity	3 per Source	3 per run*	1 per Day	2 per day*

*also continuous

The pilot trailer is equipped with a PC based data acquisition system for continuous monitoring and recording of pressure and turbidity. The data acquisition system can simultaneously monitor the untreated raw water, and the filtered effluent from each of the four filters.

The piloting operator will monitor flow rate, filter head loss, temperature and water quality during filter runs and will monitor pH, turbidity, iron, and manganese using appropriate field test methods. They will also measure backwash water volumes and complete settling tests on backwash water for each run. Filter effluent will be stored for use in backwashing the filters and to provide sufficient water to feed downstream processes during backwashing. Backwash water will be stored on site and testing will evaluate the impact of supernatant recycling into the feed water of the pilot system.

PILOT EQUIPMENT FOR PILOT EVALUATION AT BARNSTABLE WATER – FOR MANGANESE GREENSAND FILTRATION

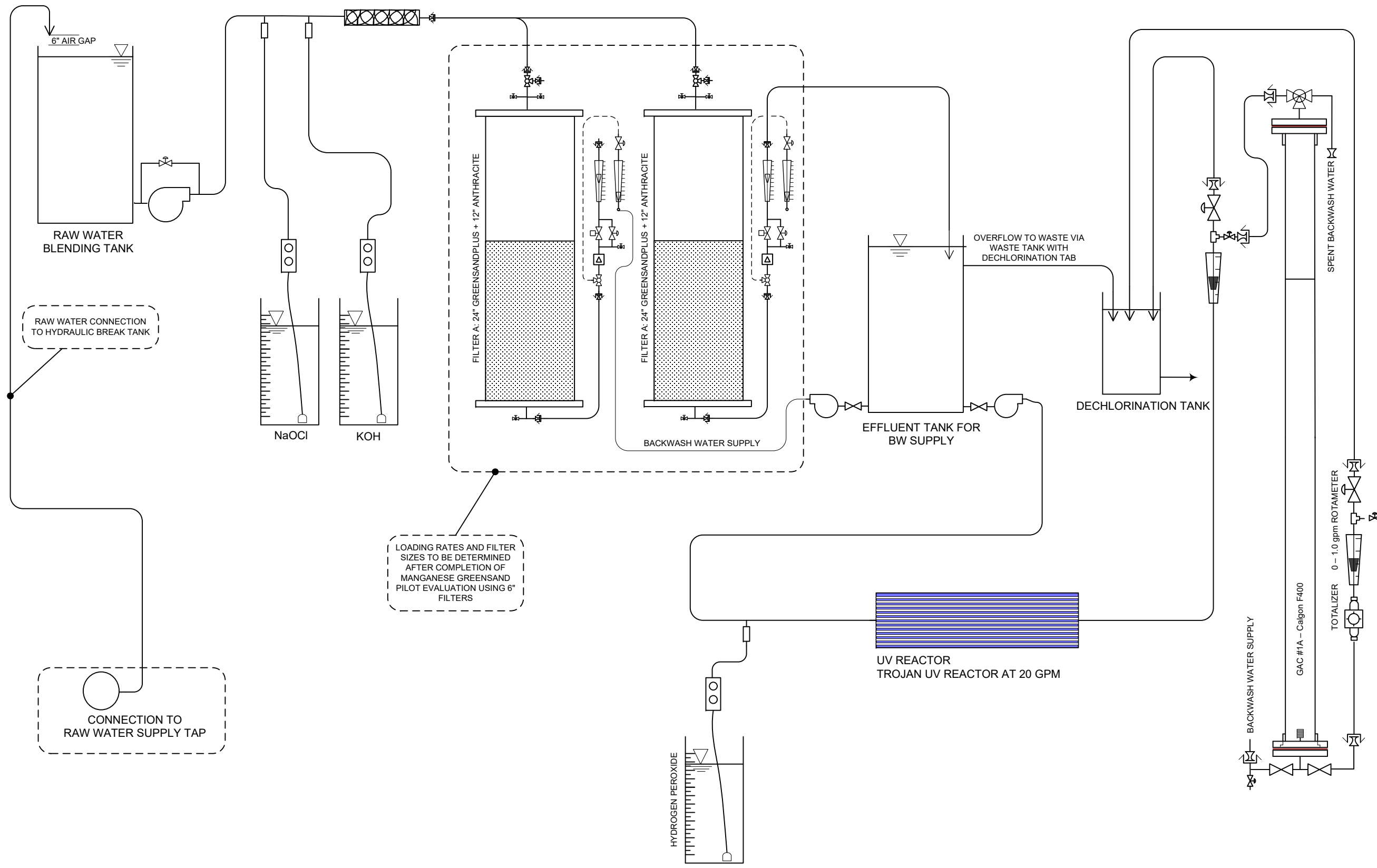


PROJECT:
**IRON AND MANGANESE REMOVAL
 PILOT STUDY – BARNSTABLE WATER**

BLUELEAF, INC
 57 DRESSER HILL ROAD, CHARLTON, MA 01507
 (508) 248-7094
 PILOT TESTING FOR WATER AND WASTEWATER TREATMENT
**FIGURE 2.04: PROCESS FLOW DIAGRAM OF
 GREENSANDPLUS PILOT SYSTEM**

DRAWN BY
 E. GROTTON
 FILE NAME
 11204_05
 DATE
 07JAN2021
 SIZE: 11' X 17"
 SCALE: NONE
 DWG NO
 1

PILOT EQUIPMENT FOR PILOT EVALUATION AT BARNSTABLE WATER STRAIGHTWAY 2 AND SIMMONS POND



RAW WATER CONNECTION TO HYDRAULIC BREAK TANK

CONNECTION TO RAW WATER SUPPLY TAP

LOADING RATES AND FILTER SIZES TO BE DETERMINED AFTER COMPLETION OF MANGANESE GREENSAND PILOT EVALUATION USING 6" FILTERS

PROJECT:
 UV-AOP AND PFOS REMOVAL PILOT STUDY - BARNSTABLE WATER

BLUELEAF, INC
 57 DRESSER HILL ROAD, CHARLTON, MA 01507
 PILOT TESTING FOR WATER AND WASTEWATER TREATMENT
 (508) 248-7094

DRAWN BY
 E. GROTTON
 FILE NAME
 11204_05
 DATE
 07JAN2021
 SIZE: 11' X 17"
 SCALE: NONE
 DWG NO

FIGURE : PROCESS FLOW DIAGRAM OF HIGH CAPACITY GREENSAND, UV-AOP AND PFOS

3.2 High Capacity Greensand Filtration Unit for Iron & Manganese Removal

The piloting operator will mobilize a high-capacity MnGS system to produce sufficient treated water to operate the UV-AOP and GAC processes at Straightway 1 and Simmons Pond. The High Capacity MnGS Filtration unit (Figure 2) will operate under conditions informed by the MnGS 6" pilot sizing runs and will be used to confirm treatment at each source. Raw water will be chemically pretreated as required by the Fe/Mn pilot source described in the 6" sizing run for oxidation and pH control. Filter surface loading rate, filter headloss and effluent turbidity will be monitored with online instrumentation and data logging equipment.

3.3 UV-AOP Pilot System for 1,4-dioxane Removal

The piloting operator will provide a Trojan UV reactor (Trojan UVPHOX 12AL30 UV oxidation System or similar) representative of the UV reactor proposed for the full-scale operation; and already installed at the Maher Treatment Plant. The reactor will include flow measurement, ballast power control, UV transmittance readings and automatic cleaning/wiper operation. The piloting operator will provide a hydrogen peroxide storage and feed system for controlling and monitoring the hydrogen peroxide feed dose.

UV-AOP will be piloted for the Simmons Pond and Straightway 2 Wells. An extended run will be conducted for the Straightway 2 Well to test for fouling of the UV sleeves. The run will be conducted over the course of two-weeks with the sample collection schedule adjusted to space the sampling events evenly over the entire extended run. At the beginning and conclusion of the extended run, the UV lamp will be tested for fouling parameters including UV transmittance and a visual inspection.

3.4 GAC Filter Unit for Monitoring Corrosion Control Water Quality Parameters

The piloting operator will provide a stand-alone mobile pilot GAC filtration system for complete simulation of the entire proposed treatment train (MnGS-UV-AOP-GAC) to monitor corrosion control related water quality parameters (WQPs) from raw water, through treatment. The GAC pilot process equipment will be located downstream of the UV-AOP pilot equipment at Straightway 1 and Simmons Pond, and downstream of the MnGs process at Hyannisport. This treatment process will be evaluated using a single 10' high GAC pilot filter with flow control and monitoring. Media type to be utilized is anticipated to consist of the type used at the Town's existing GAC filtration facilities (F400 type or equal). Monitoring for PFAS removal will also be conducted.

4. WATER QUALITY TESTING

4.1. Field Measurements

During the pilot test, raw and post treatment water quality samples will be collected for field testing during each test run. The field-testing parameters and frequencies to be analyzed are presented in Table

5 for both sizing runs. Corrosion Control WQPs in Attachment A – Table A-2 include several other field measurements that will be collected during each full run as shown on the sampling schedule in Attachment B.

4.2. Certified Laboratory Measurements

Samples of raw water, post treatment, and backwash water will also be taken during each run and analyzed by a MassDEP certified laboratory and according to the acceptable methods as per 310 CMR 22. A list and schedule of the laboratory testing water quality parameters to be analyzed is included in Attachment A and B, respectively.

- MassDEP Piloting Iron and Manganese Water Quality Parameters included in Attachment A – Table A-1 are originally provided in Appendix 2 of the MassDEP DWS Policy #90-04. These parameters will be sampled on raw water and post greensand filter treated water.
- Corrosion Control Water Quality Parameters (Corrosion Control WQPs) defined in the *USEPA Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems (2016/2019)* and presented in Table A-2, include water quality parameters that affect corrosion chemistry in water distribution systems. The Corrosion Control WQPs will be sampled on the raw water of each source and following every treatment process. Collection of these samples is important for comparing water from facilities prior to treatment and after implementation of treatment. In addition, WQPs data from the existing Maher WFP and treatment process will be compared to the pilot data. This evaluation may indicate if the change in treatment may affect corrosion and corrosion control in the Town’s distribution system.

5. SUMMARY

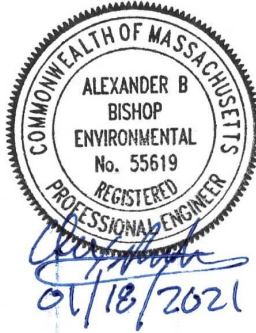
This proposal includes the procedures and schedule for piloting treatment at the Hyannis Water System’s Mary Dunn/Airport and Straightway/Hyannisport wells. The pilot test will be performed in accordance with DEP DWS Policy #90-04. A pilot test report presenting the test results will be prepared and presented to DEP upon completion of the work. On behalf of the Town of Barnstable, we thank you for your attention to this Hyannis Water System Pilot Test Proposal and look forward to your review. Please do not hesitate to contact me at (508)-370-8256 or Kirsten Ryan at (617) 498-4778, if you have any questions or wish to discuss this proposal further.

Sincerely,

KLEINFELDER



Alexander B. Bishop, P.E.
Project Professional



Kirsten N. Ryan
Project Manager

cc:

Mr. Larry VandeVenter, Kleinfelder
Mr. Erik Grotton PE, Blueleaf, Inc.
File

Attachment A: Water Quality Parameters
Attachment B: Water Quality Sampling Schedule
Attachment C: Piloting Plan Schedule



ATTACHMENT A: WATER QUALITY PARAMETERS

Table A-1: MassDEP Piloting Iron and Manganese Water Quality Parameters (from MassDEP DWS Policy #90-04 - Appendix #2)

Water Quality Parameter (for Raw and Finished Water)	Raw Water	MnGs Filtered
Total Iron	✓	✓
Dissolved Iron	✓	✓
Total Manganese	✓	✓
Dissolved Manganese	✓	✓
Free Chlorine		✓
Total Chlorine		✓
pH	✓	✓
Turbidity	✓	✓
True and apparent Color	✓	✓
Total Coliform (E.Coli if Total Coliform is present)	✓	✓
Alkalinity	✓	✓

Table A-2: Corrosion Control Water Quality Parameters

Water Quality Parameter	Unit	Field Collection	Laboratory Analysis
Alkalinity	mg/L as CaCO ₃	---	✓
pH	s.u.	✓	✓
Oxidation reduction Potential	mV	✓	✓
Dissolved Oxygen	mg/L	✓	✓
Total Dissolved Solids	mg/L	---	✓
Total Conductivity	µmho/cm @ 25°C		✓
Total Hardness	mg/L as CaCO ₃	---	✓
Temperature	°C	✓	
Carbon dioxide	mg/L	✓	
Total Chlorine	mg/L	✓	✓
Free Chlorine	mg/L	✓	✓
Calcium	mg/L	---	✓
Sodium	mg/L	---	✓
Iron	mg/L	---	✓
Magnesium	mg/L	---	✓
Manganese	mg/L	---	✓
Zinc	mg/L	---	✓
Chlorides	mg/L	---	✓
Sulfate	mg/L	---	✓



ATTACHMENT B: WATER QUALITY SAMPLING SCHEDULE

Well	Sampling Point	Field Parameters ¹	Fe/Mn Piloting ²	Corrosion WQPs ³	1,4-dioxane	TOC	PFAS (537.1)
Straightway 1	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---
Straightway 2	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	✓	---	---
	UV AOP (post)	---	---	✓	✓	---	---
	GAC (post)	---	---	✓	---	✓	✓
Hyannisport	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	---	---
	GAC (post)	---	---	✓	---	✓	✓
Simmons Pond	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	✓	---	---
	UV AOP (post)	---	---	✓	✓	---	---
	GAC (post)	---	---	✓	---	✓	✓
Airport	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---
MD-1	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---
MD-2	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---
MD-3	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---
MD-4	Raw	✓	✓	✓	✓	✓	✓
	MnGS (post)	✓	✓	✓	---	✓	---

✓ indicates samples to be collected

--- indicates samples will not be collected

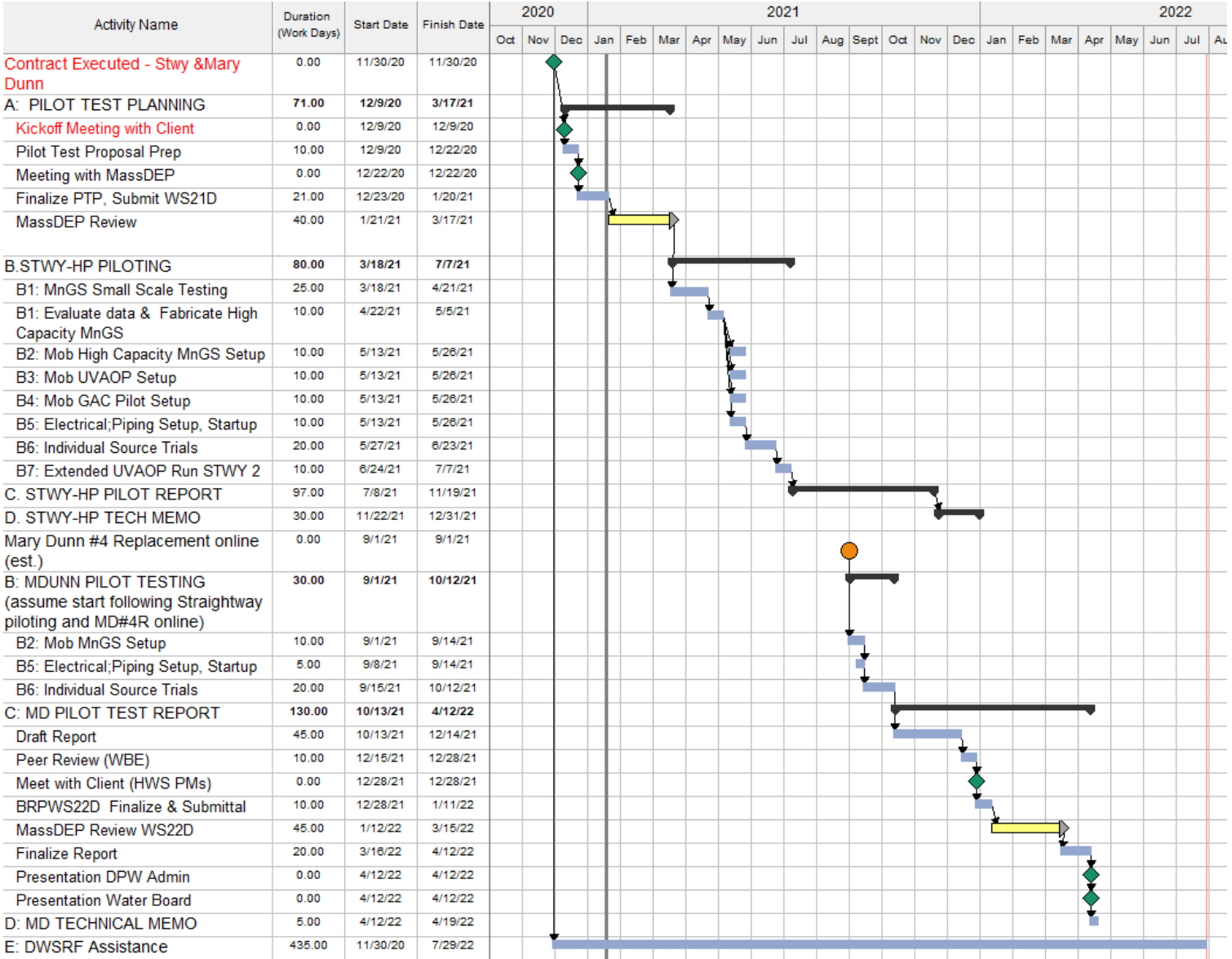
¹Field parameters presented in Table 5

²Iron and Manganese pilot (full runs) samples from Table A-1 (note some parameters appear in both Table A-1 and A-2)

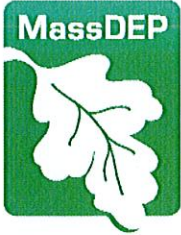
³Corrosion Control Water Quality Parameters presented in Table A-2



**ATTACHMENT C:
PILOTING PLAN SCHEDULE**



APPENDIX B
MASSDEP PILOT PROPOSAL APPROVAL LETTER



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

February 9, 2021

Mr. Hans Keijser
Hyannis Water System
47 Old Yarmouth Road
Hyannis, MA 02601

RE: BARNSTABLE – Public Water Supply
Hyannis Water System
PWS ID#: 4020004
BRPWS21D To Conduct Pilot Study =
or > 1 MGD
Mary Dunn & Straightway Plants
Transmittal No.: X287209

Dear Mr. Keijser:

Attached please find an approval to conduct a pilot study of water treatment processes to remove iron, manganese, 1,4-dioxane and per- and polyfluoroalkyl substances from water drawn from the Mary Dunn, Airport, Straightway, Hyannisport, and Simmons Pond wells servicing the Hyannis Water System in the Town of Barnstable, Massachusetts. The results of the pilot study will be used to inform the design of four (4) water treatment plants to treat the subject wells.

The signature on this cover letter indicates formal issuance of the attached document. Please contact me at (508) 946-2805 or via email at james.m.mclaughlin@mass.gov if you have any questions concerning this approval.

Sincerely,

Jim McLaughlin, Chief
Drinking Water Program
Bureau of Water Resources

JM/encl.

Y:\DWP Archive\SERO\Barnstable-4020004-System Modifications-2021-02-09

ec: Hans Keijser, Hyannis Water, hans.keijser@town.barnstable.ma.us
Nathan Collins, Nathan.Collins@town.barnstable.ma.us
Barnstable Board of Health, health@town.barnstable.ma.us

Michael Leahy, Michael.Leahy@suez.com
Kevin Sampson, Kevin.Sampson@suez.com

Larry VandeVenter, LVandeVenter@kleinfelder.com
Kirsten Ryan, KRyan@kleinfelder.com

Erik Grotton, EGrotton@blueleafwater.com

David Johnston, DEP-SERO-DRD
Jon Hobill, DEP-SERO
Bill Schwartz, DEP-SERO
Adekunle Teniola, DEP-SERO
Angela Gallagher, DEP-SERO

Hyannis Water System
Barnstable, Massachusetts
PWS ID #4020004

Pilot Study Proposal for Mary Dunn, Airport, Straightway, Simmons Pond, and Hyannisport Wells
BRPWS21D To Conduct Pilot Study = or > 1 MGD
Transmittal No. X287209

The Massachusetts Department of Environmental Protection (“the Department”) has reviewed your proposal to conduct a pilot study of iron and manganese filtration, advanced oxidation, and granular activated carbon in Barnstable, Massachusetts. The application was prepared and submitted on behalf of the Hyannis Water System (“the PWS”) by Kleinfelder, Boston, MA, over the seal and signature of Mr. Alexander B. Bishop, Massachusetts Registered Professional Engineer, P.E. No. 55619 (“the Engineer”). The Department received the application on January 25, 2021. The Engineer submitted an updated laboratory sampling plan on February 5, 2021.

PROJECT PURPOSE AND ABBREVIATED BACKGROUND

The eleven (11) active wells servicing the PWS have generally been impacted by per- and polyfluorinated substances (PFAS) and 1,4-Dioxane (1,4-D). Six PFAS compounds (PFAS6) are regulated by the Department as described later in this document. The Massachusetts Office of Research and Standards set a Guideline Limit (ORSGL) of 0.3 µg/l for 1,4-dioxane. The PWS activated a water treatment facility to remove iron, manganese, PFAS6 and 1,4-D from the three Maher wells in October, 2020. Granular activated carbon (GAC) contactors currently remove PFAS6 at the remaining well sites on a year-round or seasonal basis depending on the site.

The PWS intends to construct four (4) water treatment plants to remove iron and manganese via GreensandPlus™ pressure filtration, PFAS6 via GAC pressure filtration, and 1,4-D by hydrogen peroxide and ultraviolet light. The hydrogen peroxide and ultraviolet light (UV) combination is known as an advanced oxidation process (AOP). Hydrogen peroxide absorbs UV and produces hydroxyl radicals that oxidize contaminants to break down 1,4-D into its physiologically-inert components. Granular activated carbon (GAC) will follow advanced oxidation to remove PFAS and any residual hydrogen peroxide. All of the proposed processes were proven effective during the piloting for the design of the Maher Filtration Plant, operational since October, 2020. The proposed pilot testing will provide design parameters for the proposed treatment plants, which are listed in the following table:

Proposed Treatment Plants and Sources to be Treated

Proposed Treatment Plant	Well Name	DEP Source ID
Straightway	Straightway 1	4020004-01G
	Straightway 2	4020004-12G
Hyannisport	Hyannisport	4020004-03G
	Simmons Pond	4020004-06G
Mary Dunn South	Airport	4020004-10G
	Mary Dunn 1	4020004-04G
Mary Dunn North	Mary Dunn 2	4020004-05G
	Mary Dunn 3	4020004-08G
	Mary Dunn 4 (replacement)	4020004-09G (to be replaced)

PERFLUORINATED COMPOUNDS

On October 2, 2020, the Department published final regulations establishing a drinking water standard, or a Maximum Contaminant Level (MCL), for the sum of six per- and polyfluoroalkyl substances (PFAS). The MCL is 20 parts per trillion (ppt) for what the regulations call PFAS6, or the sum of six PFAS compounds: perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA). PFAS Drinking Water Regulations require all public water supplies to collect baseline PFAS samples and take other actions if results exceed the MCL. For information and technical support documents see: <https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas#health-advisories-and-downloadable-fact-sheets>.

PROPOSED PILOT STUDY

The portable pilot plant and operation will be supplied by Blueleaf, Inc. Piloting will be completed in two mobilizations, first at the Straightway/Hyannisport/Simmons Pond site in the spring, and then at the Mary Dunn/Airport site in the fall. Each of the nine (9) sources will be piloted separately. Note that Mary Dunn Well 4 is inactive. A replacement well for Mary Dunn Well 4 is currently being installed and is planned to be included in the pilot study. Two piloting trains will be used: a standard unit with chemical addition and four (4) parallel GreensandPlus™ filters; and a high capacity unit with chemical addition, high capacity GreensandPlus™ filters, hydrogen peroxide/UV, and a GAC column. Each of the nine (9) sources will be piloted using the standard unit for at least five (5) individual filter runs over a seven (7) day period. The filter columns in the standard unit will be 6-inches in diameter with 24-inches of GreensandPlus™ over 12-inches of anthracite sand. A GAC column will be used with the standard unit at the Hyannisport Well to evaluate PFAS adsorption following the GreensandPlus™ filtration. Additional piloting using the high-capacity unit will be used for the Simmons Pond Well and the Straightway 2 Well, with an extended run of up to two (2) weeks at Straightway 2 to evaluate fouling of the UV sleeves. Each water supply source will be protected from the pilot system with a 6-inch air gap between the water supply line and the raw water blending tank. Water will be dechlorinated prior to discharge.

Chemical addition will consist of sodium hypochlorite for oxidation and potassium hydroxide for pH adjustment. Potassium permanganate will be used for oxidation if satisfactory results are not obtained using sodium hypochlorite. pH levels at 6.8 and 7.4 will be tested through the GreensandPlus™ filters. The filters will be operated at surface loading rates of 4 gpm/sf and 8 gpm/sf. GAC piloted will be Calgon Carbon Filtrasorb® 400, currently used by the PWS. The GAC contactor will be operated at an empty bed contact time of 10 minutes.

The UV unit used will be a Trojan UVPHOX 12AL30 UV oxidation system or similar. Note that the final UV unit selected for installation in any proposed treatment plant must have the Department's New Technology Approval for use in an advanced oxidation process.

Water quality monitoring and sampling will be as listed in tables provided in the application proposal and amended in the February 5th submittal. The updated tables are reproduced at the end of this approval. Field sampling and monitoring will include iron, manganese, chlorine residual, pH, turbidity, color, alkalinity, carbon dioxide, and total coliform. Laboratory analysis will be conducted

by a Department-certified laboratory. Laboratory analysis will include, but not be limited to: PFAS; 1,4-D; bromate (a potential by-product of the AOP); oxidation-reduction potential (ORP); dissolved oxygen; total dissolved solids; conductivity; chlorine; calcium; sodium; iron; magnesium; manganese; zinc; chlorides; and sulfate.

Monitoring parameters will include those listed in the required table of Appendix #2 of the Department's Policy 90-04: *Pilot Study Requirements for Proposed Treatment*. The pilot study proposal meets the requirements of the Department's Policy DWP 90-04. This approval is requiring the PWS's consultants to evaluate the pilot study results following guidance contained in EPA's "*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems*," March, 2016, publication number EPA 816-B-16-003.

SIMULTANEOUS COMPLIANCE

The proposed treatment is not anticipated to affect the corrosivity of the finished water. However, the pilot study has been designed to evaluate potential impacts in accordance with the Department's Policy DWP 90-04 and the EPA's "*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems*," March, 2016, publication number EPA 816-B-16-003; and "*Impact of Chloride:Sulfate Mass Ratio Changes on Lead Leaching in Potable Water*", © 2010, Water Research Foundation, ISBN978-1-60573-110-0.

APPROVAL CONDITIONS

Pursuant to the Department's authority under 310 CMR 22.04(7) to require each supplier of water operate and maintain its system in a manner that ensures the delivery of safe drinking water to consumers, this approval is made subject to the following conditions:

1. All submittals required by this approval shall reference the date of this approval letter and Transmittal No. X287209.
2. The PWS shall notify this office prior to the initiation of the pilot testing so that an inspection of the pilot works can be conducted.
3. The supply line from the wells to the pilot equipment shall be equipped with an air gap or backflow preventer. None of the water used in the pilot study shall enter the finished water of the distribution system.
4. The treated pilot effluent water shall be dechlorinated prior to discharge on the ground.
5. The findings and evaluation of the pilot study results shall be submitted to the Department under permit BRP WS 22: Approval of Pilot Study Report, within one (1) year of completing the pilot study. The pilot study report shall evaluate the chloride-to-sulfate ratio following guidance contained in EPA's "*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems*," March, 2016, publication number EPA 816-B-16-003 (with 2019 update); and "*Impact of Chloride:Sulfate Mass Ratio Changes on Lead Leaching in Potable Water*", © 2010, Water Research Foundation, ISBN978-1-60573-110-0. The report shall discuss simultaneous compliance

effects of the treated water with the existing conditions of the distribution system and household plumbing. The discussion shall include historical lead and copper sampling, the presence of lead services, and the condition of chemical coating existing within the currently stable system plumbing. The report shall also discuss continuing compliance with other applicable rules, such as the Revised Total Coliform Rule, Ground Water Rule, and Disinfection By-Products Rule.

6. Include a discussion in the pilot report of the corrosion control impact of removing orthophosphate from the treatment of the existing sources.
7. Include a discussion in the pilot report of information available from the vendor and the EPA's Treatability Database on the formation of oxidation byproducts for 1,4 dioxane and perfluorinated compounds.
8. Treatment systems used for the combination of hydrogen peroxide and UV treatment require the Department's New Technology Approval prior to installation in any proposed treatment facility.
9. The PWS shall ensure that chemicals which may come in contact with the water or affect the quality of the water, are certified to be in conformance with ANSI/ NSF Standard 60 or meet the food grade standards of the United States Pharmacopeia.
10. The PWS shall sample according to the testing regimen listed in the submitted proposal as amended, and include PFAS, 1,4-D, and bromate.

This approval pertains only to the water supply aspects of the proposal and therefore does not negate the responsibility of the owners or operators to comply with other applicable laws, and/or regulations. For the purpose of the application BRPWS21D (Transmittal No. X287209) the Technical Review has been completed.

Detailed Laboratory Sampling Plan for Town of Barnstable Piloting – Straightway, Hyannisport, Mary Dunn & Airport Wells

1 - Laboratory Sampling Parameters and Frequencies for All Sources (All sites)		
Sample Location	Parameter and Frequency	Frequency
Raw	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Bromate, Dissolved Fe, Dissolved Mn	1 per study per well source
	PFOS (EPA extraction 537.1)	1 per study per well source
	1,4-Dioxane	1 per study per well source
	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
Post MnGS Filter	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Dissolved Fe, Dissolved Mn	1 per study per well source
	PFOS (EPA extraction 537.1)	None
	1,4-Dioxane	None
MnGS Backwash	Total Solids, Total Suspended Solids (note that total volume and settling rate to be completed in field)	Each backwash event

See below -for Additional sampling at Hyannisport (GAC), and Straightway 2 and Simmons Pond (GAC and UV-AOP)

Detailed Laboratory Sampling Plan for Town of Barnstable Piloting – Straightway, Hyannisport, Mary Dunn & Airport Wells
2- Laboratory Sampling Parameters and Frequencies for Hyannisport Well, with GAC

Sample Location	Parameter and Frequency	Frequency
Raw	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Bromate	1 per study per well source
	PFOS (EPA extraction 537.1)	1 per study per well source
	1,4-Dioxane	1 per study per well source
	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
Post MnGS Filter	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Bromate	1 per study per well source
	PFOS (EPA extraction 537.1)	None
	1,4-Dioxane	None
	Corrosion Control Parameters: Alkalinity, pH, Total Iron, Total Manganese, Total and Free Chlorine, Carbon Dioxide, Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study
	Other Parameters of Interest: TOC	1 per study
GAC	PFOS (EPA extraction 537.1)	3 Samples
	1,4-Dioxane	None
	Total Solids, Total Suspended Solids (note that total volume and settling rate to be completed in field)	Each backwash event
MnGS Backwash		

3 - Laboratory Sampling Parameters and Frequencies for Straightway 2 and Simmons Pond, with UV-AOP and GAC		
Sample	Parameter and Frequency	Frequency
Raw	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Bromide, Nitrate, Nitrite,	1 per study per well source
	PFOS (EPA extraction 537.1)	1 per study per well source
	1,4-Dioxane	1 per UV-AOP condition (4 total)
	Parameters Required by MaDEP Policy 90-04, Appendix 2:	
Post MnGS Filter	Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, TTHM and THAA5	1 per study per well source
	PFOS (EPA extraction 537.1)	None
	1-4 dioxane	1 per UV-AOP condition (4 total)
	Parameters Required by MaDEP Policy 90-04, Appendix 2:	
Post UV AOP Process	Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study per well source
	Other Parameters of Interest: TOC, Bromate, TTHM and HAA5, Nitrate, Nitrite	3 Samples
	1,4-Dioxane	1 per UV-AOP condition (4 total)
	Corrosion Control Parameters: Alkalinity, pH, Total Iron, Total Manganese, Total and Free Chlorine, Carbon Dioxide, Oxidation Reduction Potential, Dissolved Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1 per study
	Other Parameters of Interest: TOC, Bromate, TTHM and THAA5	1 per study
GAC	PFOS (EPA extraction 537.1)	3 Samples
	1,4-Dioxane	None
MnGS Backwash	Total Solids, Total Suspended Solids, PFAS, 1,4-Dioxane (note that total volume and settling rate to be completed in field)	Select Backwashes

APPENDIX C
CORROSION EVALUATION



MEMORANDUM

TO: Hans Keijser – Hyannis Water System
FROM: Alexander B. Bishop, P.E.; Umang Chauhan - Kleinfelder
DATE: August 09, 2021
SUBJECT: Straightway and Hyannisport Piloting Corrosion Evaluation
CC: Kirsten Ryan, Shugen Pan, P.E., PhD - Kleinfelder

The purpose of this memo is to fulfill the Corrosion Evaluation requirement set forth in the approval letter from MassDEP dated on February 09, 2021, and entitled, *BRPWS21D to Conduct Pilot Study = or > 1 MGD Mary Dunn & Straightway Plants Transmittal No.: X287209*. Item 5 in the approval letter sets several requirements and is defined below:

The findings and evaluation of the pilot study results shall be submitted to the department under BRP WS 22: Approval of Pilot Study Report, within one (1) year of completing the pilot study. The pilot study report shall evaluate the chloride to sulfate ratio following guidance contained in EPS “Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems,” March 2016, publication number EPA 816-B-16-003 (with 2019 update); and “Impact of Chloride Sulfate Mass Ratio Changes on Lead Leaching In Potable Water”, © 2010, Water Research Foundation, ISBN 978-1-6053-110-0. The report shall discuss simultaneous compliance effects with treated water with the existing conditions of the distribution system and household plumbing. The discussion shall include historical lead and copper sampling, the presence of lead service lines and the condition of chemical coating existing within the currently stable system plumbing. The report shall also discuss continuing with applicable rules such as the Revised Total Coliform Rule, Groundwater Rule, and Disinfection Byproducts Rule.

1. Existing Treatment:

The Straightway and Hyannisport facilities consist of four wells: Straightway #1 and #2, (STW1, STW2), Hyannisport (HP) and Simmons Pond (SP). All four of the wells associated with these two facilities currently receive the same treatment: C5 (SLI-7425 - polyphosphate) to sequester iron and manganese (Fe/Mn), followed by sodium hydroxide for pH adjustment, C9 (SLI321 - zinc orthophosphate) for corrosion control and sodium hypochlorite for disinfection.



The Straightway facilities include the Straightway Water Treatment Facility (which houses both Straightway Wells No. 1 and No. 2), the Straightway Tank, and the booster pumping station. Raw water from Straightway Wells No. 1 and No. 2 is treated at the Straightway Facility as described above and then pumped to the Straightway Tank.

The Hyannisport Water Treatment Facility treats the Hyannisport and Simmons Pond Wells as described above with C5, C9, sodium hydroxide, and sodium hypochlorite (with the exception that the Simmons Pond Well has C5 injected at the well pump house). The Hyannisport finished water transmission main leaving the building runs north to the Straightway Tank.

Finished water from all four wells (STW1, STW2, HP, SP) blends in the Straightway tank to achieve necessary contact time and is then pumped into the distribution main on Straightway (Road) by means of the booster station. As of Spring 2020, the Town has operated a seasonal interim GAC filter to remove per- and polyfluorinated alkyl substances (PFAS) from blended water from all wells prior to entering the Straightway Tank. The new GAC filters are installed adjacent to the Straightway Tank along with a new hypochlorite feed system (following GAC) and backwash lagoon.

1.1. Existing Chemical Additions

As mentioned, the existing Straightway/Hyannisport plant use chemical additions for some treatment processes. Sodium hydroxide (pH adjustment) and zinc orthophosphate are used specifically for corrosion control.

Iron and manganese sequestration - A blended phosphate (C5: SLI-7425) which is a combination of 3 different phosphates and contains no orthophosphate, is currently used for the sequestration of iron and manganese prevalent in all wells. The town currently doses this via flow proportional chemical metering with a target dose of 3.40 milligram per liter (mg/L), while the operators use a range of 2-2.5 mg/L. Dosing is typically done at the well prior to all other chemical injections.

pH adjustment – Used to meet drinking water standards and as a corrosion control measure. Operators typically use a 50% solution of sodium hydroxide (NaOH) at most of Hyannis Water System’s (HWS) facilities with the Maher plant being the exception which uses a 25% NaOH solution. The current pH at the Straightway/Hyannisport facilities from raw water is between 5.9 and 6.95 standard units (s.u), with typical finished water pH from the Straightway/Hyannisport facilities at 7.4 s.u. Dosing is typically done downstream of the sequestration and upstream of corrosion inhibitor.

Zinc orthophosphates - The zinc orthophosphate (C9 SLI321) solution targets a dose of 1.5 mg/L and is controlled by flow proportional chemical metering. Dosing is typically done downstream of pH adjustment.

Disinfection -Through the use of 12.5% sodium hypochlorite. Dosing is dependent upon the necessary contact time (CT) required for 4-Log virus inactivation. This is determined by the residual concentration



and combined flows of the Straightway storage tank. The Straightway tank with a 0.4 million gallon (MG) capacity requires dose of 0.5 mg/L. Disinfectant is dosed immediately prior to downstream pH adjustment.

2. Historical Lead and Copper Corrosion

The Lead and Copper Rule (LCR) was promulgated in June 1991 with the Lead and Copper Rule Revisions (LCRR) going into effect in June 2021. The two rules define the regulations for lead and copper in the distribution system, the source of which is primarily from household plumbing fittings and poorly performing corrosion control programs. The LCR established an Action Level of 0.015 milligrams per liter (mg/L) or parts per million (ppm) for lead and 1.3 mg/L for copper which are based on the 90th percentile level of samples collected from the distribution system. The LCRR introduced a new Trigger Level for lead of 0.010 mg/L although the Action Level for lead will remain 0.015 mg/L. The new Trigger Level is intended to provide an early indicator that system and/ or treatment changes are needed. Key changes to the rule more specifically define sample site selection, sample collection procedures, and treatment requirements. The rule also takes a “find and fix” approach similar to the Revised Total Coliform Rule for addressing site specific exceedances.

MassDEP recently approved HWS’s Lead and Copper sampling plan on May 18, 2021 (see Attachment 1). The sampling plan requires collection twice per year, in Quarters 2 and 4 (Q2 and Q4) for each of the 60 sampling sites, all of which are Tier 1, Class B (single family residences with lead or copper pipes with lead/tin solder built in 1963, 1984, or 1985). No Tier 1 Class A or A2 sites were included, as HWS has reported no known Lead Service Lines (LSLs) in their distribution system. HWS is currently working on a systemwide inventory to identify any remaining unknown lead service connections and comply with the anticipated LCRR. Additionally, HWS also lists 21 school and daycare facilities that will be sampled on a rolling basis according to the plan.

Lead and Copper samples collected between 2019 and 2021 demonstrated no exceedances of the action level for any samples for copper, whereas one exceedance was found for lead in Q2 of 2020. The 90th percentile for both lead and copper was well below the AL. Table 2-1 presents statistics from each round of sampling in the 2019 to 2021 period.



Table 2-1: Lead and Copper Sampling Result Statistics (2019 -2021)

	Lead (mg/L)				Copper (mg/L)			
	Q2 2019	Q2 2020	Q4 2020	Q2 2021	Q2 2019	Q2 2020	Q4 2020	Q2 2021
Average	0.00025	0.00098	0.0002	0.0000246	0.129	0.090	0.135	0.047
Max	0.0059	0.039	0.0074	0.0016	0.3	0.5	0.75	0.39
Min	0	0	0	0	0.0099	0	0.0025	0.0061
Count	34	59	72	65	34	59	72	65
90th Percentile	0	0.001	0	0	0.271	0.17	0.23	0.116

The one lead sample above the action level was collected in Summer 2020 from 41 Wellesley Circle with a concentration of 0.039 mg/L. Copper samples collected in Fall 2020 were relatively higher compared to the samples collected in other periods but were still below the action level. Wellesley Circle is a dead-end street with no visible flushing points or hydrants. Elevated levels may be due to an increased water age in the dead-end leg of the distribution piping or stagnant water within the home due to infrequent use. These factors can lead to an increased likelihood for corrosive conditions capable of releasing lead from leaded plumbing components within household plumbing. Sufficient flushing has shown to reduce water age which can mitigate water quality conditions that lead to corrosion.

Table 2-2 shows results of all other sampling events on Wellesley Circle between 2019 and 2021. 41 Wellesley Circle and 39 Wellesley Circle had detections for lead with the former having the one exceedance of 0.039 mg/L. The October 2020 results showed the highest levels of copper, although no exceedances, with 39 Wellesley Drive showing the highest concentration. HWS should continue sampling residences along Wellesley drive to see if further seasonal trends develop.

Table 2-2 Lead and Copper Sampling Result at Wellesley Circle (2019-2021)

No.	DEP Approved Sample Location	Collection Date	Lead (mg/L)	Copper (mg/L)
1	39 Wellesley Circle	7/15/2019	ND	0.041
2	41 Wellesley Circle	4/27/2020	0.039	0.5
3	39 Wellesley Circle	4/27/2020	ND	0.095
4	37 Wellesley Circle	10/14/2020	ND	0.21
5	39 Wellesley Circle	10/14/2020	0.0011	0.4
6	41 Wellesley Circle	10/15/2020	ND	0.16
7	36 Wellesley Circle	4/7/2021	ND	0.015
8	39 Wellesley Circle	4/7/2021	ND	0.029
9	24 Wellesley Cir	4/8/2021	ND	0.022

*ND is non-detection



Since 2021, water quality parameters (WQPs) are collected at three unique distribution system entry points on a monthly schedule. WQPs were also tested at 13 unique distribution sampling locations on 2 different occasions in 2021. Table 2-3 details the list of unique entry point sampling locations and the distribution sampling locations.

Table 2-3 Unique Sampling Locations

Entry Point Sampling Locations
Maher Booster Out
Mary Dunn Combined
Straightway Booster Out
Distribution Sampling Locations
Citizens Bank (Airport Rotary)
Anchor Inn
Hyannis Post Office
Resort & Conference Center
Veterans Park
Hyannis Post Office
West Hyannis Post Office
Barnstable High School
DPW Office
Cape Codder Resort
Hyannis Senior Center
Mary Dunn Large Tank
Mary Dunn Small Tank

WQPs include - pH, temperature, alkalinity, conductivity, and orthophosphate. Table 2-4 and Table 2-5 below shows statistics for the samples collected between January 2021 through June 2021. The parameters are within a similar range for both entry point as well as the distribution sampling locations.

Table 2-4 Summary of Water Quality Parameters at Entry Point Sampling Locations (Jan.-June 2021)

	pH	Temperature (C)	Alkalinity (mg/L)	Conductivity (umho/cm)	Orthophosphate (mg/L as PO4)
Mean	7.20	11.79	48.86	171.98	1.46
Minimum	6.86	7.88	11	139	0.8
Maximum	7.52	17.16	88	199.7	2.8
Count	15	15	15	15	15



Table 2-5 Summary of Water Quality Parameters at Distribution Sampling Locations (Jan-June2021)

	pH	Temperature (C)	Alkalinity (mg/L)	Conductivity (umho/cm)	Orthophosphate (mg/L as PO4)
Mean	7.25	12.30	42.34	185.19	1.39
Minimum	6.85	7.11	16	151	0.6
Maximum	7.52	18.89	71	226	2.3
Count	26	26	26	26	26

3. Proposed Treatment:

As stated in the pilot proposal, the proposed treatment processes include GreensandPlus (greensand) filtration for iron and manganese removal, Advanced Oxidation Process with UV (UV-AOP) for the destruction of 1,4-dioxane (1,4-D), and granular activated carbon (GAC) for PFAS removal. While UV-AOP are proposed at the STWY and Simmons, only MnGS-GAC are proposed at Hyannisport Additional details regarding the treatment processes are described in the Piloting Report.

Addition of the proposed treatment processes will warrant changes in chemistry and dosing. This will include the addition of pre-oxidation chemistry (sodium hypochlorite) for oxidation of iron and manganese upstream of the greensand filters and consequently the removal of polyphosphates, used for sequestration of iron and manganese. The UV-AOP process requires injection of hydrogen peroxide.

3.1. Proposed Chemical Additions:

As mentioned, the existing Straightway/Hyannisport plant used polyphosphate for the sequestration of iron and manganese, with the addition of the greensand filtration for iron and manganese removal, it will no longer be required. Discussion on the impact of removing blended phosphates is described in Section 5.2. Proposed chemical additions are as follows.

Pre-oxidation – Sodium hypochlorite will be injected upstream of the greensand filters for the oxidation of dissolved iron and manganese into their precipitate forms. The greensand filters serve a dual function by removing precipitated iron and manganese through media filtration along with bonding soluble forms to the greensand media.

pH adjustment – A 25% NaOH solution is injected downstream of the pre-oxidation chemistry to raise pH to optimal levels to precipitate iron and manganese and removal through the greensand filters. This also continues to serve as pH adjustment for corrosion control in the distribution system. The target pH is 7.4 s.u.



Advanced Oxidation Process – The UV-AOP treatment process for the destruction of 1,4-D includes the addition of hydrogen peroxide as an oxidizing agent. The target dosage ranges will be determinant upon operating conditions for each source as defined in the piloting report. Following the process, residual hydrogen peroxide will be minimal and be quenched by the GAC.

Zinc orthophosphates – used for corrosion control and will be dosed in the same manner as defined in the existing conditions.

Disinfection -Immediately prior to leaving the treatment plant, sodium hypochlorite is dosed for disinfection purposes in the same manner as defined in the existing conditions. However, less overall chemistry will be required as the chlorine demand will be satisfied through pre-oxidation and removal of organic contaminants concentrations via the GAC contactors.

4. Corrosion Evaluation:

As required by the approval letter from MassDEP, Kleinfelder conducted a corrosion evaluation of the proposed treatment system during piloting. Raw water samples along with finished water from the existing treatment plants were compared to the finished water from the pilot plant to assess if there were any significant changes in the water quality parameters that affect corrosivity. All existing and finished water samples went through the temporarily operated GAC. The sampling program carried out was developed using guidance documents in the approval letter. Additionally, samples were collected from Maher Treatment Facility for comparison.

4.1. Sample Collection:

MassDEP has indicated as part of their conditional approval that proposed treatment should have minimal changes in water characterization from a corrosion standpoint. Kleinfelder collected additional samples from the Hyannisport, Simmons Pond and Straightway Well 2 during the piloting to determine if the overall water characterization, and corrosivity, has changed between the existing treatment and proposed treatment.

The following samples were collected from each source being piloted:

- **Raw water** –collected from the individual sources being piloted prior to any treatment. Analytical results from the raw water will form the baseline water characterization.
- **Finished Water (Existing Plant)** – collected downstream of all existing treatment and interim GAC contactors and prior to the Straightway Storage Tank. Treated water collected was held at CT to simulate conditions in baffled Straightway Storage Tank required to meet 4-log inactivation of viruses and mimic the distribution system entry-point sample. After the detention time, staff filled sample bottles and took field measurements.
- **Simulated Finished Water (Piloting Plant)** – collected from the pilot plant following all treatment processes (MnGS-UVAOP-GAC) and then dosed with a phosphate called C9 (corrosion control) and hypochlorite (disinfectant) for a target chlorine residual of 0.5 mg/L. GAC effluent



pH was targeted to 7.4 and no additional pH adjustment was required. Treated water collected was held at CT to simulate conditions in baffled Straightway Storage tank required to meet 4-log inactivation of viruses and mimic the distribution system entry-point sample. After the detention time, staff filled sample bottles and took field measurements.

Comparison to Maher: Samples were collected from four sample sites at Maher treatment plant on three different dates during the pilot study. The sampling locations were raw water, greensand effluent, UV-AOP treated water, and GAC effluent.

4.2. Sampling Results:

The results from sampling events have been summarized in Attachment 3. Average value of each parameter over 2 sampling events per source are presented. The piloting plan letter includes detailed information on the parameters sampled for different waters. Attachment 3 represents both the field parameters as well as the laboratory results.

- pH- The raw water from the three wells had pH in the range of 5.9-6.9 s.u., whereas the existing treatment water demonstrated a pH value in the range of 6.8 to 7.3 s.u. The simulated water was found to have a higher pH than raw water being above 7 s.u. for all the wells. Increase in the pH can be attributed to the treatment processes.
- Alkalinity dissolved inorganic carbon (DIC) and carbon dioxide (CO₂) - Raw water from Hyannisport resulted in a low alkalinity of 6.5 mg/L which increased significantly in treated waters. At Straightway, the influent alkalinity was 47.5 mg/L which increased in both treated waters, with the highest being for simulated finished water at 71 mg/L. Treatment improved the alkalinity of the raw water at Simmons Pond and increased from 38 mg/L for raw water to 76 mg/L for existing treatment. Carbon Dioxide (CO₂) measurements were taken in the field by titration. Raw waters were calculated to have CO₂ in range of 34-36 mg/L. The treated waters calculated CO₂ levels between 9-14.75 mg/L. DIC was estimated for all the wells based on the alkalinity and pH levels using Appendix B of the OCCT. DIC was found to be higher in treated waters as compared to raw water from all three wells.
- Iron - No detectable levels of iron were found in either raw water from Hyannisport. Raw influent from Straightway and Simmons Pond demonstrated a moderate value of 1.365 mg/L and 0.0355 mg/L respectively. Iron concentrations were below detectable limits in existing treated water or the simulated treated water from all three wells.
- Manganese – Raw influent from the three wells demonstrated high manganese in the range of 0.12 to 0.975 mg/L with the highest being for the Straightway well. Levels below detection limits were reported for treated water from Hyannisport while treated water from Straightway and Simmons Pond demonstrated 0.0255 mg/L and 0.0087 mg/L of manganese, respectively. Simulated finished water resulted in a low manganese concentration of 0.0115 mg/L for Hyannisport, while it resulted in non-detects for Straightway and Simmons Pond.



- Calcium- Raw water from all three wells had a calcium concentration in the range of 8.8-20 mg/L. Existing treatment showed concentrations in similar range for Hyannisport and Straightway wells whereas concentrations in the Simmons Pond well decreased to 14.5 mg/L. Simulated water had a similar calcium concentration of 20 mg/L for all three wells.
- Chloride - Chloride concentrations for the raw water in the three wells was found to be between 47.5 mg/L to 98 mg/L. Existing treated water demonstrated slightly higher chloride concentrations between 59.5 mg/L to 110 mg/L. Simulated treated water resulted in similar concentrations to raw water ranging between 50.5 mg/L - 91.5 mg/L. Addition of sodium hypochlorite can contribute to increased levels of chloride, however since the dose is low, chloride change is minimal.
- Sulfate- For the Hyannisport, sulfate concentrations was 20 mg/L for the existing treated and simulated treated water as opposed to 15 mg/L for the influent. Straightway demonstrated a low sulfate concentration of 13 mg/L for the existing treated water, while moderate sulfate concentrations of 20 mg/L for influent and simulated water. Simmons Pond demonstrated a similar concentration of 20 mg/L for all sampling points. Sulfate levels are not expected to change significantly by the pilot process.
- Oxidation Reduction Potential (ORP) - the ORP is found to be high in the raw well water for both Hyannisport and Straightway and it decreases for the treated waters. Simmons Pond resulted in a similar ORP across raw and treated waters.

Maher Sampling Results: The results from the Maher plant showed that pH through the plant increased for the treated waters. Iron and manganese present in the raw water decreased to low levels for treated water. The raw influent at Maher plant had a low alkalinity of 15 mg/L which increased up to 18 mg/L for the treated water but was much lower than alkalinity observed in the other wells as no caustic was fed to the greensand inlet. Langelier Saturation Index (LSI) decreased slightly in both calculation methods for the treated waters and can be attributed to increase in the pH after treatment. The Larson-Skold Index (LSK) ratio decreased slightly for the treated waters compared to the raw influent, but this decrease is not significant. The CSRM calculations resulted in relatively stable ratios between raw and treated waters.

4.3. Corrosion Indices

Engineers have developed indices based on the WQPs of different water sources to effectively rate corrosivity. Each index combines and compares several different WQPs to calculate an index number. The result can then be compared with known corrosive or non-corrosive index numbers and ranges to establish and predict the corrosion potential of a given water source/sample. Some well-known and studied indices include: the Langelier Saturation Index, the Larson Skold Index, and the Chloride Sulfate Mass Ratio.



4.3.1. Langelier Saturation Index (LSI)

The Langelier Saturation Index (LSI) was developed by W.F Langelier in 1936 at the University of California at Berkely. The index is also known as the calcium carbonate saturation index or saturation index, and it describes the solubility of calcium carbonate within a solution. The methodology calculates the solubility of calcium in relation to the pH and is determined by factors including pH, alkalinity, calcium, total dissolved solids, and temperature. The resulting index describes the deposition or scale formation of calcium carbonate forming a protective barrier on the interior surface of pipes. LSI only measures the tendency to dissolve or precipitate calcium carbonate. It does not have direct relationship with lead/copper release. It is also important because of the known effects that alkalinity has in subduing corrosion driven by chlorides and sulfates.

$$\text{Langelier Saturation Index (LSI)} = pH_s - pH$$

where: pH = pH of solution
 pH_s = saturation constant of calcium carbonate at the given pH

There are two methods for calculating the pH_s value. The first option (Method 1) uses pK values, as follows:

$$pH_s = (pK_2 - pK_s) - \log(Ca^{+2}) - \log(Alk)$$

Where the terms are as follows:

- K_2 = the acidity constant for the dissociation of bicarbonate (the pH at which water with a given calcium content and alkalinity is in equilibrium with calcium carbonate; temperature dependent)
- K_s = the solubility product constant for calcium carbonate (temperature dependent)
- Ca^{+2} = calcium concentration (moles/L)
- Alk = alkalinity concentration (moles/L)

The second option (Method 2) uses the total dissolved solids concentration and temperature:

$$pH_s = (A + B) - \log(Ca^{+2}) - \log(Alk)$$

Where the terms are as follows:

- A = constant related to the temperature of the water
- B = constant related to the dissolved solids concentration of the water
- Ca^{+2} = calcium concentration (mg/L as $CaCO_3$)
- Alk = alkalinity concentration (mg/L as $CaCO_3$)

The US EPA Corrosion Manual for Internal Corrosion of Water Distribution Systems defines the methodologies for determining the saturation constant of Calcium Carbonate in addition to Langelier's



paper. Results calculated from the index are only qualitative in predicting calcium carbonate dissolution or scale formation. Index values are interpreted accordingly:

LSI < 0 water is undersaturated and will dissolve calcium carbonate

LSI = 0 water is in equilibrium

LSI > 0 water is supersaturated and will precipitate calcium carbonate

4.3.2. Larson-Skold Index:

The Larson-Skold index was developed in the late 1950s from in-situ data on the corrosion of steel piping with Great Lakes water. The index derives a ratio between corrosion accelerators, namely chlorides and sulfates vs. corrosion mitigators, alkalinity and calcium.

$$\text{Larson-Skold Index (LSK)} = \frac{[\text{Chlorides}] + [\text{Sulfates}]}{[\text{Alkalinity}]}$$

The calculated value is typically interpreted in the following ranges:

LSK < 0.8:	Chlorides and Sulfates are unlikely to prevent scale formation
0.8 < LSK < 1.2:	Chlorides and Sulfates may interfere with scale formation
LSR > 1.2:	Chlorides and Sulfates will interfere with scale formation and may lead to corrosion

4.3.3. Chloride-to-Sulfate Mass Ratio (CSMR):

The CSMR measures the impact that chlorides and sulfates have on the corrosion of leaded materials in plumbing components. Many examples in literature have attributed CSMR ratios greater than 0.58 to be associated with high levels of lead corrosion on copper and leaded components within public water systems. Index values are interpreted accordingly:

CSMR < 0.58	: No adverse impact on leaded plumbing materials
CSMR > 0.58	: Tendency for an increased concentration of lead chloride

4.3.4. Interpretation

Overall, the corrosion indices calculated for the three wells piloted demonstrate highly corrosive water that is mitigated through the existing corrosion control treatments. Comparison analytical results and indices for the existing treatment and simulated finished water show only minor changes in water quality and small decreases in corrosivity. As the historical lead and copper sampling results showed in Section 2, the existing corrosion control program yielded favorable results in distribution system sampling. With minor (favorable) changes in water quality from the proposed treatment across all wells,



the existing corrosion control program can be expected to continue to yield similar results. A summary of the corrosion indices calculations are presented in Table 4-1.

Table 4-1: Corrosion Indices

	Langelier Saturation Index (Method #1)	Langelier Saturation Index (Method #2)	Larson Skold	Chloride Sulfate Mass Ratio
Raw-HP	-4.23	-4.06	23.69	6.53
Existing-HP*	-2.28	-2.18	3.43	5.79
Simulated-HP	-1.75	-1.64	2.37	4.46
Raw-SW2	-2.09	-1.91	1.83	2.5
Existing-SW2	-1.33	-1.19	1.67	4.58
Simulated-SW2	-1.28	-1.12	1.31	2.4
Raw-SIM	-2.65	-2.48	3.59	4.1
Existing-SIM	-1.52	-1.38	1.74	3.95
Simulated-SIM	-1.77	-1.64	2.13	4
Maher-Raw	-3.62	-3.39	3.75	4.3
Maher-Greensand	-3.52	-3.29	3.45	4.47
Maher-UV	-2.74	-2.51	3.52	4.5
Maher-GAC	-2.53	-2.3	3.03	4.44

**Values reported are for only one sampling event and not average of 2 events*

Hyannisport Well:

LSI – The raw water LSI calculated at -4.23 and -4.06 increased for both methods, the existing treatment at -2.28 and -2.18, and the simulated finished at -1.75 and -1.64. While a negative value of this index suggests the water is undersaturated and will dissolve calcium carbonate, the increase towards “0” which represents equilibrium, is favorable and indicates a decrease in the waters ability to dissolve calcium carbonate scale. Results do not represent a significant change that may affect scale formation. With pH being the main driver of these index calculations, the improvement is principally due to the increase in pH of the treatment processes/corrosion control program.

Larson Skold – the ratio decreased from 23.69 in raw water samples to 3.43 and 2.37 in the existing treatment and simulated finished, respectively. The overall decrease is due to the significant increase in alkalinity. Raw water alkalinity was extremely low at 6.5 mg/L as CaCO₃ and increased to 51 and 65.5 mg/L as CaCO₃ in the existing treatment and simulated finished, respectively. This range of the ratio indicates that chlorides and sulfates will likely interfere with scale formation and may lead to corrosion.



CSRM – While the calculations of this ratio show an overall decrease between raw and treated water it does not indicate any definitive improvement. Analytical results of both chlorides and sulfates remained relatively stable. A CSRM greater than 0.58 may indicate a tendency to form soluble lead. Research has also indicated that moderate levels of alkalinity, between 40 and 50 mg/L as CaCO₃, can mitigate these effects.

Straightway 2 Well:

LSI – The raw water LSI, calculated at -2.09 and -1.91 increased in both calculation methods for the existing treatment (-1.33 and -1.19) and for the simulated finished (-1.28 and -1.12) waters. These results point to a decrease in water's ability to dissolve calcium carbonate scale but are not a significant increase.

Larson Skold – The ratio decreased from 1.83 in raw water samples to 1.67 and 1.31 in the existing treatment and simulated finished, respectively. This decrease in ratio can be attributed to corresponding increase in alkalinity. These values are above 1.2 indicating that chlorides and sulfates will likely interfere with scale formation and may lead to corrosion.

CSRM – The ratio for raw water was 2.5, with existing treatment at 4.58 and simulated finished at 2.4. A CSRM greater than 0.58 may indicate a tendency for the formation of soluble lead however, research has also indicated that moderate levels of alkalinity can mitigate these effects.

Simmons Pond Well:

LSI – The raw water LSI, calculated at -2.65 and -2.48 increased in both calculation methods for the existing treatment (-1.52 and -1.38) and for the simulated finished (-1.77 and -1.64) waters. This increase can be attributed to the increase in pH for existing treated and simulated finished waters. However, this change is not significant and may not affect scale formation.

Larson Skold – the ratio decreased from 3.59 to 1.73 and 2.13 in the existing treatment and simulated finished, respectively. These values are above 1.2 indicating that chlorides and sulfates will likely interfere with scale formation and may lead to corrosion.

CSRM – The ratio for raw water was 4.1, with existing treatment at 3.9 and simulated finished at 4. This does not indicate any definitive improvement. CSRM greater than 0.58 may indicate a tendency for an increased concentration of lead chloride however, research has also indicated that moderate levels of alkalinity can mitigate these effects.

Maher Treatment Plant:



LSI – The raw water LSI, calculated at -3.62 and -3.39 decreased slightly in both calculation methods post greensand treatment (-3.58 and -3.29), whereas it decreased more for post UV-AOP (-2.74 and -2.51) and post GAC treatment (-2.53 and -2.30). These results do not show a significant change and the small increase for treated waters can be attributed to the increase in the corresponding pH.

Larson Skold – The ratio decreased from 3.75 in raw water to 3.45, 3.52 and 3.03 in the greensand, UV-AOP, and GAC treatment, respectively. The decrease in the ratio is not significant and such high ratios indicate that chlorides and sulfates will interfere with scale formation and may lead to corrosion.

CSRM – The ratio for raw water was 4.30, 4.47 for greensand, 4.50 for UV-AOP treated, and 4.44 for GAC treatment. The calculations show that the ratio is relatively stable between raw and treated water.

5. Impacts of Process Changes

With the discovery of PFAS and 1,4-D in nearly all raw water sources, HWS has moved to add treatment processes at all plants – Maher, Mary Dunn and Airport, and Straightway and Hyannisport. HWS has pursued a stepwise implementation of treatment processes beginning with interim and seasonal GAC contactors at all plants (2017-2020) and followed by a full-scale permanent treatment plant at Maher in late 2020. Historically lead and copper data show that the HWS has been in compliance with the LCR and consequently has operated an effective corrosion control system throughout these significant changes to the public water system.

5.1. Comparison to Maher Treatment Facility

The Maher Treatment Facility (MTF) implemented a similar treatment process in 2020 as to the piloted process for the proposed Straightway Treatment Facility (SWTF) and Hyannisport Treatment Facility (HPTF). Processes include - greensand filtration for removal of iron and manganese, UV-AOP for destruction of 1,4-D, and GAC for adsorption of PFAS. MTF consequentially has eliminated the use of polyphosphate for iron and manganese sequestration. Compliance monitoring and process evaluations demonstrate the plant is effectively removing the contaminants of concern. The 2021 lead and copper and WQPs sampling results also show no significant changes. Additionally, the WPQ sampling since 2021 show points within the distribution system continuing to have pH and orthophosphates within target ranges.

Similar trends are observed when comparing sampling results from MTF to the piloted treatment at STWY/HP facilities. Most notably these include:

- Treatment processes were proven to be effective for destruction and removal of 1,4-D and PFAS, respectively.



- Greensand filtration effectively removes of iron and manganese to meet treatment goals and allows for the elimination of polyphosphate addition for sequestration.
- Both the MTF and STWY/HP piloting showed an increase in pH between raw water and finished water. This is due mainly to the addition of sodium hydroxide to increase pH. Resulting pH's from both are similar within the 7-7.4 s.u. range. A corresponding decrease in CO₂ is also indicated by this.
- With the decrease in CO₂, there was also a general increase in alkalinity. Research has indicated that alkalinity in ranges above 50 mg/L as CaCO₃ can have a mitigating effect on corrosion from elevated levels of chlorides (and CSMR)
- Raw water at both MTF and STWY/HP sites had low levels of sulfates and moderate levels of chlorides that remained stable through the piloted treatment processes.
- Both the MTF and STWY/HP piloting demonstrated corrosion indices that favor corrosive conditions. However as indicated previously, the implemented corrosion control and historical lead and copper sampling has indicated acceptable results that are in compliance with the LCR.
 - The LSI showed slight increase due to increases in pH.
 - The Larson-Skold showed slight decreases due to slight increases in alkalinity.
 - The CSMR remained stable as implemented treatment processes do not affect these ions.

Comparison of these results to the existing treatment at STWY/HP facilities (interim GAC) showed similar results.

5.2. Changes in Ortho- and Blended Phosphates

As indicated, the HWS uses two types of phosphates for treatment purposes. Zinc Orthophosphate is used to form protective coatings on the interior of pipes to prevent lead leaching into the bulk water, and a blended phosphate for the sequestration of iron and manganese.

The effectiveness of orthophosphate treatment depends on factors including phosphate dose, pH, DIC and other constituents in water (e.g., aluminum, iron, manganese). The target residual concentrations based on the piloting results are approximately 1.33 mg/L as PO₄.

Chapter 3 in the OCCT provides flowcharts for determining a PWSs corrosion control system (Exhibit 3.3 flowcharts 1b and 3b are provided in Attachment 4). According to Exhibit 3.3, the finished water will switch from having Fe/Mn present to none in the finished water. This changes the recommended treatment selection flowchart used, from Flowchart 3b to 1b. (This assumes finished water target pH of 7.4 s.u. and DIC at ≈20 mg/L as C as presented in Attachment 3). The takeaways are:

- Chart 3b used when Fe/Mn are present in finished water, recommends with DIC ≥ 5 mg/L as C, to add blended phosphates and to adjust pH to between 7.2-7.8 s.u. HWSs current practice of dosing zinc orthophosphate and blended phosphate at all treatment facilities; except at the MTF



which only adds zinc orthophosphate.

- With the introduction of greensand filtration at the proposed SWTF/HPTF for removal Fe/Mn, Chart 1b should be used. This flowchart recommends pH adjustment and addition of orthophosphate (no addition of blended phosphates). This practice is consistent with the existing corrosion control treatment at the MTF.

The addition of greensand filtration at the MTF has allowed for the elimination of polyphosphates for sequestration. According to the OCCT, "...sequestering agents such as polyphosphates may reduce black/red water complaints from iron and manganese oxidation but can cause increase in lead and copper levels measured at the tap." The text also indicates that polyphosphate should mainly be used for sequestration and not for lead and copper control alone. Elimination of the blended phosphate is recommended and supported by the OCCT guidance. This will also be consistent with the MTF corrosion control program.

Distribution system WQP results presented in Section 2 indicate that adequate concentrations of orthophosphate are found throughout the distribution system and is likely forming the protective coating on the interior of pipes and plumbing components. As each new treatment plant comes online and eliminates the use of polyphosphates, a slow transition will occur within the distribution system that should minimize impacts as Fe/Mn deposits in the distribution system dwindle overtime.

5.3. Simultaneous Compliance

The addition of treatment processes to the proposed SWTF and HPTF will be capable of meeting simultaneous compliance with the Revised Total Coliform Rule, Groundwater Rule, Stage 1/Stage 2 Disinfectants and Disinfection By-Product Rule, and the LCR and LCRR. As previously indicated, HWS is in compliance with the LCR, and implementation of new treatment should have minimal effect on changes to lead and copper results in the distribution system.

Revised Total Coliform Rule (RTCR) and Groundwater Rule (GWR): HWS is currently in compliance with the RTCR as indicated in their compliance monitoring program. There are no proposed changes to the disinfection process for the proposed SWTF other than the addition of UV-AOP process and diverting water from Hyannisport and Simmons Pond wells to their own dedicated treatment facility. The SWTF will continue to use the existing baffled storage tank and booster station and therefore require the same disinfection residual and contact time to meet 4-log inactivation of viruses. The proposed HPTF will require a 4-log determination if built as a separate plant with a new dedicated serpentine contact tank and entry point to the distribution system.

Stage 1/Stage 2 Disinfectants and Disinfection By-Product Rule (DBPR): HWS is currently in compliance with the DBPR. Treatment processes implemented will introduce more oxidants to the intermediate process water, however, sampling results indicated low levels of bromide and TOC. This suggests a low potential for DBP formation. Additionally, bromate, TTHMs, and HAA5s sampled in the simulated



finished water from piloting were low or non-detect. Finally, implementation of GAC as a treatment process will significantly remove TOC and decrease DBP precursors in the raw water.

6. Conclusion

This evidence presented herein shows that the additional treatment processes piloted for the proposed SWTF and HPTF will likely not result in significant changes in distribution system water chemistry and corrosivity or increases in lead and copper exceedances. This is apparent in the following major takeaways of this evaluation:

- HWS has historically been in compliance with the LCR as demonstrated through lead and copper and water quality parameter sampling. This is also true as similar treatment process changes at the MTF has not led to significant changes in distribution system lead and copper results.
- Comparison of the piloted proposed treatment system to the existing treatment systems at the STWY/HP facilities indicated no significant changes to water quality chemistry or corrosion indices.
- Comparison of the piloted proposed treatment system to the MTF indicated no significant changes to water quality chemistry or corrosion indices.
- The changes in the treatment processes do not impact simultaneous compliance with the TCR, DBPs and disinfection, but instead provide enhancements.

It is recommended that HWS continue to monitor WQPs at the entry points to the distribution systems as well as several locations throughout the distribution system.

ATTACHMENTS:

1. LEAD AND COPPER SAMPLING PLAN
2. HWS HYDRAULIC MODEL SCENARIOS
3. SUMMARY OF WATER QUALITY DATA FROM KLEINFELDER SAMPLING
4. OCCT EXCERPTS ON DISSOLVED INORGANIC CARBON AND CORROSION CONTROL DETERMINATION
5. LAB RESULTS FOR KLEINFELDER SAMPLING AT ALL THREE WELLS

ATTACHMENT 1
LEAD AND COPPER SAMPLING PLAN



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Kathleen A. Theoharides
Secretary

Karyn E. Polito
Lieutenant Governor

Martin Suuberg
Commissioner

PWSID	PWS NAME	TOWN_NAME	#LCR PRIMARY SITES
4020004	HYANNIS WATER SYSTEM	BARNSTABLE	60

DATE: 5/18/2021

Mr. Henricus Keijser
Hyannis Water System
47 Old Yarmouth Road
Hyannis, MA 02601

Re: Program: LCR
Sampling Plan Approval
Standard Reduced
310 CMR 22.06B

Dear Mr. Keijser:

This letter is to inform you that the Massachusetts Department of Environmental Protection (MassDEP), Drinking Water Program, Southeast Regional Office, has reviewed the lead and copper sampling plan that you submitted on May 13, 2021 to comply with the requirements of 310 CMR 22.06B, the Lead and Copper Rule. Based on your submission and certification MassDEP hereby approves your plan for sampling for lead and copper at the locations identified in the plan.

Enclosed please find a MassDEP approved and signed copy of the Lead and Copper Sampling Plan for your water system. **This sampling plan supersedes all previously approved sampling plans. This plan may include Alternate Sites. Please be reminded that all changes to this sampling plan must be approved by MassDEP in writing prior to sample collection.**

Compliance with the lead and copper action levels of 0.015 mg/l and 1.3 mg/l, respectively, are based on the 90th percentile results for each set of data you collect. Systems meeting the lead and copper action level may be granted a reduction in sampling based on MassDEP's determination in accordance with 310 CMR 22.06B(7)(d)4.

Please follow the MassDEP most recent "Instructions for Residents for Home Sampling" available on the website at <http://www.mass.gov/cea/agencies/massdep/water/approvals/drinking-water-forms.html#9>, Chain of Custody-Home sampling for Lead and Copper. Samples are to be collected after an extended period (at least 6 hours) of stagnant water conditions (i.e. no water use during this period) within the interior piping. Do not intentionally flush the line before the start of the 6-hour period. Due to this requirement, either early mornings or evenings upon returning from work are the best times for collecting samples. It is recommended that you check each sample Chain-of-Custody Form to confirm that the sample was collected in accordance with the sampling instructions. *A sample cannot be invalidated once it is analyzed.* Lead and copper samples must be analyzed by a Massachusetts certified laboratory using

EPA approved methods and submitted on Form LCR-C and Forms LCR-D or LCR-E (Note: the DEP Lead & Copper 90th Percentile Compliance Worksheet may be submitted as a substitute for Forms LCR-D or E.)

Please note that if a 90th percentile result exceeds the lead or copper action level you must immediately collect water quality samples from all entry points (i.e., sample the source water; post-treatment if treatment is used) and from sites in the distribution system which represent water quality throughout the distribution system (e.g., coliform sampling sites). The number of distribution sites to be sampled is based upon the population served:

System Population Served	No. Water Quality Sites	System Population Served	No. Water Quality Sites
>100,000	25	3,301-10,000	3
50,001-100,000	10	501-3,300	2
10,001-50,000	10	Less than or equal to 500	1

Two (2) sets of water quality data are required to be collected. The water quality parameters to be analyzed include: pH, alkalinity, conductivity, calcium, temperature, orthophosphate (if a phosphate inhibitor is used), and silica (if a silica based inhibitor is used). Water quality data shall be reported to the Department on Form LCR-WQP.

In addition, each entry point (finished water) must be sampled individually for lead and copper once within the same monitoring period. This sample is meant to be a "flushed" sample, which is collected after the water is run for several minutes, in order to accurately determine concentration within the source water and to avoid any potential contribution from plumbing materials. A "flushed" sample is different from the "first draw" sample that was previously discussed. The lead and copper source data shall be reported to the MassDEP on Form LCR-C noted as "Source Name-flushed sample".

Please note that if a 90th percentile result exceeds the **lead** action level at any time you must provide water users with information regarding the health effects of lead in drinking water. Please contact this office immediately for specific instructions.

Electronic versions of Lead and Copper MassDEP reporting forms are available at the following website address:

<http://www.mass.gov/eea/agencies/massdep/water/approvals/drinking-water-forms.html#9>

Important Note on Schools: In accordance with 310 CMR 22.06B(7)(a)9, a community system is also required to collect lead and copper samples (250 ml) from at least two schools and childcare facilities during each sampling period. The collection and analysis for the school and childcare sites, listed on Form LCR- B of your submittal, shall rotate through the local schools and childcare facilities until all schools and childcare facilities have been sampled before starting another rotation. **These school samples are not used to determine compliance with the Lead and Copper Rule** but are diagnostic and used to educate, facilitate and encourage school and childcare facilities to implement their own program to routinely evaluate lead and copper in their drinking water. As required by 310 CMR 22.06B(1)(g) Public Water Suppliers must provide the school and childcare sample results to each facility using the MassDEP Form located at <http://www.mass.gov/eea/agencies/massdep/water/approvals/drinking-water-forms.html#9>. For more information on the USEPA and MassDEP Lead Contamination Control Act (LCCA) voluntary program for schools and childcare facilities please see <http://www.mass.gov/eea/agencies/massdep/water/drinking/lead-in-drinking-water.html> .

If you have any questions on this information please contact Giliane Tardieu at (508) 946-2789 or giliane.tardieu@mass.gov.

Sincerely,



Jim McLaughlin, Chief
Drinking Water Program
Bureau of Water Resources

- Enclosures:
- Approved Lead & Copper Sampling Plan (Copy)
 - Revised Sampling Schedule dated: _____ & cover letter
 - Chain of Custody (LCR-COC)
 - Instructions for Residents for Home Sampling
 - Form LCR-WQP
 - Form LCR-C, D or E (or DEP LC 90th Percentile Compliance Worksheet)

cc: health@town.barnstable.ma.us
Kevin.sampson@Suez.com
Hans.Keijser@town.barnstable.ma.us

Y:\DWP\Archive\SERO\BARNSTABLE-4020004-LCR Sampling Plan Approval-2021-05-18



Massachusetts Department of Environmental Protection
Drinking Water Program

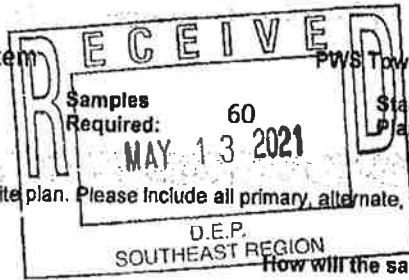
LEAD AND COPPER SAMPLING PLAN

LCR-SP-A

Primary Sites

I. PWS INFORMATION:

PWSID# 4020004 PWS Name: Hyannis Water System PWS Town: Barnstable
Phone: 508-775-0063 Population: 18,000
X3524



II. REPORTING:

Please type or print clearly using black ink, and attach a sample location site plan. Please include all primary, alternate, and school sheets as necessary with your submittal.

Sample Category Sample How will the samples be collected? Check one.

Tier ¹	Tier Class ²	Primary ¹ Sample Site Address	Location K ²	B ³	PWS	Homeowner or Resident	Lab	Other
1	1	B 34 Quisset Road- Centerville	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	1	B 144 Lafrance Avenue- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	1	B 88 Greenwood Ave- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	1	B 8 Hamden Circle- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	1	B 37 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	1	B 89 Goatfield Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	1	B 120 Bishops Terrace- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	1	B 98 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	1	B 115 Sudbury Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	1	B 54 Nobadeer Road- Centerville	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	1	B 34 Rabbit Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	1	B 25 Worcester Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	1	B 650 Old Strawberry Hill Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	1	B 143 Third Avenue- W. Hyannisport	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	1	B 146 Woodland Avenue- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Alternative Sampling Sites: Please add your alternate sampling sites on LCR-SP-B

Schools: 310 CMR 22.06B(7)(a)9 requires systems that serve schools or Early Education and Care Facilities (EECFs) to collect at least two samples from two schools or EECFs. For schools and EECFs please add your sites to form LCR-SP-C.

I do not have any lead service lines (check if applicable). If any of the above sites are not Tier 1 sites in accordance with Massachusetts Drinking Water Regulations 310 CMR 22.06B, my signature below indicates that: (1) Tier 1 sites were not available. (2) I have provided MassDEP with a "materials survey", (3) I have complied with 310 CMR 22.06B(7), and (4) if there are higher Tier sites in my distribution system, I have submitted a LCR highest Tier Form (LCR-Samp-HTS).

I certify under penalties of law that I am the person authorized to fill out this form and the information contained herein is true, accurate and complete to the best extent of my knowledge.

PWS Authorized Signature: *Kevin E. Sampson*
Date: 05-13-2021 Title: Project Manager

Email: kevin.sampson@suez.com

Phone: 508-775-0063

Classification Information for COM Systems Within each tier, use higher classification locations before lower classification locations (ex. Tier 1A before Tier 1B).

1* Tier 1 Class:

- A: Single Family Residence (SFR) with Lead Service lines (LSL) (partial or full) or lead-lined
- A2: Multifamily Residence (MFR) w/ LSL if ≥ 20% connections served by PWS are MFRs
- A3: SFR with lead goosenecks/pigtails
- B: SFR with lead pipes or copper pipes with lead/tin solder-Built in 1983, 1984, or 1985
- B2: SFR with verified Lead/Tin Solder built in 1986 or later

1* Tier 2 Class:

- C: MFR with LSL and/or lead goosenecks/pigtails
- D: MFR with lead pipes or copper pipes with lead/tin solder built 1983, 1984 or 1985
- E: Private building with LSL and/or with lead goosenecks/pigtails
- F: Private building with lead pipe or copper pipe with lead/tin solder installed in 1983, 1984, or 1985

1* Tier 3 Class:

- G: SFRs built prior to 1983
- H: Other/exceptional cases
- Note: (Please explain on LCR-SP-A2 Overflow sheet in the comments section)

Information for NTNC Systems

- 1* Tier 1:** Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or are served by a lead service line (LSL)
- 1* Tier 2:** Copper pipes with lead solder installed before 1983
- 1* Tier 3:** Not applicable

¹ During any monitoring period no MassDEP approved sampling site shall be sampled more than once without prior written approval from MassDEP
² Kitchen
³ Bathroom

For MassDEP use: Approved Deficient/Disapproved Comment

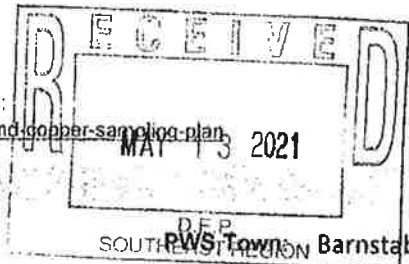
DEP STAFF: GILIANE TARDIEU Date: 5/17/21



LEAD AND COPPER SAMPLING PLAN

LCR-SP-A

Primary Sites – continuation sheet



MassDEP staff name:

Date:

This form is available at the MassDEP website at <https://www.mass.gov/doc/lcr-sp-a-lead-and-copper-sampling-plan>

I. PWS INFORMATION:

PWSID#: 4020004 PWS Name: Hyannis Water System

Phone: 508-775-0063 X3524

Population: 18,000

Samples Required: 60

Standard Plan

Reduced Plan

II. REPORTING:

Please type or print clearly using black ink, and attach a sample location site plan.

Sample Category		Sample Primary ¹ Sample Site Address	Location		How will the samples be collected? Check one			
Tier [†]	Tier Class [‡]		K ²	B ³	PWS	Homeowner or Resident	Lab	Other
1	B	46 Wayland Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	93 Uncle Willie's Way- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	21 Saint Joseph Street- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	36 Delta Street- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	29 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	56 Lexington Drive- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	40 Goatfield- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	206 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	4 Saint Francis Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	155 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	46 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	35 Pasture Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	15 Carla Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	79 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	62 Quisset Road- Centerville	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	39 Marks Path- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	99 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	23 Uncle Willies Way- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	59 Goatfield Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	20 Erin Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	505 Lincoln Road EXT.- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	57 Seagate Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	36 Lexington Drive- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	20 Weston Circle- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	130 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other/Exceptional Cases Comments:

If you have more primary sites please use the LCR-SP-A continuation sheet.

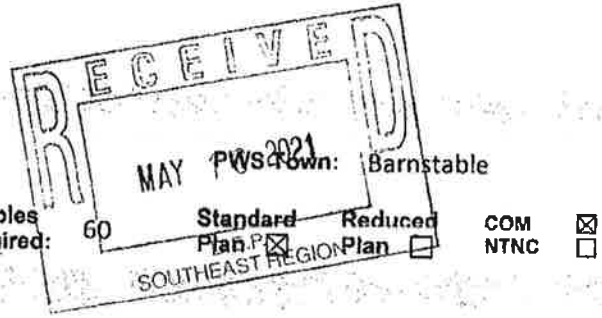
Please make additional LCR-SP-A continuation sheets as necessary.



LEAD AND COPPER SAMPLING PLAN

LCR-SP-A

Primary Sites – continuation sheet



I. PWS INFORMATION:

PWSID#: 4020004 PWS Name: Hyannis Water System

Phone: 508-775-0063 X3524 Population: 18,000

Samples Required: 60

II. REPORTING:

Please type or print clearly using black ink, and attach a sample location site plan.

Sample Category	Tier Class†	Sample Primary¹ Sample Site Address	Location		How will the samples be collected? Check one				
			K²	B³	PWS	Homeowner or Resident	Lab	Other	
1	B	294 Scudder Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	253 Sudbury Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	154 Woodland Avenue- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	40 Simmons Pond Circle- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	285 Old Town Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	30 Marks path- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	39 Wellesley Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	58 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	57 Saint John Street- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	5 Lil Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	58 Wagon Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	41 Wellesley Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	6 Lexington Drive- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	36 Worcester Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	25 Goatfield Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	290 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	64 Melbourne Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	53 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	395 Old Strawberry Hill Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	32 Buckwood Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other/Exceptional Cases Comments:

Please make additional LCR-SP-A continuation sheets as necessary.
This form is available at the MassDEP website at <https://www.mass.gov/doc/lcr-sp-a-lead-and-copper-sampling-plan>



Massachusetts Department of Environmental Protection
Drinking Water Program

LEAD AND COPPER SAMPLING PLAN
Alternative Sites

LCR-SP-B



I. PWS INFORMATION:

PWSID#: 4020004 PWS Name: Hyannis Water System

Phone: 508-775-0063
X3524

Population: 18,000

Samples Required: 60

Standard Plan Reduced Plan

PWS Town: Barnstable

II. REPORTING:

Please type or print clearly using black ink, and include on attached a sample location site plan.

After approval of the overall sampling plan (LCR-SP-A/ LCR-SP-B) by MassDEP, alternative LCR sites may be used without additional prior approval if:

- (1) the primary site result was not greater than the LCR action level during the previous sampling round (if previously sampled) and
- (2) the alternate site is at the same or higher tier than the primary site.

If these two criteria cannot be met then prior written approval from MassDEP is required prior to using the alternate site.

Sample Category	Tier†	Tier Class‡	Sample Alternative¹ Sample Site Address	Location		How will the samples be collected? Check one			
				K²	B³	PWS	Homeowner or Resident	Lab	Other
1	1	B	36 Kelley Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	1	B	71 Peacock Drive- hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	1	B	19 Erin lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	1	B	37 Wellesley Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	1	B	23 Park Place- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	1	B	23 Marks Path- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	1	B	81 Melbourne Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	1	B	25 Greenwood Avenue- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	1	B	1 Peacock Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	1	B	15 Seagate Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	1	B	23 Simmons Pond Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	1	B	17 Worcester Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	1	B	31 Worcester Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	1	B	83 Peacock Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	1	B	104 Pitchers Way- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	1	B	619 Falmouth Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	1	B	77 Peacock Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	1	B	19 Kennedy Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	1	B	25 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	1	B	127 Nobadeer Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	1	B	60 Lexington Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	1	B	39 Peacock Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	1	B	112 Wayland Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	1	B	44 Nobadeer Road- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	1	B	545 Lincoln Road EXT.- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	1	B	38 Fawcett Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	1	B	50 Oakview Terrace- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	1	B	39 Mainsail Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	1	B	455 Scudder Avenue- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	1	B	47 Pitchers Way- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have more alternative sites please use the LCR-B continuation sheet.



Massachusetts Department of Environmental Protection
Drinking Water Program

LEAD AND COPPER SAMPLING PLAN

LCR-SP-B

Alternative Sites - continuation sheet

Please make as many LCR-SP-B Alternative Sites continuation sheets as necessary.

Sample Category		Sample Alternative ¹ Sample Site Address	Location		How will the samples be collected? Check one			
Tier [†]	Tier Class [‡]		K ²	B ³	PWS	Homeowner or Resident	Lab	Other
1	B	114 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	134 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	124 Sudbury Lane- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	36 Wellesley Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	70 Buckwood Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	251 Arrowhead Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	19 Wagon Lane- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	24 Wellesley Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	33 Simmons Pond Circle- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	76 Smith Street- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	61 Peacock Drive- Hyannis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	82 Buckwood Drive- Hyannis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	B	7 Pitchers Way	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





Massachusetts Department of Environmental Protection
Drinking Water Program

LEAD AND COPPER SAMPLING PLAN

Schools and Early Education and Care Facilities

LCR-SP-C



I. PWS INFORMATION:

PWSID#: 4020004 PWS Name: Hyannis Water System

D.E.P. SOUTH WEST REGION PWS Town: Barnstable

II. REPORTING:

Please type or print clearly using black ink.

- 310 CMR 22.06B (7)(a)9 requires the collection of lead and copper samples from at least two schools.
- Systems that serve any schools or EECFs must rotate through their list of schools/EECFs and collect at least two samples (kitchen and bubbler/fountain) from two schools/EECFs during each sampling round until all facilities are sampled before starting over.
- When selecting an EECF, the PWS should focus on School Age Child Care programs.
- List all schools/EECFs served by the distribution system in the order that they will be sampled.
- If you have more schools /early education and care facilities use LCR-C school and EECF continuation sheets as necessary.

	List all School/EECFs Name (and School Org code if known)	Check type		Was facility previously sampled by the PWS?		Date of next sample?
		School	EECF	Yes	No	
1	Barnstable High School- 744 West Main Street	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
2	Barnstable Community Horace Mann- 165 Bearses Way	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
3	Barnstable Intermediate School- 895 Falmouth Road	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
4	Hyannis West Elementary- 549 West main Street	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
5	Enoch Cobb Early Learning Center- 77 Old Craigville Road	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
6	Academy of Early Learning- 465 Falmouth Road	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
7	ST. John Paul II High School- 120 High School Road	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
8	ST. Francis Xavier Prep- 33 Cross Street	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
9	Little Step Daycare- 184 Compass Circle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
10	Crystal Hyannis- 1582 Iyannough Road	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
11	Child Development- 154 Barnstable Road	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
12	Kiddie Kollege- 154 Bearses Way	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
13	Early learning Center- 744 main Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
14	Cape Cod Child Development- 83 Pearl Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
15	Cape Cod Child Development- 979 Pearl Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
16	Crystal Garden Children Center- 64 Enterprise Road	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
17	Bourne Sandwich Pre school- 90 Stevens Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
18	Stevens Street Pre School- 116 Stevens Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
19	Cape Care Network Cape Cod- 372 North Street	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
20	Sturgis Charter Public School- 427 Main Street	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
21	Faith Christian Academy- 270 Communication Way	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
22		<input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
23		<input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
24		<input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
25		<input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

ATTACHMENT 2
HWS HYDRAULIC MODEL SCENARIOS

ATTACHMENT 3

WATER QUALITY SUMMARY OF KLEINFELDER SAMPLING
& MAHER SAMPLING



Parameter	Unit	Hyannisport			Straightway 2			Simmons Pond			Maher Treatment Plant			
		Raw	Existing Treatment*	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Greensand Treated	UV Treated	GAC Treated
pH	s.u.	5.905	6.8	7.1	6.85	7.165	7.4	6.6	7.25	7.15	6.27	6.3	7.1	7.27
Carbon Dioxide	mg/L	29*	22.8*	3*	34.54	9.02	9.68	36.52	8.14	14.74	101	95	65.33	46.67
Dissolved Oxygen	mg/L	4.415	4.28	6.815	0.36	4.985	5.565	3.475	5.225	7.41	3.37	6.47	9.53	8.23
Temperature	°C	12.85	16.1	15.1	12.25	15.1	15.95	12.9	15.8	15.2				
Total Conductivity	umhos/cm	420	530	525	280	355	340	425	475	485	163.33	166.67	170	170
Alkalinity	mg/L as CaCO ₃	6.5	51	63.5	47.5	58.5	71	38	76	66	15	16.67	16.33	18.67
Dissolved Inorganic Carbon ¹		3.6	19.2	21.6	19.2	19.2	21.6	18	24	21.6	7.8	8.4	5.4	6
Calcium	mg/L	8.8	10	14.35	19	23.5	19	20	14.5	19	6.63	7	6.9	6.63
Chloride	mg/L	98	110	91.5	47.5	59.5	50.5	82	79	84	34	35	35	34.33
Iron	mg/L	0.0032 ²	0.0032 ²	0.0032 ²	1.365	0.0032 ²	0.0032 ²	0.0355	0.0032 ²	0.0032 ²	0.0603	0.0032 ²	0.0032 ²	0.0032 ³
Manganese	mg/L	0.12	0.001 ²	0.0115 ³	0.975	0.0255	0.00125 ³	0.155	0.0087	0.0012 ³	0.073	0.041	0.0393	0.0031
Magnesium	mg/L	3.15	3.5	4.8	5.5	6.9	5.5	5.65	4.85	5.5	2.87	2.93	2.83	2.77
Sulfate	mg/L	15	19	20.5	19	13	21	20	20	21	7.9	7.83	7.77	7.73
Sodium	mg/L	61.5	84	76	26	35	42	50	74	64.5	19	20	19.67	21
Oxidation reduction Potential	mv	816.8	757.6	742.75	641.85	555	547.1	623.05	611.2	626.35	250	270	246.67	576.67
Orthophosphate	mg/L as P	0.0845 ³	0.3	0.4*		0.25	0.3		0.3	0.45				
Total Hardness	mg/L as CaCO ₃	35	40	77*	70	87	69.5	73	57	70	28.33	29.33	29.33	28

¹Estimated values from OCCT Appendix B.1. Values are marked 20% higher than actual values to adjust for temperature correction

²Both sampling values were reported below detection limit

³ One of the sampling results was below detection limit

*Values reported are for only one sampling event and not average of 2 events



Parameter	Hyannisport			Straightway 2			Simmons Pond			Maher Treatment Plant			
	Raw	Existing Treatment*	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Greensand Treated	UV Treated	GAC Treated
Langelier Saturation Index (Method #1)	-4.23	-2.28	-1.75	-2.09	-1.33	-1.28	-2.65	-1.52	-1.77	-3.62	-3.52	-2.74	-2.53
Langelier Saturation Index (Method #2)	-4.06	-2.18	-1.64	-1.91	-1.19	-1.12	-2.48	-1.38	-1.64	-3.39	-3.29	-2.51	-2.30
Larson Skold	23.69	3.43	2.37	1.83	1.67	1.31	3.59	1.74	2.13	3.75	3.45	3.52	3.03
Chloride Sulfate Mass Ratio	6.53	5.79	4.46	2.5	4.58	2.4	4.1	3.95	4	4.30	4.47	4.50	4.44

*Values reported are for only one sampling event and not average of 2 events

ATTACHMENT 4

OCCT EXERCEPTS ON DISSOLVED INORGANIC CARBON AND CORROSION CONTROL DETERMINATION

be useful for all system types. The flowcharts have been updated to reflect new research conducted since 2003.

These flowcharts are a screening tool and are not meant to substitute for pilot studies and other site-specific investigations. They are meant to indicate likely possibilities and do not include information on optimizing any of the treatments. In particular, systems with LSLs should work with their primacy agencies to select treatment that most effectively reduces lead release from the service line and should also consider full LSL replacement as recommended earlier in this chapter. Also, as stated elsewhere in this document, the presence of other chemicals in the finished water such as aluminum, iron, manganese, and calcium may interfere with CCT and point to a need for additional studies and/or alternative control options.

Additional information on setting water quality parameters and dose for the treatment options is provided in Section 3.3.

Exhibit 3.3: Identifying the Appropriate Flowchart for Preliminary CCT Selection

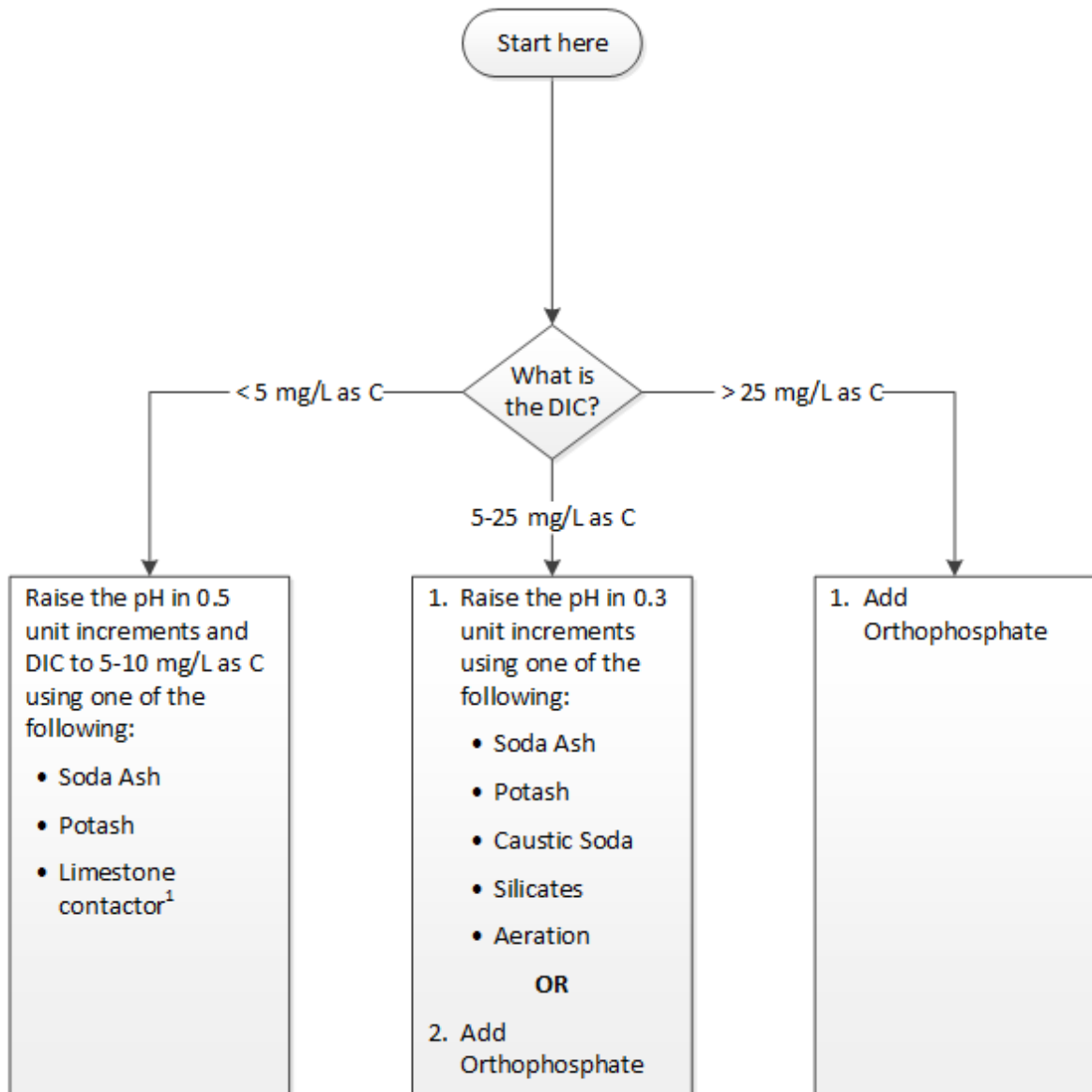
Is iron or manganese present in finished water? ¹	What is the contaminant to be addressed?	What is the finished water pH?	Use This Flowchart ²
No	Lead only, or Both Lead and Copper	< 7.2	1a
		7.2 - 7.8	1b
		>7.8 - 9.5	1c
		>9.5	1d
	Copper only	< 7.2	2a
		7.2 - 7.8	2b
		>7.8	2c
Yes	Lead and/or Copper	< 7.2	3a
		≥ 7.2	3b

Notes:

¹ Flowcharts 3a and 3b present several treatment options for lead and copper that also reduce iron and manganese. Systems can also consider removing iron and manganese first, then using flowcharts 1a through 2c to control for lead and/or copper.

² As discussed in Section 3.1.1, the term “limestone contactor” generically identifies filtration processes where calcite-containing materials are used to add pH, alkalinity, and DIC to water.

Flowchart 1b: Selecting Treatment for Lead only or Lead and Copper with pH from 7.2 to 7.8



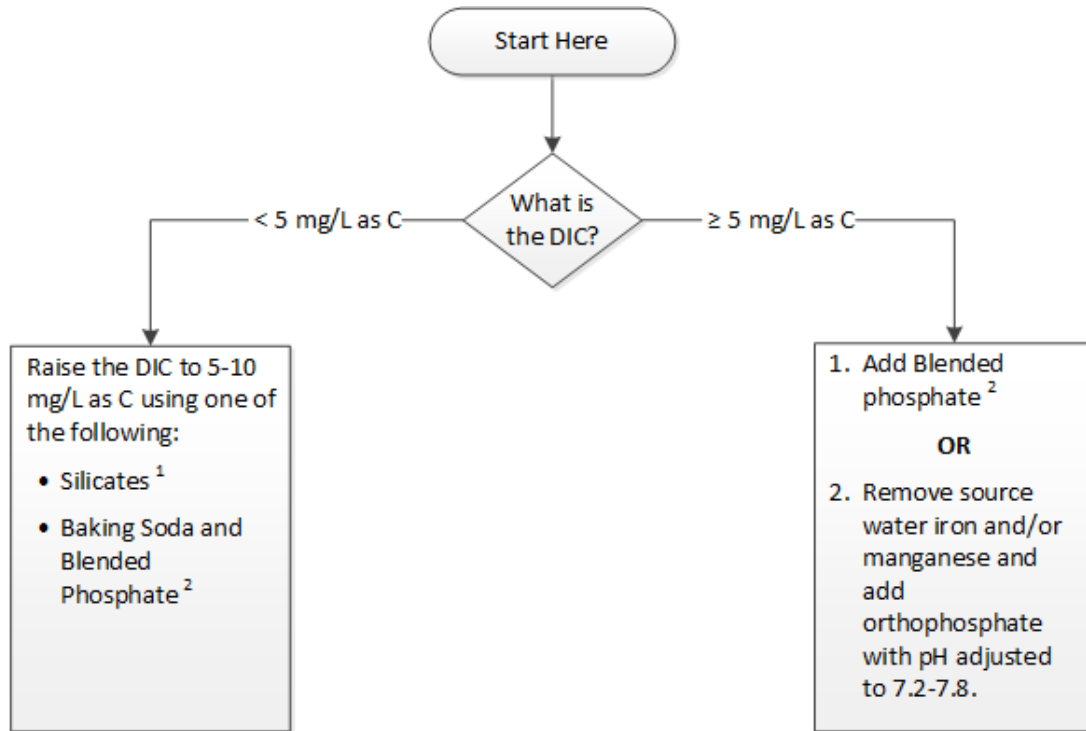
KEY:

AL = Action Level
 Caustic soda = sodium hydroxide (NaOH)
 DIC = Dissolved Inorganic Carbon
 mg/L as C = milligrams per liter as carbon
 Potash = potassium carbonate (K₂CO₃)
 Soda ash = sodium carbonate (Na₂CO₃)

Footnotes:

1. Carbon dioxide feed before the limestone contactor may be necessary.

Flowchart 3b: Selecting Treatment for Lead and/or Copper with Iron and Manganese in Finished Water and pH ≥ 7.2



KEY:
 AL = Action Level
 Baking soda = sodium bicarbonate (NaHCO₃)
 DIC = Dissolved Inorganic Carbon
 mg/L as C = milligrams per liter as carbon

Footnotes:

1. Silicates are most effective when combined iron and manganese concentrations are less than 1.0 mg/L.
2. The effectiveness of blended phosphate varies based on the formulation. Additional evaluation and/or monitoring is recommended. See Section 3.3.2 for additional discussion. Blended phosphates are less effective for controlling copper at DIC greater than 25 mg/L as C.

ATTACHMENT 5
WATER QUALITY LABORATORY RESULTS FROM
KLEINFELDER SAMPLING

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 56787
Date Received: 4/29/21

Project: Barnstable

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/13/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw-HP	Water	4/29/2021 8:45	56787-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	4/29/2021 9:45	56787-002	PFAS in Water by EPA 537.1

Project ID: Barnstable

Job ID: 56787

Sample#: 56787-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 4/29/21 8:45

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM		2101197	5/5/21	6:24	SW8260Dmod

Project ID: Barnstable

Job ID: 56787

Sample#: 56787-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 4/29/21 8:45

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		Reference
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Calcium	8.8	0.50	mg/L	1	AGN	5/5/21	13845	5/5/21	17:26	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	5/5/21	13845	5/5/21	17:26	E200.8
Magnesium	3.1	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	17:26	E200.8
Manganese	0.12	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	17:26	E200.8
Sodium	63	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	17:26	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	5/5/21	13845	5/11/21	17:39	E200.8
Hardness (as CaCO3)	35	3	mg/L	1			2101212			SM2340B

Sample#: 56787-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 4/29/21 8:45

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		Reference
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Alkalinity, Total (as CaCO3)	6	5	mg/L	1	SFM		2101167	5/3/21	14:30	SM2320B
Apparent Color	< 5.0	5.0	CU	1	DJM		2101150	4/30/21	16:35	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV		2101192	5/4/21	14:12	E300.0A
Chloride	100	2.5	mg/L	5	DBV		2101156	4/30/21	14:34	E300.0A
Nitrate-N	4.4	0.1	mg/L	1	DBV		2101156	4/30/21	20:20	E300.0A
Nitrite-N	< 0.1	0.1	mg/L	1	DBV		2101156	4/30/21	20:20	E300.0A
ortho-phosphate as P	< 0.1	0.1	mg/L	1	DBV		2101156	4/30/21	20:20	E300.0A
Sulfate	15	0.5	mg/L	1	DBV		2101156	4/30/21	20:20	E300.0A
Total Dissolved Solids (TDS)	220	20	mg/L	1	SFM		2101164	4/30/21	18:00	SM2540C
Total Coliform Bacteria	absent			1	DBV		2101144	4/29/21	16:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101144	4/29/21	16:40	SM9223BColilert
Conductivity	420	5	umhos/cm	1	SFM		2101137	4/30/21	12:30	SM2510B
pH	6.1H		pH	1	SFM		2101180	4/29/21	18:30	SM4500H+B
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB		2101143	4/30/21	11:45	SM2130B

Sample#: 56787-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 4/29/21 8:45

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		Reference
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101189	5/4/21	15:10	SM5310C

Project ID: Barnstable

Job ID: 56787

Sample#: 56787-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 4/29/21 8:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorobutane sulfonic acid (PFBS)	5.9	1.7	0.42	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluoroheptanoic acid (PFHPA)	3.1	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorohexane sulfonic acid (PFHXS)	20	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorohexanoic acid (PFHXA)	6.4	1.7	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorononanoic acid (PFNA)	0.88 J	1.7	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorooctane sulfonic acid (PFOS)	16	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorooctanoic acid (PFOA)	6.6	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	5/5/21	13842	5/5/21	11:44
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130		%	1	ACA	5/5/21	13842	5/5/21	11:44
13C2-PFDA SUR	96	70-130		%	1	ACA	5/5/21	13842	5/5/21	11:44
D5-NEtFOSAA SUR	82	70-130		%	1	ACA	5/5/21	13842	5/5/21	11:44
13C3-HFPO-DA SUR	104	70-130		%	1	ACA	5/5/21	13842	5/5/21	11:44

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: Barnstable

Job ID: 56787

Sample#: 56787-002

Sample ID: Field Blank

Matrix: Water

Sampled: 4/29/21 9:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.46	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13842	5/5/21	12:16
Surrogate Recovery		Limits								
13C2-PFHxA SUR	98	70-130		%	1	ACA	5/5/21	13842	5/5/21	12:16
13C2-PFDA SUR	119	70-130		%	1	ACA	5/5/21	13842	5/5/21	12:16
D5-NEtFOSAA SUR	84	70-130		%	1	ACA	5/5/21	13842	5/5/21	12:16
13C3-HFPO-DA SUR	111	70-130		%	1	ACA	5/5/21	13842	5/5/21	12:16

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56787

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101197	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101197	1,4-dioxane		9.8	ug/L	8	122	70 130		
SW8260Dmod	LCSD2101197	1,4-dioxane		9.5	ug/L	8	119	70 130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13845	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13845	Calcium	56785-001	8.8	mg/L				1	20	
		Iron	56785-001	< 0.050	mg/L					20	
		Magnesium	56785-001	3.2	mg/L				0	20	
		Manganese	56785-001	< 0.010	mg/L					20	
		Sodium	56785-001	91	mg/L				1	20	
		Zinc	56785-001	11	mg/L				2	20	
E200.8	LCS13845	Calcium		2.6	mg/L	2.5	106	85	115		
		Iron		0.52	mg/L	0.5	104	85	115		
		Magnesium		0.50	mg/L	0.5	101	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	99	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13845	Calcium		2.6	mg/L	2.5	105	85	115	1	20
		Iron		0.52	mg/L	0.5	103	85	115	0	20
		Magnesium		0.50	mg/L	0.5	101	85	115	0	20
		Manganese		0.50	mg/L	0.5	100	85	115	0	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	1	20
E200.8	MS13845	Calcium	56785-001	11	mg/L	2.5	96	70	130		
		Iron	56785-001	0.50	mg/L	0.5	99	70	130		
		Magnesium	56785-001	3.6	mg/L	0.5	79	70	130		
		Manganese	56785-001	0.50	mg/L	0.5	100	70	130		
		Sodium	56785-001	94	mg/L	5	83	70	130		
		Zinc	56785-001	12	mg/L	0.5	51	70	130		
E200.8	MS13845	Calcium	56822-001	23	mg/L	2.5	108	70	130		
		Iron	56822-001	0.48	mg/L	0.5	95	70	130		
		Magnesium	56822-001	6.9	mg/L	0.5	107	70	130		
		Manganese	56822-001	0.51	mg/L	0.5	97	70	130		
		Sodium	56822-001	67	mg/L	5	101	70	130		
		Zinc	56822-001	0.55	mg/L	0.5	101	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101156	Chloride		<	0.5	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		ortho-phosphate as P		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101156	Chloride	56785-001	110	mg/L				1	10
		ortho-phosphate as P	56785-001	18	mg/L				8	10
E300.0A	LCS2101156	Chloride		94	mg/L	100	94	90	110	
		Nitrate-N		9.6	mg/L	10	96	90	110	
		Nitrite-N		15	mg/L	15	99	90	110	
		ortho-phosphate as P		9.4	mg/L	10	94	90	110	
		Sulfate		100	mg/L	100	100	90	110	
E300.0A	LCSD2101156	Chloride		95	mg/L	100	95	90	110	0
		Nitrate-N		9.6	mg/L	10	96	90	110	0
		Nitrite-N		15	mg/L	15	99	90	110	0
		ortho-phosphate as P		9.8	mg/L	10	98	90	110	4
		Sulfate		100	mg/L	100	100	90	110	0
E300.0A	MS2101156	Chloride	56785-001	180	mg/L	83.3	85 *	90	110	
		ortho-phosphate as P	56785-001	24	mg/L	8.3	85 *	90	110	
E300.0A	MS2101156	Chloride	56797-003	61	mg/L	16	41 *	90	110	
E300.0A	BLK2101192	Bromide		<	0.1	mg/L				
E300.0A	DUP2101192	Bromide	56821-001	<	0.1	mg/L				10
E300.0A	LCS2101192	Bromide		9.8	mg/L	10	98	90	110	
E300.0A	LCSD2101192	Bromide		9.7	mg/L	10	97	90	110	0
E300.0A	MS2101192	Bromide	56821-001	1.6	mg/L	1.66	95	90	110	
SM2120B	DUP2101150	Apparent Color	56792-007	<	5	CU				20
SM2120B	LCS2101150	Apparent Color		35	CU	35		30	40	
SM2120B	PB2101150	Apparent Color		<	5	CU		5		
SM2320B	DUP2101167	Alkalinity, Total (as CaCO3)	56792-008	59	mg/L				2	10
SM2320B	LCS2101167	Alkalinity, Total (as CaCO3)		25	mg/L	25	101	90	110	
SM2320B	LCSD2101167	Alkalinity, Total (as CaCO3)		26	mg/L	25	103	90	110	1
SM2320B	PB2101167	Alkalinity, Total (as CaCO3)		<	5	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101137	Conductivity		<	5	uS/cm				
SM2510B	DUP2101137	Conductivity	56792-008	530	uS/cm				0	20
SM2510B	LCS2101137	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101137	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101164	Total Dissolved Solids (TDS)	56752-001	1000	mg/L				2	5
SM2540C	LCS2101164	Total Dissolved Solids (TDS)		110	mg/L	99.2	109	75 125		
SM2540C	PB2101164	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101180	pH	56796-002	5.4	pH					
SM4500H+B	DUP2101180	pH	56823-001	5.5	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		95			%			70 130		
		D5-NEIFOSAA SUR		81			%			70 130		
		13C3-HFPO-DA SUR		94			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56773-009	0.76 J	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56773-009	1.7 U	1.7	0.33	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56773-009	1.7 U	1.7	0.27	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56773-009	2.6	1.7	0.42	ng/L				2	30
		perfluorodecanoic acid (PFDA)	56773-009	1.5 J	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDOA)	56773-009	1.7 U	1.7	0.36	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56773-009	12	1.7	0.28	ng/L				3	30
		perfluorohexane sulfonic acid (PFHXS)	56773-009	29	1.7	0.33	ng/L				1	30
		perfluorohexanoic acid (PFHXA)	56773-009	7.1	1.7	0.29	ng/L				5	30
		perfluorononanoic acid (PFNA)	56773-009	4.1	1.7	0.38	ng/L				17	30
		perfluorooctane sulfonic acid (PFOS)	56773-009	58	1.7	0.34	ng/L				5	30
		perfluorooctanoic acid (PFOA)	56773-009	56	1.7	0.28	ng/L				4	30
		perfluorotetradecanoic acid (PFTEA)	56773-009	1.7 U	1.7	0.42	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56773-009	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56773-009	1.7 U	1.7	0.27	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56773-009	1.7 U	1.7	0.33	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56773-009	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56773-009	1.7 U	1.7	0.15	ng/L					30
		13C2-PFHxA SUR	56773-009	42			%			70 130	*	
		13C2-PFDA SUR	56773-009	145			%			70 130	*	
		D5-NEIFOSAA SUR	56773-009	74			%			70 130		
		13C3-HFPO-DA SUR	56773-009	38			%			70 130	*	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		4.5	2.0	0.30	ng/L	4	112	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		3.8	2.0	0.39	ng/L	4	96	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		4.2	2.0	0.33	ng/L	4	104	50 150		
		perfluorobutane sulfonic acid (PFBS)		3.3	2.0	0.50	ng/L	3.54	94	50 150		
		perfluorodecanoic acid (PFDA)		4.0	2.0	0.34	ng/L	4	101	50 150		
		perfluorododecanoic acid (PFDOA)		4.0	2.0	0.43	ng/L	4	100	50 150		
		perfluoroheptanoic acid (PFHPA)		4.5	2.0	0.33	ng/L	4	113	50 150		
		perfluorohexane sulfonic acid (PFHXS)		3.7	2.0	0.40	ng/L	3.8	97	50 150		
		perfluorohexanoic acid (PFHXA)		4.0	2.0	0.35	ng/L	4	101	50 150		
		perfluorononanoic acid (PFNA)		4.0	2.0	0.45	ng/L	4	101	50 150		
		perfluorooctane sulfonic acid (PFOS)		3.3	2.0	0.40	ng/L	3.84	86	50 150		
		perfluorooctanoic acid (PFOA)		4.2	2.0	0.33	ng/L	4	105	50 150		
		perfluorotetradecanoic acid (PFTEA)		3.4	2.0	0.50	ng/L	4	86	50 150		
		perfluorotridecanoic acid (PFTRIA)		4.1	2.0	0.13	ng/L	4	102	50 150		
		perfluoroundecanoic acid (PFUNA)		3.6	2.0	0.32	ng/L	4	90	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.8	2.0	0.39	ng/L	3.78	74	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		3.1	2.0	0.40	ng/L	3.74	83	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		4.2	2.0	0.18	ng/L	3.78	110	50 150		
		13C2-PFHxA SUR		97			%			70 130		
		13C2-PFDA SUR		103			%			70 130		
		D5-NEIFOSAA SUR		85			%			70 130		
		13C3-HFPO-DA SUR		110			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56787-001	180	1.7	0.25	ng/L	167	106	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56787-001	150	1.7	0.33	ng/L	167	89	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56787-001	170	1.7	0.27	ng/L	167	100	70 130		
		perfluorobutane sulfonic acid (PFBS)	56787-001	150	1.7	0.42	ng/L	147	97	70 130		
		perfluorodecanoic acid (PFDA)	56787-001	150	1.7	0.29	ng/L	167	89	70 130		
		perfluorododecanoic acid (PFDOA)	56787-001	150	1.7	0.36	ng/L	167	89	70 130		
		perfluoroheptanoic acid (PFHPA)	56787-001	160	1.7	0.28	ng/L	167	95	70 130		
		perfluorohexane sulfonic acid (PFHXS)	56787-001	170	1.7	0.33	ng/L	158	94	70 130		
		perfluorohexanoic acid (PFHXA)	56787-001	160	1.7	0.29	ng/L	167	92	70 130		
		perfluorononanoic acid (PFNA)	56787-001	160	1.7	0.38	ng/L	167	93	70 130		
		perfluorooctane sulfonic acid (PFOS)	56787-001	150	1.7	0.33	ng/L	160	85	70 130		
		perfluorooctanoic acid (PFOA)	56787-001	170	1.7	0.28	ng/L	167	95	70 130		
		perfluorotetradecanoic acid (PFTEA)	56787-001	140	1.7	0.41	ng/L	167	83	70 130		
		perfluorotridecanoic acid (PFTRIA)	56787-001	150	1.7	0.11	ng/L	167	91	70 130		
		perfluoroundecanoic acid (PFUNA)	56787-001	150	1.7	0.27	ng/L	167	87	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56787-001	130	1.7	0.33	ng/L	158	84	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56787-001	140	1.7	0.33	ng/L	156	90	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56787-001	140	1.7	0.15	ng/L	158	88	70 130		
		13C2-PFHxA SUR	56787-001	94			%			70 130		
		13C2-PFDA SUR	56787-001	95			%			70 130		
		D5-NEIFOSAA SUR	56787-001	80			%			70 130		
		13C3-HFPO-DA SUR	56787-001	104			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

56787

ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Technology Dr. Westborough MA
Report To: Alex Bishop
Phone #: 914-406-9598
Invoice to:
Email: abb.bishop@kleinfelder.com
PO #:

Project Name: Barnstable
Project #:
Project Location: NH MA ME VT
Accreditation Required? N/Y
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting Limits: QAPP GW-1 S-1
EPA DW Other
Quote #
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664		<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	
<input type="checkbox"/> pH	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> pH	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity
<input type="checkbox"/> TSS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS	<input type="checkbox"/> TSS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals
<input type="checkbox"/> Total Metals-list: Cu, Ni, Mg, Zn, Fe, Mn	<input type="checkbox"/> Dissolved Metals-list:		<input type="checkbox"/> Total Metals-list: Cu, Ni, Mg, Zn, Fe, Mn	<input type="checkbox"/> Dissolved Metals-list:	
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride	<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP		<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC
<input type="checkbox"/> Subcontract: Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Subcontract: Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos
<input checked="" type="checkbox"/> Total Coliform			<input checked="" type="checkbox"/> Total Coliform		
<input type="checkbox"/> Grab (G) or Composite (C)			<input type="checkbox"/> Grab (G) or Composite (C)		

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
56787a	Raw -HP	1	✓								04/29/21	0845	
	Raw -HP	7	✓										
	Raw -HP	1	✓										
	Raw -HP	2	✓										
	Raw -HP	2	✓										
	Raw -HP	3	✓										
02	Field Blank	1	✓								04/29/21	0945	

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

SPECIAL INSTRUCTIONS
See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.
REPORTING INSTRUCTIONS PDF (e-mail address) abb.bishop@kleinfelder.com & KRyan@kleinfelder.com
 HARD COPY REQUIRED EDD _____
RECEIVED ON ICE YES NO
TEMPERATURE 3 °C

CUSTODY RECORD
QSD-01 Revision 03/09/2020

Relinquished by Sampler: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1205</u>	Received by: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1205</u>
Relinquished by: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1400</u>	Received by: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1400</u>
Relinquished by: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1602</u>	Received by Laboratory: <u>[Signature]</u>	Date: <u>4/29/21</u> Time: <u>1602</u>

Sample Receipt Condition Report

56787

Absolute Resource Associates

Job Number: _____

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 3 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments: _____

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:
	40mL(G)	250mL(P)	500mL(P)	1L(G)	125mL(P)	250mL(P)	500mL(P)	1L(P)	
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)					*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual CI not present: ABN625 _____ Pest608 _____ Bacteria ResCI ✓ by analyst PC Dry applicable? Y N 1L(G) _____ 1L(P) _____
HNO ₃	125mL(P)	250mL(P)	500mL(P)						
H ₂ SO ₄	40mL(G) <u>2</u>	60mL(P)	125mL(P)		250mL(P)	500mL(P)			
NaOH	125mL(P)	250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)						
ZnAc-NaOH	125mL(P)	250mL(P)							
Trizma	125mL(P)	250mL(P)	<u>4</u>						
NH ₄ Ac	125mL(P)	250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)	<u>1</u>						
MeOH	20mL(G)	40mL(G)							
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe					
None (water)	40ml (G) <u>2</u>	60mL(P) <u>2</u>	125mL(P) <u>3</u>	250mL(P)	<u>1</u>	500mL(P)	<u>1</u>		
Mold	Cassette	Bulk	Plate	Tape Lift					
Asbestos	Cassette	Bulk							
Lead	Cassette	Bulk	Wipe						

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?		<input checked="" type="checkbox"/>		asked for total phos from unpro bottle that Ortho is taking them
Analyses marked on COC match bottles received?	<input checked="" type="checkbox"/>			
VOC & TOC Water-no headspace?	<input checked="" type="checkbox"/>			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	<input checked="" type="checkbox"/>			
PFAS: Lab specific bottles? QC received, if required?	<input checked="" type="checkbox"/>		<u>1</u>	
Bacteria bottles provided by ARA?	<input checked="" type="checkbox"/>			
Samples within holding time?	<input checked="" type="checkbox"/>			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	<input checked="" type="checkbox"/>			DBV, SRM, EB
Date, time & ID on samples match CoC?	<input checked="" type="checkbox"/>			
Rushes communicated to analyst in writing?			<input checked="" type="checkbox"/>	
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests. T-phos

Inspected and Received By: [Signature] Date/Time: 4/30/21 7:45

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

	Initials	Date	What was sent?
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 56785
Date Received: 4/29/21

Project: Barnstable

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/13/2021
Total number of pages: 13

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated HP	Water	4/29/2021 11:45	56785-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable

Job ID: 56785

Sample#: 56785-001

Sample ID: Simulated HP

Matrix: Water

Sampled: 4/29/21 11:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
chloroform	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	16:08	E524.2	
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	16:08	E524.2	
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	16:08	E524.2	
bromoform	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	16:08	E524.2	
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	16:08	E524.2	
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	101	70-130	%	1	LMM	2101172	5/3/21	16:08	E524.2	
1,4-dichlorobenzene-D4 SUR	98	70-130	%	1	LMM	2101172	5/3/21	16:08	E524.2	

Sample#: 56785-001

Sample ID: Simulated HP

Matrix: Water

Sampled: 4/29/21 11:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Calcium	8.7	0.50	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8
Magnesium	3.2	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8
Sodium	90	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8
Zinc	11	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	17:05	E200.8

Project ID: Barnstable

Job ID: 56785

Sample#: 56785-001

Sample ID: Simulated HP

Matrix: Water

Sampled: 4/29/21 11:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Alkalinity, Total (as CaCO3)	47	5	mg/L	1	SFM	2101167	5/3/21	14:30	SM2320B	
Apparent Color	< 5.0	5.0	CU	1	DJM	2101150	4/30/21	16:34	SM2120B	
Bromide	< 0.1	0.1	mg/L	1	DBV	2101134	4/29/21	18:52	E300.0A	
Chloride	100M	2.5	mg/L	5	DBV	2101156	4/30/21	13:45	E300.0A	
M = The recovery for the matrix spike was 85%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.										
ortho-phosphate as P	16M	0.5	mg/L	5	DBV	2101156	4/30/21	13:45	E300.0A	
M = The recovery for the matrix spike was 85%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.										
Sulfate	23	0.5	mg/L	1	DBV	2101134	4/29/21	18:52	E300.0A	
Total Dissolved Solids (TDS)	330	20	mg/L	1	SFM	2101164	4/30/21	18:00	SM2540C	
Total Phosphorus as P	15	1.0	mg/L	100	WAS	2101135	4/30/21	13:05	E365.3	
Total Coliform Bacteria	absent			1	DBV	2101144	4/29/21	16:40	SM9223BColilert	
E. coli Bacteria	absent			1	DBV	2101144	4/29/21	16:40	SM9223BColilert	
Conductivity	550	5	umhos/cm	1	SFM	2101137	4/30/21	12:30	SM2510B	
pH	6.5H		pH	1	SFM	2101132	4/29/21	18:12	SM4500H+B	
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB	2101143	4/30/21	11:43	SM2130B	

Sample#: 56785-001

Sample ID: Simulated HP

Matrix: Water

Sampled: 4/29/21 11:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	14:52	SM5310C	

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56785

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 56785-001 did not meet the acceptance criteria for chloride and ortho-phosphate as P. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101172	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			96	%			70	130		
		1,4-dichlorobenzene-D4 SUR			104	%			70	130		
E524.2	DUP2101172	chloroform	56803-003	<	0.50	ug/L				20		
		bromodichloromethane	56803-003	<	0.50	ug/L				20		
		dibromochloromethane	56803-003	<	0.50	ug/L				20		
		bromoform	56803-003	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	56803-003		90	%			70	130		
		1,4-dichlorobenzene-D4 SUR	56803-003		100	%			70	130		
E524.2	LCS2101172	chloroform			10	ug/L	10	105	70	130		
		bromodichloromethane			11	ug/L	10	110	70	130		
		dibromochloromethane			12	ug/L	10	115	70	130		
		bromoform			12	ug/L	10	120	70	130		
		4-bromofluorobenzene SUR			109	%			70	130		
		1,4-dichlorobenzene-D4 SUR			128	%			70	130		
E524.2	LCSD2101172	chloroform			10	ug/L	10	102	70	130	2	20
		bromodichloromethane			11	ug/L	10	105	70	130	4	20
		dibromochloromethane			11	ug/L	10	110	70	130	5	20
		bromoform			12	ug/L	10	117	70	130	3	20
		4-bromofluorobenzene SUR			107	%			70	130		
		1,4-dichlorobenzene-D4 SUR			119	%			70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13845	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13845	Calcium	56785-001	8.8	mg/L				1	20	
		Iron	56785-001	< 0.050	mg/L					20	
		Magnesium	56785-001	3.2	mg/L				0	20	
		Manganese	56785-001	< 0.010	mg/L					20	
		Sodium	56785-001	91	mg/L				1	20	
		Zinc	56785-001	11	mg/L				2	20	
E200.8	LCS13845	Calcium		2.6	mg/L	2.5	106	85	115		
		Iron		0.52	mg/L	0.5	104	85	115		
		Magnesium		0.50	mg/L	0.5	101	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	99	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13845	Calcium		2.6	mg/L	2.5	105	85	115	1	20
		Iron		0.52	mg/L	0.5	103	85	115	0	20
		Magnesium		0.50	mg/L	0.5	101	85	115	0	20
		Manganese		0.50	mg/L	0.5	100	85	115	0	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	1	20
E200.8	MS13845	Calcium	56785-001	11	mg/L	2.5	96	70	130		
		Iron	56785-001	0.50	mg/L	0.5	99	70	130		
		Magnesium	56785-001	3.6	mg/L	0.5	79	70	130		
		Manganese	56785-001	0.50	mg/L	0.5	100	70	130		
		Sodium	56785-001	94	mg/L	5	83	70	130		
		Zinc	56785-001	12	mg/L	0.5	51	70	130		
E200.8	MS13845	Calcium	56822-001	23	mg/L	2.5	108	70	130		
		Iron	56822-001	0.48	mg/L	0.5	95	70	130		
		Magnesium	56822-001	6.9	mg/L	0.5	107	70	130		
		Manganese	56822-001	0.51	mg/L	0.5	97	70	130		
		Sodium	56822-001	67	mg/L	5	101	70	130		
		Zinc	56822-001	0.55	mg/L	0.5	101	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101134	Bromide		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	LCS2101134	Bromide		9.5	mg/L	10	95	90	110	
		Sulfate		98	mg/L	100	98	90	110	
E300.0A	LCSD2101134	Bromide		9.6	mg/L	10	96	90	110	0
		Sulfate		98	mg/L	100	98	90	110	0
E300.0A	BLK2101156	Chloride		<	0.5	mg/L				
		ortho-phosphate as P		<	0.1	mg/L				
E300.0A	DUP2101156	Chloride	56785-001	110	mg/L				1	10
		ortho-phosphate as P	56785-001	18	mg/L				8	10
E300.0A	LCS2101156	Chloride		94	mg/L	100	94	90	110	
		ortho-phosphate as P		9.4	mg/L	10	94	90	110	
E300.0A	LCSD2101156	Chloride		95	mg/L	100	95	90	110	0
		ortho-phosphate as P		9.8	mg/L	10	98	90	110	4
E300.0A	MS2101156	Chloride	56785-001	180	mg/L	83.3	85	90	110	
		ortho-phosphate as P	56785-001	24	mg/L	8.3	85	90	110	
E300.0A	MS2101156	Chloride	56797-003	61	mg/L	16	41	90	110	
E365.3	DUP2101135	Total Phosphorus as P	56785-001	16	mg/L				6	20
E365.3	LCS2101135	Total Phosphorus as P		0.20	mg/L	0.2	99	75	125	
E365.3	LCSD2101135	Total Phosphorus as P		0.19	mg/L	0.2	97	75	125	3
E365.3	MS2101135	Total Phosphorus as P	56760-001	0.39	mg/L	0.2	97	75	125	
E365.3	PB2101135	Total Phosphorus as P		<	0.01	mg/L				
SM2120B	DUP2101150	Apparent Color	56792-007	<	5	CU				20
SM2120B	LCS2101150	Apparent Color		35	CU	35		30	40	
SM2120B	PB2101150	Apparent Color		<	5	CU		5		
SM2320B	DUP2101167	Alkalinity, Total (as CaCO3)	56792-008	59	mg/L				2	10
SM2320B	LCS2101167	Alkalinity, Total (as CaCO3)		25	mg/L	25	101	90	110	
SM2320B	LCSD2101167	Alkalinity, Total (as CaCO3)		26	mg/L	25	103	90	110	1
SM2320B	PB2101167	Alkalinity, Total (as CaCO3)		<	5	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101137	Conductivity		<	5	uS/cm				
SM2510B	DUP2101137	Conductivity	56792-008	530	uS/cm				0	20
SM2510B	LCS2101137	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101137	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101164	Total Dissolved Solids (TDS)	56752-001	1000	mg/L				2	5
SM2540C	LCS2101164	Total Dissolved Solids (TDS)		110	mg/L	99.2	109	75 125		
SM2540C	PB2101164	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101132	pH	56730-001	7.0	pH					
SM4500H+B	DUP2101132	pH	56757-001	7.7	pH					
SM4500H+B	DUP2101132	pH	56785-001	6.7	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

56785

ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Technology Dr. Westborough, MA
Report To: Alex Bishop
Phone #: 914-406-9598
Invoice to: _____
Email: abbishop@kleinfelder.com
PO #: _____

Project Name: Barnstable
Project #: _____
Project Location: NH MA ME VT
Accreditation Required? N/Y
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting QAPP GW-1 S-1
Limits: EPA DW Other _____
Quote # _____
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<input type="checkbox"/> TPH	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> Apparent Color	<input type="checkbox"/> TSS	<input type="checkbox"/> SDS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS	<input type="checkbox"/> Alkalinity	<input type="checkbox"/> Acidity	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> Hardness	<input type="checkbox"/> Total Metals-list: <u>Ca, Na, Mg, Zn, Fe, Mn</u>	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TON	<input type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos	<u>Total Coliform</u>	<u>TTHM, HAA</u>	<input type="checkbox"/> Grab (G) or Composite (C)
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Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
<u>55125-01</u>	<u>Simulated HP</u>	<u>1</u>	<input checked="" type="checkbox"/>								<u>04/29/21</u>	<u>11:45 AM</u>	<u>MB</u>
	<u>Simulated HP</u>	<u>8</u>	<input checked="" type="checkbox"/>							<u>THIO</u>	<u>04/29/21</u>	<u>11:45</u>	
	<u>Simulated HP</u>	<u>1</u>	<input checked="" type="checkbox"/>							<u>NP</u>	<u>04/29/21</u>	<u>11:45</u>	
	<u>Simulated HP</u>	<u>1</u>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	<u>04/29/21</u>	<u>11:45</u>	
	<u>Simulated HP</u>	<u>1</u>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	<u>04/29/21</u>	<u>11:45</u>	
	<u>Simulated HP</u>	<u>2</u>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	<u>04/29/21</u>	<u>11:45</u>	
	<u>Simulated HP</u>	<u>25</u>	<input checked="" type="checkbox"/>							<u>NH₄Cl</u>	<u>04/29/21</u>	<u>11:45</u>	

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.
SPECIAL INSTRUCTIONS
REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com
 HARD COPY REQUIRED EDD _____
RECEIVED ON ICE YES NO
TEMPERATURE 3 °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>12:05</u>	Received by: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>12:05</u>
	Relinquished by: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>14:00</u>	Received by: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>14:00</u>
	Relinquished by: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>16:00</u>	Received by Laboratory: <u>[Signature]</u>	Date: <u>4/29/21</u>	Time: <u>16:00</u>

Sample Receipt Condition Report

56785

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 3 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:
HCl	40mL(G)	<u>2</u>	250mL(P)		500mL(P)		1L(G)	*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y N
HNO ₃	125mL(P)		250mL(P)	<u>1</u>	500mL(P)			
H ₂ SO ₄	40mL(G)	<u>2</u>	60mL(P)		125mL(P)	<u>1</u>	250mL(P)	
NaOH	125mL(P)		250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)			
ZnAc-NaOH	125mL(P)		250mL(P)					
Trizma	125mL(P)		250mL(P)					
NH ₄ Ac	125mL(P)		250mL(P)					
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	<u>1</u>				
MeOH	20mL(G)		40mL(G)					
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe	
None (water)	40mL(G) <u>60 P</u>	<u>3</u>	60mL(P) <u>60 P</u>	<u>3</u>	125mL(P)	<u>3</u>	250mL(P)	
						<u>1</u>	500mL(P)	
							1L(G)	
							1L(P)	

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?	X			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	X			
PFAS: Lab specific bottles? QC received, if required?			X	
Bacteria bottles provided by ARA?	X		X	TESTED 4/20
Samples within holding time?	X			
Immediate tests communicated in writing: NO ₃ , NO ₂ -PO ₄ pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	X			
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?	X			HAA
Pesticides EPA 608 pH5-9?			X	
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: SPM

 Date/Time: 4/29/21 17:00

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HT's communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 05/13/2021
Work Order #: 2105-00651
Client Job #:
Date Received: 05/05/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 05/13/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2105-00651-001
SAMPLED BY: AB

SAMPLE ADDRESS: Simulated HP
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 04/29/2021 11:45AM
DATE AND TIME RECEIVED: 05/05/2021 11:17AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 4.9° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	05/06/2021 09:45AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/07/2021 04:08PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/07/2021 04:08PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/07/2021 04:08PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	05/07/2021 04:08PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	05/07/2021 04:08PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/07/2021 04:08PM
2,3-Dibromopropionic Acid	108	%	✓			70-130%	EPA 552.2 - SS	KV-NH	05/07/2021 04:08PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 516911
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4892364	L2122108/SIMULATED-HP	317.0	04/29/21 11:45	Client	05/05/21 08:15

Report Summary

Note: Sample container was provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Nathan Trowbridge at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.



Authorized Signature

Title

05/14/2021

Date

Client Name: Alpha Analytical

Report #: 516911

Client Name: Alpha Analytical

Report #: 516911

Sampling Point: L2122108/SIMULATED-HP

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	05/12/21 17:32	4892364

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

pm 5/5/21 425132



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2122108

516911

Client Information Project Information Regulatory Requirements/Report Limits

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

Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Location: MA
Project Manager: Nathalie Lewis

State/Federal Program:
Regulatory Criteria:

Turnaround & Deliverables Information

Due Date:
Deliverables:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2122108 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
4892364	SIMULATED-HP	04-29-21 11:45	DW	Bromate	
Client Provided Sample Container					

Form No: AL_subcoc	Relinquished By:	Date/Time:	Received By:	Date/Time:
		5/4/21		
				5/5/2021 0815

Temp. 0.2°



CHAIN OF CUSTODY

PAGE _____ OF _____

Date Rec'd in Lab: 4/29/21

ALPHA Job #: L2122108

6 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: *Borshole*

Project Location: *Hyannisport well*

Project #:

Project Manager:

ALPHA Quote #:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved!)

Date Due:

Report Information - Data Deliverables

ADEx EMAIL

Billing Information

Same as Client info PO #:

Client Information

Client: *Kleinfelder*

Address: *4 Technology Dr.
Westborough, MA*

Phone: *914-400-9518*

Email: *abb.shop@kleinfelder.com*

Additional Project Information:

*email reports to
abb.shop@kleinfelder.com and k.ryan@kleinfelder.com*

Regulatory Requirements & Project Information Requirements

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

ANALYSIS		SAMPLE INFO
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	<input type="checkbox"/> ABN <input type="checkbox"/> PAH	
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	<input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PPI3	Preservation <input type="checkbox"/> Lab to do
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> PCB <input type="checkbox"/> PEST	Sample Comments
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	

Brownlee

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
22108 -01	<i>Raw-HP</i>	<i>4/29/21</i>	<i>0845</i>	<i>DW</i>	<i>AB</i>
-02	<i>Finished-HP</i>	<i>4/29/21</i>	<i>1150</i>	<i>DW</i>	<i>AB</i>
-03	<i>Simulated-HP</i>	<i>4/29/21</i>	<i>1145</i>	<i>DW</i>	<i>AB</i>

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

Preservative
 A= None
 B= HCl
 C= HNO₃
 D= H₂SO₄
 E= NaOH
 F= MeOH
 G= NaHSO₄
 H= Na₂S₂O₅
 I= Ascorbic Acid
 J= NH₄Cl
 K= Zn Acetate
 O= Other

Container Type	<i>PA</i>
Preservative	<i>A</i>

Relinquished By:	Date/Time	Received By:	Date/Time
<i>[Signature]</i>	<i>4/29/2021</i>	<i>[Signature]</i>	<i>4/29/21 12:05</i>
<i>[Signature]</i>	<i>4/29 14:00</i>	<i>[Signature]</i>	<i>4/29/21 1710</i>

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
 FORM NO: 01-01 (rev. 12-Mar-2012)

TOTAL # BOTTLES



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2122108

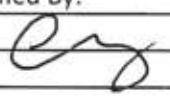
Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5170 Email: nlewis@alphalab.com	Project Location: MA Project Manager: Nathalie Lewis	State/Federal Program:
	Turnaround & Deliverables Information	Regulatory Criteria:
	Due Date: Deliverables:	

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2122108 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	SIMULATED-HP	04-29-21 11:45	DW	Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		5/4/21		

Form No: AL_subcoc

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 56823
Date Received: 5/3/21

Project: Barnstable- Hyannisport Well

Attached please find results for the analysis of the samples received on the date referenced above.

The following report has been revised to correct the sample ID, as requested by the customer.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/13/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw-HP	Water	5/3/2021 9:00	56823-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity by SM2130B Zinc in water by 200.8
Field Blank	Water	5/3/2021 0:00	56823-002	PFAS in Water by EPA 537.1

Project ID: Barnstable- Hyannisport Well

Job ID: 56823

Sample#: 56823-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 5/3/21 9:00

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM	2101197	5/5/21	7:26	SW8260Dmod	

Project ID: Barnstable- Hyannisport Well

Job ID: 56823

Sample#: 56823-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 5/3/21 9:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	8.8	0.50	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Magnesium	3.2	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Manganese	0.12	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Sodium	60	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	19:07	E200.8
Hardness (as CaCO3)	35	3	mg/L	1	AGN	5/5/21	13845	5/6/21		SM2340B

Sample#: 56823-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 5/3/21 9:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	7	5	mg/L	1	SFM		2101240	5/7/21	11:00	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM		2101178	5/4/21	11:17	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV		2101192	5/4/21	12:33	E300.0A
Chloride	96	0.5	mg/L	1	DBV		2101192	5/4/21	12:33	E300.0A
ortho-phosphate as P	0.1	0.1	mg/L	1	DBV		2101192	5/4/21	12:33	E300.0A
Sulfate	15	0.5	mg/L	1	DBV		2101192	5/4/21	12:33	E300.0A
Total Dissolved Solids (TDS)	230	20	mg/L	1	SFM		2101237	5/6/21	16:00	SM2540C
Total Coliform Bacteria	absent			1	DBV		2101185	5/3/21	16:25	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101185	5/3/21	16:25	SM9223BColilert
Conductivity	420	5	umhos/cm	1	SFM		2101173	5/4/21	10:15	SM2510B
pH	5.7H		pH	1	SFM		2101180	5/3/21	17:20	SM4500H+B
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	AGN		2101184	5/4/21	15:14	SM2130B

Sample#: 56823-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 5/3/21 9:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101189	5/4/21	17:18	SM5310C

Project ID: Barnstable- Hyannisport Well

Job ID: 56823

Sample#: 56823-001

Sample ID: Raw-HP

Matrix: Water

Sampled: 5/3/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	0.43 J	1.7	0.25	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	0.33 J	1.7	0.27	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorobutane sulfonic acid (PFBS)	5.4	1.7	0.42	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorodecanoic acid (PFDA)	0.39 J	1.7	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluoroheptanoic acid (PFHPA)	3.4	1.7	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorohexane sulfonic acid (PFHXS)	19	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorohexanoic acid (PFHXA)	6.8	1.7	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorononanoic acid (PFNA)	1.1 J	1.7	0.38	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorooctane sulfonic acid (PFOS)	14	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorooctanoic acid (PFOA)	6.3	1.7	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluorotridecanoic acid (PFTRIA)	0.26 J	1.7	0.11	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
perfluoroundecanoic acid (PFUNA)	0.30 J	1.7	0.27	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	0.31 J	1.7	0.15	ng/L	1	ACA	5/5/21	13843	5/5/21	19:13
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:13
13C2-PFDA SUR	92	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:13
D5-NEtFOSAA SUR	74	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:13
13C3-HFPO-DA SUR	96	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:13

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Revised 5/13/21 Sample ID

Project ID: Barnstable- Hyannisport Well

Job ID: 56823

Sample#: 56823-002

Sample ID: Field Blank

Matrix: Water

Sampled: 5/3/21 0:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13843	5/5/21	19:29
Surrogate Recovery		Limits								
13C2-PFHxA SUR	90	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:29
13C2-PFDA SUR	92	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:29
D5-NEtFOSAA SUR	79	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:29
13C3-HFPO-DA SUR	92	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:29

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Revised 5/13/21 Sample ID

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56823

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101197	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101197	1,4-dioxane		9.8	ug/L	8	122	70 130		
SW8260Dmod	LCSD2101197	1,4-dioxane		9.5	ug/L	8	119	70 130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13845	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13845	Calcium	56785-001	8.8	mg/L				1	20	
		Iron	56785-001	< 0.050	mg/L					20	
		Magnesium	56785-001	3.2	mg/L				0	20	
		Manganese	56785-001	< 0.010	mg/L					20	
		Sodium	56785-001	91	mg/L				1	20	
		Zinc	56785-001	11	mg/L				2	20	
E200.8	LCS13845	Calcium		2.6	mg/L	2.5	106	85	115		
		Iron		0.52	mg/L	0.5	104	85	115		
		Magnesium		0.50	mg/L	0.5	101	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	99	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13845	Calcium		2.6	mg/L	2.5	105	85	115	1	20
		Iron		0.52	mg/L	0.5	103	85	115	0	20
		Magnesium		0.50	mg/L	0.5	101	85	115	0	20
		Manganese		0.50	mg/L	0.5	100	85	115	0	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	1	20
E200.8	MS13845	Calcium	56785-001	11	mg/L	2.5	96	70	130		
		Iron	56785-001	0.50	mg/L	0.5	99	70	130		
		Magnesium	56785-001	3.6	mg/L	0.5	79	70	130		
		Manganese	56785-001	0.50	mg/L	0.5	100	70	130		
		Sodium	56785-001	94	mg/L	5	83	70	130		
		Zinc	56785-001	12	mg/L	0.5	51	70	130		
E200.8	MS13845	Calcium	56822-001	23	mg/L	2.5	108	70	130		
		Iron	56822-001	0.48	mg/L	0.5	95	70	130		
		Magnesium	56822-001	6.9	mg/L	0.5	107	70	130		
		Manganese	56822-001	0.51	mg/L	0.5	97	70	130		
		Sodium	56822-001	67	mg/L	5	101	70	130		
		Zinc	56822-001	0.55	mg/L	0.5	101	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101192	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101192	Bromide	56821-001	<	0.1	mg/L				10		
		ortho-phosphate as P	56821-001		0.2	mg/L			9	10		
		Sulfate	56821-001		19	mg/L			0	10		
E300.0A	LCS2101192	Bromide			9.8	mg/L	10	98	90	110		
		Chloride			96	mg/L	100	96	90	110		
		ortho-phosphate as P			10	mg/L	10	104	90	110		
		Sulfate			100	mg/L	100	102	90	110		
E300.0A	LCSD2101192	Bromide			9.7	mg/L	10	97	90	110	0	10
		Chloride			95	mg/L	100	95	90	110	1	10
		ortho-phosphate as P			10	mg/L	10	103	90	110	1	10
		Sulfate			99	mg/L	100	99	90	110	2	10
E300.0A	MS2101192	Chloride	56792-007		170	mg/L	83.3	83 *	90	110		
E300.0A	MS2101192	Bromide	56821-001		1.6	mg/L	1.66	95	90	110		
		ortho-phosphate as P	56821-001		1.8	mg/L	1.66	91	90	110		
		Sulfate	56821-001		33	mg/L	16	81 *	90	110		
SM2120B	DUP2101178	Apparent Color	56734-007		8	CU					0	20
SM2120B	DUP2101178	Apparent Color	56735-007		10	CU					0	20
SM2120B	LCS2101178	Apparent Color			50	CU	50		45	55		
SM2120B	PB2101178	Apparent Color		<	5	CU			5			
SM2130B	DUP2101184	Turbidity	56823-001			NTU						20
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56872-003		22	mg/L					29 *	10
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56877-001		13	mg/L					3	10
SM2320B	LCS2101240	Alkalinity, Total (as CaCO3)			25	mg/L	25	101	90	110		
SM2320B	LCSD2101240	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110	1	10
SM2320B	PB2101240	Alkalinity, Total (as CaCO3)		<	5	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101173	Conductivity		<	5	uS/cm				
SM2510B	DUP2101173	Conductivity	56823-001	420	uS/cm				1	20
SM2510B	LCS2101173	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101173	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101237	Total Dissolved Solids (TDS)	56823-001	220	mg/L				2	5
SM2540C	LCS2101237	Total Dissolved Solids (TDS)		90.0	mg/L	99.2	91	75 125		
SM2540C	PB2101237	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101180	pH	56796-002	5.4	pH					
SM4500H+B	DUP2101180	pH	56823-001	5.5	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		93			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NEIFOSAA SUR		79			%			70 130		
		13C3-HFPO-DA SUR		101			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56817-002	1.7 U	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56817-002	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56817-002	1.9	1.7	0.43	ng/L				11	30
		perfluorodecanoic acid (PFDA)	56817-002	1.7 U	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDOA)	56817-002	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56817-002	2.9	1.7	0.29	ng/L				13	30
		perfluorohexane sulfonic acid (PFHXS)	56817-002	1.6 J	1.7	0.34	ng/L					30
		perfluorohexanoic acid (PFHXA)	56817-002	3.7	1.7	0.30	ng/L				12	30
		perfluorononanoic acid (PFNA)	56817-002	0.42 J	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56817-002	3.2	1.7	0.34	ng/L				12	30
		perfluorooctanoic acid (PFOA)	56817-002	2.9	1.7	0.29	ng/L				16	30
		perfluorotetradecanoic acid (PFTEA)	56817-002	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56817-002	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56817-002	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	56817-002	93			%			70 130		
		13C2-PFDA SUR	56817-002	93			%			70 130		
		D5-NEIFOSAA SUR	56817-002	76			%			70 130		
		13C3-HFPO-DA SUR	56817-002	99			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		39	2.0	0.30	ng/L	40	98	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		37	2.0	0.39	ng/L	40	92	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		38	2.0	0.33	ng/L	40	95	70 130		
		perfluorobutane sulfonic acid (PFBS)		33	2.0	0.50	ng/L	35	92	70 130		
		perfluorodecanoic acid (PFDA)		37	2.0	0.34	ng/L	40	93	70 130		
		perfluorododecanoic acid (PFDOA)		36	2.0	0.43	ng/L	40	89	70 130		
		perfluoroheptanoic acid (PFHPA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorohexane sulfonic acid (PFHXS)		36	2.0	0.40	ng/L	38	94	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	96	70 130		
		perfluorooctane sulfonic acid (PFOS)		31	2.0	0.40	ng/L	38	80	70 130		
		perfluorooctanoic acid (PFOA)		39	2.0	0.33	ng/L	40	98	70 130		
		perfluorotetradecanoic acid (PFTEA)		32	2.0	0.50	ng/L	40	81	70 130		
		perfluorotridecanoic acid (PFTRIA)		36	2.0	0.13	ng/L	40	90	70 130		
		perfluoroundecanoic acid (PFUNA)		34	2.0	0.32	ng/L	40	86	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		28	2.0	0.39	ng/L	37	75	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		31	2.0	0.40	ng/L	37	83	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		36	2.0	0.18	ng/L	37	95	70 130		
		13C2-PFHxA SUR		93			%			70 130		
		13C2-PFDA SUR		104			%			70 130		
		D5-NEIFOSAA SUR		78			%			70 130		
		13C3-HFPO-DA SUR		101			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56821-001	3.0	1.7	0.25	ng/L	3.35	90	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56821-001	2.8	1.7	0.33	ng/L	3.35	85	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56821-001	2.8	1.7	0.27	ng/L	3.35	83	50 150		
		perfluorobutane sulfonic acid (PFBS)	56821-001	2.3	1.7	0.42	ng/L	2.97	76	50 150		
		perfluorodecanoic acid (PFDA)	56821-001	2.4	1.7	0.29	ng/L	3.35	72	50 150		
		perfluorododecanoic acid (PFDOA)	56821-001	2.3	1.7	0.36	ng/L	3.35	69	50 150		
		perfluoroheptanoic acid (PFHPA)	56821-001	2.9	1.7	0.28	ng/L	3.35	86	50 150		
		perfluorohexane sulfonic acid (PFHXS)	56821-001	2.5	1.7	0.33	ng/L	3.18	78	50 150		
		perfluorohexanoic acid (PFHXA)	56821-001	2.6	1.7	0.29	ng/L	3.35	79	50 150		
		perfluorononanoic acid (PFNA)	56821-001	2.7	1.7	0.38	ng/L	3.35	81	50 150		
		perfluorooctane sulfonic acid (PFOS)	56821-001	2.3	1.7	0.34	ng/L	3.22	70	50 150		
		perfluorooctanoic acid (PFOA)	56821-001	2.6	1.7	0.28	ng/L	3.35	79	50 150		
		perfluorotetradecanoic acid (PFTEA)	56821-001	2.2	1.7	0.42	ng/L	3.35	67	50 150		
		perfluorotridecanoic acid (PFTRIA)	56821-001	2.4	1.7	0.11	ng/L	3.35	71	50 150		
		perfluoroundecanoic acid (PFUNA)	56821-001	2.3	1.7	0.27	ng/L	3.35	67	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56821-001	2.0	1.7	0.33	ng/L	3.17	63	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56821-001	2.1	1.7	0.34	ng/L	3.13	67	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56821-001	2.6	1.7	0.15	ng/L	3.17	83	50 150		
		13C2-PFHxA SUR	56821-001	93			%			70 130		
		13C2-PFDA SUR	56821-001	96			%			70 130		
		D5-NEIFOSAA SUR	56821-001	80			%			70 130		
		13C3-HFPO-DA SUR	56821-001	91			%			70 130		



ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Technology Drive Warrington, VA
Report To: Alex Bishop
Phone #: 914-406-9598
Invoice to: Kleinfelder
Email: abbishop@kleinfelder.com
PO #:

Project Name: Barnstable Hyannis port well
Project #: _____
Project Location: NH MA ME VT _____
Accreditation Required? N/C
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting QAPP GW-1 S-1
Limits: EPA/DW Other _____
Quote # _____
 NH Reimbursement Pricing

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
<u>56823</u>	<u>Ruw-HP</u>	<u>7</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>5/3/21</u>	<u>0900</u>	<u>UL</u>
		<u>1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		<u>1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		<u>2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		<u>2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
	<u>Field Blank</u>	<u>2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 824.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	
<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity
<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input checked="" type="checkbox"/> TS
<input checked="" type="checkbox"/> RCRA Metals	<input checked="" type="checkbox"/> Priority Pollutant Metals	<input checked="" type="checkbox"/> TAL Metals
<input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Ca, Na, Mg, Zn</u>	<input type="checkbox"/> Hardness	
<input type="checkbox"/> Dissolved Metals-list:		
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC
<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides
<input type="checkbox"/> Asbestos	<input type="checkbox"/> Total Coliform	
<input type="checkbox"/> Grab (G) or Composite (C)		

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
Send Report to KRyan@kleinfelder.com

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com and KRyan@kleinfelder.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 6 °C

CUSTODY RECORD
QSD-01 Revision 03/09/2020

Relinquished by Sampler: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>1400</u>	Received by: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>1400</u>
Relinquished by: <u>[Signature]</u>	Date: _____ Time: _____	Received by: _____	Date: _____ Time: _____
Relinquished by: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>15:31</u>	Received by Laboratory: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>15:31</u>

Sample Receipt Condition Report

56823

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: _____ °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:	
	40mL(G)	250mL(P)	500mL(P)	1L(G)					
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)					
HNO ₃	125mL(P)	250mL(P)	500mL(P)						
H ₂ SO ₄	40mL(G) 2	60mL(P)	125mL(P)	250mL(P)	500mL(P)				
NaOH	125mL(P)	250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)						
ZnAc-NaOH	125mL(P)	250mL(P)							
Trizma	125mL(P)	250mL(P) 3							
NH ₄ Ac	125mL(P)	250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)							
MeOH	20mL(G)	40mL(G)							
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe					
None (water)	40ml (G) 2	60mL(P) 2	125mL(P) 3	250mL(P) 1	500mL(P) 1				
Mold	Cassette	Bulk	Plate	Tape Lift					
Asbestos	Cassette	Bulk							
Lead	Cassette	Bulk	Wipe						

pH 2.5 PM

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
Residual Cl not present:
ABN625 Pest608
Bacteria ResCl ✓ by analyst

PC Dry applicable? Y N

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?	X			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	X			
PFAS: Lab specific bottles? QC received, if required?	X			
Bacteria bottles provided by ARA?	X			
Samples within holding time?	X			
Immediate tests communicated in writing: NCL, NDA, PC, pH, BOD, Coliform/E. coli (T/P) or MPN, Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	X			SPM, DBV, TES, SPM, NO ₃ , NO ₂ , 5/13/21
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: SPM

Date/Time: 5/13/21 16:17

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 56821
Date Received: 5/3/21

Project: Barnstable- Hyannisport

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/13/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Finished-HP	Water	5/3/2021 11:00	56821-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Shipping & Handling to Subcontract Lab Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 Turbidity by SM2130B VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable- Hyannisport

Job ID: 56821

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			Reference
		Limit	Units	Factor	Analyst		Batch	Date	Time	
chloroform	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	23:03	E524.2	
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	23:03	E524.2	
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	23:03	E524.2	
bromoform	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	23:03	E524.2	
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM	2101172	5/3/21	23:03	E524.2	
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	99	70-130	%	1	LMM	2101172	5/3/21	23:03	E524.2	
1,4-dichlorobenzene-D4 SUR	98	70-130	%	1	LMM	2101172	5/3/21	23:03	E524.2	

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			Reference
		Limit	Units	Factor	Analyst		Batch	Date	Time	
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM	2101197	5/5/21	6:55	SW8260Dmod	

Project ID: Barnstable- Hyannisport

Job ID: 56821

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Parameter	Reporting		Instr Dil'n		Prep		Analysis			Reference
	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Calcium	10	0.50	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Magnesium	3.5	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Sodium	84	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Zinc	0.15	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	18:47	E200.8
Hardness (as CaCO3)	40	3	mg/L	1	AGN	5/5/21	13845	5/6/21		SM2340B

Project ID: Barnstable- Hyannisport

Job ID: 56821

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Alkalinity, Total (as CaCO3)	51	5	mg/L	1	SFM	2101240	5/7/21	11:00	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101178	5/4/21	11:15	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV	2101192	5/4/21	11:27	E300.0A
Chloride	110	2.5	mg/L	5	DBV	2101210	5/5/21	15:19	E300.0A
Nitrate-N	4.4M	0.1	mg/L	1	DBV	2101192	5/4/21	11:27	E300.0A
M = The recovery for the matrix spike was 56%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.									
Nitrite-N	< 0.1M	0.1	mg/L	1	DBV	2101192	5/4/21	11:27	E300.0A
M = The recovery for the matrix spike was 88%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.									
ortho-phosphate as P	0.3	0.1	mg/L	1	DBV	2101192	5/4/21	11:27	E300.0A
Sulfate	19M	0.5	mg/L	1	DBV	2101192	5/4/21	11:27	E300.0A
M = The recovery for the matrix spike was 81%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.									
Total Dissolved Solids (TDS)	290	20	mg/L	1	SFM	2101237	5/6/21	16:00	SM2540C
Total Phosphorus as P	0.19	0.01	mg/L	1	SFM	2101221	5/6/21	14:40	E365.3
Total Coliform Bacteria	absent			1	DBV	2101185	5/3/21	16:25	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101185	5/3/21	16:25	SM9223BColilert
Conductivity	530	5	umhos/cm	1	SFM	2101173	5/4/21	10:15	SM2510B
pH	6.8H		pH	1	SFM	2101180	5/3/21	17:13	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	AGN	2101184	5/4/21	15:12	SM2130B

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	16:23	SM5310C

Project ID: Barnstable- Hyannisport

Job ID: 56821

Sample#: 56821-001

Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluoroheptanoic acid (PFHPA)	0.37 J	1.7	0.28	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorohexanoic acid (PFHXA)	0.51 J	1.7	0.29	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorooctane sulfonic acid (PFOS)	0.45 J	1.7	0.33	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorooctanoic acid (PFOA)	0.43 J	1.7	0.28	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	5/12/21	13843	5/5/21	18:41
Surrogate Recovery		Limits								
13C2-PFHxA SUR	89	70-130		%	1	ACA	5/12/21	13843	5/5/21	18:41
13C2-PFDA SUR	93	70-130		%	1	ACA	5/12/21	13843	5/5/21	18:41
D5-NEtFOSAA SUR	76	70-130		%	1	ACA	5/12/21	13843	5/5/21	18:41
13C3-HFPO-DA SUR	92	70-130		%	1	ACA	5/12/21	13843	5/5/21	18:41

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56821

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 56821-001 did not meet the acceptance criteria for Nitrate-N, Nitrite-N, and Sulfate. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101172	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			96	%			70	130		
		1,4-dichlorobenzene-D4 SUR			104	%			70	130		
E524.2	DUP2101172	chloroform	56803-003	<	0.50	ug/L				20		
		bromodichloromethane	56803-003	<	0.50	ug/L				20		
		dibromochloromethane	56803-003	<	0.50	ug/L				20		
		bromoform	56803-003	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	56803-003		90	%			70	130		
		1,4-dichlorobenzene-D4 SUR	56803-003		100	%			70	130		
E524.2	LCS2101172	chloroform			10	ug/L	10	105	70	130		
		bromodichloromethane			11	ug/L	10	110	70	130		
		dibromochloromethane			12	ug/L	10	115	70	130		
		bromoform			12	ug/L	10	120	70	130		
		4-bromofluorobenzene SUR			109	%			70	130		
		1,4-dichlorobenzene-D4 SUR			128	%			70	130		
E524.2	LCSD2101172	chloroform			10	ug/L	10	102	70	130	2	20
		bromodichloromethane			11	ug/L	10	105	70	130	4	20
		dibromochloromethane			11	ug/L	10	110	70	130	5	20
		bromoform			12	ug/L	10	117	70	130	3	20
		4-bromofluorobenzene SUR			107	%			70	130		
		1,4-dichlorobenzene-D4 SUR			119	%			70	130		
SW8260Dmod	BLK2101197	1,4-dioxane		<	0.25	ug/L						
SW8260Dmod	LCS2101197	1,4-dioxane			9.8	ug/L	8	122	70	130		
SW8260Dmod	LCSD2101197	1,4-dioxane			9.5	ug/L	8	119	70	130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13845	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13845	Calcium	56785-001	8.8	mg/L				1	20	
		Iron	56785-001	< 0.050	mg/L					20	
		Magnesium	56785-001	3.2	mg/L				0	20	
		Manganese	56785-001	< 0.010	mg/L					20	
		Sodium	56785-001	91	mg/L				1	20	
		Zinc	56785-001	11	mg/L				2	20	
E200.8	LCS13845	Calcium		2.6	mg/L	2.5	106	85	115		
		Iron		0.52	mg/L	0.5	104	85	115		
		Magnesium		0.50	mg/L	0.5	101	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	99	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13845	Calcium		2.6	mg/L	2.5	105	85	115	1	20
		Iron		0.52	mg/L	0.5	103	85	115	0	20
		Magnesium		0.50	mg/L	0.5	101	85	115	0	20
		Manganese		0.50	mg/L	0.5	100	85	115	0	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	1	20
E200.8	MS13845	Calcium	56785-001	11	mg/L	2.5	96	70	130		
		Iron	56785-001	0.50	mg/L	0.5	99	70	130		
		Magnesium	56785-001	3.6	mg/L	0.5	79	70	130		
		Manganese	56785-001	0.50	mg/L	0.5	100	70	130		
		Sodium	56785-001	94	mg/L	5	83	70	130		
		Zinc	56785-001	12	mg/L	0.5	51	70	130		
E200.8	MS13845	Calcium	56822-001	23	mg/L	2.5	108	70	130		
		Iron	56822-001	0.48	mg/L	0.5	95	70	130		
		Magnesium	56822-001	6.9	mg/L	0.5	107	70	130		
		Manganese	56822-001	0.51	mg/L	0.5	97	70	130		
		Sodium	56822-001	67	mg/L	5	101	70	130		
		Zinc	56822-001	0.55	mg/L	0.5	101	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101192	Bromide		<	0.1	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101192	Bromide	56821-001	<	0.1	mg/L				10		
		Nitrate-N	56821-001		4.4	mg/L			1	10		
		Nitrite-N	56821-001	<	0.1	mg/L				10		
		ortho-phosphate as P	56821-001		0.2	mg/L			9	10		
		Sulfate	56821-001		19	mg/L			0	10		
E300.0A	LCS2101192	Bromide			9.8	mg/L	10	98	90	110		
		Nitrate-N			9.6	mg/L	10	96	90	110		
		Nitrite-N			15	mg/L	15	100	90	110		
		ortho-phosphate as P			10	mg/L	10	104	90	110		
		Sulfate			100	mg/L	100	102	90	110		
E300.0A	LCSD2101192	Bromide			9.7	mg/L	10	97	90	110	0	10
		Nitrate-N			9.4	mg/L	10	94	90	110	2	10
		Nitrite-N			15	mg/L	15	98	90	110	2	10
		ortho-phosphate as P			10	mg/L	10	103	90	110	1	10
		Sulfate			99	mg/L	100	99	90	110	2	10
E300.0A	MS2101192	Bromide	56821-001		1.6	mg/L	1.66	95	90	110		
		Nitrate-N	56821-001		5.3	mg/L	1.66	56 *	90	110		
		Nitrite-N	56821-001		2.2	mg/L	2.53	88 *	90	110		
		ortho-phosphate as P	56821-001		1.8	mg/L	1.66	91	90	110		
		Sulfate	56821-001		33	mg/L	16	81 *	90	110		
E300.0A	BLK2101210	Chloride		<	0.5	mg/L						
E300.0A	LCS2101210	Chloride			96	mg/L	100	96	90	110		
E300.0A	LCSD2101210	Chloride			96	mg/L	100	96	90	110	0	10
E365.3	LCS2101221	Total Phosphorus as P			0.21	mg/L	0.2	103	75	125		
E365.3	LCSD2101221	Total Phosphorus as P			0.20	mg/L	0.2	98	75	125	5	20
E365.3	PB2101221	Total Phosphorus as P		<	0.01	mg/L						
SM2120B	DUP2101178	Apparent Color	56734-007		8	CU					0	20
SM2120B	DUP2101178	Apparent Color	56735-007		10	CU					0	20
SM2120B	LCS2101178	Apparent Color			50	CU	50		45	55		
SM2120B	PB2101178	Apparent Color		<	5	CU			5			

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56872-003	22	mg/L				29 *	10
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56877-001	13	mg/L				3	10
SM2320B	LCS2101240	Alkalinity, Total (as CaCO3)		25	mg/L	25	101	90 110		
SM2320B	LCSD2101240	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110	1	10
SM2320B	PB2101240	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101173	Conductivity		<	5	uS/cm				
SM2510B	DUP2101173	Conductivity	56823-001	420	uS/cm				1	20
SM2510B	LCS2101173	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101173	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101237	Total Dissolved Solids (TDS)	56823-001	220	mg/L				2	5
SM2540C	LCS2101237	Total Dissolved Solids (TDS)		90.0	mg/L	99.2	91	75 125		
SM2540C	PB2101237	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101180	pH	56796-002	5.4	pH					
SM4500H+B	DUP2101180	pH	56823-001	5.5	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		93			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NEIFOSAA SUR		79			%			70 130		
		13C3-HFPO-DA SUR		101			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56817-002	1.7 U	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56817-002	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56817-002	1.9	1.7	0.43	ng/L				11	30
		perfluorodecanoic acid (PFDA)	56817-002	1.7 U	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDOA)	56817-002	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56817-002	2.9	1.7	0.29	ng/L				13	30
		perfluorohexane sulfonic acid (PFHXS)	56817-002	1.6 J	1.7	0.34	ng/L					30
		perfluorohexanoic acid (PFHXA)	56817-002	3.7	1.7	0.30	ng/L				12	30
		perfluorononanoic acid (PFNA)	56817-002	0.42 J	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56817-002	3.2	1.7	0.34	ng/L				12	30
		perfluorooctanoic acid (PFOA)	56817-002	2.9	1.7	0.29	ng/L				16	30
		perfluorotetradecanoic acid (PFTEA)	56817-002	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56817-002	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56817-002	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	56817-002	93			%			70	130	
		13C2-PFDA SUR	56817-002	93			%			70	130	
		D5-NEIFOSAA SUR	56817-002	76			%			70	130	
		13C3-HFPO-DA SUR	56817-002	99			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		39	2.0	0.30	ng/L	40	98	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		37	2.0	0.39	ng/L	40	92	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		38	2.0	0.33	ng/L	40	95	70 130		
		perfluorobutane sulfonic acid (PFBS)		33	2.0	0.50	ng/L	35	92	70 130		
		perfluorodecanoic acid (PFDA)		37	2.0	0.34	ng/L	40	93	70 130		
		perfluorododecanoic acid (PFDOA)		36	2.0	0.43	ng/L	40	89	70 130		
		perfluoroheptanoic acid (PFHPA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorohexane sulfonic acid (PFHXS)		36	2.0	0.40	ng/L	38	94	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	96	70 130		
		perfluorooctane sulfonic acid (PFOS)		31	2.0	0.40	ng/L	38	80	70 130		
		perfluorooctanoic acid (PFOA)		39	2.0	0.33	ng/L	40	98	70 130		
		perfluorotetradecanoic acid (PFTEA)		32	2.0	0.50	ng/L	40	81	70 130		
		perfluorotridecanoic acid (PFTRIA)		36	2.0	0.13	ng/L	40	90	70 130		
		perfluoroundecanoic acid (PFUNA)		34	2.0	0.32	ng/L	40	86	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		28	2.0	0.39	ng/L	37	75	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		31	2.0	0.40	ng/L	37	83	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		36	2.0	0.18	ng/L	37	95	70 130		
		13C2-PFHxA SUR		93			%			70 130		
		13C2-PFDA SUR		104			%			70 130		
		D5-NEIFOSAA SUR		78			%			70 130		
		13C3-HFPO-DA SUR		101			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56821-001	3.0	1.7	0.25	ng/L	3.35	90	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56821-001	2.8	1.7	0.33	ng/L	3.35	85	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56821-001	2.8	1.7	0.27	ng/L	3.35	83	50 150		
		perfluorobutane sulfonic acid (PFBS)	56821-001	2.3	1.7	0.42	ng/L	2.97	76	50 150		
		perfluorodecanoic acid (PFDA)	56821-001	2.4	1.7	0.29	ng/L	3.35	72	50 150		
		perfluorododecanoic acid (PFDOA)	56821-001	2.3	1.7	0.36	ng/L	3.35	69	50 150		
		perfluoroheptanoic acid (PFHPA)	56821-001	2.9	1.7	0.28	ng/L	3.35	86	50 150		
		perfluorohexane sulfonic acid (PFHXS)	56821-001	2.5	1.7	0.33	ng/L	3.18	78	50 150		
		perfluorohexanoic acid (PFHXA)	56821-001	2.6	1.7	0.29	ng/L	3.35	79	50 150		
		perfluorononanoic acid (PFNA)	56821-001	2.7	1.7	0.38	ng/L	3.35	81	50 150		
		perfluorooctane sulfonic acid (PFOS)	56821-001	2.3	1.7	0.34	ng/L	3.22	70	50 150		
		perfluorooctanoic acid (PFOA)	56821-001	2.6	1.7	0.28	ng/L	3.35	79	50 150		
		perfluorotetradecanoic acid (PFTEA)	56821-001	2.2	1.7	0.42	ng/L	3.35	67	50 150		
		perfluorotridecanoic acid (PFTRIA)	56821-001	2.4	1.7	0.11	ng/L	3.35	71	50 150		
		perfluoroundecanoic acid (PFUNA)	56821-001	2.3	1.7	0.27	ng/L	3.35	67	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56821-001	2.0	1.7	0.33	ng/L	3.17	63	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56821-001	2.1	1.7	0.34	ng/L	3.13	67	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56821-001	2.6	1.7	0.15	ng/L	3.17	83	50 150		
		13C2-PFHxA SUR	56821-001	93			%			70 130		
		13C2-PFDA SUR	56821-001	96			%			70 130		
		D5-NEIFOSAA SUR	56821-001	80			%			70 130		
		13C3-HFPO-DA SUR	56821-001	91			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

56821

ANALYSIS REQUEST

Company Name: Kleinfelder
 Project Name: Barnstable Hyannisport
 Company Address: 4 Technology Dr. Westborough, MA
 Project #: _____
 Report To: Alex Bishop
 Project Location: NH MA ME VT _____
 Phone #: 914-406-9598
 Accreditation Required? N/Y: X
 Invoice to: Kleinfelder
 Protocol: RCRA SDWA NPDES
 MCP NHDES DOD
 Reporting QAPP GW-1 S-1
 Email: abbishop@kleinfelder.com
 Limits: RPA/DW Other _____
 PO #: _____
 Quote # _____
 NH Reimbursement Pricing

VOC 8260 VOC 8260 MADEP
 VOC 8260 NHDES VOC 8260 MADEP
 VOC 624.1 VOC BTEX MIBE, only VOC 8021VT
 VPH MADEP GR0 8015 T, 4-Dioxane
 VOC 524.2 VOC 524.2 NH List Gases-List: (THAs)
 TPH DR0 8015 EPH MADEP TPH Fingerprint
 8270PAH 8270ABN 625.1 EDB
 8082 PCB 8081 Pesticides 608.3 Pest/PCB
 PFAS 537.1
 O&G 1664 Mineral O&G 1664
 pH BOD Conductivity Turbidity Apparent Color
 TSS TDS TSS TDS Alkalinity Acidity
 RCRA Metals Priority Pollutant Metals TAL Metals Hardness
 Total Metals-list: Fe, Mn, Cu, Ni, Mg, Zn
 Dissolved Metals-list:
 Ammonia COD TKN TN TOC Ferrous Iron
 F-Phosphorus Bacteria P/A Bacteria MPN Enterococci
 Cyanide Sulfide Nitrate + Nitrite Ortho P Phenols
 Nitrate Nitrite Chloride Sulfate Bromide Fluoride
 Corrosivity Ignitibility/FP
 TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide
 Subcontract: Grain Size Herbicides Asbestos
Total Coliform
THAs
 Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME
56821-01	Finshed HP	8	✓							5/3/21	1100	uc
		1										
		1										
		2										
		3										
		2										
		3										
		2										
		2										

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
Report to KRyan@kleinfelder.com

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com and KRyan@kleinfelder.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
 TEMPERATURE 6 °C

CUSTODY RECORD
 QSD-01 Revision 03/09/2020

Relinquished by Sampler: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>1400</u>	Received by: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>14:00</u>
Relinquished by:	Date: _____ Time: _____	Received by:	Date: _____ Time: _____
Relinquished by: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>15:31</u>	Received by Laboratory: <u>[Signature]</u>	Date: <u>5/3/21</u> Time: <u>15:31</u>

Sample Receipt Condition Report

56821

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 6 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:		
HCl	40mL(G)	<u>2</u>	250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	<u>1</u>	500mL(P)					
H ₂ SO ₄	40mL(G)	<u>2</u>	60mL(P)		125mL(P)	<u>1</u>	250mL(P)	500mL(P)	<u>pH 2.5m pH 7.5m</u>	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	<u>3</u>					*pH ✓ by analyst: VOC, PFAS, TOC, O&G	
NH ₄ Ac	125mL(P)		250mL(P)						Residual Cl not present:	
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	<u>1</u>					ABN625 Pest608	
MeOH	20mL(G)		40mL(G)						Bacteria ResCl ✓ by analyst	
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe		PC Dry applicable? Y N	
None (water)	40ml (G)	<u>2</u>	60mL(P)	<u>3</u>	125mL(P)	<u>3</u>	250mL(P)	<u>1</u>	500mL(P)	<u>1</u>
<u>NH₄Cl</u>	<u>60mL(G)</u>	<u>3</u>							1L(G)	1L(P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	<input checked="" type="checkbox"/>			
Analyses marked on COC match bottles received?	<input checked="" type="checkbox"/>			
VOC & TOC Water-no headspace?	<input checked="" type="checkbox"/>			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	<input checked="" type="checkbox"/>			
PFAS: Lab specific bottles? QC received, if required?	<input checked="" type="checkbox"/>			<u>X TBSA 5/3/21</u>
Bacteria bottles provided by ARA?	<input checked="" type="checkbox"/>			
Samples within holding time?	<input checked="" type="checkbox"/>			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (N/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	<input checked="" type="checkbox"/>			<u>DBU, SFM, AS</u>
Date, time & ID on samples match CoC?	<input checked="" type="checkbox"/>			
Rushes communicated to analyst in writing?				<u>X HAA GSA</u>
Subcontract note on login board?	<input checked="" type="checkbox"/>			
Pesticides EPA 608 pH5-9?				<u>X</u>
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				<u>J</u> Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: SJM

 Date/Time: 6/3/21 6:55

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 05/20/2021
Work Order #: 2105-00872
Client Job #:
Date Received: 05/06/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 05/20/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2105-00872-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 56821
Finished-HP
MA

DATE AND TIME COLLECTED: 05/03/2021 11:00AM
DATE AND TIME RECEIVED: 05/06/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 4.3° CELSIUS

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	05/13/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 10:44AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 10:44AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 10:44AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	05/14/2021 10:44AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	05/14/2021 10:44AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 10:44AM
2,3-Dibromopropionic Acid	112	%	✓			70-130%	EPA 552.2 - SS	KV-NH	05/14/2021 10:44AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 56822
Date Received: 5/3/21

Project: Barnstable- Hyannisport

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/13/2021
Total number of pages: 13

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated-HP	Water	5/3/2021 10:30	56822-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Shipping & Handling to Subcontract Lab Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 Turbidity by SM2130B VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Trip Blank	Water	5/3/2021 0:00	56822-002	VOA Trip Blank VOCs Trihalomethanes in water by 524.2

Project ID: Barnstable- Hyannisport

Job ID: 56822

Sample#: 56822-001

Sample ID: Simulated-HP

Matrix: Water

Sampled: 5/3/21 10:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			Reference
		Limit	Units	Factor	Analyst		Batch	Date	Time	
chloroform	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	18:36	E524.2	
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	18:36	E524.2	
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	18:36	E524.2	
bromoform	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	18:36	E524.2	
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	18:36	E524.2	
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	89	70-130	%	1	LMM	2101255	5/10/21	18:36	E524.2	
1,4-dichlorobenzene-D4 SUR	93	70-130	%	1	LMM	2101255	5/10/21	18:36	E524.2	

Sample#: 56822-002

Sample ID: Trip Blank

Matrix: Water

Sampled: 5/3/21 0:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			Reference
		Limit	Units	Factor	Analyst		Batch	Date	Time	
chloroform	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	17:31	E524.2	
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	17:31	E524.2	
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	17:31	E524.2	
bromoform	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	17:31	E524.2	
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM	2101255	5/10/21	17:31	E524.2	
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	90	70-130	%	1	LMM	2101255	5/10/21	17:31	E524.2	
1,4-dichlorobenzene-D4 SUR	96	70-130	%	1	LMM	2101255	5/10/21	17:31	E524.2	

Sample#: 56822-001

Sample ID: Simulated-HP

Matrix: Water

Sampled: 5/3/21 10:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			Reference
		Limit	Units	Factor	Analyst		Batch	Date	Time	
Calcium	20	0.50	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Magnesium	6.4	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Manganese	0.022	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Sodium	62	0.10	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Zinc	0.045	0.010	mg/L	1	AGN	5/5/21	13845	5/5/21	18:54	E200.8
Hardness (as CaCO3)	77	3	mg/L	1	AGN	5/5/21	13845	5/6/21		SM2340B

Project ID: Barnstable- Hyannisport

Job ID: 56822

Sample#: 56822-001

Sample ID: Simulated-HP

Matrix: Water

Sampled: 5/3/21 10:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Alkalinity, Total (as CaCO3)	80	5	mg/L	1	SFM	2101240	5/7/21	11:00	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101178	5/4/21	11:16	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV	2101192	5/4/21	12:17	E300.0A
Chloride	83	2.5	mg/L	5	DBV	2101210	5/5/21	15:36	E300.0A
Nitrate-N	3.5	0.1	mg/L	1	DBV	2101192	5/4/21	12:17	E300.0A
Nitrite-N	< 0.1	0.1	mg/L	1	DBV	2101192	5/4/21	12:17	E300.0A
ortho-phosphate as P	0.4	0.1	mg/L	1	DBV	2101192	5/4/21	12:17	E300.0A
Sulfate	18	0.5	mg/L	1	DBV	2101192	5/4/21	12:17	E300.0A
Total Dissolved Solids (TDS)	260	20	mg/L	1	SFM	2101237	5/6/21	16:00	SM2540C
Total Phosphorus as P	0.62	0.02	mg/L	2	SFM	2101221	5/6/21	14:40	E365.3
Total Coliform Bacteria	absent			1	DBV	2101185	5/3/21	16:25	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101185	5/3/21	16:25	SM9223BColilert
Conductivity	500	5	umhos/cm	1	SFM	2101173	5/4/21	10:15	SM2510B
pH	7.7H		pH	1	SFM	2101180	5/3/21	17:17	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	AGN	2101184	5/4/21	15:13	SM2130B

Sample#: 56822-001

Sample ID: Simulated-HP

Matrix: Water

Sampled: 5/3/21 10:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	16:59	SM5310C

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56822

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101255	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			88	%			70	130		
		1,4-dichlorobenzene-D4 SUR			97	%			70	130		
E524.2	DUP2101255	chloroform	56850-002	<	0.50	ug/L				20		
		bromodichloromethane	56850-002	<	0.50	ug/L				20		
		dibromochloromethane	56850-002	<	0.50	ug/L				20		
		bromoform	56850-002	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	56850-002		90	%			70	130		
		1,4-dichlorobenzene-D4 SUR	56850-002		98	%			70	130		
E524.2	LCS2101255	chloroform			9.0	ug/L	10	90	70	130		
		bromodichloromethane			9.4	ug/L	10	94	70	130		
		dibromochloromethane			11	ug/L	10	105	70	130		
		bromoform			12	ug/L	10	117	70	130		
		4-bromofluorobenzene SUR			99	%			70	130		
		1,4-dichlorobenzene-D4 SUR			121	%			70	130		
E524.2	LCSD2101255	chloroform			9.6	ug/L	10	96	70	130	7	20
		bromodichloromethane			9.9	ug/L	10	99	70	130	6	20
		dibromochloromethane			11	ug/L	10	110	70	130	5	20
		bromoform			12	ug/L	10	124	70	130	6	20
		4-bromofluorobenzene SUR			96	%			70	130		
		1,4-dichlorobenzene-D4 SUR			123	%			70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13845	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13845	Calcium	56785-001	8.8	mg/L				1	20	
		Iron	56785-001	< 0.050	mg/L					20	
		Magnesium	56785-001	3.2	mg/L				0	20	
		Manganese	56785-001	< 0.010	mg/L					20	
		Sodium	56785-001	91	mg/L				1	20	
		Zinc	56785-001	11	mg/L				2	20	
E200.8	LCS13845	Calcium		2.6	mg/L	2.5	106	85	115		
		Iron		0.52	mg/L	0.5	104	85	115		
		Magnesium		0.50	mg/L	0.5	101	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	99	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13845	Calcium		2.6	mg/L	2.5	105	85	115	1	20
		Iron		0.52	mg/L	0.5	103	85	115	0	20
		Magnesium		0.50	mg/L	0.5	101	85	115	0	20
		Manganese		0.50	mg/L	0.5	100	85	115	0	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	1	20
E200.8	MS13845	Calcium	56785-001	11	mg/L	2.5	96	70	130		
		Iron	56785-001	0.50	mg/L	0.5	99	70	130		
		Magnesium	56785-001	3.6	mg/L	0.5	79	70	130		
		Manganese	56785-001	0.50	mg/L	0.5	100	70	130		
		Sodium	56785-001	94	mg/L	5	83	70	130		
		Zinc	56785-001	12	mg/L	0.5	51	70	130		
E200.8	MS13845	Calcium	56822-001	23	mg/L	2.5	108	70	130		
		Iron	56822-001	0.48	mg/L	0.5	95	70	130		
		Magnesium	56822-001	6.9	mg/L	0.5	107	70	130		
		Manganese	56822-001	0.51	mg/L	0.5	97	70	130		
		Sodium	56822-001	67	mg/L	5	101	70	130		
		Zinc	56822-001	0.55	mg/L	0.5	101	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101192	Bromide		<	0.1	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101192	Bromide	56821-001	<	0.1	mg/L				10		
		Nitrate-N	56821-001		4.4	mg/L			1	10		
		Nitrite-N	56821-001	<	0.1	mg/L				10		
		ortho-phosphate as P	56821-001		0.2	mg/L			9	10		
		Sulfate	56821-001		19	mg/L			0	10		
E300.0A	LCS2101192	Bromide			9.8	mg/L	10	98	90	110		
		Nitrate-N			9.6	mg/L	10	96	90	110		
		Nitrite-N			15	mg/L	15	100	90	110		
		ortho-phosphate as P			10	mg/L	10	104	90	110		
		Sulfate			100	mg/L	100	102	90	110		
E300.0A	LCSD2101192	Bromide			9.7	mg/L	10	97	90	110	0	10
		Nitrate-N			9.4	mg/L	10	94	90	110	2	10
		Nitrite-N			15	mg/L	15	98	90	110	2	10
		ortho-phosphate as P			10	mg/L	10	103	90	110	1	10
		Sulfate			99	mg/L	100	99	90	110	2	10
E300.0A	MS2101192	Bromide	56821-001		1.6	mg/L	1.66	95	90	110		
		Nitrate-N	56821-001		5.3	mg/L	1.66	56 *	90	110		
		Nitrite-N	56821-001		2.2	mg/L	2.53	88 *	90	110		
		ortho-phosphate as P	56821-001		1.8	mg/L	1.66	91	90	110		
		Sulfate	56821-001		33	mg/L	16	81 *	90	110		
E300.0A	BLK2101210	Chloride		<	0.5	mg/L						
E300.0A	LCS2101210	Chloride			96	mg/L	100	96	90	110		
E300.0A	LCSD2101210	Chloride			96	mg/L	100	96	90	110	0	10
E365.3	LCS2101221	Total Phosphorus as P			0.21	mg/L	0.2	103	75	125		
E365.3	LCSD2101221	Total Phosphorus as P			0.20	mg/L	0.2	98	75	125	5	20
E365.3	PB2101221	Total Phosphorus as P		<	0.01	mg/L						
SM2120B	DUP2101178	Apparent Color	56734-007		8	CU					0	20
SM2120B	DUP2101178	Apparent Color	56735-007		10	CU					0	20
SM2120B	LCS2101178	Apparent Color			50	CU	50		45	55		
SM2120B	PB2101178	Apparent Color		<	5	CU			5			

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56872-003	22	mg/L				29 *	10
SM2320B	DUP2101240	Alkalinity, Total (as CaCO3)	56877-001	13	mg/L				3	10
SM2320B	LCS2101240	Alkalinity, Total (as CaCO3)		25	mg/L	25	101	90 110		
SM2320B	LCSD2101240	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110	1	10
SM2320B	PB2101240	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101173	Conductivity		<	5	uS/cm				
SM2510B	DUP2101173	Conductivity	56823-001	420	uS/cm				1	20
SM2510B	LCS2101173	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101173	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101237	Total Dissolved Solids (TDS)	56823-001	220	mg/L				2	5
SM2540C	LCS2101237	Total Dissolved Solids (TDS)		90.0	mg/L	99.2	91	75 125		
SM2540C	PB2101237	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101180	pH	56796-002	5.4	pH					
SM4500H+B	DUP2101180	pH	56823-001	5.5	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Sample Receipt Condition Report

56822

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 6 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	<u>3</u> 250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		<u>1</u> 250mL(P)		500mL(P)				<u>OHZSRM</u>
H ₂ SO ₄	40mL(G)	<u>2</u> 60mL(P)		125mL(P)	<u>1</u>	250mL(P)		500mL(P)	<u>OHZSRM</u>
NaOH	125mL(P)		250mL(P)						
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)				
ZnAc-NaOH	125mL(P)		250mL(P)						
Trizma	125mL(P)		250mL(P)						
NH ₄ Ac	125mL(P)		250mL(P)						
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	<u>1</u>					
MeOH	20mL(G)		40mL(G)						
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe		
None (water)	40ml (G)		60mL(P)	<u>3</u>	125mL(P)	<u>2</u>	250mL(P)	<u>1</u>	500mL(P) <u>1</u>
<u>HAA</u>	<u>60mL(G)</u>	<u>3</u>							
Mold	Cassette	Bulk	Plate	Tape Lift					
Asbestos	Cassette	Bulk							
Lead	Cassette	Bulk	Wipe						

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 _____ Pest608 _____
 Bacteria ResCl ✓ by analyst

PC Dry applicable? Y N

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	<input checked="" type="checkbox"/>			
Analyses marked on COC match bottles received?	<input checked="" type="checkbox"/>			
VOC & TOC Water-no headspace?	<input checked="" type="checkbox"/>			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	<input checked="" type="checkbox"/>			
PFAS: Lab specific bottles? QC received, if required?			<input checked="" type="checkbox"/>	
Bacteria bottles provided by ARA?	<input checked="" type="checkbox"/>			
Samples within holding time?	<input checked="" type="checkbox"/>			
Immediate tests communicated in writing: (NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A) or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	<input checked="" type="checkbox"/>			<u>DAVISRM, AS</u>
Date, time & ID on samples match CoC?	<input checked="" type="checkbox"/>			
Rushes communicated to analyst in writing?			<input checked="" type="checkbox"/>	<u>HAA GSA</u>
Subcontract note on login board?	<input checked="" type="checkbox"/>			
Pesticides EPA 608 pH5-9?			<input checked="" type="checkbox"/>	
Compliance samples have no discrepancies/require no flags?			<input checked="" type="checkbox"/>	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			<input checked="" type="checkbox"/>	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: SRM Date/Time: 5/3/21 16:07

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 05/20/2021
Work Order #: 2105-00867
Client Job #:
Date Received: 05/06/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 05/20/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2105-00867-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 56822
Simulated-HP
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 05/03/2021 10:30AM
DATE AND TIME RECEIVED: 05/06/2021 11:19AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 4.3° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	05/13/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 09:22AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 09:22AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 09:22AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	05/14/2021 09:22AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	05/14/2021 09:22AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	05/14/2021 09:22AM
2,3-Dibromopropionic Acid	106	%	✓			70-130%	EPA 552.2 - SS	KV-NH	05/14/2021 09:22AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57187
Date Received: 5/27/21

Project: Barnstable, SW2 SW2

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/9/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw-SW2	Water	5/27/2021 10:00	57187-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	5/27/2021 10:00	57187-002	PFAS in Water by EPA 537.1

Project ID: Barnstable, SW2 SW2

Job ID: 57187

Sample#: 57187-001

Sample ID: Raw-SW2

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
1,4-dioxane	0.70	0.25	ug/L	1	LMM	2101601	6/5/21	8:04	SW8260Dmod	

Project ID: Barnstable, SW2 SW2

Job ID: 57187

Sample#: 57187-001

Sample ID: Raw-SW2

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	19	0.50	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Iron	2.2	0.050	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Magnesium	5.5	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Manganese	0.98	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Sodium	26	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:51	E200.8
Hardness (as CaCO3)	71	3	mg/L	1	AGN	6/7/21	13945	6/8/21		SM2340B

Sample#: 57187-001

Sample ID: Raw-SW2

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	48	5	mg/L	1	DJM		2101535	6/2/21	9:21	SM2320B
Apparent Color	5.0	5.0	CU	1	SFM		2101509	5/28/21	12:44	SM2120B
Bromide	0.1	0.1	mg/L	1	DBV		2101520	5/28/21	21:02	E300.0A
Chloride	48	0.5	mg/L	1	DBV		2101520	5/28/21	21:02	E300.0A
Sulfate	19	0.5	mg/L	1	DBV		2101520	5/28/21	21:02	E300.0A
Total Dissolved Solids (TDS)	180	20	mg/L	1	SFM		2101566	6/2/21	14:25	SM2540C
True Color	< 5.0	5.0	CU	1	SFM		2101510	5/28/21	14:22	SM2120B
Total Coliform Bacteria	absent			1	DBV		2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101516	5/27/21	17:40	SM9223BColilert
Conductivity	280	5	umhos/cm	1	SFM		2101528	6/1/21	14:00	SM2510B
pH	7.1H		pH	1	SFM		2101511	5/28/21	10:23	SM4500H+B
H = Sample was received beyond method holding time.										
Turbidity	2.7	1.0	NTU	1	AGN		2101503	5/28/21	11:42	SM2130B

Sample#: 57187-001

Sample ID: Raw-SW2

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101548	6/2/21	13:25	SM5310C

Project ID: Barnstable, SW2 SW2

Job ID: 57187

Sample#: 57187-001

Sample ID: Raw-SW2

Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorobutane sulfonic acid (PFBS)	3.7	1.7	0.42	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorodecanoic acid (PFDA)	0.31 J	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluoroheptanoic acid (PFHPA)	4.8	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorohexane sulfonic acid (PFHXS)	28	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorohexanoic acid (PFHXA)	10	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorononanoic acid (PFNA)	1.7	1.7	0.37	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorooctane sulfonic acid (PFOS)	35	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorooctanoic acid (PFOA)	17	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/1/21	13921	6/1/21	17:56
Surrogate Recovery		Limits								
13C2-PFHxA SUR	101	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:56
13C2-PFDA SUR	114	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:56
D5-NEtFOSAA SUR	97	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:56
13C3-HFPO-DA SUR	105	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:56

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: Barnstable, SW2 SW2

Job ID: 57187

Sample#: 57187-002

Sample ID: Field Blank

Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluorotridecanoic acid (PFTRIA)	0.14 J	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/1/21	13921	6/2/21	5:32
Surrogate Recovery		Limits								
13C2-PFHxA SUR	111	70-130		%	1	WAS	6/1/21	13921	6/2/21	5:32
13C2-PFDA SUR	125	70-130		%	1	WAS	6/1/21	13921	6/2/21	5:32
D5-NEtFOSAA SUR	104	70-130		%	1	WAS	6/1/21	13921	6/2/21	5:32
13C3-HFPO-DA SUR	114	70-130		%	1	WAS	6/1/21	13921	6/2/21	5:32

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57187

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101601	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101601	1,4-dioxane		8.4	ug/L	8	105	70 130		
SW8260Dmod	LCSD2101601	1,4-dioxane		8.4	ug/L	8	105	70 130	0	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13945	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13945	Calcium	57136-001	0.69	mg/L				9	20
		Iron	57136-001	< 0.050	mg/L					20
		Magnesium	57136-001	0.48	mg/L				2	20
		Manganese	57136-001	0.030	mg/L				0	20
E200.8	LCS13945	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13945	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13945	Calcium	57136-001	3.0	mg/L	2.5	121	70 130		
		Iron	57136-001	0.49	mg/L	0.5	98	70 130		
		Magnesium	57136-001	0.96	mg/L	0.5	96	70 130		
		Manganese	57136-001	0.54	mg/L	0.5	101	70 130		
E200.8	MS13945	Calcium	57190-003	21	mg/L	2.5	104	70 130		
		Iron	57190-003	0.49	mg/L	0.5	97	70 130		
		Magnesium	57190-003	5.9	mg/L	0.5	108	70 130		
		Manganese	57190-003	0.50	mg/L	0.5	100	70 130		
		Sodium	57190-003	47	mg/L	5	103	70 130		
		Zinc	57190-003	0.51	mg/L	0.5	102	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101520	Bromide		<	0.1	mg/L				
		Chloride		<	0.5	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	LCS2101520	Bromide		9.4	mg/L	10	94	90	110	
		Chloride		97	mg/L	100	97	90	110	
		Sulfate		96	mg/L	100	96	90	110	
E300.0A	LCSD2101520	Bromide		9.4	mg/L	10	94	90	110	0
		Chloride		97	mg/L	100	97	90	110	0
		Sulfate		96	mg/L	100	96	90	110	0
E300.0A	MS2101520	Bromide	57065-002	95	mg/L	100	95	90	110	
SM2120B	DUP2101509	Apparent Color	57139-001	8	CU				0	20
SM2120B	DUP2101509	Apparent Color	57139-005	8	CU				0	20
SM2120B	LCS2101509	Apparent Color		35	CU	35		30	40	
SM2120B	PB2101509	Apparent Color		<	5	CU		5		
SM2120B	BLK2101510	True Color		<	5	CU		5		
SM2120B	DUP2101510	True Color	57187-001	<	5	CU				20
SM2120B	LCS2101510	True Color		35	CU	35		30	40	
SM2320B	CCVB2101535	Alkalinity, Total (as CaCO3)		6.04	pH			5.94	6.06	
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94	4.06	
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94	4.06	
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-004	75	mg/L				3	10
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-007	15	mg/L				2	10
SM2320B	LCS2101535	Alkalinity, Total (as CaCO3)		24	mg/L	25	97	90	110	
SM2320B	LCSD2101535	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90	110	1
SM2320B	PB2101535	Alkalinity, Total (as CaCO3)		<	5	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101528	Conductivity		<	5	uS/cm				
SM2510B	DUP2101528	Conductivity	57190-008	150	uS/cm				0	20
SM2510B	DUP2101528	Conductivity	57190-009	150	uS/cm				2	20
SM2510B	LCS2101528	Conductivity		1400	uS/cm	1409	99	90 110		
SM2510B	LCSD2101528	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101566	Total Dissolved Solids (TDS)	57190-007	76	mg/L				5	5
SM2540C	LCS2101566	Total Dissolved Solids (TDS)		110	mg/L	99.2	106	75 125		
SM2540C	PB2101566	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101511	pH	57136-001	8.3	pH					
SM4500H+B	DUP2101511	pH	57179-001	8.1	pH					
SM4500H+B	DUP2101511	pH	57186-001	7.3	pH					
SM4500H+B	DUP2101511	pH	57190-009	7.4	pH					
SM5310C	BLK2101548	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101548	Total Organic Carbon (TOC)	57219-001	9	mg/L				1	20
SM5310C	LCS2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115		
SM5310C	LCSD2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115	0	20
SM5310C	MS2101548	Total Organic Carbon (TOC)	57219-002	13	mg/L	10	97	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		109			%			70	130	
		13C2-PFDA SUR		117			%			70	130	
		D5-NETFOSAA SUR		104			%			70	130	
		13C3-HFPO-DA SUR		110			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57136-001	1.7 U	1.7	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57136-001	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57136-001	1.8	1.7	0.44	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57136-001	1.7 U	1.7	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57136-001	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57136-001	0.76 J	1.7	0.29	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57136-001	0.44 J	1.7	0.35	ng/L					30
		perfluorohexanoic acid (PFHXA)	57136-001	1.4 J	1.7	0.30	ng/L					30
		perfluorononanoic acid (PFNA)	57136-001	1.7 U	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57136-001	0.88 J	1.7	0.35	ng/L					30
		perfluorooctanoic acid (PFOA)	57136-001	2.6	1.7	0.29	ng/L				2	30
		perfluorotetradecanoic acid (PFTEA)	57136-001	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57136-001	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57136-001	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57136-001	1.7 U	1.7	0.35	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57136-001	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	57136-001	111			%			70 130		
		13C2-PFDA SUR	57136-001	111			%			70 130		
		D5-NEtFOSAA SUR	57136-001	104			%			70 130		
		13C3-HFPO-DA SUR	57136-001	121			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		42	2.0	0.30	ng/L	40	106	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		42	2.0	0.39	ng/L	40	105	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		40	2.0	0.33	ng/L	40	99	70 130		
		perfluorobutane sulfonic acid (PFBS)		35	2.0	0.50	ng/L	35	99	70 130		
		perfluorodecanoic acid (PFDA)		38	2.0	0.34	ng/L	40	95	70 130		
		perfluorododecanoic acid (PFDOA)		45	2.0	0.43	ng/L	40	112	70 130		
		perfluoroheptanoic acid (PFHPA)		45	2.0	0.33	ng/L	40	113	70 130		
		perfluorohexane sulfonic acid (PFHXS)		39	2.0	0.40	ng/L	38	103	70 130		
		perfluorohexanoic acid (PFHXA)		40	2.0	0.35	ng/L	40	101	70 130		
		perfluorononanoic acid (PFNA)		43	2.0	0.45	ng/L	40	108	70 130		
		perfluorooctane sulfonic acid (PFOS)		35	2.0	0.40	ng/L	38	90	70 130		
		perfluorooctanoic acid (PFOA)		42	2.0	0.33	ng/L	40	105	70 130		
		perfluorotetradecanoic acid (PFTEA)		40	2.0	0.50	ng/L	40	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		41	2.0	0.13	ng/L	40	103	70 130		
		perfluoroundecanoic acid (PFUNA)		40	2.0	0.32	ng/L	40	101	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		32	2.0	0.39	ng/L	37	85	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		34	2.0	0.40	ng/L	37	92	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		43	2.0	0.18	ng/L	37	113	70 130		
		13C2-PFHxA SUR		113			%			70 130		
		13C2-PFDA SUR		126			%			70 130		
		D5-NETFOSAA SUR		102			%			70 130		
		13C3-HFPO-DA SUR		120			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57178-001	3.9	1.7	0.26	ng/L	3.41	114	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57178-001	3.8	1.7	0.33	ng/L	3.41	111	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57178-001	3.9	1.7	0.28	ng/L	3.41	115	50 150		
		perfluorobutane sulfonic acid (PFBS)	57178-001	3.7	1.7	0.43	ng/L	3.02	122	50 150		
		perfluorodecanoic acid (PFDA)	57178-001	3.5	1.7	0.29	ng/L	3.41	102	50 150		
		perfluorododecanoic acid (PFDOA)	57178-001	3.9	1.7	0.37	ng/L	3.41	114	50 150		
		perfluoroheptanoic acid (PFHPA)	57178-001	4.9	1.7	0.28	ng/L	3.41	144	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57178-001	3.8	1.7	0.34	ng/L	3.24	117	50 150		
		perfluorohexanoic acid (PFHXA)	57178-001	4.8	1.7	0.29	ng/L	3.41	140	50 150		
		perfluorononanoic acid (PFNA)	57178-001	4.1	1.7	0.38	ng/L	3.41	119	50 150		
		perfluorooctane sulfonic acid (PFOS)	57178-001	3.4	1.7	0.34	ng/L	3.27	102	50 150		
		perfluorooctanoic acid (PFOA)	57178-001	6.1	1.7	0.28	ng/L	3.41	116	50 150		
		perfluorotetradecanoic acid (PFTEA)	57178-001	3.3	1.7	0.42	ng/L	3.41	96	50 150		
		perfluorotridecanoic acid (PFTRIA)	57178-001	3.5	1.7	0.11	ng/L	3.41	103	50 150		
		perfluoroundecanoic acid (PFUNA)	57178-001	3.7	1.7	0.28	ng/L	3.41	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57178-001	2.8	1.7	0.34	ng/L	3.22	86	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57178-001	3.0	1.7	0.34	ng/L	3.19	94	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57178-001	4.0	1.7	0.16	ng/L	3.22	125	50 150		
		13C2-PFHxA SUR	57178-001	113			%			70 130		
		13C2-PFDA SUR	57178-001	119			%			70 130		
		D5-NETFOSAA SUR	57178-001	106			%			70 130		
		13C3-HFPO-DA SUR	57178-001	110			%			70 130		



Absolute Resource Associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST

57187

PAGE OF

Company Name: Kleinelder

Company Address: 4 Teal Drive Westborough MA

Report to: Alex Bzap

Phone #: 914-406-9548

Invoice to: Kleinelder

Email: abs.slope@kleinelder.com

PO #: _____

Project Name: Barnstable SW2

Project #: SW2

Project Location: NH MA ME VT

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES MCP NHDES DOD

Reporting QAPP GW-1 S-1 Limits: EPLDW Other

Quote # _____

NH Reimbursement Pricing

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57187A1	Road-SW2	1	X							5/27/21	10:00	UC	
		7											
		2											
		2											
	02 Field Blank	1											

- VOC 8260
- VOC 8260 NHDES
- VOC 8260 MADEP
- VOC 624.1
- VOC BTEX MtBE, only
- VOC 8021VT
- VPH MADEP
- GRO 8015
- 1,4-Dioxane *
- VOC 524.2
- VOC 524.2 NH List
- Gases-List:
- TPH 8100
- DRO 8015
- EPH MADEP
- TPH Fingerprint
- 8270PAH
- 8270ABN
- 625.1
- EDB
- PFAS 537.1
- PFAS 533
- PFAS isotope dilution
- O&G 1664
- Mineral O&G 1664
- pH
- BOD
- Conductivity
- Turbidity
- Apparent Color *true*
- TSS
- TDS
- TS
- TVS
- Alkalinity
- Acidity
- RCRA Metals
- Priority Pollutant Metals
- TAL Metals
- Hardness
- Total Metals-list: *Ca, Na, Mg, Mn, Fe, Zn*
- Dissolved Metals-list:
- Ammonia
- COD
- TKN
- TN
- TON
- TOC
- Ferrous Iron
- T-Phosphorus
- Bacteria P/A
- Bacteria MPN
- Enterococci
- Cyanide
- Sulfide
- Nitrate + Nitrite
- Ortho P
- Phenols
- Nitrate
- Nitrite
- Chloride
- Sulfate
- Bromide
- Fluoride
- Corrosivity
- Ignitibility/FP
- TCLP Metals
- TCLP VOC
- TCLP SVOC
- TCLP Pesticide
- Subcontract: Grain Size Herbicides Asbestos
- Total Coliform

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
* Use reporting limit of 0.13 ug/L for 1,4-Dioxane

REPORTING INSTRUCTIONS
 HARD COPY REQUIRED EDD

Requisitioned by Sampler: *[Signature]*
Requisitioned by: *[Signature]*
Received by Laboratory: *[Signature]*

RECEIVED ON ICE DYES CNO TEMPERATURE _____ °C

CUSTODY RECORD
OSD-01 Revision 03/09/2020

Relinquished by:	Date	Time	Received by:	Date	Time
<i>[Signature]</i>	5/27	11:30	<i>[Signature]</i>	5/27	14:20
<i>[Signature]</i>	5/27	14:20	<i>[Signature]</i>	5/27	17:16

Sample Receipt Condition Report

57187

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 1 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					pH 2.50
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)		250mL(P)		500mL(P)	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	3						*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>N</u>
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)	2	60mL(P)	2	125mL(P)	3	250mL(P)	1	500mL(P)	1
									1L(G)	1L(P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			the agreement
Date, time & ID on samples match CoC?	✓			DBV, SEM, AN
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JO Date/Time: 5/27/24 18:10

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
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Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57186
Date Received: 5/27/21

Project: Barnstable, SW2 SW2

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', is written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/9/2021
Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Finished-SW2	Water	5/27/2021 10:45	57186-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Prep for transfer to Subcontract Lab Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable, SW2 SW2

Job ID: 57186

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
chloroform	< 0.50	0.50	ug/L	1	LMM	2101571	6/3/21	14:20	E524.2	
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM	2101571	6/3/21	14:20	E524.2	
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM	2101571	6/3/21	14:20	E524.2	
bromoform	< 0.50	0.50	ug/L	1	LMM	2101571	6/3/21	14:20	E524.2	
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM	2101571	6/3/21	14:20	E524.2	
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	92	70-130	%	1	LMM	2101571	6/3/21	14:20	E524.2	
1,4-dichlorobenzene-D4 SUR	98	70-130	%	1	LMM	2101571	6/3/21	14:20	E524.2	

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM	2101601	6/5/21	7:33	SW8260Dmod	

Project ID: Barnstable, SW2 SW2

Job ID: 57186

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Parameter	Reporting		Instr Dil'n		Prep		Analysis			Reference
	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Calcium	21	0.50	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Magnesium	6.3	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Manganese	0.019	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Sodium	42	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Zinc	0.15	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:44	E200.8
Hardness (as CaCO3)	78	3	mg/L	1	AGN	6/7/21	13945	6/8/21		SM2340B

Project ID: Barnstable, SW2 SW2

Job ID: 57186

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Alkalinity, Total (as CaCO3)	60	5	mg/L	1	DJM	2101535	6/2/21	9:21	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101509	5/28/21	12:42	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV	2101519	5/28/21	11:40	E300.0A
Chloride	65M	0.5	mg/L	1	DBV	2101549	6/2/21	15:46	E300.0A
M = The recovery for the matrix spike was 30%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.									
Nitrate-N	3.7	0.1	mg/L	1	DBV	2101519	5/28/21	11:40	E300.0A
Nitrite-N	< 0.1	0.1	mg/L	1	DBV	2101519	5/28/21	11:40	E300.0A
ortho-phosphate as P	0.3	0.1	mg/L	1	DBV	2101519	5/28/21	11:40	E300.0A
Sulfate	13	0.5	mg/L	1	DBV	2101519	5/28/21	11:40	E300.0A
Total Dissolved Solids (TDS)	220	20	mg/L	1	SFM	2101566	6/2/21	14:25	SM2540C
Total Phosphorus as P	0.44	0.01	mg/L	1	SFM	2101506	5/28/21	15:00	E365.3
True Color	< 5.0	5.0	CU	1	SFM	2101510	5/28/21	12:42	SM2120B
Total Coliform Bacteria	absent			1	DBV	2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101516	5/27/21	17:40	SM9223BColilert
Conductivity	380	5	umhos/cm	1	SFM	2101528	6/1/21	14:00	SM2510B
pH	7.4H		pH	1	SFM	2101511	5/28/21	10:03	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	AGN	2101503	5/28/21	11:41	SM2130B

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101548	6/2/21	13:06	SM5310C

Project ID: Barnstable, SW2 SW2

Job ID: 57186

Sample#: 57186-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/1/21	13921	6/1/21	17:40
Surrogate Recovery		Limits								
13C2-PFHxA SUR	112	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:40
13C2-PFDA SUR	123	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:40
D5-NEtFOSAA SUR	98	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:40
13C3-HFPO-DA SUR	110	70-130		%	1	WAS	6/1/21	13921	6/1/21	17:40

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57186

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 57186-001 did not meet the acceptance criteria for chloride. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101571	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			93	%			70	130	
		1,4-dichlorobenzene-D4 SUR			95	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101571	chloroform	57188-001	<	0.50	ug/L				20	
		bromodichloromethane	57188-001	<	0.50	ug/L				20	
		dibromochloromethane	57188-001	<	0.50	ug/L				20	
		bromoform	57188-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57188-001		96	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57188-001		95	%			70	130	
		Total Trihalomethanes (THMs)	57188-001							95.8	
E524.2	LCS2101571	chloroform			10	ug/L	10	104	70	130	
		bromodichloromethane			10	ug/L	10	103	70	130	
		dibromochloromethane			10	ug/L	10	104	70	130	
		bromoform			11	ug/L	10	110	70	130	
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			122	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101571	chloroform			10	ug/L	10	100	70	130	4
		bromodichloromethane			9.9	ug/L	10	99	70	130	4
		dibromochloromethane			10	ug/L	10	101	70	130	2
		bromoform			10	ug/L	10	105	70	130	4
		4-bromofluorobenzene SUR			106	%			70	130	
		1,4-dichlorobenzene-D4 SUR			114	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101601	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101601	1,4-dioxane			8.4	ug/L	8	105	70	130	
SW8260Dmod	LCSD2101601	1,4-dioxane			8.4	ug/L	8	105	70	130	0

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13945	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13945	Calcium	57136-001	0.69	mg/L				9	20
		Iron	57136-001	< 0.050	mg/L					20
		Magnesium	57136-001	0.48	mg/L				2	20
		Manganese	57136-001	0.030	mg/L				0	20
E200.8	LCS13945	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13945	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13945	Calcium	57136-001	3.0	mg/L	2.5	121	70 130		
		Iron	57136-001	0.49	mg/L	0.5	98	70 130		
		Magnesium	57136-001	0.96	mg/L	0.5	96	70 130		
		Manganese	57136-001	0.54	mg/L	0.5	101	70 130		
E200.8	MS13945	Calcium	57190-003	21	mg/L	2.5	104	70 130		
		Iron	57190-003	0.49	mg/L	0.5	97	70 130		
		Magnesium	57190-003	5.9	mg/L	0.5	108	70 130		
		Manganese	57190-003	0.50	mg/L	0.5	100	70 130		
		Sodium	57190-003	47	mg/L	5	103	70 130		
		Zinc	57190-003	0.51	mg/L	0.5	102	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101519	Bromide		<	0.1	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		ortho-phosphate as P		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101519	Nitrate-N	57189-003		0.5	mg/L			0	10
		Nitrite-N	57189-003	<	0.1	mg/L				10
E300.0A	LCS2101519	Bromide			9.5	mg/L	10	95	90	110
		Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
		ortho-phosphate as P			10	mg/L	10	102	90	110
		Sulfate			97	mg/L	100	97	90	110
E300.0A	LCSD2101519	Bromide			9.5	mg/L	10	95	90	110
		Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
		ortho-phosphate as P			10	mg/L	10	104	90	110
		Sulfate			97	mg/L	100	97	90	110
E300.0A	MS2101519	Nitrate-N	57189-003		2.0	mg/L	1.66	92	90	110
		Nitrite-N	57189-003		2.4	mg/L	2.53	96	90	110
E300.0A	MS2101519	Nitrate-N	57190-008		2.2	mg/L	1.66	95	90	110
		Nitrite-N	57190-008		2.5	mg/L	2.53	100	90	110
		Sulfate	57190-008		23	mg/L	16	93	90	110
E300.0A	BLK2101549	Chloride		<	0.5	mg/L				
E300.0A	LCS2101549	Chloride			97	mg/L	100	97	90	110
E300.0A	LCSD2101549	Chloride			97	mg/L	100	97	90	110
E300.0A	MS2101549	Chloride	57186-001		70	mg/L	16	30 *	90	110
E365.3	LCS2101506	Total Phosphorus as P			0.19	mg/L	0.2	96	75	125
E365.3	LCSD2101506	Total Phosphorus as P			0.20	mg/L	0.2	98	75	125
E365.3	PB2101506	Total Phosphorus as P		<	0.01	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101509	Apparent Color	57139-001	8	CU				0	20
SM2120B	DUP2101509	Apparent Color	57139-005	8	CU				0	20
SM2120B	LCS2101509	Apparent Color		35	CU	35		30 40		
SM2120B	PB2101509	Apparent Color		< 5	CU			5		
SM2120B	BLK2101510	True Color		< 5	CU			5		
SM2120B	DUP2101510	True Color	57187-001	< 5	CU					20
SM2120B	LCS2101510	True Color		35	CU	35		30 40		
SM2320B	CCVB2101535	Alkalinity, Total (as CaCO3)		6.04	pH			5.94 6.06		
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-004	75	mg/L				3	10
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-007	15	mg/L				2	10
SM2320B	LCS2101535	Alkalinity, Total (as CaCO3)		24	mg/L	25	97	90 110		
SM2320B	LCSD2101535	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90 110	1	10
SM2320B	PB2101535	Alkalinity, Total (as CaCO3)		< 5	mg/L					
SM2510B	BLK2101528	Conductivity		< 5	uS/cm					
SM2510B	DUP2101528	Conductivity	57190-008	150	uS/cm				0	20
SM2510B	DUP2101528	Conductivity	57190-009	150	uS/cm				2	20
SM2510B	LCS2101528	Conductivity		1400	uS/cm	1409	99	90 110		
SM2510B	LCSD2101528	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101566	Total Dissolved Solids (TDS)	57190-007	76	mg/L				5	5
SM2540C	LCS2101566	Total Dissolved Solids (TDS)		110	mg/L	99.2	106	75 125		
SM2540C	PB2101566	Total Dissolved Solids (TDS)		< 20	mg/L					
SM4500H+B	DUP2101511	pH	57136-001	8.3	pH					
SM4500H+B	DUP2101511	pH	57179-001	8.1	pH					
SM4500H+B	DUP2101511	pH	57186-001	7.3	pH					
SM4500H+B	DUP2101511	pH	57190-009	7.4	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2101548	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101548	Total Organic Carbon (TOC)	57219-001	9	mg/L				1	20
SM5310C	LCS2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115		
SM5310C	LCSD2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115	0	20
SM5310C	MS2101548	Total Organic Carbon (TOC)	57219-002	13	mg/L	10	97	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		109			%			70	130	
		13C2-PFDA SUR		117			%			70	130	
		D5-NETFOSAA SUR		104			%			70	130	
		13C3-HFPO-DA SUR		110			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57136-001	1.7 U	1.7	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57136-001	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57136-001	1.8	1.7	0.44	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57136-001	1.7 U	1.7	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57136-001	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57136-001	0.76 J	1.7	0.29	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57136-001	0.44 J	1.7	0.35	ng/L					30
		perfluorohexanoic acid (PFHXA)	57136-001	1.4 J	1.7	0.30	ng/L					30
		perfluorononanoic acid (PFNA)	57136-001	1.7 U	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57136-001	0.88 J	1.7	0.35	ng/L					30
		perfluorooctanoic acid (PFOA)	57136-001	2.6	1.7	0.29	ng/L				2	30
		perfluorotetradecanoic acid (PFTEA)	57136-001	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57136-001	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57136-001	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57136-001	1.7 U	1.7	0.35	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57136-001	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	57136-001	111			%			70 130		
		13C2-PFDA SUR	57136-001	111			%			70 130		
		D5-NEtFOSAA SUR	57136-001	104			%			70 130		
		13C3-HFPO-DA SUR	57136-001	121			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		42	2.0	0.30	ng/L	40	106	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		42	2.0	0.39	ng/L	40	105	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		40	2.0	0.33	ng/L	40	99	70 130		
		perfluorobutane sulfonic acid (PFBS)		35	2.0	0.50	ng/L	35	99	70 130		
		perfluorodecanoic acid (PFDA)		38	2.0	0.34	ng/L	40	95	70 130		
		perfluorododecanoic acid (PFDOA)		45	2.0	0.43	ng/L	40	112	70 130		
		perfluoroheptanoic acid (PFHPA)		45	2.0	0.33	ng/L	40	113	70 130		
		perfluorohexane sulfonic acid (PFHXS)		39	2.0	0.40	ng/L	38	103	70 130		
		perfluorohexanoic acid (PFHXA)		40	2.0	0.35	ng/L	40	101	70 130		
		perfluorononanoic acid (PFNA)		43	2.0	0.45	ng/L	40	108	70 130		
		perfluorooctane sulfonic acid (PFOS)		35	2.0	0.40	ng/L	38	90	70 130		
		perfluorooctanoic acid (PFOA)		42	2.0	0.33	ng/L	40	105	70 130		
		perfluorotetradecanoic acid (PFTEA)		40	2.0	0.50	ng/L	40	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		41	2.0	0.13	ng/L	40	103	70 130		
		perfluoroundecanoic acid (PFUNA)		40	2.0	0.32	ng/L	40	101	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		32	2.0	0.39	ng/L	37	85	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		34	2.0	0.40	ng/L	37	92	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		43	2.0	0.18	ng/L	37	113	70 130		
		13C2-PFHxA SUR		113			%			70 130		
		13C2-PFDA SUR		126			%			70 130		
		D5-NEtFOSAA SUR		102			%			70 130		
		13C3-HFPO-DA SUR		120			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57178-001	3.9	1.7	0.26	ng/L	3.41	114	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57178-001	3.8	1.7	0.33	ng/L	3.41	111	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57178-001	3.9	1.7	0.28	ng/L	3.41	115	50 150		
		perfluorobutane sulfonic acid (PFBS)	57178-001	3.7	1.7	0.43	ng/L	3.02	122	50 150		
		perfluorodecanoic acid (PFDA)	57178-001	3.5	1.7	0.29	ng/L	3.41	102	50 150		
		perfluorododecanoic acid (PFDOA)	57178-001	3.9	1.7	0.37	ng/L	3.41	114	50 150		
		perfluoroheptanoic acid (PFHPA)	57178-001	4.9	1.7	0.28	ng/L	3.41	144	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57178-001	3.8	1.7	0.34	ng/L	3.24	117	50 150		
		perfluorohexanoic acid (PFHXA)	57178-001	4.8	1.7	0.29	ng/L	3.41	140	50 150		
		perfluorononanoic acid (PFNA)	57178-001	4.1	1.7	0.38	ng/L	3.41	119	50 150		
		perfluorooctane sulfonic acid (PFOS)	57178-001	3.4	1.7	0.34	ng/L	3.27	102	50 150		
		perfluorooctanoic acid (PFOA)	57178-001	6.1	1.7	0.28	ng/L	3.41	116	50 150		
		perfluorotetradecanoic acid (PFTEA)	57178-001	3.3	1.7	0.42	ng/L	3.41	96	50 150		
		perfluorotridecanoic acid (PFTRIA)	57178-001	3.5	1.7	0.11	ng/L	3.41	103	50 150		
		perfluoroundecanoic acid (PFUNA)	57178-001	3.7	1.7	0.28	ng/L	3.41	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57178-001	2.8	1.7	0.34	ng/L	3.22	86	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57178-001	3.0	1.7	0.34	ng/L	3.19	94	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57178-001	4.0	1.7	0.16	ng/L	3.22	125	50 150		
		13C2-PFHxA SUR	57178-001	113			%			70 130		
		13C2-PFDA SUR	57178-001	119			%			70 130		
		D5-NETFOSAA SUR	57178-001	106			%			70 130		
		13C3-HFPO-DA SUR	57178-001	110			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57186

ANALYSIS REQUEST

Company Name: Kleinfelder

Company Address: 4 Technology Drive, Westborough, MA

Report To: Alex Bishop

Phone #: 914-406-9598

Invoice to: Kleinfelder

Email: abbishop@kleinfelder.com

PO #:

Project Name: Barnstable, SW2

Project #: SW2

Project Location: NH MA ME VT

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP EPA DW GW-1 S-1
Other

Quote #

NH Reimbursement Pricing

VOC 8260 VOC 8260 MADEP

VOC 624.1 VOC BTEX MBE, only VOC 8021VT

VPH MADEP GRO 8015 1,4-Dioxane TRM

VOC 524.2 VOC 524.2 NH List Gases-List: TRM

TPH 8100 DRO 8015 EPH MADEP TPH Fingerprint

8270PAH 8270ABN 625.1 EDB

8082 PCB 8081 Pesticides 608.3 Pest/PCB

PFAS 537.1 PFAS 533 PFAS isotope dilution

O&G 1664 Mineral O&G 1664

pH BOD Conductivity Turbidity Apparent Color/True

TSS TDS TS TVS Alkalinity Acidity

RCRA Metals Priority Pollutant Metals TAL Metals Hardness

Total Metals-list: Ca, Mg, Na, Mn, Fe, Zn

Dissolved Metals-list:

Ammonia COD TKN TN TON VOC Ferrous Iron

Total Phosphorus Bacteria P/A Bacteria MPN Enterococci

Cyanide Sulfide Nitrate Nitrite Ortho P Phenols

Nitrate Nitrite Chloride Sulfate Bromide Fluoride

Corrosivity Ignitability/FP

TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide

Subcontract: Grain Size Herbicides Asbestos

Total coliform P/A per ASD

HAAS

57186

Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57186001	Finished SW2	8	X								5/27/21	10:45	UC
		1											
		1											
		2											
		2											
		1											
		2				X							
		3											
		2											

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com

HARD COPY REQUIRED EDD

SPECIAL INSTRUCTIONS

*use reporting limit of 0.13 ug/L for 1,4-Dioxane

Kryan@kleinfelder.com

RECEIVED ON ICE YES NO

TEMPERATURE °C

CUSTODY RECORD

QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>5/27</u> Time: <u>11:30</u>	Received by:	Date: <u>5/27</u> Time: <u>11:30</u>
Relinquished by:	Date: <u>5/27/21</u> Time: <u>14:20</u>	Received by:	Date: <u>5-27</u> Time: <u>14:20</u>
Relinquished by:	Date: <u>5-27</u> Time: <u>17:16</u>	Received by Laboratory:	Date: <u>5/27/21</u> Time: <u>17:16</u>

Sample Receipt Condition Report

57186

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: _____ °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)		*pH ✓by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓by analyst PC Dry applicable? Y <input checked="" type="checkbox"/> N <input type="checkbox"/> 1L(G) _____ 1L (P) _____
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)				
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)	
NaOH	125mL(P)		250mL(P)						
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)				
ZnAc-NaOH	125mL(P)		250mL(P)						
Trizma	125mL(P)		250mL (P)	2					
NH ₄ Ac	125mL(P)		250mL (P)						
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1					
MeOH	20mL(G)		40mL(G)						
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe		
None (water)	40ml (G)	2	60mL(P)	3	125mL(P)	3	250mL(P)	1 500mL(P) 1	
NH ₄ Cl	60mL(G)	3							
Mold	Cassette		Bulk		Plate		Tape Lift		
Asbestos	Cassette		Bulk						
Lead	Cassette		Bulk		Wipe				

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: true Color, Apparent Color, NO ₃ , NO ₂ -P, pH, BOD, Coliform, E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			DBV
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?				
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: NO

Date/Time: 5/27/21 17:57

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/08/2021
Work Order #: 2106-00278
Client Job #:
Date Received: 06/02/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00278-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: Finished-SW2
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 10:45AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 01:31AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 01:31AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 01:31AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 01:31AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 01:31AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 01:31AM
2,3-Dibromopropionic Acid	90	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 01:31AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource associates



124 Heritage Avenue #16
 Portsmouth, NH 03801
 603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57186

ANALYSIS REQUEST

Company Name: Kleinfelder

Company Address: 4 Technology Drive, Westborough, MA

Report To: Alex Bishop

Phone #: 914-406-9598

Invoice to: Kleinfelder

Email: abbishop@kleinfelder.com

PO #: _____

Project Name: Barnstable, SWZ

Project #: SWZ

Project Location: NH MA ME VT _____

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES
 MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> 1,4-Dioxane
<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<u>TIRM</u>
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRP 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> Pesticides
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	<input type="checkbox"/> PFAS
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity
<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input type="checkbox"/> Apparent Color	<u>True</u>
<input type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TVS	<input type="checkbox"/> Alkalinity
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness
<input checked="" type="checkbox"/> Total Metals-list: <u>Ca, Mg, Na, Mn, Fe, Zn</u>	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate
<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide
<input type="checkbox"/> Phenols	<input type="checkbox"/> TOC	<input type="checkbox"/> TKN	<input type="checkbox"/> TN
<input type="checkbox"/> Enterococci	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Corrosivity/FP	<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Nitrate
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide
<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Grain Size	<input type="checkbox"/> TCLP Pesticide
<input type="checkbox"/> Grab (G) or Composite (C)	<input type="checkbox"/> Total coliform P/A per ASD	<input type="checkbox"/> HAAS	<input type="checkbox"/> HAAS

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57186001	Finished SW2	8	X								5/27/21	10:45	UC
		1											
		2											
		2											
		1											
		2											
		3											
		2				X							

TAT REQUESTED

Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
*Use Reporting Limit of 0.13 ug/L for 1,4-Dioxane

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE _____ °C

Kryan@kleinfelder.com

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date: <u>5/27</u> Time: <u>11:30</u>	Received by:	Date: <u>5/27</u> Time: <u>11:30</u>
	Relinquished by:	Date: <u>5/27/21</u> Time: <u>14:20</u>	Received by:	Date: <u>5-27</u> Time: <u>14:20</u>
	Relinquished by:	Date: <u>5-27</u> Time: <u>17:16</u>	Received by Laboratory:	Date: <u>5/27/21</u> Time: <u>17:16</u>

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57188
Date Received: 5/27/21

Project: Barnstable SW2

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/9/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated-SW2	Water	5/27/2021 11:15	57188-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable SW2

Job ID: 57188

Sample#: 57188-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 5/27/21 11:15

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
chloroform	< 0.50	0.50	ug/L	1	LMM		2101571	6/3/21	14:52	E524.2
bromodichloromethane	< 0.50	0.50	ug/L	1	LMM		2101571	6/3/21	14:52	E524.2
dibromochloromethane	< 0.50	0.50	ug/L	1	LMM		2101571	6/3/21	14:52	E524.2
bromoform	< 0.50	0.50	ug/L	1	LMM		2101571	6/3/21	14:52	E524.2
Total Trihalomethanes (THMs)	< 0.50	0.50	ug/L	1	LMM		2101571	6/3/21	14:52	E524.2
Surrogate Recovery		Limits								
4-bromofluorobenzene SUR	93	70-130	%	1	LMM		2101571	6/3/21	14:52	E524.2
1,4-dichlorobenzene-D4 SUR	89	70-130	%	1	LMM		2101571	6/3/21	14:52	E524.2

Sample#: 57188-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 5/27/21 11:15

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	19	0.50	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Magnesium	5.4	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Sodium	42	0.10	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Zinc	0.081	0.010	mg/L	1	AGN	6/7/21	13945	6/7/21	19:58	E200.8
Hardness (as CaCO3)	69	3	mg/L	1	AGN	6/7/21	13945	6/8/21		SM2340B

Project ID: Barnstable SW2

Job ID: 57188

Sample#: 57188-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 5/27/21 11:15

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Alkalinity, Total (as CaCO3)	70	5	mg/L	1	DJM	2101535	6/2/21	9:21	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101509	5/28/21	12:45	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
Chloride	51	0.5	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
Nitrate-N	0.7	0.1	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
Nitrite-N	< 0.1	0.1	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
ortho-phosphate as P	0.2	0.1	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
Sulfate	21	0.5	mg/L	1	DBV	2101519	5/28/21	11:56	E300.0A
Total Dissolved Solids (TDS)	200	20	mg/L	1	SFM	2101566	6/2/21	14:25	SM2540C
Total Phosphorus as P	0.19	0.01	mg/L	1	SFM	2101506	5/28/21	15:00	E365.3
True Color	< 5.0	5.0	CU	1	SFM	2101510	5/28/21	12:45	SM2120B
Total Coliform Bacteria	absent			1	DBV	2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101516	5/27/21	17:40	SM9223BColilert
Conductivity	340	5	umhos/cm	1	SFM	2101528	6/1/21	14:00	SM2510B
pH	7.4H		pH	1	SFM	2101511	5/28/21	10:31	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	AGN	2101503	5/28/21	11:43	SM2130B

Sample#: 57188-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 5/27/21 11:15

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		
	Result	Limit	Units	Factor			Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101548	6/2/21	14:38	SM5310C

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57188

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101571	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			93	%			70	130		
		1,4-dichlorobenzene-D4 SUR			95	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101571	chloroform	57188-001	<	0.50	ug/L				20		
		bromodichloromethane	57188-001	<	0.50	ug/L				20		
		dibromochloromethane	57188-001	<	0.50	ug/L				20		
		bromoform	57188-001	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	57188-001		96	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57188-001		95	%			70	130		
		Total Trihalomethanes (THMs)	57188-001								95.8	
E524.2	LCS2101571	chloroform			10	ug/L	10	104	70	130		
		bromodichloromethane			10	ug/L	10	103	70	130		
		dibromochloromethane			10	ug/L	10	104	70	130		
		bromoform			11	ug/L	10	110	70	130		
		4-bromofluorobenzene SUR			112	%			70	130		
		1,4-dichlorobenzene-D4 SUR			122	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101571	chloroform			10	ug/L	10	100	70	130	4	20
		bromodichloromethane			9.9	ug/L	10	99	70	130	4	20
		dibromochloromethane			10	ug/L	10	101	70	130	2	20
		bromoform			10	ug/L	10	105	70	130	4	20
		4-bromofluorobenzene SUR			106	%			70	130		
		1,4-dichlorobenzene-D4 SUR			114	%			70	130		
		Total Trihalomethanes (THMs)										

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13945	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13945	Calcium	57136-001	0.69	mg/L				9	20
		Iron	57136-001	< 0.050	mg/L					20
		Magnesium	57136-001	0.48	mg/L				2	20
		Manganese	57136-001	0.030	mg/L				0	20
E200.8	LCS13945	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13945	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13945	Calcium	57136-001	3.0	mg/L	2.5	121	70 130		
		Iron	57136-001	0.49	mg/L	0.5	98	70 130		
		Magnesium	57136-001	0.96	mg/L	0.5	96	70 130		
		Manganese	57136-001	0.54	mg/L	0.5	101	70 130		
E200.8	MS13945	Calcium	57190-003	21	mg/L	2.5	104	70 130		
		Iron	57190-003	0.49	mg/L	0.5	97	70 130		
		Magnesium	57190-003	5.9	mg/L	0.5	108	70 130		
		Manganese	57190-003	0.50	mg/L	0.5	100	70 130		
		Sodium	57190-003	47	mg/L	5	103	70 130		
		Zinc	57190-003	0.51	mg/L	0.5	102	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101519	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101519	Nitrate-N	57189-003		0.5	mg/L			0	10		
		Nitrite-N	57189-003	<	0.1	mg/L				10		
E300.0A	LCS2101519	Bromide			9.5	mg/L	10	95	90	110		
		Chloride			97	mg/L	100	97	90	110		
		Nitrate-N			9.9	mg/L	10	99	90	110		
		Nitrite-N			15	mg/L	15	97	90	110		
		ortho-phosphate as P			10	mg/L	10	102	90	110		
		Sulfate			97	mg/L	100	97	90	110		
E300.0A	LCSD2101519	Bromide			9.5	mg/L	10	95	90	110	0	10
		Chloride			98	mg/L	100	98	90	110	1	10
		Nitrate-N			9.9	mg/L	10	99	90	110	0	10
		Nitrite-N			15	mg/L	15	97	90	110	0	10
		ortho-phosphate as P			10	mg/L	10	104	90	110	2	10
		Sulfate			97	mg/L	100	97	90	110	0	10
E300.0A	MS2101519	Chloride	57078-006		17	mg/L	16	104	90	110		
E300.0A	MS2101519	Nitrate-N	57189-003		2.0	mg/L	1.66	92	90	110		
		Nitrite-N	57189-003		2.4	mg/L	2.53	96	90	110		
E300.0A	MS2101519	Chloride	57190-008		42	mg/L	16	77 *	90	110		
		Nitrate-N	57190-008		2.2	mg/L	1.66	95	90	110		
		Nitrite-N	57190-008		2.5	mg/L	2.53	100	90	110		
		Sulfate	57190-008		23	mg/L	16	93	90	110		
E300.0A	MSD2101519	Chloride	57078-006		18	mg/L	16	107	90	110	3	10
E365.3	LCS2101506	Total Phosphorus as P			0.19	mg/L	0.2	96	75	125		
E365.3	LCSD2101506	Total Phosphorus as P			0.20	mg/L	0.2	98	75	125	3	20
E365.3	PB2101506	Total Phosphorus as P		<	0.01	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101509	Apparent Color	57139-001	8	CU				0	20
SM2120B	DUP2101509	Apparent Color	57139-005	8	CU				0	20
SM2120B	LCS2101509	Apparent Color		35	CU	35		30 40		
SM2120B	PB2101509	Apparent Color		< 5	CU			5		
SM2120B	BLK2101510	True Color		< 5	CU			5		
SM2120B	DUP2101510	True Color	57187-001	< 5	CU					20
SM2120B	LCS2101510	True Color		35	CU	35		30 40		
SM2320B	CCVB2101535	Alkalinity, Total (as CaCO3)		6.04	pH			5.94 6.06		
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-004	75	mg/L				3	10
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-007	15	mg/L				2	10
SM2320B	LCS2101535	Alkalinity, Total (as CaCO3)		24	mg/L	25	97	90 110		
SM2320B	LCSD2101535	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90 110	1	10
SM2320B	PB2101535	Alkalinity, Total (as CaCO3)		< 5	mg/L					
SM2510B	BLK2101528	Conductivity		< 5	uS/cm					
SM2510B	DUP2101528	Conductivity	57190-008	150	uS/cm				0	20
SM2510B	DUP2101528	Conductivity	57190-009	150	uS/cm				2	20
SM2510B	LCS2101528	Conductivity		1400	uS/cm	1409	99	90 110		
SM2510B	LCSD2101528	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101566	Total Dissolved Solids (TDS)	57190-007	76	mg/L				5	5
SM2540C	LCS2101566	Total Dissolved Solids (TDS)		110	mg/L	99.2	106	75 125		
SM2540C	PB2101566	Total Dissolved Solids (TDS)		< 20	mg/L					
SM4500H+B	DUP2101511	pH	57136-001	8.3	pH					
SM4500H+B	DUP2101511	pH	57179-001	8.1	pH					
SM4500H+B	DUP2101511	pH	57186-001	7.3	pH					
SM4500H+B	DUP2101511	pH	57190-009	7.4	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2101548	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101548	Total Organic Carbon (TOC)	57219-001	9	mg/L				1	20
SM5310C	LCS2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115		
SM5310C	LCSD2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115	0	20
SM5310C	MS2101548	Total Organic Carbon (TOC)	57219-002	13	mg/L	10	97	75 125		



ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Tech Dr. Westborough MA
Report To: Alex Bausp
Phone #: 914-406-9598
Invoice to: abb@shop.kleinfelder.com
Email: Alex Bausp
PO #:

Project Name: Barnstable
Project #: SW2
Project Location: NH MA ME VT
Accreditation Required? N/A
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting QAPP GW-1 S-1
Limits: EPA DW Other
Quote #
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane	
<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	Gases-List: <u>TTHM</u>	
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	
<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664		
<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> Hardness
Total Metals-list: <u>Cd, Ni, Pb, Fe, Zn, Mn</u>			
Dissolved Metals-list:			
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate	<input type="checkbox"/> Ortho P
<input checked="" type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate
<input type="checkbox"/> Cadmium	<input type="checkbox"/> Ignitability/FP		
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide
Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos			
Total Coliform P/A per AID RAT 5			
Grab (G) or Composite (C)			

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME
578801	Simulated-SW2	3	X	X						5/27	11:5	VC
		1	X									
		1										
		2										
		2										
		3				X						

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.
SPECIAL INSTRUCTIONS
REPORTING INSTRUCTIONS PDF (e-mail address) abb@shop.kleinfelder.com + kryan@kleinfelder.com
 HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO
TEMPERATURE _____ °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date: <u>5/27</u> Time: <u>11:30</u>	Received by:	Date: <u>5/27</u> Time: <u>11:30</u>
	Relinquished by:	Date: <u>5/27/21</u> Time: <u>14:20</u>	Received by:	Date: <u>5-27</u> Time: <u>14:20</u>
	Relinquished by:	Date: <u>5-27</u> Time: <u>17:16</u>	Received by Laboratory:	Date: <u>5/27/21</u> Time: <u>17:16</u>

Sample Receipt Condition Report

57188

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 1 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y N pH 2.2 T. phos pH 2.2
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)		
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL (P)							
NH ₄ Ac	125mL(P)		250mL (P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)		60mL(P)	3	125mL(P)	3	250mL(P)	1	500mL(P)	1
NH ₄ Cl	40ml(G)	3								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: <small>NO₃, NO₂, PO₄, pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferric Iron, Dissolved Oxygen, Unpres 624</small>	✓			the apparent ✓ ✓ ABV/SEM, AIV
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JD

Date/Time: 5/27/21 18:28

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/08/2021
Work Order #: 2106-00273
Client Job #:
Date Received: 06/02/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00273-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: Simulated-SW2
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 11:15AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 12:50AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 12:50AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 12:50AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 12:50AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 12:50AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 12:50AM
2,3-Dibromopropionic Acid	102	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 12:50AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57188

ANALYSIS REQUEST

Company Name: Kleinfelder
 Company Address: 4 Tech Dr. Westborough MA
 Report To: Alex Banz
 Phone #: 914-406-9598
 Invoice to: abbishop@kleinfelder.com
 Email: Alex Banz
 PO #:

Project Name: Barnstable
 Project #: sw2
 Project Location: NH MA ME VT
 Accreditation Required? NA
 Protocol: RCRA SDWA NPDES
 MCP NHDES DOD
 Reporting QAPP GW-1 S-1
 Limits: EPA DW Other
 Quote #
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> pH	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> Apparent Color	<input checked="" type="checkbox"/> Iron
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> Hardness
<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	Gases-List: <u>TMM</u>	<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRP 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> TSS	<input type="checkbox"/> TDS
<input type="checkbox"/> BOD	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TON	<input type="checkbox"/> TOC
<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Nitrate
<input type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Cadmium	<input type="checkbox"/> Ignitibility/FP	
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	Subcontract: Grain Size Herbiocides Asbestos		

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO3	H2SO4	NaOH	MeOH	DATE	TIME
578801	Simulated-sw2	1	X							5/27	11:5	bc
		1	X									
		2										
		2										
		3				X						

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

SPECIAL INSTRUCTIONS
 See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.
REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com + kryan@kleinfelder.com
 HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO
 TEMPERATURE _____ °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler: <u>[Signature]</u> Date: <u>5/27</u> Time: <u>11:30</u>	Received by: <u>[Signature]</u> Date: <u>5/27</u> Time: <u>11:30</u>
	Relinquished by: <u>[Signature]</u> Date: <u>5/27/21</u> Time: <u>14:20</u>	Received by: <u>[Signature]</u> Date: <u>5-27</u> Time: <u>14:20</u>
	Relinquished by: <u>[Signature]</u> Date: <u>5-27</u> Time: <u>17:16</u>	Received by Laboratory: <u>[Signature]</u> Date: <u>5/27/21</u> Time: <u>17:16</u>

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 519815
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4917423	L2128312-01/Finished-SW2	317.0	05/27/21 10:45	Client	06/02/21 08:30
4917424	L2128312-02/Simulated-SW2	317.0	05/27/21 11:15	Client	06/02/21 08:30

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.




Authorized Signature

Title

06/10/2021

Date

Client Name: Alpha Analytical

Report #: 519815

Client Name: Alpha Analytical

Report #: 519815

Sampling Point: L2128312-01/Finished-SW2

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 22:12	4917423

Sampling Point: L2128312-02/Simulated-SW2

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 22:37	4917424

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

427413
519815

Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2128312



Client Information

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

Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Information

Project Location: MA
Project Manager: Nathalie Lewis

Turnaround & Deliverables Information

Due Date:
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128312 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
FINISHED-SW2 SIMULATED-SW2	-D1 -D2 per bottles	05-27-21 10:45 05-27-21 11:15	DW DW	4917423 4917424	
	bottles show unpreserved Okay to preserve 6/2/21 AcH EDA added upon receipt ss 6-2-21				
				Client Provided Sample Container	
					1.2°C
Relinquished By:				Date/Time: 6/1/21	Received By:
				Date/Time: 6-2-21 0830	
Form No: AL_subcoc					



CHAIN OF CUSTODY

PAGE _____ OF _____

Date Rec'd in Lab: 05/27/21

ALPHA Job #: L2128312

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300**Project Information**

Project Name: Barnstable

Project Location: straightway 2

Project #:

Project Manager: Kirsten Ryan

ALPHA Quote #:

Turn-Around Time Standard RUSH (only confirmed if pre-approved!)

Date Due:

Report Information - Data Deliverables ADEx EMAIL**Billing Information** Same as Client info PO #:**Client Information**

Client: Kleinfelder

Address: 4 Tech Drive
Westborough, MA

Phone: 914-406-4598

Email: abb.shop@kleinfelder.com

Additional Project Information:

Regulatory Requirements & Project Information Requirements

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

ANALYSIS		SAMPLE INFO
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 9242	Filtration	
SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	<input type="checkbox"/> Field	
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15	<input type="checkbox"/> Lab to do	
METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8	Preservation	
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Lab to do	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
<input type="checkbox"/> PCB <input type="checkbox"/> PEST		
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		

Bromate

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
28312-01	Finalled - SW2	5/27	1045	DW	uc
-02	Simulated - SW2	5/27	1115	DW	uc

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

Preservative
 A= None
 B= HCl
 C= HNO₃
 D= H₂SO₄
 E= NaOH
 F= MeOH
 G= NaHSO₄
 H= Na₂S₂O₃
 I= Ascorbic Acid
 J= NH₄Cl
 K= Zn Acetate
 O= Other

Container Type	PI
Preservative	NP

Relinquished By:	Date/Time	Received By:	Date/Time
<i>[Signature]</i>	5/27/21 11:30	<i>[Signature]</i>	5/27/21 14:40
<i>[Signature]</i>	5/27/21 14:40	<i>[Signature]</i>	5/27/21 14:40

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
 FORM NO: 01-01 (rev. 12-Mar-2012)



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2128312

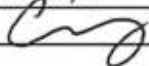
Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5170 Email: nlewis@alphalab.com	Project Location: MA Project Manager: Nathalie Lewis	State/Federal Program: Regulatory Criteria:
	Turnaround & Deliverables Information	
	Due Date: Deliverables:	

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128312 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	FINISHED-SW2 SIMULATED-SW2	05-27-21 10:45 05-27-21 11:15	DW DW	Bromate Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		6/1/21		
Form No: AL_subcoc				

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57268
Date Received: 6/3/21

Project: Barnstable StraightWay2

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink that reads "Alexander Alterisio". The signature is written in a cursive, flowing style.

Alex Alterisio
Authorized Signature

Date of Approval: 6/11/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW-SW2	Water	6/3/2021 11:10	57268-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	6/3/2021 11:10	57268-002	PFAS in Water by EPA 537.1

Project ID: Barnstable StraightWay2

Job ID: 57268

Sample#: 57268-001

Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

Parameter	Result	Reporting		DL	Units	Instr Dil'n		Prep		Analysis			
		Limit				Factor		Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.72	0.25		0.12	ug/L	1	LMM			2101643	6/8/21	11:13	SW8260Dmod

Project ID: Barnstable StraightWay2

Job ID: 57268

Sample#: 57268-001

Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Iron	0.53	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Magnesium	5.5	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Manganese	0.97	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Sodium	26	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Zinc	0.0039 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:30	E200.8
Hardness (as CaCO3)	69	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B

Sample#: 57268-001

Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	47	5	0.47	mg/L	1	DJM			2101588	6/4/21	10:30	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:40	SM2120B
Bromide	0.1	0.1	0.021	mg/L	1	DBV			2101597	6/4/21	15:12	E300.0A
Chloride	47	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	15:12	E300.0A
Sulfate	19	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	15:12	E300.0A
Total Dissolved Solids (TDS)	190	20	7.5	mg/L	1	SFM			2101631	6/8/21	17:27	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:40	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
Conductivity	280	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	6.6 H			pH	1	SFM			2101579	6/4/21	7:13	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	1.6	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:18	SM2130B

Sample#: 57268-001

Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Total Organic Carbon (TOC)	0.85 J	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	12:36	SM5310C

Project ID: Barnstable StraightWay2

Job ID: 57268

Sample#: 57268-001

Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorobutane sulfonic acid (PFBS)	3.6	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorodecanoic acid (PFDA)	0.31 J	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluoroheptanoic acid (PFHPA)	5.1	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorohexane sulfonic acid (PFHXS)	26	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorohexanoic acid (PFHXA)	11	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorononanoic acid (PFNA)	1.9	1.7	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorooctane sulfonic acid (PFOS)	35	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorooctanoic acid (PFOA)	18	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	6/8/21	13948	6/9/21	15:44
Surrogate Recovery		Limits								
13C2-PFHxA SUR	96	70-130		%	1	ACA	6/8/21	13948	6/9/21	15:44
13C2-PFDA SUR	100	70-130		%	1	ACA	6/8/21	13948	6/9/21	15:44
D5-NEtFOSAA SUR	100	70-130		%	1	ACA	6/8/21	13948	6/9/21	15:44
13C3-HFPO-DA SUR	99	70-130		%	1	ACA	6/8/21	13948	6/9/21	15:44

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: Barnstable StraightWay2

Job ID: 57268

Sample#: 57268-002

Sample ID: Field Blank

Matrix: Water

Sampled: 6/3/21 11:10

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	6/8/21	13948	6/9/21	16:00
Surrogate Recovery		Limits								
13C2-PFHxA SUR	99	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:00
13C2-PFDA SUR	100	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:00
D5-NEtFOSAA SUR	93	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:00
13C3-HFPO-DA SUR	98	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:00

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57268

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

No exceptions noted.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30 ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39 ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33 ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50 ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34 ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43 ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33 ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40 ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35 ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45 ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40 ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33 ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50 ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13 ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32 ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39 ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40 ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18 ng/L					
		13C2-PFHxA SUR		100		%			70 130		
		13C2-PFDA SUR		112		%			70 130		
		D5-NETFOSAA SUR		97		%			70 130		
		13C3-HFPO-DA SUR		95		%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	1.9 U	1.9	0.29	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57290-002	1.9 U	1.9	0.38	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57290-002	2.3	1.9	0.48	ng/L				1	30
		perfluorodecanoic acid (PFDA)	57290-002	1.9 U	1.9	0.33	ng/L					30
		perfluorododecanoic acid (PFDOA)	57290-002	1.9 U	1.9	0.41	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57290-002	1.8 J	1.9	0.32	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57290-002	1.4 J	1.9	0.38	ng/L					30
		perfluorohexanoic acid (PFHXA)	57290-002	3.4	1.9	0.33	ng/L				8	30
		perfluorononanoic acid (PFNA)	57290-002	0.54 J	1.9	0.43	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57290-002	3.6	1.9	0.38	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57290-002	5.9	1.9	0.32	ng/L				7	30
		perfluorotetradecanoic acid (PFTEA)	57290-002	1.9 U	1.9	0.48	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57290-002	1.9 U	1.9	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57290-002	1.9 U	1.9	0.18	ng/L					30
		13C2-PFHxA SUR	57290-002	102			%			70 130		
		13C2-PFDA SUR	57290-002	103			%			70 130		
		D5-NETFOSAA SUR	57290-002	95			%			70 130		
		13C3-HFPO-DA SUR	57290-002	99			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		170	2.0	0.30	ng/L	200	87	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		210	2.0	0.39	ng/L	200	103	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	108	70 130		
		perfluorobutane sulfonic acid (PFBS)		160	2.0	0.50	ng/L	177	91	70 130		
		perfluorodecanoic acid (PFDA)		200	2.0	0.34	ng/L	200	102	70 130		
		perfluorododecanoic acid (PFDOA)		210	2.0	0.43	ng/L	200	104	70 130		
		perfluoroheptanoic acid (PFHPA)		180	2.0	0.33	ng/L	200	90	70 130		
		perfluorohexane sulfonic acid (PFHXS)		160	2.0	0.40	ng/L	190	85	70 130		
		perfluorohexanoic acid (PFHXA)		180	2.0	0.35	ng/L	200	90	70 130		
		perfluorononanoic acid (PFNA)		190	2.0	0.45	ng/L	200	93	70 130		
		perfluorooctane sulfonic acid (PFOS)		160	2.0	0.40	ng/L	192	85	70 130		
		perfluorooctanoic acid (PFOA)		180	2.0	0.33	ng/L	200	89	70 130		
		perfluorotetradecanoic acid (PFTEA)		200	2.0	0.50	ng/L	200	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		200	2.0	0.13	ng/L	200	99	70 130		
		perfluoroundecanoic acid (PFUNA)		200	2.0	0.32	ng/L	200	102	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	97	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		170	2.0	0.18	ng/L	189	89	70 130		
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NETFOSAA SUR		84			%			70 130		
		13C3-HFPO-DA SUR		85			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	1.8	0.28	ng/L	36	95	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57286-001	43	1.8	0.36	ng/L	36	116	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57286-001	40	1.8	0.30	ng/L	36	108	70 130		
		perfluorobutane sulfonic acid (PFBS)	57286-001	30	1.8	0.46	ng/L	32	94	70 130		
		perfluorodecanoic acid (PFDA)	57286-001	39	1.8	0.31	ng/L	36	106	70 130		
		perfluorododecanoic acid (PFDOA)	57286-001	41	1.8	0.39	ng/L	36	112	70 130		
		perfluoroheptanoic acid (PFHPA)	57286-001	37	1.8	0.30	ng/L	36	101	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57286-001	32	1.8	0.36	ng/L	34	92	70 130		
		perfluorohexanoic acid (PFHXA)	57286-001	37	1.8	0.32	ng/L	36	102	70 130		
		perfluorononanoic acid (PFNA)	57286-001	37	1.8	0.41	ng/L	36	102	70 130		
		perfluorooctane sulfonic acid (PFOS)	57286-001	33	1.8	0.37	ng/L	35	94	70 130		
		perfluorooctanoic acid (PFOA)	57286-001	39	1.8	0.30	ng/L	36	107	70 130		
		perfluorotetradecanoic acid (PFTEA)	57286-001	41	1.8	0.46	ng/L	36	111	70 130		
		perfluorotridecanoic acid (PFTRIA)	57286-001	40	1.8	0.12	ng/L	36	110	70 130		
		perfluoroundecanoic acid (PFUNA)	57286-001	43	1.8	0.30	ng/L	36	117	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57286-001	33	1.8	0.36	ng/L	34	96	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57286-001	33	1.8	0.37	ng/L	34	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57286-001	33	1.8	0.17	ng/L	34	95	70 130		
		13C2-PFHxA SUR	57286-001	97			%			70 130		
		13C2-PFDA SUR	57286-001	100			%			70 130		
		D5-NETFOSAA SUR	57286-001	101			%			70 130		
		13C3-HFPO-DA SUR	57286-001	91			%			70 130		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101643	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101643	1,4-dioxane		9.3	ug/L	8	116	70 130		
SW8260Dmod	LCSD2101643	1,4-dioxane		9.5	ug/L	8	118	70 130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13946	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13946	Calcium	57226-001	20	mg/L				6	20
		Iron	57226-001	< 0.050	mg/L					20
		Magnesium	57226-001	5.3	mg/L				2	20
		Manganese	57226-001	< 0.010	mg/L					20
		Sodium	57226-001	27	mg/L				4	20
E200.8	LCS13946	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13946	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13946	Calcium	57226-001	24	mg/L	2.5	173	70 130		
		Iron	57226-001	0.49	mg/L	0.5	97	70 130		
		Magnesium	57226-001	5.9	mg/L	0.5	136	70 130		
		Manganese	57226-001	0.52	mg/L	0.5	104	70 130		
		Sodium	57226-001	32	mg/L	5	118	70 130		
E200.8	MS13946	Calcium	57271-008	11	mg/L	2.5	116	70 130		
		Iron	57271-008	0.52	mg/L	0.5	104	70 130		
		Magnesium	57271-008	3.7	mg/L	0.5	114	70 130		
		Manganese	57271-008	0.51	mg/L	0.5	103	70 130		
		Sodium	57271-008	25	mg/L	5	105	70 130		
		Zinc	57271-008	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101597	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101597	Bromide	57269-001	<	0.1	mg/L				10		
		Chloride	57269-001		54	mg/L			0	10		
		Sulfate	57269-001		13	mg/L			0	10		
E300.0A	LCS2101597	Bromide			9.8	mg/L	10	98	90	110		
		Chloride			99	mg/L	100	99	90	110		
		Sulfate			98	mg/L	100	98	90	110		
E300.0A	LCSD2101597	Bromide			9.8	mg/L	10	98	90	110	0	10
		Chloride			99	mg/L	100	99	90	110	0	10
		Sulfate			98	mg/L	100	98	90	110	0	10
E300.0A	MS2101597	Bromide	57269-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57269-001		61	mg/L	16	44 *	90	110		
		Sulfate	57269-001		28	mg/L	16	89 *	90	110		
SM2120B	DUP2101582	Apparent Color	57268-001	<	5	CU					20	
SM2120B	DUP2101582	Apparent Color	57271-009	<	5	CU					20	
SM2120B	LCS2101582	Apparent Color			50	CU	50		45	55		
SM2120B	PB2101582	Apparent Color		<	5	CU			5			
SM2120B	DUP2101583	True Color	57271-003	<	5.0	CU						
SM2120B	LCS2101583	True Color			20	CU	20		15	25		
SM2120B	PB2101583	True Color		<	5.0	CU						
SM2130B	DUP2101590	Turbidity	57271-009	<	1.0	NTU					20	
SM2320B	CCVB2101588	Alkalinity, Total (as CaCO3)			6.01	pH			5.94	6.06		
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	pH			3.94	4.06		
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	pH			3.94	4.06		
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57227-007		53	mg/L					3	10
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57271-004		72	mg/L					3	10
SM2320B	LCS2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110		
SM2320B	LCSD2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110	1	10
SM2320B	PB2101588	Alkalinity, Total (as CaCO3)		<	5	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101638	Conductivity		<	5	uS/cm				
SM2510B	DUP2101638	Conductivity	57280-003	560	uS/cm				2	20
SM2510B	DUP2101638	Conductivity	57280-004	510	uS/cm				3	20
SM2510B	LCS2101638	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101638	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57268-001	180	mg/L				3	5
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57271-010	120	mg/L				20 *	5
SM2540C	LCS2101631	Total Dissolved Solids (TDS)		99.0	mg/L	99.2	100	75 125		
SM2540C	PB2101631	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101579	pH	57205-002	9.4	pH					
SM4500H+B	DUP2101579	pH	57226-001	8.0	pH					
SM4500H+B	DUP2101579	pH	57249-001	7.8	pH					
SM4500H+B	DUP2101579	pH	57268-001	6.6	pH					
SM5310C	BLK2101615	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101615	Total Organic Carbon (TOC)	57268-001	<	1	mg/L				20
SM5310C	LCS2101615	Total Organic Carbon (TOC)		10	mg/L	10	100	85 115		
SM5310C	LCSD2101615	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	0	20
SM5310C	MS2101615	Total Organic Carbon (TOC)	57269-001	10	mg/L	10	99	75 125		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57268

ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Technology Drive, Westborough, MA
Report To: Alex Bishop
Phone #: 914-406-9598
Invoice to: Kleinfelder
Email: abbishop@kleinfelder.com
PO #:

Project Name: Barnstable, StraightWay2
Project #: _____
Project Location: NH MA ME VT _____
Accreditation Required? N/Y: Y
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting: QAPP GW-1 S-1
Limits: EPA DW Other _____
Quote # _____
 NH Reimbursement Pricing

<input type="checkbox"/>	VOC 8260	<input type="checkbox"/>	VOC 8260 NHDES	<input type="checkbox"/>	VOC 8260 MADEP	<input type="checkbox"/>	VOC 8260	<input type="checkbox"/>	NHDES	<input type="checkbox"/>	VOC 8260	<input type="checkbox"/>	VOC 624.1	<input type="checkbox"/>	VOC BTEX MIBE, only	<input type="checkbox"/>	VOC 8021VT	<input type="checkbox"/>	VPH MADEP	<input type="checkbox"/>	GRO 8015	<input checked="" type="checkbox"/>	1,4-Dioxane *	<input type="checkbox"/>	VOC 524.2	<input type="checkbox"/>	NH List	<input type="checkbox"/>	Gases-List:	<input type="checkbox"/>	TTHMs	<input type="checkbox"/>	TPH	<input type="checkbox"/>	DR0 8015	<input type="checkbox"/>	EPH MADEP	<input type="checkbox"/>	TPH Fingerprint	<input type="checkbox"/>	8270PAH	<input type="checkbox"/>	827DABN	<input type="checkbox"/>	625.1	<input type="checkbox"/>	EDB	<input type="checkbox"/>	8082 PCB	<input type="checkbox"/>	8081 Pesticides	<input type="checkbox"/>	608.3 Pest/PCB	<input checked="" type="checkbox"/>	PFAS 537.1	<input type="checkbox"/>	O&G 1664	<input type="checkbox"/>	Mineral O&G 1664	<input checked="" type="checkbox"/>	pH	<input checked="" type="checkbox"/>	Conductivity	<input checked="" type="checkbox"/>	Turbidity	<input checked="" type="checkbox"/>	Apparent Color	<input checked="" type="checkbox"/>	True	<input checked="" type="checkbox"/>	TSS	<input checked="" type="checkbox"/>	TDS	<input type="checkbox"/>	TS	<input checked="" type="checkbox"/>	TVS	<input type="checkbox"/>	Alkalinity	<input type="checkbox"/>	Acidity	<input type="checkbox"/>	RCRA Metals	<input type="checkbox"/>	Priority Pollutant Metals	<input type="checkbox"/>	TAL Metals	<input checked="" type="checkbox"/>	Hardness	<input checked="" type="checkbox"/>	Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn	<input type="checkbox"/>	Dissolved Metals-list:		<input type="checkbox"/>	Ammonia	<input type="checkbox"/>	COD	<input type="checkbox"/>	TKN	<input type="checkbox"/>	TN	<input type="checkbox"/>	TON	<input checked="" type="checkbox"/>	TOC	<input type="checkbox"/>	Ferrous Iron	<input type="checkbox"/>	T-Phosphorus	<input type="checkbox"/>	Bacteria P/A	<input type="checkbox"/>	Bacteria MPN	<input type="checkbox"/>	Enterococci	<input type="checkbox"/>	Cyanide	<input type="checkbox"/>	Sulfide	<input type="checkbox"/>	Nitrate + Nitrite	<input type="checkbox"/>	Ortho P	<input type="checkbox"/>	Phenols	<input type="checkbox"/>	Nitrate	<input type="checkbox"/>	Nitrite	<input checked="" type="checkbox"/>	Chloride	<input checked="" type="checkbox"/>	Sulfate	<input checked="" type="checkbox"/>	Bromide	<input type="checkbox"/>	Fluoride	<input type="checkbox"/>	Corrosivity	<input type="checkbox"/>	Ignitibility/FP	<input type="checkbox"/>	TCLP Metals	<input type="checkbox"/>	TCLP VOC	<input type="checkbox"/>	TCLP SVOC	<input type="checkbox"/>	TCLP Pesticide	<input type="checkbox"/>	Subcontract	<input type="checkbox"/>	Grain Size	<input type="checkbox"/>	Herbicides	<input type="checkbox"/>	Asbestos	<input type="checkbox"/>	Total Coliform		<input type="checkbox"/>	Grab (G) or Composite (C)	
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Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57268-01	Raw-SW2	7	X			Non Preserved					6/3/21	11:10	X ²
		1				Thio					6/3/21		
		1				X							
		2				X							
		2				Triz							
		2				Non Preserved							
02	Field Blank	1				Triz							

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard
(10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
*use reporting limit of 0.13 ug/l for 1,4-Dioxane

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 24 °C *(Temp'd wrong cooler so)*

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date: 6/3/21	Time: 12:30	Received by:	Date: 6/3/21	Time: 12:30
	Relinquished by:	Date: 6/3/21	Time: 15:00	Received by:	Date: 6-3	Time: 3:04
	Relinquished by:	Date: 6-3	Time: 17:15	Received by Laboratory:	Date: 6/3/21	Time: 17:15

Sample Receipt Condition Report

57268

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 4 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:		
	40mL(G)	250mL(P)	500mL(P)	1L(G)							
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)					*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>N</u>		
HNO ₃	125mL(P)	250mL(P)	500mL(P)					pH 2 JO			
H ₂ SO ₄	40mL(G) 2	60mL(P)	125mL(P)	250mL(P)	500mL(P)						
NaOH	125mL(P)	250mL(P)									
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)								
ZnAc-NaOH	125mL(P)	250mL(P)									
Trizma	125mL(P)	250mL(P)	3								
NH ₄ Ac	125mL(P)	250mL(P)									
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)	1								
MeOH	20mL(G)	40mL(G)									
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe							
None (water)	40ml (G) 2	60mL(P)	2	125mL(P)	3	250mL(P)	1	500mL(P)	1	1L(G)	1L(P)
Mold	Cassette	Bulk	Plate	Tape Lift							
Asbestos	Cassette	Bulk									
Lead	Cassette	Bulk	Wipe								

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			less than pea-sized bubble in 1,4 dioxane - OIB JO
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: ADD	✓			
NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: JO

 Date/Time: 6/3/21 18:12

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57269
Date Received: 6/3/21

Project: Barnstable StraightWay2

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover. The following report has been revised to include the results for the metals analysis, as requested by the customer.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/24/2021
Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Finished-SW2	Water	6/3/2021 11:45	57269-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable StraightWay2

Job ID: 57269

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	18:24	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	18:24	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	18:24	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	18:24	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	18:24	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	90	70-130		%	1	LMM			2101699	6/11/21	18:24	E524.2
1,4-dichlorobenzene-D4 SUR	82	70-130		%	1	LMM			2101699	6/11/21	18:24	E524.2

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.16 J	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	11:45	SW8260Dmod

Project ID: Barnstable StraightWay2

Job ID: 57269

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Parameter	Result	Reporting			Units	Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL			Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	26	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Magnesium	7.5	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Manganese	0.032	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Sodium	28	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Zinc	0.19	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:37	E200.8	
Hardness (as CaCO3)	96	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B	

Project ID: Barnstable StraightWay2

Job ID: 57269

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	57	5	0.47	mg/L	1	DJM			2101588	6/4/21	10:30	SM2320B
Apparent Color	2.5 J	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:42	SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
Chloride	54 M	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
M = The recovery for the matrix spike was 44%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrate-N	3.3 M	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
M = The recovery for the matrix spike was 70%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
ortho-phosphate as P	0.2	0.1	0.069	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
Sulfate	13 M	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
M = The recovery for the matrix spike was 89%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Total Dissolved Solids (TDS)	220	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00	SM2540C
Total Phosphorus as P	0.33	0.01	0.0080	mg/L	1	SFM			2101621	6/7/21	15:00	E365.3
True Color	2.5 J	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:42	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
Conductivity	330	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	7.3 H			pH	1	SFM			2101579	6/4/21	7:17	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:19	SM2130B

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	13:12	SM5310C

Project ID: Barnstable StraightWay2

Job ID: 57269

Sample#: 57269-001

Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.37	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	6/8/21	13948	6/9/21	16:16
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:16
13C2-PFDA SUR	96	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:16
D5-NEtFOSAA SUR	101	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:16
13C3-HFPO-DA SUR	101	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:16

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57269

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time.

Calibration

No exceptions noted.

PFAS: No exceptions noted regarding the Internal Standards or Calibration/Calibration Verifications associated with sample analysis.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The MS for 57269-001 did not meet the acceptance criteria for chloride, nitrate-N, and sulfate. The percent recovery was acceptable in the associated LCS/D. Data has been qualified accordingly.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101699	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			98	%			70	130	
		1,4-dichlorobenzene-D4 SUR			96	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20	
		bromodichloromethane	57363-001	<	0.50	ug/L				20	
		dibromochloromethane	57363-001	<	0.50	ug/L				20	
		bromoform	57363-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57363-001		99	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130	
		Total Trihalomethanes (THMs)	57363-001							99.3	
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130	
		bromodichloromethane			10	ug/L	10	104	70	130	
		dibromochloromethane			10	ug/L	10	100	70	130	
		bromoform			10	ug/L	10	104	70	130	
		4-bromofluorobenzene SUR			104	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7
		bromodichloromethane			11	ug/L	10	111	70	130	6
		dibromochloromethane			11	ug/L	10	107	70	130	7
		bromoform			11	ug/L	10	110	70	130	5
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101643	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101643	1,4-dioxane			9.3	ug/L	8	116	70	130	
SW8260Dmod	LCSD2101643	1,4-dioxane			9.5	ug/L	8	118	70	130	2

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13946	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13946	Calcium	57226-001	20	mg/L				6	20
		Iron	57226-001	< 0.050	mg/L					20
		Magnesium	57226-001	5.3	mg/L				2	20
		Manganese	57226-001	< 0.010	mg/L					20
		Sodium	57226-001	27	mg/L				4	20
E200.8	LCS13946	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13946	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13946	Calcium	57226-001	24	mg/L	2.5	173	70 130		
		Iron	57226-001	0.49	mg/L	0.5	97	70 130		
		Magnesium	57226-001	5.9	mg/L	0.5	136	70 130		
		Manganese	57226-001	0.52	mg/L	0.5	104	70 130		
		Sodium	57226-001	32	mg/L	5	118	70 130		
E200.8	MS13946	Calcium	57271-008	11	mg/L	2.5	116	70 130		
		Iron	57271-008	0.52	mg/L	0.5	104	70 130		
		Magnesium	57271-008	3.7	mg/L	0.5	114	70 130		
		Manganese	57271-008	0.51	mg/L	0.5	103	70 130		
		Sodium	57271-008	25	mg/L	5	105	70 130		
		Zinc	57271-008	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101597	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101597	Bromide	57269-001	<	0.1	mg/L				10		
		Chloride	57269-001		54	mg/L			0		10	
		Nitrate-N	57269-001		3.3	mg/L			1		10	
		Nitrite-N	57269-001	<	0.1	mg/L					10	
		ortho-phosphate as P	57269-001		0.2	mg/L			3		10	
		Sulfate	57269-001		13	mg/L			0		10	
E300.0A	LCS2101597	Bromide			9.8	mg/L	10	98	90	110		
		Chloride			99	mg/L	100	99	90	110		
		Nitrate-N			10.0	mg/L	10	100	90	110		
		Nitrite-N			15	mg/L	15	99	90	110		
		ortho-phosphate as P			9.6	mg/L	10	96	90	110		
		Sulfate			98	mg/L	100	98	90	110		
E300.0A	LCSD2101597	Bromide			9.8	mg/L	10	98	90	110	0	10
		Chloride			99	mg/L	100	99	90	110	0	10
		Nitrate-N			9.9	mg/L	10	99	90	110	1	10
		Nitrite-N			15	mg/L	15	99	90	110	0	10
		ortho-phosphate as P			9.9	mg/L	10	99	90	110	3	10
		Sulfate			98	mg/L	100	98	90	110	0	10
E300.0A	MS2101597	Bromide	57269-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57269-001		61	mg/L	16	44	*	90	110	
		Nitrate-N	57269-001		4.4	mg/L	1.66	70	*	90	110	
		Nitrite-N	57269-001		2.4	mg/L	2.53	96		90	110	
		ortho-phosphate as P	57269-001		1.9	mg/L	1.66	99		90	110	
		Sulfate	57269-001		28	mg/L	16	89	*	90	110	
E300.0A	MS2101597	Nitrate-N	57280-003		11	mg/L	8.3	90	90	110		
E365.3	LCS2101621	Total Phosphorus as P			0.21	mg/L	0.2	104	75	125		
E365.3	LCSD2101621	Total Phosphorus as P			0.20	mg/L	0.2	99	75	125	5	20
E365.3	MS2101621	Total Phosphorus as P	57233-001		0.30	mg/L	0.2	102	75	125		
E365.3	MSD2101621	Total Phosphorus as P	57233-001		0.30	mg/L	0.2	102	75	125	0	20
E365.3	PB2101621	Total Phosphorus as P		<	0.01	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101582	Apparent Color	57268-001	<	5	CU				20
SM2120B	DUP2101582	Apparent Color	57271-009	<	5	CU				20
SM2120B	LCS2101582	Apparent Color			50	CU	50	45	55	
SM2120B	PB2101582	Apparent Color		<	5	CU		5		
SM2120B	DUP2101583	True Color	57271-003	<	5.0	CU				
SM2120B	LCS2101583	True Color			20	CU	20	15	25	
SM2120B	PB2101583	True Color		<	5.0	CU				
SM2130B	DUP2101590	Turbidity	57271-009	<	1.0	NTU				20
SM2320B	CCVB2101588	Alkalinity, Total (as CaCO3)			6.01	pH		5.94	6.06	
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	pH		3.94	4.06	
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	pH		3.94	4.06	
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57227-007		53	mg/L			3	10
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57271-004		72	mg/L			3	10
SM2320B	LCS2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110
SM2320B	LCSD2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110
SM2320B	PB2101588	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101638	Conductivity		<	5	uS/cm				
SM2510B	DUP2101638	Conductivity	57280-003		560	uS/cm			2	20
SM2510B	DUP2101638	Conductivity	57280-004		510	uS/cm			3	20
SM2510B	LCS2101638	Conductivity			1400	uS/cm	1409	100	90	110
SM2510B	LCSD2101638	Conductivity			1400	uS/cm	1409	102	90	110
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57268-001		180	mg/L			3	5
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57271-010		120	mg/L			20 *	5
SM2540C	LCS2101631	Total Dissolved Solids (TDS)			99.0	mg/L	99.2	100	75	125
SM2540C	PB2101631	Total Dissolved Solids (TDS)		<	20	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM4500H+B	DUP2101579	pH	57205-002	9.4	pH					
SM4500H+B	DUP2101579	pH	57226-001	8.0	pH					
SM4500H+B	DUP2101579	pH	57249-001	7.8	pH					
SM4500H+B	DUP2101579	pH	57268-001	6.6	pH					
SM5310C	BLK2101615	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101615	Total Organic Carbon (TOC)	57268-001	<	1	mg/L				20
SM5310C	LCS2101615	Total Organic Carbon (TOC)		10	mg/L	10	100	85	115	
SM5310C	LCSD2101615	Total Organic Carbon (TOC)		10	mg/L	10	101	85	115	0
SM5310C	MS2101615	Total Organic Carbon (TOC)	57269-001	10	mg/L	10	99	75	125	

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR		100	%			70	130	
		13C2-PFDA SUR		112	%			70	130	
		D5ETFOSAA SUR		97	%			70	130	
		HFPODA13C3 SUR		95	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	<	1.9	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57290-002	<	1.9	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57290-002	<	1.9	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57290-002		2.3	ng/L			1	30
		perfluorodecanoic acid (PFDA)	57290-002	<	1.9	ng/L				30
		perfluorododecanoic acid (PFDOA)	57290-002	<	1.9	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57290-002	<	1.9	ng/L				30
		perfluorohexane sulfonic acid (PFHXS)	57290-002	<	1.9	ng/L				30
		perfluorohexanoic acid (PFHXA)	57290-002		3.4	ng/L			8	30
		perfluorononanoic acid (PFNA)	57290-002	<	1.9	ng/L				30
		perfluorooctane sulfonic acid (PFOS)	57290-002		3.6	ng/L			2	30
		perfluorooctanoic acid (PFOA)	57290-002		5.9	ng/L			7	30
		perfluorotetradecanoic acid (PFTEA)	57290-002	<	1.9	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57290-002	<	1.9	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57290-002	<	1.9	ng/L				30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57290-002	<	1.9	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57290-002	<	1.9	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57290-002	<	1.9	ng/L				30
		13C2-PFHxA SUR	57290-002		102	%		70	130	
		13C2-PFDA SUR	57290-002		103	%		70	130	
		D5ETFOSAA SUR	57290-002		95	%		70	130	
		HFPODA13C3 SUR	57290-002		99	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		170	ng/L	200	87	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		210	ng/L	200	103	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	ng/L	200	108	70	130	
		perfluorobutane sulfonic acid (PFBS)		160	ng/L	177	91	70	130	
		perfluorodecanoic acid (PFDA)		200	ng/L	200	102	70	130	
		perfluorododecanoic acid (PFDOA)		210	ng/L	200	104	70	130	
		perfluoroheptanoic acid (PFHPA)		180	ng/L	200	90	70	130	
		perfluorohexane sulfonic acid (PFHXS)		160	ng/L	190	85	70	130	
		perfluorohexanoic acid (PFHXA)		180	ng/L	200	90	70	130	
		perfluorononanoic acid (PFNA)		190	ng/L	200	93	70	130	
		perfluorooctane sulfonic acid (PFOS)		160	ng/L	192	85	70	130	
		perfluorooctanoic acid (PFOA)		180	ng/L	200	89	70	130	
		perfluorotetradecanoic acid (PFTEA)		200	ng/L	200	100	70	130	
		perfluorotridecanoic acid (PFTRIA)		200	ng/L	200	99	70	130	
		perfluoroundecanoic acid (PFUNA)		200	ng/L	200	102	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	ng/L	189	97	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	ng/L	187	95	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		170	ng/L	189	89	70	130	
		13C2-PFHxA SUR		90	%			70	130	
		13C2-PFDA SUR		99	%			70	130	
		D5ETFOSAA SUR		84	%			70	130	
		HFPODA13C3 SUR		85	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	ng/L	36	95	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57286-001	43	ng/L	36	116	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57286-001	40	ng/L	36	108	70	130	
		perfluorobutane sulfonic acid (PFBS)	57286-001	30	ng/L	32	94	70	130	
		perfluorodecanoic acid (PFDA)	57286-001	39	ng/L	36	106	70	130	
		perfluorododecanoic acid (PFDOA)	57286-001	41	ng/L	36	112	70	130	
		perfluoroheptanoic acid (PFHPA)	57286-001	37	ng/L	36	101	70	130	
		perfluorohexane sulfonic acid (PFHXS)	57286-001	32	ng/L	34	92	70	130	
		perfluorohexanoic acid (PFHXA)	57286-001	37	ng/L	36	102	70	130	
		perfluorononanoic acid (PFNA)	57286-001	37	ng/L	36	102	70	130	
		perfluorooctane sulfonic acid (PFOS)	57286-001	33	ng/L	35	94	70	130	
		perfluorooctanoic acid (PFOA)	57286-001	39	ng/L	36	107	70	130	
		perfluorotetradecanoic acid (PFTEA)	57286-001	41	ng/L	36	111	70	130	
		perfluorotridecanoic acid (PFTRIA)	57286-001	40	ng/L	36	110	70	130	
		perfluoroundecanoic acid (PFUNA)	57286-001	43	ng/L	36	117	70	130	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57286-001	33	ng/L	34	96	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57286-001	33	ng/L	34	95	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57286-001	33	ng/L	34	95	70	130	
		13C2-PFHxA SUR	57286-001	97	%			70	130	
		13C2-PFDA SUR	57286-001	100	%			70	130	
		D5ETFOSAA SUR	57286-001	101	%			70	130	
		HFPODA13C3 SUR	57286-001	91	%			70	130	

Sample Receipt Condition Report

57269

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 2 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	<u>2</u>	250mL(P)		500mL(P)		1L(G)			pH <u>2.00</u> pH <u>2.00</u> *pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>(N)</u>
HNO ₃	125mL(P)		250mL(P)	<u>1</u>	500mL(P)					
H ₂ SO ₄	40mL(G)	<u>2</u>	60mL(P)		125mL(P)	<u>1</u>	250mL(P)		500mL(P)	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	<u>2</u>						
NH ₄ Ac	125mL(P)		250mL(P)							
NaS ₂ O ₃	40mL(G)		120mL(P)							
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml(G)	<u>2</u>	60mL(P)	<u>3</u>	125mL(P)	<u>3</u>	250mL(P)	<u>1</u>	500mL(P)	<u>1</u>
<u>NH₄Cl</u>	<u>60mL(G)</u>	<u>3</u>								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			BOD is checked off, no bottle received.
Analyses marked on COC match bottles received?		✓		
VOC & TOC Water-no headspace?				
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: <u>AJD, DBV, AN, SFM</u>	✓			
<u>NO₃, NO₂, PO₄, pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, color</u> <u>Surfactants, Turbidity, Odor, CrVI, Ferrrous Iron, Dissolved Oxygen, Unpres 624</u>	✓			
Date, time & ID on samples match CoC?		✓		Bacteria bottle has ID "Simulated -SW2" but correct time. (57270 bact is also simulated)
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: AJD Date/Time: 6/3/21 18:40

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

	<u>Initials</u>	<u>Date</u>	<u>What was sent?</u>
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/23/2021
Work Order #: 2106-00934
Client Job #:
Date Received: 06/04/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/23/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-00934-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57269
Finished-SW2
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 06/03/2021 11:45AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 01:27PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 01:27PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 01:27PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 01:27PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 01:27PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 01:27PM
2,3-Dibromopropionic Acid	100	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 01:27PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57270
Date Received: 6/3/21

Project: Barnstable StraightWay2

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'Willie Stone', with a long, sweeping underline.

Willie Stone
Authorized Signature

Date of Approval: 6/15/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated-SW2	Water	6/3/2021 11:30	57270-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable StraightWay2

Job ID: 57270

Sample#: 57270-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 6/3/21 11:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	18:56	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	18:56	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	18:56	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	18:56	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	18:56	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	90	70-130		%	1	LMM			2101699	6/11/21	18:56	E524.2
1,4-dichlorobenzene-D4 SUR	85	70-130		%	1	LMM			2101699	6/11/21	18:56	E524.2

Sample#: 57270-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 6/3/21 11:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Magnesium	5.6	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Manganese	0.0015 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Sodium	42	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Zinc	0.13	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:43	E200.8
Hardness (as CaCO3)	70	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B

Project ID: Barnstable StraightWay2

Job ID: 57270

Sample#: 57270-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 6/3/21 11:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
Alkalinity, Total (as CaCO3)	72	5	0.47	mg/L	1	DJM			2101588	6/4/21	10:30 SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:44 SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
Chloride	50	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
Nitrate-N	0.5	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
ortho-phosphate as P	0.4	0.1	0.069	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
Sulfate	21	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	14:07 E300.0A
Total Dissolved Solids (TDS)	190	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00 SM2540C
Total Phosphorus as P	0.26	0.01	0.0080	mg/L	1	SFM			2101621	6/7/21	15:00 E365.3
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:44 SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45 SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45 SM9223BColilert
Conductivity	340	5		umhos/cm	1	SFM			2101638	6/8/21	16:45 SM2510B
pH	7.4 H			pH	1	SFM			2101579	6/4/21	7:19 SM4500H+B
H = Sample was received beyond method holding time.											
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:19 SM2130B

Sample#: 57270-001

Sample ID: Simulated-SW2

Matrix: Water

Sampled: 6/3/21 11:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	13:49 SM5310C

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57270

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101699	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			98	%			70	130	
		1,4-dichlorobenzene-D4 SUR			96	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20	
		bromodichloromethane	57363-001	<	0.50	ug/L				20	
		dibromochloromethane	57363-001	<	0.50	ug/L				20	
		bromoform	57363-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57363-001		99	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130	
		Total Trihalomethanes (THMs)	57363-001								99.3
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130	
		bromodichloromethane			10	ug/L	10	104	70	130	
		dibromochloromethane			10	ug/L	10	100	70	130	
		bromoform			10	ug/L	10	104	70	130	
		4-bromofluorobenzene SUR			104	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7
		bromodichloromethane			11	ug/L	10	111	70	130	6
		dibromochloromethane			11	ug/L	10	107	70	130	7
		bromoform			11	ug/L	10	110	70	130	5
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13946	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13946	Calcium	57226-001	20	mg/L				6	20
		Iron	57226-001	< 0.050	mg/L					20
		Magnesium	57226-001	5.3	mg/L				2	20
		Manganese	57226-001	< 0.010	mg/L					20
		Sodium	57226-001	27	mg/L				4	20
E200.8	LCS13946	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13946	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13946	Calcium	57226-001	24	mg/L	2.5	173	70 130		
		Iron	57226-001	0.49	mg/L	0.5	97	70 130		
		Magnesium	57226-001	5.9	mg/L	0.5	136	70 130		
		Manganese	57226-001	0.52	mg/L	0.5	104	70 130		
		Sodium	57226-001	32	mg/L	5	118	70 130		
E200.8	MS13946	Calcium	57271-008	11	mg/L	2.5	116	70 130		
		Iron	57271-008	0.52	mg/L	0.5	104	70 130		
		Magnesium	57271-008	3.7	mg/L	0.5	114	70 130		
		Manganese	57271-008	0.51	mg/L	0.5	103	70 130		
		Sodium	57271-008	25	mg/L	5	105	70 130		
		Zinc	57271-008	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101597	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101597	Bromide	57269-001	<	0.1	mg/L				10		
		Chloride	57269-001		54	mg/L			0		10	
		Nitrate-N	57269-001		3.3	mg/L			1		10	
		Nitrite-N	57269-001	<	0.1	mg/L					10	
		ortho-phosphate as P	57269-001		0.2	mg/L			3		10	
		Sulfate	57269-001		13	mg/L			0		10	
E300.0A	LCS2101597	Bromide			9.8	mg/L	10	98	90	110		
		Chloride			99	mg/L	100	99	90	110		
		Nitrate-N			10.0	mg/L	10	100	90	110		
		Nitrite-N			15	mg/L	15	99	90	110		
		ortho-phosphate as P			9.6	mg/L	10	96	90	110		
		Sulfate			98	mg/L	100	98	90	110		
E300.0A	LCSD2101597	Bromide			9.8	mg/L	10	98	90	110	0	10
		Chloride			99	mg/L	100	99	90	110	0	10
		Nitrate-N			9.9	mg/L	10	99	90	110	1	10
		Nitrite-N			15	mg/L	15	99	90	110	0	10
		ortho-phosphate as P			9.9	mg/L	10	99	90	110	3	10
		Sulfate			98	mg/L	100	98	90	110	0	10
E300.0A	MS2101597	Bromide	57269-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57269-001		61	mg/L	16	44	*	90	110	
		Nitrate-N	57269-001		4.4	mg/L	1.66	70	*	90	110	
		Nitrite-N	57269-001		2.4	mg/L	2.53	96		90	110	
		ortho-phosphate as P	57269-001		1.9	mg/L	1.66	99		90	110	
		Sulfate	57269-001		28	mg/L	16	89	*	90	110	
E300.0A	MS2101597	Nitrate-N	57280-003		11	mg/L	8.3	90	90	110		
E365.3	LCS2101621	Total Phosphorus as P			0.21	mg/L	0.2	104	75	125		
E365.3	LCSD2101621	Total Phosphorus as P			0.20	mg/L	0.2	99	75	125	5	20
E365.3	MS2101621	Total Phosphorus as P	57233-001		0.30	mg/L	0.2	102	75	125		
E365.3	MSD2101621	Total Phosphorus as P	57233-001		0.30	mg/L	0.2	102	75	125	0	20
E365.3	PB2101621	Total Phosphorus as P		<	0.01	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101582	Apparent Color	57268-001	<	5	CU				20
SM2120B	DUP2101582	Apparent Color	57271-009	<	5	CU				20
SM2120B	LCS2101582	Apparent Color			50	CU	50	45	55	
SM2120B	PB2101582	Apparent Color		<	5	CU		5		
SM2120B	DUP2101583	True Color	57271-003	<	5.0	CU				
SM2120B	LCS2101583	True Color			20	CU	20	15	25	
SM2120B	PB2101583	True Color		<	5.0	CU				
SM2130B	DUP2101590	Turbidity	57271-009	<	1.0	NTU				20
SM2320B	CCVB2101588	Alkalinity, Total (as CaCO3)			6.01	pH		5.94	6.06	
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	pH		3.94	4.06	
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	pH		3.94	4.06	
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57227-007		53	mg/L			3	10
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57271-004		72	mg/L			3	10
SM2320B	LCS2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110
SM2320B	LCSD2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110
SM2320B	PB2101588	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101638	Conductivity		<	5	uS/cm				
SM2510B	DUP2101638	Conductivity	57280-003		560	uS/cm			2	20
SM2510B	DUP2101638	Conductivity	57280-004		510	uS/cm			3	20
SM2510B	LCS2101638	Conductivity			1400	uS/cm	1409	100	90	110
SM2510B	LCSD2101638	Conductivity			1400	uS/cm	1409	102	90	110
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57268-001		180	mg/L			3	5
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57271-010		120	mg/L			20 *	5
SM2540C	LCS2101631	Total Dissolved Solids (TDS)			99.0	mg/L	99.2	100	75	125
SM2540C	PB2101631	Total Dissolved Solids (TDS)		<	20	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM4500H+B	DUP2101579	pH	57205-002	9.4	pH					
SM4500H+B	DUP2101579	pH	57226-001	8.0	pH					
SM4500H+B	DUP2101579	pH	57249-001	7.8	pH					
SM4500H+B	DUP2101579	pH	57268-001	6.6	pH					
SM5310C	BLK2101615	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101615	Total Organic Carbon (TOC)	57268-001	<	1	mg/L				20
SM5310C	LCS2101615	Total Organic Carbon (TOC)		10	mg/L	10	100	85	115	
SM5310C	LCSD2101615	Total Organic Carbon (TOC)		10	mg/L	10	101	85	115	0
SM5310C	MS2101615	Total Organic Carbon (TOC)	57269-001	10	mg/L	10	99	75	125	

Sample Receipt Condition Report

57270

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -U8PS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 2 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)	pH=2 Tphos pH=2	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)							
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)							
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)		60mL(P)	3	125mL(P)	3	250mL(P)	1	500mL(P)	1
NH ₄ Cl	60mL(G)	3								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 ___ Pest608 ___
 Bacteria ResCl ✓ by analyst
 PC Dry applicable? Y (N)

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?			✓	
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: <u>NO₃, NO₂, A-PO, pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color</u>	✓			
<u>Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624</u>	✓			
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:	✓			Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: WD Date/Time: 6/3/21 19:32

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/17/2021
Work Order #: 2106-00936
Client Job #:
Date Received: 06/04/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/17/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-00936-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57270
Simulated-Sw2
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/03/2021 11:30AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 02:07PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 02:07PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 02:07PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 02:07PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 02:07PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 02:07PM
2,3-Dibromopropionic Acid	89	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 02:07PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 520326
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4922448	L2129644/Finished-SW2	317.0	06/03/21 11:45	Client	06/08/21 08:30
4922449	L2129644/Simulated-SW2	317.0	06/03/21 11:10	Client	06/08/21 08:30

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.



ASM

Authorized Signature

Title

06/11/2021

Date

Client Name: Alpha Analytical

Report #: 520326

Client Name: Alpha Analytical

Report #: 520326

Sampling Point: L2129644/Finished-SW2

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/10/21 23:01	4922448

Sampling Point: L2129644/Simulated-SW2

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/10/21 23:26	4922449

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(\text{MS or MSD value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery \%}$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

pm 6/8/21 427422
520326

Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2129644



Client Information

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

Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Information

Project Location: MA
Project Manager: Nathalie Lewis

Turnaround & Deliverables Information

Due Date: 06/17/21
Deliverables:


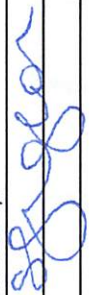
Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2129644 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
FINISHED-SW2 SIMULATED-SW2		06-03-21 11:45 06-03-21 11:10	DW DW	Bromate Bromate 4922448 4922449	
Client Provided Sample Container					
3.6°C					
Relinquished By: 		Date/Time: 6/7/21	Received By: 		Date/Time: 6-8-21 0830
Form No: AL_subcoc					



CHAIN OF CUSTODY

PAGE _____ OF _____

Date Rec'd in Lab: 6/3/21

ALPHA Job #: L2129644

8 Walkup Drive Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: Barnstable
Project Location: Straytown 2
Project #:
Project Manager: Alex Bishop
ALPHA Quote #:

Report Information - Data Deliverables
 ADEx EMAIL
Billing Information
 Same as Client info PO #:
Client Information

Client: Heinfelder
Address: Technology Drive
Westborough MA
Phone: 914-406-9598
Email: abb.bishop@heinfelder.com

Turn-Around Time
 Standard RUSH (only confirmed if pre-approved)

Date Due:

Additional Project Information:

Regulatory Requirements & Project Information Requirements

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

ANALYSIS		SAMPLE INFO Filtration <input type="checkbox"/> Field <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do Sample Comments
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2		
SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH		
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15		
EPH: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PPT3		
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
<input type="checkbox"/> PCB <input type="checkbox"/> PEST		
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		
None		
TOTAL # BOTTLES		

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
29644 01	Final Lab - SW2	6/3/21	1145	PW	AB
02	Simulated SW2	6/3/21	1130	PW	AB

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

Preservative
 A= None
 B= HCl
 C= HNO₃
 D= H₂SO₄
 E= NaOH
 F= MeOH
 G= NaHSO₄
 H= Na₂S₂O₃
 I= Ascorbic Acid
 J= NH₄Cl
 K= Zn Acetate
 O= Other

Container Type	P
Preservative	-

Relinquished By:	Date/Time	Received By:	Date/Time
<i>[Signature]</i>	6/3/21 12:30	<i>[Signature]</i>	6/3/21 12:30
<i>[Signature]</i>	6/3/21 14:25	<i>[Signature]</i>	6/3/21 14:25

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
 FORM NO: 01-01 (rev. 12-Mar-2012)



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2129644

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5170 Email: nlewis@alphalab.com	Project Location: MA Project Manager: Nathalie Lewis	State/Federal Program: Regulatory Criteria:
	Turnaround & Deliverables Information	
	Due Date: 06/17/21 Deliverables:	

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2129644 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	FINISHED-SW2 SIMULATED-SW2	06-03-21 11:45 06-03-21 11:10	DW DW	Bromate Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		6/7/21		
Form No: AL_subcoc				

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57362
Date Received: 6/10/21

Project: Barnstable Simmons Pond, HH

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/23/2021
Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw-SIM	Water	6/10/2021 9:15	57362-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	6/10/2021 10:45	57362-002	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: Barnstable Simmons Pond, HH

Job ID: 57362

Sample#: 57362-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/10/21 9:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	14:39	SW8260Dmod

Project ID: Barnstable Simmons Pond, HH

Job ID: 57362

Sample#: 57362-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/10/21 9:15

Parameter	Result	Reporting			Units	Instr Dil'n Factor	Prep		Batch	Analysis		
		Limit	DL				Analyst	Date		Time	Date	Time
Calcium	20	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Iron	0.043 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Magnesium	5.8	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Manganese	0.16	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Sodium	51	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Zinc	0.0059 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:05	E200.8
Hardness (as CaCO3)	74	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Project ID: Barnstable Simmons Pond, HH

Job ID: 57362

Sample#: 57362-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/10/21 9:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	38	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:37	SM2120B
Bromide	0.072 J	0.1	0.021	mg/L	1	DBV			2101707	6/11/21	13:42	E300.0A
Chloride	82	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	13:42	E300.0A
Sulfate	20	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	13:42	E300.0A
Total Dissolved Solids (TDS)	220	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:37	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	420	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	6.6 H			pH	1	DJM			2101692	6/11/21	5:58	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:26	SM2130B

Sample#: 57362-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/10/21 9:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	10:43	SM5310C

Project ID: Barnstable Simmons Pond, HH

Job ID: 57362

Sample#: 57362-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/10/21 9:15

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorobutane sulfonic acid (PFBS)	4.5	1.7	0.42	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluoroheptanoic acid (PFHPA)	3.7	1.7	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorohexane sulfonic acid (PFHXS)	22	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorohexanoic acid (PFHXA)	9.1	1.7	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorononanoic acid (PFNA)	1.2 J	1.7	0.38	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorooctane sulfonic acid (PFOS)	29	1.7	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorooctanoic acid (PFOA)	11	1.7	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13969	6/16/21	19:33
Surrogate Recovery		Limits								
13C2-PFHxA SUR	74	70-130	%	1	WAS	6/16/21	13969	6/16/21	19:33	
13C2-PFDA SUR	87	70-130	%	1	WAS	6/16/21	13969	6/16/21	19:33	
D5-NEtFOSAA SUR	82	70-130	%	1	WAS	6/16/21	13969	6/16/21	19:33	
13C3-HFPO-DA SUR	71	70-130	%	1	WAS	6/16/21	13969	6/16/21	19:33	
Sum of MA PFAS6 Analytes (MAPFAS6)	66	1.7		ng/L	1			2101748		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: Barnstable Simmons Pond, HH

Job ID: 57362

Sample#: 57362-002

Sample ID: Field Blank

Matrix: Water

Sampled: 6/10/21 10:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.44	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.40	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.11	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	WAS	6/16/21	13969	6/16/21	19:49
Surrogate Recovery		Limits								
13C2-PFHxA SUR	98	70-130		%	1	WAS	6/16/21	13969	6/16/21	19:49
13C2-PFDA SUR	107	70-130		%	1	WAS	6/16/21	13969	6/16/21	19:49
D5-NEtFOSAA SUR	96	70-130		%	1	WAS	6/16/21	13969	6/16/21	19:49
13C3-HFPO-DA SUR	96	70-130		%	1	WAS	6/16/21	13969	6/16/21	19:49
Sum of MA PFAS6 Analytes (MAPFAS6)	1.8 U	1.8		ng/L	1			2101748		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57362

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101731	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101731	1,4-dioxane		8.4	ug/L	8	106	70 130		
SW8260Dmod	LCSD2101731	1,4-dioxane		9.7	ug/L	8	121	70 130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13977	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13977	Calcium	57362-001	20	mg/L				2	20	
		Iron	57362-001	< 0.050	mg/L					20	
		Magnesium	57362-001	5.6	mg/L				2	20	
		Manganese	57362-001	0.16	mg/L				2	20	
		Sodium	57362-001	50	mg/L				2	20	
		Zinc	57362-001	< 0.010	mg/L					20	
E200.8	LCS13977	Calcium		2.7	mg/L	2.5	108	85	115		
		Iron		0.54	mg/L	0.5	108	85	115		
		Magnesium		0.50	mg/L	0.5	99	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	98	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13977	Calcium		2.6	mg/L	2.5	105	85	115	2	20
		Iron		0.55	mg/L	0.5	110	85	115	1	20
		Magnesium		0.50	mg/L	0.5	100	85	115	1	20
		Manganese		0.51	mg/L	0.5	102	85	115	2	20
		Sodium		5.0	mg/L	5	99	85	115	1	20
		Zinc		0.51	mg/L	0.5	102	85	115	3	20
E200.8	MS13977	Calcium	57362-001	23	mg/L	2.5	100	70	130		
		Iron	57362-001	0.56	mg/L	0.5	113	70	130		
		Magnesium	57362-001	6.2	mg/L	0.5	88	70	130		
		Manganese	57362-001	0.67	mg/L	0.5	101	70	130		
		Sodium	57362-001	56	mg/L	5	92	70	130		
		Zinc	57362-001	0.53	mg/L	0.5	106	70	130		
E200.8	MS13977	Manganese	57375-010	0.52	mg/L	0.5	105	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101707	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101707	Bromide	57363-001	<	0.1	mg/L				10		
		Chloride	57363-001		84	mg/L			0	10		
		Sulfate	57363-001		19	mg/L			1	10		
E300.0A	LCS2101707	Bromide			9.9	mg/L	10	99	90	110		
		Chloride			100	mg/L	100	100	90	110		
		Sulfate			99	mg/L	100	99	90	110		
E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99	90	110	0	10
		Chloride			100	mg/L	100	100	90	110	0	10
		Sulfate			99	mg/L	100	99	90	110	0	10
E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57363-001		85	mg/L	16	11	90	110		
		Sulfate	57363-001		33	mg/L	16	83 *	90	110		
SM2120B	DUP2101689	Apparent Color	57326-010		45	CU				0	20	
SM2120B	DUP2101689	Apparent Color	57365-006	<	5	CU					20	
SM2120B	LCS2101689	Apparent Color			10	CU	10		5	15		
SM2120B	PB2101689	Apparent Color		<	5	CU			5			
SM2120B	DUP2101703	True Color	57365-006			CU						
SM2130B	DUP2101695	Turbidity	57365-006			NTU						
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)			6.01	pH			5.94	6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)			4.01	pH			3.94	4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)			4.03	pH			3.94	4.06		
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57365-007		21	mg/L				3	10	
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57399-001		45	mg/L				2	10	
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)			26	mg/L	25	106	90	110		
SM2320B	LCSD2101727	Alkalinity, Total (as CaCO3)			26	mg/L	25	104	90	110	1	10
SM2320B	PB2101727	Alkalinity, Total (as CaCO3)		<	5	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101702	Conductivity		<	5	uS/cm				
SM2510B	DUP2101702	Conductivity	57365-007	200	uS/cm				0	20
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		
SM2510B	LCSD2101702	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57330-001	910	mg/L				3	5
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57365-007	98	mg/L				8	5
SM2540C	LCS2101708	Total Dissolved Solids (TDS)		81.0	mg/L	99.2	82	75 125		
SM2540C	PB2101708	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101692	pH	57362-001	6.5	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		96			%			70 130		
		13C2-PFDA SUR		110			%			70 130		
		D5-NETFOSAA SUR		101			%			70 130		
		13C3-HFPO-DA SUR		103			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57299-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57299-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57299-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57299-001	0.67 J	1.8	0.45	ng/L					30
		perfluorodecanoic acid (PFDA)	57299-001	1.8 U	1.8	0.31	ng/L					30
		perfluorododecanoic acid (PFDOA)	57299-001	1.8 U	1.8	0.39	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57299-001	0.87 J	1.8	0.30	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57299-001	0.85 J	1.8	0.36	ng/L					30
		perfluorohexanoic acid (PFHXA)	57299-001	0.91 J	1.8	0.31	ng/L					30
		perfluorononanoic acid (PFNA)	57299-001	1.8 U	1.8	0.40	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57299-001	1.8	1.8	0.36	ng/L				1	30
		perfluorooctanoic acid (PFOA)	57299-001	1.4 J	1.8	0.30	ng/L					30
		perfluorotetradecanoic acid (PFTEA)	57299-001	1.8 U	1.8	0.45	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57299-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57299-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57299-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57299-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57299-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57299-001	76			%			70 130		
		13C2-PFDA SUR	57299-001	95			%			70 130		
		D5-NETFOSAA SUR	57299-001	91			%			70 130		
		13C3-HFPO-DA SUR	57299-001	76			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		4.5	2.0	0.30	ng/L	4	113	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		4.3	2.0	0.39	ng/L	4	107	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		4.1	2.0	0.33	ng/L	4	103	50 150		
		perfluorobutane sulfonic acid (PFBS)		3.2	2.0	0.50	ng/L	3.54	91	50 150		
		perfluorodecanoic acid (PFDA)		4.5	2.0	0.34	ng/L	4	113	50 150		
		perfluorododecanoic acid (PFDOA)		4.2	2.0	0.43	ng/L	4	104	50 150		
		perfluoroheptanoic acid (PFHPA)		4.2	2.0	0.33	ng/L	4	104	50 150		
		perfluorohexane sulfonic acid (PFHXS)		3.4	2.0	0.40	ng/L	3.8	89	50 150		
		perfluorohexanoic acid (PFHXA)		4.0	2.0	0.35	ng/L	4	99	50 150		
		perfluorononanoic acid (PFNA)		4.7	2.0	0.45	ng/L	4	117	50 150		
		perfluorooctane sulfonic acid (PFOS)		3.6	2.0	0.40	ng/L	3.84	93	50 150		
		perfluorooctanoic acid (PFOA)		4.1	2.0	0.33	ng/L	4	102	50 150		
		perfluorotetradecanoic acid (PFTEA)		4.4	2.0	0.50	ng/L	4	110	50 150		
		perfluorotridecanoic acid (PFTRIA)		4.2	2.0	0.13	ng/L	4	104	50 150		
		perfluoroundecanoic acid (PFUNA)		4.3	2.0	0.32	ng/L	4	108	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		3.6	2.0	0.39	ng/L	3.78	95	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		3.5	2.0	0.40	ng/L	3.74	93	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		3.7	2.0	0.18	ng/L	3.78	97	50 150		
		13C2-PFHxA SUR		98			%			70 130		
		13C2-PFDA SUR		111			%			70 130		
		D5-NEtFOSAA SUR		95			%			70 130		
		13C3-HFPO-DA SUR		108			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57361-001	130	1.8	0.27	ng/L	178	70	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57361-001	170	1.8	0.35	ng/L	178	93	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57361-001	170	1.8	0.29	ng/L	178	97	70 130		
		perfluorobutane sulfonic acid (PFBS)	57361-001	120	1.8	0.45	ng/L	158	77	70 130		
		perfluorodecanoic acid (PFDA)	57361-001	170	1.8	0.30	ng/L	178	96	70 130		
		perfluorododecanoic acid (PFDOA)	57361-001	150	1.8	0.38	ng/L	178	83	70 130		
		perfluoroheptanoic acid (PFHPA)	57361-001	140	1.8	0.30	ng/L	178	80	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57361-001	130	1.8	0.35	ng/L	169	78	70 130		
		perfluorohexanoic acid (PFHXA)	57361-001	140	1.8	0.31	ng/L	178	76	70 130		
		perfluorononanoic acid (PFNA)	57361-001	150	1.8	0.40	ng/L	178	86	70 130		
		perfluorooctane sulfonic acid (PFOS)	57361-001	140	1.8	0.36	ng/L	171	80	70 130		
		perfluorooctanoic acid (PFOA)	57361-001	160	1.8	0.30	ng/L	178	91	70 130		
		perfluorotetradecanoic acid (PFTEA)	57361-001	130	1.8	0.44	ng/L	178	70	70 130		
		perfluorotridecanoic acid (PFTRIA)	57361-001	140	1.8	0.12	ng/L	178	76	70 130		
		perfluoroundecanoic acid (PFUNA)	57361-001	160	1.8	0.29	ng/L	178	87	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57361-001	150	1.8	0.35	ng/L	168	88	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57361-001	150	1.8	0.36	ng/L	166	89	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57361-001	120	1.8	0.16	ng/L	168	73	70 130		
		13C2-PFHxA SUR	57361-001	87			%			70 130		
		13C2-PFDA SUR	57361-001	109			%			70 130		
		D5-NETFOSAA SUR	57361-001	84			%			70 130		
		13C3-HFPO-DA SUR	57361-001	87			%			70 130		

Absolute Resource associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57362

ANALYSIS REQUEST

Company Name: Kleinfelder	Project Name: Barnstable, StraightWay2 Simmonds Pond, HH
Company Address: 4 Technology Drive, Westborough, MA	Project Location: NH <input checked="" type="checkbox"/> MA <input type="checkbox"/> ME <input type="checkbox"/> VT
Report To: Alex Bishop	Accreditation Required? N/Y: Y
Phone #: 914-406-9598	Protocol: RCRA <input type="checkbox"/> SDWA <input checked="" type="checkbox"/> NPDES <input type="checkbox"/> MCP <input type="checkbox"/> NHDES <input type="checkbox"/> DOD <input type="checkbox"/>
Invoice to: Kleinfelder	Reporting Limits: QAPP <input type="checkbox"/> GW-1 <input type="checkbox"/> S-1 <input type="checkbox"/> EPA DW <input checked="" type="checkbox"/> Other <input type="checkbox"/>
Email: abbishop@kleinfelder.com	Quote # _____
PO #: _____	<input type="checkbox"/> NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane *	<input type="checkbox"/> Gases-List:
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<input type="checkbox"/> TTHMS
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> PFAS 537.1
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664
<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity
<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input checked="" type="checkbox"/> TS	<input checked="" type="checkbox"/> TVS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness
<input checked="" type="checkbox"/> Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD
<input type="checkbox"/> Total Coliform	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC
<input type="checkbox"/> Ferrous Iron	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Phenols	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho-P
<input type="checkbox"/> Fluoride	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride
<input type="checkbox"/> Sulfate	<input checked="" type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity
<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP Pesticide
<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5736201	Raw-SW2 SIM	7	X			Non Preserved					6/10/21	9:15	uc
		1				Thio							
		1				X							
		2				X							
		2				Triz							
		2				Non Preserved							
		2				X							
02	Field Blank	1				Triz					6/10/21	10:45	uc

TAT REQUESTED	See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.	SPECIAL INSTRUCTIONS	
Priority (24 hr*) <input type="checkbox"/>		*use reporting limit of 0.13 ug/l for 1,4-Dioxane	
Expedited (48 hr*) <input type="checkbox"/>			
Standard (10 Business Days) <input type="checkbox"/>			
*Date Needed _____			
REPORTING INSTRUCTIONS		<input type="checkbox"/> PDF (e-mail address) <u>abbishop@kleinfelder.com & kryan@kleinfelder.com</u>	
<input type="checkbox"/> HARD COPY REQUIRED		<input type="checkbox"/> EDD	
RECEIVED ON ICE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		TEMPERATURE <u>8</u> °C	

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date: <u>6/10/21</u>	Time: <u>11:30</u>	Received by:	Date: <u>6/10/21</u>	Time: <u>11:30</u>
	Relinquished by:	Date: <u>6/10/21</u>	Time: <u>14:10</u>	Received by:	Date: <u>6-10</u>	Time: <u>2pm</u>
	Relinquished by:	Date: <u>6-10</u>	Time: _____	Received by Laboratory:	Date: <u>6/10/21</u>	Time: <u>16:15</u>

Sample Receipt Condition Report

57362

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					pH 2
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)		250mL(P)		500mL(P)	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	3						*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y N
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)	2	60mL(P)	2	125mL(P)	3	250mL(P)	1	500mL(P)	1
									1L(G)	1L(P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			Less than pre-sized bubble in 01B/4D
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	✓			Lot ID#: <u>FB-05</u>
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , O-PO ₄ , pH, BOD, Coliform/E. coli (P/LA or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			✓ DBV, ADDAN, WS
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JD

Date/Time: 6/10/21 17:10

Peer Review Checklist

- | | | | |
|--|---|---|---|
| <input type="checkbox"/> Client ID/Project Manager | <input type="checkbox"/> On Ice, Temperature OK? | <input type="checkbox"/> Sample IDs | <input type="checkbox"/> Analyses in Correctly |
| <input type="checkbox"/> Project Name | <input type="checkbox"/> PO# (if provided) | <input type="checkbox"/> Matrix | -references |
| <input type="checkbox"/> TAT/rushes communicated | <input type="checkbox"/> Sub samples sent? Shipping Charge? | <input type="checkbox"/> Date/Time collected | -wastewater methods |
| <input type="checkbox"/> Received Date/Time | <input type="checkbox"/> Issues noted above communicated? | <input type="checkbox"/> Short HTs communicated | <input type="checkbox"/> Notes from CoC in LIMS |

Reviewed By: _____

Date: _____

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57363
Date Received: 6/10/21

Project: Barnstable Simmons Pond, HH

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/23/2021
Total number of pages: 21

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Finished-SIM	Water	6/10/2021 10:45	57363-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Handling to Subcontract Lab Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Trip Blank	Water	6/10/2021 0:00	57363-002	VOA Trip Blank VOCs Trihalomethanes in water by 524.2

Project ID: Barnstable Simmons Pond, HH

Job ID: 57363

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	21:04	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	21:04	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	21:04	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	21:04	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	21:04	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	92	70-130		%	1	LMM			2101699	6/11/21	21:04	E524.2
1,4-dichlorobenzene-D4 SUR	85	70-130		%	1	LMM			2101699	6/11/21	21:04	E524.2

Sample#: 57363-002

Sample ID: Trip Blank

Matrix: Water

Sampled: 6/10/21 0:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101717	6/14/21	20:08	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101717	6/14/21	20:08	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101717	6/14/21	20:08	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101717	6/14/21	20:08	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101717	6/14/21	20:08	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	88	70-130		%	1	LMM			2101717	6/14/21	20:08	E524.2
1,4-dichlorobenzene-D4 SUR	81	70-130		%	1	LMM			2101717	6/14/21	20:08	E524.2

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	15:11	SW8260Dmod

Project ID: Barnstable Simmons Pond, HH

Job ID: 57363

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Parameter	Result	Reporting			Units	Instr Dil'n Factor	Prep		Batch	Analysis		
		Limit	DL				Analyst	Date		Time	Date	Time
Calcium	15	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Magnesium	5.1	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Manganese	0.012	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Sodium	76	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Zinc	0.12	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:25	E200.8
Hardness (as CaCO3)	59	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Project ID: Barnstable Simmons Pond, HH

Job ID: 57363

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	74	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:39	SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
Chloride	84	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
Nitrate-N	4.2 M	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
M = The recovery for the matrix spike was 63%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
ortho-phosphate as P	0.3 M	0.1	0.069	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
M = The recovery for the matrix spike was 89%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Sulfate	19 M	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
M = The recovery for the matrix spike was 83%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Total Dissolved Solids (TDS)	260	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
Total Phosphorus as P	0.59	0.02	0.016	mg/L	2	SFM			2101720	6/14/21	6:43	E365.3
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:39	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	480	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	7.2 H			pH	1	DJM			2101692	6/11/21	6:07	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:27	SM2130B

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	11:19	SM5310C

Project ID: Barnstable Simmons Pond, HH

Job ID: 57363

Sample#: 57363-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13969	6/16/21	20:05
Surrogate Recovery										
		Limits								
13C2-PFHxA SUR	90	70-130	%	1	WAS	6/16/21	13969	6/16/21	20:05	
13C2-PFDA SUR	92	70-130	%	1	WAS	6/16/21	13969	6/16/21	20:05	
D5-NEtFOSAA SUR	87	70-130	%	1	WAS	6/16/21	13969	6/16/21	20:05	
13C3-HFPO-DA SUR	84	70-130	%	1	WAS	6/16/21	13969	6/16/21	20:05	
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101748		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57363

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 57363-001 did not meet the acceptance criteria for Nitrate-N, ortho-phosphate as P, and Sulfate. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101699	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			98	%			70	130		
		1,4-dichlorobenzene-D4 SUR			96	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20		
		bromodichloromethane	57363-001	<	0.50	ug/L				20		
		dibromochloromethane	57363-001	<	0.50	ug/L				20		
		bromoform	57363-001	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	57363-001		99	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130		
		Total Trihalomethanes (THMs)	57363-001							99.3		
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130		
		bromodichloromethane			10	ug/L	10	104	70	130		
		dibromochloromethane			10	ug/L	10	100	70	130		
		bromoform			10	ug/L	10	104	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7	20
		bromodichloromethane			11	ug/L	10	111	70	130	6	20
		dibromochloromethane			11	ug/L	10	107	70	130	7	20
		bromoform			11	ug/L	10	110	70	130	5	20
		4-bromofluorobenzene SUR			112	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101717	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			91	%			70	130		
		1,4-dichlorobenzene-D4 SUR			84	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCS2101717	chloroform			8.7	ug/L	10	87	70	130		
		bromodichloromethane			9.6	ug/L	10	96	70	130		
		dibromochloromethane			8.9	ug/L	10	89	70	130		
		bromoform			8.6	ug/L	10	86	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			98	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101717	chloroform			9.2	ug/L	10	92	70	130	6	20
		bromodichloromethane			9.9	ug/L	10	99	70	130	3	20
		dibromochloromethane			9.4	ug/L	10	94	70	130	5	20
		bromoform			8.9	ug/L	10	89	70	130	4	20
		4-bromofluorobenzene SUR			102	%			70	130		
		1,4-dichlorobenzene-D4 SUR			100	%			70	130		
		Total Trihalomethanes (THMs)										
SW8260Dmod	BLK2101731	1,4-dioxane		<	0.25	ug/L						
SW8260Dmod	LCS2101731	1,4-dioxane			8.4	ug/L	8	106	70	130		
SW8260Dmod	LCSD2101731	1,4-dioxane			9.7	ug/L	8	121	70	130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13977	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13977	Calcium	57362-001	20	mg/L				2	20	
		Iron	57362-001	< 0.050	mg/L					20	
		Magnesium	57362-001	5.6	mg/L				2	20	
		Manganese	57362-001	0.16	mg/L				2	20	
		Sodium	57362-001	50	mg/L				2	20	
		Zinc	57362-001	< 0.010	mg/L					20	
E200.8	LCS13977	Calcium		2.7	mg/L	2.5	108	85	115		
		Iron		0.54	mg/L	0.5	108	85	115		
		Magnesium		0.50	mg/L	0.5	99	85	115		
		Manganese		0.50	mg/L	0.5	100	85	115		
		Sodium		4.9	mg/L	5	98	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13977	Calcium		2.6	mg/L	2.5	105	85	115	2	20
		Iron		0.55	mg/L	0.5	110	85	115	1	20
		Magnesium		0.50	mg/L	0.5	100	85	115	1	20
		Manganese		0.51	mg/L	0.5	102	85	115	2	20
		Sodium		5.0	mg/L	5	99	85	115	1	20
		Zinc		0.51	mg/L	0.5	102	85	115	3	20
E200.8	MS13977	Calcium	57362-001	23	mg/L	2.5	100	70	130		
		Iron	57362-001	0.56	mg/L	0.5	113	70	130		
		Magnesium	57362-001	6.2	mg/L	0.5	88	70	130		
		Manganese	57362-001	0.67	mg/L	0.5	101	70	130		
		Sodium	57362-001	56	mg/L	5	92	70	130		
		Zinc	57362-001	0.53	mg/L	0.5	106	70	130		
E200.8	MS13977	Manganese	57375-010	0.52	mg/L	0.5	105	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101707	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101707	Bromide	57363-001	<	0.1	mg/L				10		
		Chloride	57363-001		84	mg/L			0		10	
		Nitrate-N	57363-001		4.2	mg/L			0		10	
		Nitrite-N	57363-001	<	0.1	mg/L					10	
		ortho-phosphate as P	57363-001		0.3	mg/L			2		10	
		Sulfate	57363-001		19	mg/L			1		10	
E300.0A	LCS2101707	Bromide			9.9	mg/L	10	99	90	110		
		Chloride			100	mg/L	100	100	90	110		
		Nitrate-N			10	mg/L	10	100	90	110		
		Nitrite-N			15	mg/L	15	98	90	110		
		ortho-phosphate as P			9.4	mg/L	10	94	90	110		
		Sulfate			99	mg/L	100	99	90	110		
E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99	90	110	0	10
		Chloride			100	mg/L	100	100	90	110	0	10
		Nitrate-N			10	mg/L	10	100	90	110	0	10
		Nitrite-N			15	mg/L	15	99	90	110	0	10
		ortho-phosphate as P			9.6	mg/L	10	96	90	110	3	10
		Sulfate			99	mg/L	100	99	90	110	0	10
E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57363-001		85	mg/L	16	11	90	110		
		Nitrate-N	57363-001		5.2	mg/L	1.66	63	*	90	110	
		Nitrite-N	57363-001		2.3	mg/L	2.53	92		90	110	
		ortho-phosphate as P	57363-001		1.8	mg/L	1.66	89	*	90	110	
		Sulfate	57363-001		33	mg/L	16	83	*	90	110	
E365.3	LCS2101720	Total Phosphorus as P		0.21	mg/L	0.2	103	75	125			
E365.3	LCSD2101720	Total Phosphorus as P		0.19	mg/L	0.2	96	75	125	7	20	
E365.3	MS2101720	Total Phosphorus as P	57336-002		0.35	mg/L	0.2	99	75	125		
E365.3	MSD2101720	Total Phosphorus as P	57336-002		0.34	mg/L	0.2	97	75	125	1	20
E365.3	PB2101720	Total Phosphorus as P		<	0.01	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101689	Apparent Color	57326-010	45	CU				0	20
SM2120B	DUP2101689	Apparent Color	57365-006	< 5	CU					20
SM2120B	LCS2101689	Apparent Color		10	CU	10		5 15		
SM2120B	PB2101689	Apparent Color		< 5	CU			5		
SM2120B	DUP2101703	True Color	57365-006		CU					
SM2130B	DUP2101695	Turbidity	57365-006		NTU					
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)		6.01	pH			5.94 6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)		4.01	pH			3.94 4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)		4.03	pH			3.94 4.06		
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57365-007	21	mg/L				3	10
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57399-001	45	mg/L				2	10
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	106	90 110		
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	104	90 110	1	10
SM2320B	PB2101727	Alkalinity, Total (as CaCO3)		< 5	mg/L					
SM2510B	BLK2101702	Conductivity		< 5	uS/cm					
SM2510B	DUP2101702	Conductivity	57365-007	200	uS/cm				0	20
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57330-001	910	mg/L				3	5
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57365-007	98	mg/L				8	5
SM2540C	LCS2101708	Total Dissolved Solids (TDS)		81.0	mg/L	99.2	82	75 125		
SM2540C	PB2101708	Total Dissolved Solids (TDS)		< 20	mg/L					
SM4500H+B	DUP2101692	pH	57362-001	6.5	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)			10	mg/L	10	99	85	115
SM5310C	LCSD2101750	Total Organic Carbon (TOC)			10	mg/L	10	101	85	115
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001		10	mg/L	10	98	75	125

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		96			%			70	130	
		13C2-PFDA SUR		110			%			70	130	
		D5-NETFOSAA SUR		101			%			70	130	
		13C3-HFPO-DA SUR		103			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57299-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57299-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57299-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57299-001	0.67 J	1.8	0.45	ng/L					30
		perfluorodecanoic acid (PFDA)	57299-001	1.8 U	1.8	0.31	ng/L					30
		perfluorododecanoic acid (PFDOA)	57299-001	1.8 U	1.8	0.39	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57299-001	0.87 J	1.8	0.30	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57299-001	0.85 J	1.8	0.36	ng/L					30
		perfluorohexanoic acid (PFHXA)	57299-001	0.91 J	1.8	0.31	ng/L					30
		perfluorononanoic acid (PFNA)	57299-001	1.8 U	1.8	0.40	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57299-001	1.8	1.8	0.36	ng/L				1	30
		perfluorooctanoic acid (PFOA)	57299-001	1.4 J	1.8	0.30	ng/L					30
		perfluorotetradecanoic acid (PFTEA)	57299-001	1.8 U	1.8	0.45	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57299-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57299-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57299-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57299-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57299-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57299-001	76			%			70 130		
		13C2-PFDA SUR	57299-001	95			%			70 130		
		D5-NETFOSAA SUR	57299-001	91			%			70 130		
		13C3-HFPO-DA SUR	57299-001	76			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		4.5	2.0	0.30	ng/L	4	113	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		4.3	2.0	0.39	ng/L	4	107	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		4.1	2.0	0.33	ng/L	4	103	50 150		
		perfluorobutane sulfonic acid (PFBS)		3.2	2.0	0.50	ng/L	3.54	91	50 150		
		perfluorodecanoic acid (PFDA)		4.5	2.0	0.34	ng/L	4	113	50 150		
		perfluorododecanoic acid (PFDOA)		4.2	2.0	0.43	ng/L	4	104	50 150		
		perfluoroheptanoic acid (PFHPA)		4.2	2.0	0.33	ng/L	4	104	50 150		
		perfluorohexane sulfonic acid (PFHXS)		3.4	2.0	0.40	ng/L	3.8	89	50 150		
		perfluorohexanoic acid (PFHXA)		4.0	2.0	0.35	ng/L	4	99	50 150		
		perfluorononanoic acid (PFNA)		4.7	2.0	0.45	ng/L	4	117	50 150		
		perfluorooctane sulfonic acid (PFOS)		3.6	2.0	0.40	ng/L	3.84	93	50 150		
		perfluorooctanoic acid (PFOA)		4.1	2.0	0.33	ng/L	4	102	50 150		
		perfluorotetradecanoic acid (PFTEA)		4.4	2.0	0.50	ng/L	4	110	50 150		
		perfluorotridecanoic acid (PFTRIA)		4.2	2.0	0.13	ng/L	4	104	50 150		
		perfluoroundecanoic acid (PFUNA)		4.3	2.0	0.32	ng/L	4	108	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		3.6	2.0	0.39	ng/L	3.78	95	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		3.5	2.0	0.40	ng/L	3.74	93	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		3.7	2.0	0.18	ng/L	3.78	97	50 150		
		13C2-PFHxA SUR		98			%			70 130		
		13C2-PFDA SUR		111			%			70 130		
		D5-NETFOSAA SUR		95			%			70 130		
		13C3-HFPO-DA SUR		108			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57361-001	130	1.8	0.27	ng/L	178	70	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57361-001	170	1.8	0.35	ng/L	178	93	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57361-001	170	1.8	0.29	ng/L	178	97	70 130		
		perfluorobutane sulfonic acid (PFBS)	57361-001	120	1.8	0.45	ng/L	158	77	70 130		
		perfluorodecanoic acid (PFDA)	57361-001	170	1.8	0.30	ng/L	178	96	70 130		
		perfluorododecanoic acid (PFDOA)	57361-001	150	1.8	0.38	ng/L	178	83	70 130		
		perfluoroheptanoic acid (PFHPA)	57361-001	140	1.8	0.30	ng/L	178	80	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57361-001	130	1.8	0.35	ng/L	169	78	70 130		
		perfluorohexanoic acid (PFHXA)	57361-001	140	1.8	0.31	ng/L	178	76	70 130		
		perfluorononanoic acid (PFNA)	57361-001	150	1.8	0.40	ng/L	178	86	70 130		
		perfluorooctane sulfonic acid (PFOS)	57361-001	140	1.8	0.36	ng/L	171	80	70 130		
		perfluorooctanoic acid (PFOA)	57361-001	160	1.8	0.30	ng/L	178	91	70 130		
		perfluorotetradecanoic acid (PFTEA)	57361-001	130	1.8	0.44	ng/L	178	70	70 130		
		perfluorotridecanoic acid (PFTRIA)	57361-001	140	1.8	0.12	ng/L	178	76	70 130		
		perfluoroundecanoic acid (PFUNA)	57361-001	160	1.8	0.29	ng/L	178	87	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57361-001	150	1.8	0.35	ng/L	168	88	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57361-001	150	1.8	0.36	ng/L	166	89	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57361-001	120	1.8	0.16	ng/L	168	73	70 130		
		13C2-PFHxA SUR	57361-001	87			%			70 130		
		13C2-PFDA SUR	57361-001	109			%			70 130		
		D5-NETFOSAA SUR	57361-001	84			%			70 130		
		13C3-HFPO-DA SUR	57361-001	87			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57363

ANALYSIS REQUEST

Company Name: **Kleinfelder**

Company Address: **4 Technology Drive, Westborough, MA**

Report To: **Alex Bishop**

Phone #: **914-406-9598**

Invoice to: **Kleinfelder**

Email: **abbishop@kleinfelder.com**

PO #:

Project Name: **Barnstable, StraightWay2, Simmons Pond, HH**

Project #: _____

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: **Y**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
 EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input checked="" type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane *	<input type="checkbox"/> Gases-List: TTHMs	<input type="checkbox"/> TPH	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input type="checkbox"/> Hardness	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> P-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	Total Coliform	HAAs	Grab (G) or Composite (C)
<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input checked="" type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane *	<input type="checkbox"/> Gases-List: TTHMs	<input type="checkbox"/> TPH	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input type="checkbox"/> Hardness	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> P-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	Total Coliform	HAAs	Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5736301	Finished-SW2	8	X			Non Preserved					4/10/21	10:45	uc
		1				Thio							
		1				X							
		2				X							
		2				X							
		3				NH4Cl							
		1				X							
		2				Triz							
		2				Non Preserved							
-02	Trip Blank					X							

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

*use reporting limit of 0.13 ug/l for 1,4-Dioxane

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO

TEMPERATURE 10 °C

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date	Time	Received by:	Date	Time
	<i>[Signature]</i>	6/10/21	11:30	<i>[Signature]</i>	6/10/21	11:30
	Relinquished by:	Date	Time	Received by:	Date	Time
<i>[Signature]</i>	6/10/21	14:10	<i>[Signature]</i>	6-10	2pm	
Relinquished by:	Date	Time	Received by Laboratory:	Date	Time	
<i>[Signature]</i>	6-10		<i>[Signature]</i>	6/10/21	10:15	

Sample Receipt Condition Report

57363

Absolute Resource Associates

Job Number: _____

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A *NO ICE 6/10/21* Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A *NO ICE 6/10/21* Any signs of freezing? -Yes -No
Samples rec. on ice cubes

Comments: _____

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:			
HCl	40mL(G)	3	250mL(P)		500mL(P)		1L(G)			pH 2 NO T Phos pH 2 *pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>(N)</u>		
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)							
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)				
NaOH	125mL(P)		250mL(P)									
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)							
ZnAc-NaOH	125mL(P)		250mL(P)									
Trizma	125mL(P)		250mL(P)	2								
NH ₄ Ac	125mL(P)		250mL(P)									
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1								
MeOH	20mL(G)		40mL(G)									
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe					
None (water)	40ml (G)	2	60mL(P)	3	125mL(P)	3	250mL(P)	1	500mL(P)	1	1L(G)	1L(P)
<i>NH₄Cl</i>	<i>60mL(G)</i>	<i>3</i>										
Mold	Cassette		Bulk		Plate		Tape Lift					
Asbestos	Cassette		Bulk									
Lead	Cassette		Bulk		Wipe							

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	✓			Lot ID#: <u>PB-05</u>
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P) A or MPN, Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			<i>✓ DBV, WS, AN, AND</i>
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:	✓			Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: *JD*

Date/Time: *6/10/21 16:53*

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/18/2021
Work Order #: 2106-02505
Client Job #:
Date Received: 06/15/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/18/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-02505-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57363
Finished- SIM
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/10/2021 10:45AM
DATE AND TIME RECEIVED: 06/15/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/16/2021 09:05AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:04PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:04PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:04PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/17/2021 03:04PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/17/2021 03:04PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:04PM
2,3-Dibromopropionic Acid	106	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/17/2021 03:04PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57363

ANALYSIS REQUEST

Company Name: **Kleinfelder**

Company Address: **4 Technology Drive, Westborough, MA**

Report To: **Alex Bishop**

Phone #: **914-406-9598**

Invoice to: **Kleinfelder**

Email: **abbishop@kleinfelder.com**

PO #:

Project Name: **Barnstable, StraightWay2, Simmons Pond, HH**

Project #: _____

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: **Y**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
 EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input checked="" type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane *	<input type="checkbox"/> Gases-List: TTHMs	<input type="checkbox"/> TPH	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input type="checkbox"/> Hardness	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC	<input checked="" type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	Total Coliform	HAAs	Grab (G) or Composite (C)
<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input checked="" type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane *	<input type="checkbox"/> Gases-List: TTHMs	<input type="checkbox"/> TPH	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input type="checkbox"/> Hardness	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC	<input checked="" type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	Total Coliform	HAAs	Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5736301	Finished-SW2	8	X			Non Preserved					4/10/21	10:45	uc
		1				Thio							
		1				X							
		2				X							
		2				X							
		3				NH4Cl							
		1				X							
		2				Triz							
		2				Non Preserved							
-02	Trip Blank					X							

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

*use reporting limit of 0.13 ug/l for 1,4-Dioxane

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO

TEMPERATURE 10 °C

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date	Time	Received by:	Date	Time
	<i>[Signature]</i>	6/10/21	11:30	<i>[Signature]</i>	6/10/21	11:30
	Relinquished by:	Date	Time	Received by:	Date	Time
<i>[Signature]</i>	6/10/21	14:10	<i>[Signature]</i>	6-10	2pm	
Relinquished by:	Date	Time	Received by Laboratory:	Date	Time	
<i>[Signature]</i>	6-10		<i>[Signature]</i>	6/10/21	10:15	

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57364
Date Received: 6/10/21

Project: Barnstable Simmons Pond, HH

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/23/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated-SIM	Water	6/10/2021 10:15	57364-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Handling to Subcontract Lab Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable Simmons Pond, HH

Job ID: 57364

Sample#: 57364-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/10/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	21:36	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	21:36	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	21:36	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	21:36	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	21:36	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	94	70-130		%	1	LMM			2101699	6/11/21	21:36	E524.2
1,4-dichlorobenzene-D4 SUR	88	70-130		%	1	LMM			2101699	6/11/21	21:36	E524.2

Sample#: 57364-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/10/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Magnesium	5.7	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Manganese	U	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Sodium	68	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Zinc	0.10	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31	E200.8
Hardness (as CaCO3)	71	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Project ID: Barnstable Simmons Pond, HH

Job ID: 57364

Sample#: 57364-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/10/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	71	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:52	SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
Chloride	84	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
Nitrate-N	4.3	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
ortho-phosphate as P	0.2	0.1	0.069	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
Sulfate	21	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	12:52	E300.0A
Total Dissolved Solids (TDS)	270	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
Total Phosphorus as P	0.31	0.01	0.0080	mg/L	1	SFM			2101720	6/14/21	6:43	E365.3
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:52	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	490	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	7.3 H			pH	1	DJM			2101692	6/11/21	6:13	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	0.47 J	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:28	SM2130B

Sample#: 57364-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/10/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	11:56	SM5310C

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57364

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101699	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			98	%			70	130		
		1,4-dichlorobenzene-D4 SUR			96	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20		
		bromodichloromethane	57363-001	<	0.50	ug/L				20		
		dibromochloromethane	57363-001	<	0.50	ug/L				20		
		bromoform	57363-001	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	57363-001		99	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130		
		Total Trihalomethanes (THMs)	57363-001							99.3		
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130		
		bromodichloromethane			10	ug/L	10	104	70	130		
		dibromochloromethane			10	ug/L	10	100	70	130		
		bromoform			10	ug/L	10	104	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7	20
		bromodichloromethane			11	ug/L	10	111	70	130	6	20
		dibromochloromethane			11	ug/L	10	107	70	130	7	20
		bromoform			11	ug/L	10	110	70	130	5	20
		4-bromofluorobenzene SUR			112	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13977	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13977	Calcium	57362-001	20	mg/L				2	20
		Iron	57362-001	< 0.050	mg/L					20
		Magnesium	57362-001	5.6	mg/L				2	20
		Manganese	57362-001	0.16	mg/L				2	20
		Sodium	57362-001	50	mg/L				2	20
		Zinc	57362-001	< 0.010	mg/L					20
E200.8	LCS13977	Calcium		2.7	mg/L	2.5	108	85 115		
		Iron		0.54	mg/L	0.5	108	85 115		
		Magnesium		0.50	mg/L	0.5	99	85 115		
		Manganese		0.50	mg/L	0.5	100	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.50	mg/L	0.5	99	85 115		
E200.8	LCSD13977	Calcium		2.6	mg/L	2.5	105	85 115	2	20
		Iron		0.55	mg/L	0.5	110	85 115	1	20
		Magnesium		0.50	mg/L	0.5	100	85 115	1	20
		Manganese		0.51	mg/L	0.5	102	85 115	2	20
		Sodium		5.0	mg/L	5	99	85 115	1	20
		Zinc		0.51	mg/L	0.5	102	85 115	3	20
E200.8	MS13977	Calcium	57362-001	23	mg/L	2.5	100	70 130		
		Iron	57362-001	0.56	mg/L	0.5	113	70 130		
		Magnesium	57362-001	6.2	mg/L	0.5	88	70 130		
		Manganese	57362-001	0.67	mg/L	0.5	101	70 130		
		Sodium	57362-001	56	mg/L	5	92	70 130		
		Zinc	57362-001	0.53	mg/L	0.5	106	70 130		
E200.8	MS13977	Manganese	57375-010	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101707	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101707	Bromide	57363-001	<	0.1	mg/L				10		
		Chloride	57363-001		84	mg/L			0		10	
		Nitrate-N	57363-001		4.2	mg/L			0		10	
		Nitrite-N	57363-001	<	0.1	mg/L					10	
		ortho-phosphate as P	57363-001		0.3	mg/L			2		10	
		Sulfate	57363-001		19	mg/L			1		10	
E300.0A	LCS2101707	Bromide			9.9	mg/L	10	99	90	110		
		Chloride			100	mg/L	100	100	90	110		
		Nitrate-N			10	mg/L	10	100	90	110		
		Nitrite-N			15	mg/L	15	98	90	110		
		ortho-phosphate as P			9.4	mg/L	10	94	90	110		
		Sulfate			99	mg/L	100	99	90	110		
E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99	90	110	0	10
		Chloride			100	mg/L	100	100	90	110	0	10
		Nitrate-N			10	mg/L	10	100	90	110	0	10
		Nitrite-N			15	mg/L	15	99	90	110	0	10
		ortho-phosphate as P			9.6	mg/L	10	96	90	110	3	10
		Sulfate			99	mg/L	100	99	90	110	0	10
E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57363-001		85	mg/L	16	11	90	110		
		Nitrate-N	57363-001		5.2	mg/L	1.66	63	*	90	110	
		Nitrite-N	57363-001		2.3	mg/L	2.53	92		90	110	
		ortho-phosphate as P	57363-001		1.8	mg/L	1.66	89	*	90	110	
		Sulfate	57363-001		33	mg/L	16	83	*	90	110	
E365.3	LCS2101720	Total Phosphorus as P		0.21	mg/L	0.2	103	75	125			
E365.3	LCSD2101720	Total Phosphorus as P		0.19	mg/L	0.2	96	75	125	7	20	
E365.3	MS2101720	Total Phosphorus as P	57336-002		0.35	mg/L	0.2	99	75	125		
E365.3	MSD2101720	Total Phosphorus as P	57336-002		0.34	mg/L	0.2	97	75	125	1	20
E365.3	PB2101720	Total Phosphorus as P		<	0.01	mg/L						

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101689	Apparent Color	57326-010	45	CU				0	20
SM2120B	DUP2101689	Apparent Color	57365-006	< 5	CU					20
SM2120B	LCS2101689	Apparent Color		10	CU	10		5 15		
SM2120B	PB2101689	Apparent Color		< 5	CU			5		
SM2120B	DUP2101703	True Color	57365-006		CU					
SM2130B	DUP2101695	Turbidity	57365-006		NTU					
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)		6.01	pH			5.94 6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)		4.01	pH			3.94 4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)		4.03	pH			3.94 4.06		
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57365-007	21	mg/L				3	10
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57399-001	45	mg/L				2	10
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	106	90 110		
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	104	90 110	1	10
SM2320B	PB2101727	Alkalinity, Total (as CaCO3)		< 5	mg/L					
SM2510B	BLK2101702	Conductivity		< 5	uS/cm					
SM2510B	DUP2101702	Conductivity	57365-007	200	uS/cm				0	20
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57330-001	910	mg/L				3	5
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57365-007	98	mg/L				8	5
SM2540C	LCS2101708	Total Dissolved Solids (TDS)		81.0	mg/L	99.2	82	75 125		
SM2540C	PB2101708	Total Dissolved Solids (TDS)		< 20	mg/L					
SM4500H+B	DUP2101692	pH	57362-001	6.5	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

Absolute Resource associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57364

ANALYSIS REQUEST

Company Name: **Kleinfelder**

Company Address: **4 Technology Drive, Westborough, MA**

Report To: **Alex Bishop**

Phone #: **914-406-9598**

Invoice to: **Kleinfelder**

Email: **abbishop@kleinfelder.com**

PO #:

Project Name: **Barnstable, StraightWay2 Simmens Pond, LM**

Project #: _____

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: **Y**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
 EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MDEP
<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> VOC 8015
<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> GR0 8015
<input type="checkbox"/> TPH	<input type="checkbox"/> VOC 524.2 NH List
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> TPH Fingerprint
<input checked="" type="checkbox"/> PFAS-397-1	<input type="checkbox"/> 8270ABN
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> 625.1
<input type="checkbox"/> pH	<input type="checkbox"/> 8081 Pesticides
<input checked="" type="checkbox"/> Conductivity	<input type="checkbox"/> 608.3 Pest/PCB
<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color True
<input checked="" type="checkbox"/> TSS	<input type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness
<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn
<input checked="" type="checkbox"/> RCRA Metals	<input type="checkbox"/> Dissolved Metals-list:
<input checked="" type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ammonia
<input checked="" type="checkbox"/> Nitrite	<input type="checkbox"/> COD
<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> TKN
<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> TN
<input type="checkbox"/> Ignitability/FP	<input type="checkbox"/> TOC
<input type="checkbox"/> TCLP Metals	<input checked="" type="checkbox"/> Ferrous Iron
<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> Bacteria P/A
<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Pesticide Subcontract	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Grain Size	<input type="checkbox"/> Ortho P
<input type="checkbox"/> Herbicides	<input type="checkbox"/> Phenols
<input type="checkbox"/> Asbestos	<input checked="" type="checkbox"/> Bromide
Total Coliform	<input checked="" type="checkbox"/> Fluoride
HAAS	<input type="checkbox"/> Corrosivity
Grab (G) or Composite (C)	<input type="checkbox"/> TCLP Pesticide

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5736401	Simulated-SW2 SIM	8	X			Non Preserved					6/10/21	10:15	uc
		1				Thio							
		1				X							
		2				X							
		2				NH4Cl							
		3				X							
		1				X							

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

SPECIAL INSTRUCTIONS

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 0 °C

CUSTODY RECORD

OSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>6/10/21</u>	Time: <u>1:50</u>
Relinquished by:	Date: <u>6/10/21</u>	Time: <u>14:10</u>
Relinquished by:	Date: <u>6-10</u>	Time:

Received by:	Date: <u>6/10/21</u>	Time: <u>11:30</u>
Received by:	Date: <u>6-10</u>	Time: <u>2pm</u>
Received by Laboratory:	Date: <u>6/10/21</u>	Time: <u>6:15</u>

Sample Receipt Condition Report

57364

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)	T. phos pttz 2 JO	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)							
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40mL(G)		60mL(P)	3	125mL(P)	3	250mL(P)	1	500mL(P)	1
NH ₄ Cl	40mL(G)	3								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 Pest608
 Bacteria ResCl ✓ by analyst
 PC Dry applicable? Y (N)

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?			✓	Less than pea sized bubble in -OIB VOC Lot ID#:
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			ISV, ASD, US, AN
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?	✓			
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: JD

 Date/Time: 6/10/21 17:02

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/18/2021
Work Order #: 2106-02506
Client Job #:
Date Received: 06/15/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/18/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-02506-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57364
Simulated-SIM
MA

DATE AND TIME COLLECTED: 06/10/2021 10:15AM
DATE AND TIME RECEIVED: 06/15/2021 11:21AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/16/2021 09:05AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:45PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:45PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:45PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/17/2021 03:45PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/17/2021 03:45PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 03:45PM
2,3-Dibromopropionic Acid	102	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/17/2021 03:45PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 521472
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4932331	L2131278/Finished-SIM	317.0	06/10/21 10:45	Client	06/17/21 09:40
4932332	L2131278/Simulated-SIM	317.0	06/10/21 10:15	Client	06/17/21 09:40

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.



ASIM

06/27/2021

Authorized Signature

Title

Date

Client Name: Alpha Analytical

Report #: 521472

Client Name: Alpha Analytical

Report #: 521472

Sampling Point: L2131278/Finished-SIM

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 01:52	4932331

Sampling Point: L2131278/Simulated-SIM

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 02:17	4932332

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

428 701

10/16/12



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2131278

521472

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019
Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Information

Project Location: MA
Project Manager: Nathalie Lewis
Turnaround & Deliverables Information
Due Date:
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2131278 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
4932231 ↓	FINISHED-SIM SIMULATED-SIM	06-10-21 10:45 06-10-21 10:15	WATER WATER	Bromate Bromate	
Client Provided Sample Container					
Relinquished By:		Date/Time:	Received By:	Date/Time:	
P. Schean		6/16/21	[Signature]	6/17/2021	0140
Form No: AL_subcoc					

Temp. 1.40



CHAIN OF CUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 6/10/21

ALPHA Job #: 2131278

6 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300**Project Information**

Project Name: Barnstable Simmons Pond H/H

Project Location: MA

Project #:

Project Manager: Alex Bishop

ALPHA Quote #:

Turn-Around Time Standard RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables ADEX EMAIL**Billing Information** Same as Client info PO #:**Client Information**

Client: Kleinfelder

Address: 4 Technology Drive
Westborough, MA

Phone: 914-406-9598

Email: abbishop@kleinfelder.com

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

ANALYSIS		SAMPLE INFO	
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	Filtration	<input type="checkbox"/> Field
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8	<input type="checkbox"/> Lab to do	Preservation
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Lab to do	
PCB: <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		
Bromate			
Sample Comments			

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		

31278-01	Finished - SIM	6/10/21	10:45	water	UC
02	Simulated - SIM	6/10/21	10:15	water	UC

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

Preservative
 A= None
 B= HCl
 C= HNO₃
 D= H₂SO₄
 E= NaOH
 F= MeOH
 G= NaHSO₄
 H= Na₂S₂O₅
 I= Ascorbic Acid
 J= NH₄Cl
 K= Zn Acetate
 O= Other

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time

 6/10/21 11:30
 6/10/21 14:20

 6/10/21 11:30

 6/10/21 14:20

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

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

TOTAL # BOTTLES



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2131278

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Nathalie Lewis	State/Federal Program: Regulatory Criteria:
Phone: 508.439.5170 Email: nlewis@alphalab.com	Turnaround & Deliverables Information Due Date: Deliverables:	

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2131278

Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	FINISHED-SIM SIMULATED-SIM	06-10-21 10:45 06-10-21 10:15	WATER WATER	Bromate Bromate	

Form No: AL_subcoc	Relinquished By:	Date/Time:	Received By:	Date/Time:
	<i>C. Sebeau</i>	<i>6/16/21</i>		

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57433
Date Received: 6/15/21

Project: Barnstable Simmons Pond, Low/Low

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 7/2/2021
Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw-SIM	Water	6/15/2021 8:45	57433-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	6/15/2021 8:45	57433-002	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57433

Sample#: 57433-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/15/21 8:45

Parameter	Result	Reporting			Units	Instr Dil'n		Prep		Analysis		
		Limit	DL			Factor	Analyst	Date	Time	Batch	Date	Time
1,4-dioxane	0.24 J	0.25	0.12	ug/L	1	LMM			2101754	6/16/21	15:27	SW8260Dmod

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57433

Sample#: 57433-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/15/21 8:45

Parameter	Result	Reporting			Units	Instr Dil'n Factor	Prep		Batch	Analysis		
		Limit	DL				Analyst	Date		Time	Date	Time
Calcium	20	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:12	E200.8
Iron	0.028 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:48	E200.8
Magnesium	5.5	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:48	E200.8
Manganese	0.15	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:48	E200.8
Sodium	49	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:48	E200.8
Zinc	0.0042 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:48	E200.8
Hardness (as CaCO3)	72	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57433

Sample#: 57433-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/15/21 8:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	38	5	0.47	mg/L	1	DJM			2101762	6/16/21	11:00	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101741	6/16/21	15:30	SM2120B
Bromide	0.069 J	0.1	0.021	mg/L	1	DBV			2101776	6/17/21	16:05	E300.0A
Chloride	82	0.5	0.36	mg/L	1	DBV			2101776	6/17/21	16:05	E300.0A
Sulfate	20 M	0.5	0.21	mg/L	1	DBV			2101776	6/17/21	16:05	E300.0A
M = The recovery for the matrix spike was 81%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Total Dissolved Solids (TDS)	230	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101742	6/16/21	15:30	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
Conductivity	430	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	6.6 H			pH	1	SFM			2101813	6/16/21	10:58	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101761	6/16/21	15:52	SM2130B

Sample#: 57433-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/15/21 8:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	0.65 J	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	17:28	SM5310C

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57433

Sample#: 57433-001

Sample ID: Raw-SIM

Matrix: Water

Sampled: 6/15/21 8:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	0.54 J	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	3.0	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorobutane sulfonic acid (PFBS)	5.5	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorodecanoic acid (PFDA)	0.65 J	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorododecanoic acid (PFDOA)	2.0	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluoroheptanoic acid (PFHPA)	5.3	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorohexane sulfonic acid (PFHXS)	27	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorohexanoic acid (PFHXA)	12	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorononanoic acid (PFNA)	1.7 J	1.7	0.39	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorooctane sulfonic acid (PFOS)	33	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorooctanoic acid (PFOA)	14	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorotetradecanoic acid (PFTEA)	3.3	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluorotridecanoic acid (PFTRIA)	2.8	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
perfluoroundecanoic acid (PFUNA)	0.77 J	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	0.53 J	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	0.41 J	1.7	0.16	ng/L	1	WAS	6/16/21	13970	6/17/21	0:52
Surrogate Recovery		Limits								
13C2-PFHxA SUR	96	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:52
13C2-PFDA SUR	99	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:52
D5-NEtFOSAA SUR	98	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:52
13C3-HFPO-DA SUR	89	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:52
Sum of MA PFAS6 Analytes (MAPFAS6)	80	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57433

Sample#: 57433-002

Sample ID: Field Blank

Matrix: Water

Sampled: 6/15/21 8:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/16/21	13970	6/17/21	4:04
Surrogate Recovery		Limits								
13C2-PFHxA SUR	93	70-130	%	1	WAS	6/16/21	13970	6/17/21	4:04	
13C2-PFDA SUR	96	70-130	%	1	WAS	6/16/21	13970	6/17/21	4:04	
D5-NEtFOSAA SUR	91	70-130	%	1	WAS	6/16/21	13970	6/17/21	4:04	
13C3-HFPO-DA SUR	91	70-130	%	1	WAS	6/16/21	13970	6/17/21	4:04	
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57433

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 57433-001 did not meet the acceptance criteria for Sulfate. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101754	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101754	1,4-dioxane		9.1	ug/L	8	113	70 130		
SW8260Dmod	LCSD2101754	1,4-dioxane		10	ug/L	8	130	70 130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13984	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13984	Manganese	57380-048	0.020	mg/L				1	20
E200.8	LCS13984	Calcium		2.7	mg/L	2.5	108	85	115	
		Iron		0.52	mg/L	0.5	103	85	115	
		Magnesium		0.50	mg/L	0.5	100	85	115	
		Manganese		0.50	mg/L	0.5	101	85	115	
		Sodium		4.9	mg/L	5	98	85	115	
		Zinc		0.52	mg/L	0.5	105	85	115	
E200.8	LCSD13984	Calcium		2.7	mg/L	2.5	108	85	115	1
		Iron		0.53	mg/L	0.5	106	85	115	2
		Magnesium		0.50	mg/L	0.5	101	85	115	1
		Manganese		0.51	mg/L	0.5	102	85	115	1
		Sodium		4.9	mg/L	5	99	85	115	1
		Zinc		0.51	mg/L	0.5	102	85	115	2
E200.8	MS13984	Manganese	57380-048	0.50	mg/L	0.5	97	70	130	
E200.8	MS13984	Manganese	57380-057	0.48	mg/L	0.5	95	70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101776	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101776	Bromide	57433-001	<	0.1	mg/L				10		
		Chloride	57433-001		82	mg/L			0	10		
		Sulfate	57433-001		20	mg/L			0	10		
E300.0A	LCS2101776	Bromide			10	mg/L	10	102	90	110		
		Chloride			100	mg/L	100	103	90	110		
		Sulfate			100	mg/L	100	102	90	110		
E300.0A	LCSD2101776	Bromide			9.8	mg/L	10	98	90	110	4	10
		Chloride			98	mg/L	100	98	90	110	5	10
		Sulfate			98	mg/L	100	98	90	110	4	10
E300.0A	MS2101776	Bromide	57433-001		1.6	mg/L	1.66	94	90	110		
		Chloride	57433-001		84	mg/L	16	15	90	110		
		Sulfate	57433-001		33	mg/L	16	81 *	90	110		
SM2120B	DUP2101741	Apparent Color	57435-002	<	5	CU					20	
SM2120B	LCS2101741	Apparent Color			35	CU	35		30	40		
SM2120B	PB2101741	Apparent Color		<	5	CU			5			
SM2120B	DUP2101742	True Color	57435-002	<	5	CU					20	
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)			6.04	pH			5.94	6.06		
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	pH			3.94	4.06		
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	pH			3.94	4.06		
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57411-001		120	mg/L				0	10	
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57435-002		59	mg/L				2	10	
SM2320B	LCS2101762	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110		
SM2320B	LCSD2101762	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110	1	10
SM2320B	PB2101762	Alkalinity, Total (as CaCO3)		<	5	mg/L						
SM2510B	BLK2101781	Conductivity		<	5	uS/cm						
SM2510B	DUP2101781	Conductivity	57435-004		460	uS/cm				0	20	
SM2510B	LCS2101781	Conductivity			1500	uS/cm	1409	103	90	110		
SM2510B	LCSD2101781	Conductivity			1400	uS/cm	1409	103	90	110	20	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2540C	DUP2101745	Total Dissolved Solids (TDS)	57400-002	95	mg/L				1	5
SM2540C	LCS2101745	Total Dissolved Solids (TDS)		79.0	mg/L	99.2	80	75 125		
SM2540C	PB2101745	Total Dissolved Solids (TDS)		< 20	mg/L					
SM4500H+B	DUP2101813	pH	57432-001	7.3	pH					
SM4500H+B	DUP2101813	pH	57476-001	8.0	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		< 1	mg/L					
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	< 1	mg/L					20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		98			%			70	130	
		13C2-PFDA SUR		106			%			70	130	
		D5-NETFOSAA SUR		98			%			70	130	
		13C3-HFPO-DA SUR		93			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57407-001	5.5	1.8	0.45	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57407-001	0.32 J	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57407-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57407-001	5.4	1.8	0.30	ng/L				4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001	27	1.8	0.35	ng/L				2	30
		perfluorohexanoic acid (PFHXA)	57407-001	12	1.8	0.31	ng/L				4	30
		perfluorononanoic acid (PFNA)	57407-001	1.8	1.8	0.40	ng/L				7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001	34	1.8	0.36	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57407-001	14	1.8	0.30	ng/L				9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57407-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57407-001	99			%			70	130	
		13C2-PFDA SUR	57407-001	99			%			70	130	
		D5-NETFOSAA SUR	57407-001	98			%			70	130	
		13C3-HFPO-DA SUR	57407-001	95			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	2.0	0.30	ng/L	40	89	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	2.0	0.39	ng/L	40	100	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorobutane sulfonic acid (PFBS)		31	2.0	0.50	ng/L	35	88	70 130		
		perfluorodecanoic acid (PFDA)		42	2.0	0.34	ng/L	40	104	70 130		
		perfluorododecanoic acid (PFDOA)		40	2.0	0.43	ng/L	40	101	70 130		
		perfluoroheptanoic acid (PFHPA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorohexane sulfonic acid (PFHXS)		32	2.0	0.40	ng/L	38	85	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	98	70 130		
		perfluorooctane sulfonic acid (PFOS)		33	2.0	0.40	ng/L	38	87	70 130		
		perfluorooctanoic acid (PFOA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorotetradecanoic acid (PFTEA)		45	2.0	0.50	ng/L	40	113	70 130		
		perfluorotridecanoic acid (PFTRIA)		44	2.0	0.13	ng/L	40	111	70 130		
		perfluoroundecanoic acid (PFUNA)		39	2.0	0.32	ng/L	40	98	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	2.0	0.39	ng/L	37	93	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	2.0	0.40	ng/L	37	94	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	2.0	0.18	ng/L	37	91	70 130		
		13C2-PFHxA SUR		92			%			70 130		
		13C2-PFDA SUR		103			%			70 130		
		D5-NETFOSAA SUR		90			%			70 130		
		13C3-HFPO-DA SUR		90			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	1.7	0.26	ng/L	3.48	95	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	1.7	0.34	ng/L	3.48	100	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	1.7	0.28	ng/L	3.48	101	50 150		
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	1.7	0.44	ng/L	3.08	89	50 150		
		perfluorodecanoic acid (PFDA)	57432-001	3.7	1.7	0.30	ng/L	3.48	107	50 150		
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	1.7	0.37	ng/L	3.48	111	50 150		
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	1.7	0.29	ng/L	3.48	102	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	1.7	0.34	ng/L	3.31	89	50 150		
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	1.7	0.30	ng/L	3.48	97	50 150		
		perfluorononanoic acid (PFNA)	57432-001	3.6	1.7	0.39	ng/L	3.48	103	50 150		
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	1.7	0.35	ng/L	3.34	92	50 150		
		perfluorooctanoic acid (PFOA)	57432-001	3.3	1.7	0.29	ng/L	3.48	96	50 150		
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	1.7	0.43	ng/L	3.48	117	50 150		
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	1.7	0.11	ng/L	3.48	107	50 150		
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	1.7	0.28	ng/L	3.48	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	1.7	0.34	ng/L	3.29	90	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	1.7	0.35	ng/L	3.25	90	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	1.7	0.16	ng/L	3.29	102	50 150		
		13C2-PFHxA SUR	57432-001	94			%			70 130		
		13C2-PFDA SUR	57432-001	100			%			70 130		
		D5-NETFOSAA SUR	57432-001	95			%			70 130		
		13C3-HFPO-DA SUR	57432-001	92			%			70 130		



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57433

ANALYSIS REQUEST

Company Name: Kleinfelder
Company Address: 4 Technology Drive, Westborough, MA
Report To: Alex Bishop
Phone #: 914-406-9598
Invoice to: Kleinfelder
Email: abbishop@kleinfelder.com
PO #:

Project Name: Barnstable, ~~StraightWay~~ *Simon's Pond*
Project #: *Low/low*
Project Location: NH MA ME VT _____
Accreditation Required? N/Y: Y
Protocol: RCRA SDWA NPDES MCP NHDES DOD
Reporting Limits: QAPP EPA DW GW-1 S-1 Other _____
Quote # _____
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MHDES	<input type="checkbox"/> VOC 8260 MADEP	VOC 8260 MHDES <input type="checkbox"/> VOC 8260 MADEP VOC 624.1 <input type="checkbox"/> VOC BTEX MBE, only <input type="checkbox"/> VOC 8021VT VPH MADEP <input type="checkbox"/> GRO 8015 <input checked="" type="checkbox"/> 1,4-Dioxane * VOC 524.2 <input type="checkbox"/> VOC 524.2 NH List <input type="checkbox"/> Gases List: TTHMS TPH <input type="checkbox"/> DR0 8015 <input type="checkbox"/> EPH MADEP <input type="checkbox"/> TPH Fingerprint 8270PAH <input type="checkbox"/> 8270ABN <input type="checkbox"/> 625.1 <input type="checkbox"/> EDB 8082 PCB <input type="checkbox"/> 8081 Pesticides <input type="checkbox"/> 608.3 Pest/PCB PPFAS 537.1 O&G 1664 <input type="checkbox"/> Mineral O&G 1664 pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <i>170vc</i> TSS <input checked="" type="checkbox"/> TDS <input type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input type="checkbox"/> Acidity RCRA Metals <input type="checkbox"/> Priority Pollutant Metals <input type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn Dissolved Metals-list: _____ Ammonia <input type="checkbox"/> COD <input type="checkbox"/> TKN <input type="checkbox"/> TN <input type="checkbox"/> <input checked="" type="checkbox"/> TOC <input type="checkbox"/> Ferrous Iron T-Phosphorus <input type="checkbox"/> Bacteria P/A <input type="checkbox"/> Bacteria MPN <input type="checkbox"/> Enterococci Cyanide <input type="checkbox"/> Sulfide <input type="checkbox"/> Nitrate + Nitrite <input type="checkbox"/> Ortho P <input type="checkbox"/> Phenols Nitrate <input type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input type="checkbox"/> Fluoride Corrosivity <input type="checkbox"/> Ignitability/FP TCLP Metals <input type="checkbox"/> TCLP VOC <input type="checkbox"/> TCLP SVOC <input type="checkbox"/> TCLP Pesticide Subcontract <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos Total Coliform _____ Grab (G) or Composite (C)
<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MHDES	<input type="checkbox"/> VOC 8260 MADEP	
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane *	
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases List: TTHMS	
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	
<input checked="" type="checkbox"/> PPFAS 537.1			
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664		
<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	
<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TS	
<input checked="" type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	
<input checked="" type="checkbox"/> Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn			
<input type="checkbox"/> Dissolved Metals-list: _____			
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitability/FP		
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	
<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	
<input type="checkbox"/> Asbestos			

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling			
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER	
57433-01	Raw- SW2 <i>SW2</i>	7	<input checked="" type="checkbox"/>									6/15/21	8:45	<input checked="" type="checkbox"/>
		1												
		1								Thio				
		2								X				
		2												
		2												
		2												
		2								Triz				
		2												
		2												
		2												
02	Field Blank	1												

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard
(10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
*use reporting limit of 0.13 ug/l for 1,4-Dioxane

REPORTING INSTRUCTIONS PDF (e-mail address) abbishop@kleinfelder.com & kryan@kleinfelder.com
 HARD COPY REQUIRED EDD _____
Vchauhan@kleinfelder.com

RECEIVED ON ICE YES NO
TEMPERATURE _____ °C

CUSTODY RECORD			
Relinquished by Sampler: Relinquished by: Relinquished by:	<i>[Signature]</i> Date: 6/15/21 Time: 12:00	Received by: <i>[Signature]</i> Date: 6/15/21 Time: 12:00	Date: 6/15/21 Time: 12:00
	<i>[Signature]</i> Date: 6/15/21 Time: 14:00	Received by: <i>[Signature]</i> Date: 6-15 Time: 2pm	Date: 6-15 Time: 2pm
	<i>[Signature]</i> Date: 6-15 Time: _____	Received by Laboratory: <i>[Signature]</i> Date: 6/15/21 Time: 1600	Date: 6/15/21 Time: 1600

Sample Receipt Condition Report

57433

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 2 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)			pH 2 *pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>N</u>
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)		250mL(P)	500mL(P)		
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	3						
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)	2	60mL(P)	2	125mL(P)	3	250mL(P)	1	500mL(P)	1
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			PB-05
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres. 624	X			DBV, ASD, SEM
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: WJ

Date/Time: 6/15/21 16:45

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57434
Date Received: 6/15/21

Project: Barnstable Simmons Pond, Low/Low

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 7/2/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Simulated-SIM	Water	6/15/2021 10:15	57434-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Trip Blank	Water	6/15/2021 0:00	57434-002	VOA Trip Blank VOCs Trihalomethanes in water by 524.2

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57434

Sample#: 57434-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	14:42	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	14:42	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101774	6/17/21	14:42	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101774	6/17/21	14:42	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101774	6/17/21	14:42	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	94	70-130		%	1	LMM			2101774	6/17/21	14:42	E524.2
1,4-dichlorobenzene-D4 SUR	88	70-130		%	1	LMM			2101774	6/17/21	14:42	E524.2

Sample#: 57434-002

Sample ID: Trip Blank

Matrix: Water

Sampled: 6/15/21 0:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	13:06	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	13:06	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101774	6/17/21	13:06	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101774	6/17/21	13:06	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101774	6/17/21	13:06	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	91	70-130		%	1	LMM			2101774	6/17/21	13:06	E524.2
1,4-dichlorobenzene-D4 SUR	86	70-130		%	1	LMM			2101774	6/17/21	13:06	E524.2

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57434

Sample#: 57434-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

Parameter	Result	Reporting			Units	Instr Dil'n Factor	Prep		Batch	Analysis		
		Limit	DL				Analyst	Date		Time	Date	Time
Calcium	19	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:18	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:55	E200.8
Magnesium	5.3	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:55	E200.8
Manganese	0.0014 J	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:55	E200.8
Sodium	61	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:55	E200.8
Zinc	0.40	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:55	E200.8
Hardness (as CaCO3)	69	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Project ID: Barnstable Simmons Pond, Low/Low

Job ID: 57434

Sample#: 57434-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	61	5	0.47	mg/L	1	DJM			2101762	6/16/21	11:00	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101741	6/16/21	15:31	SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
Chloride	84	0.5	0.36	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
Nitrate-N	4.2	0.1	0.038	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
ortho-phosphate as P	0.7	0.1	0.069	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
Sulfate	21	0.5	0.21	mg/L	1	DBV			2101730	6/15/21	16:52	E300.0A
Total Dissolved Solids (TDS)	250	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
Total Phosphorus as P	0.79	0.02	0.016	mg/L	2	SFM			2101846	6/23/21	13:00	E365.3
True Color	U	5.0	2.5	CU	1	SFM			2101742	6/16/21	15:31	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
Conductivity	480	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	7.0 H			pH	1	SFM			2101813	6/16/21	11:09	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101761	6/16/21	15:53	SM2130B

Sample#: 57434-001

Sample ID: Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	17:46	SM5310C

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57434

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101774	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			94	%			70	130		
		1,4-dichlorobenzene-D4 SUR			92	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101774	chloroform	57420-006		5.0	ug/L			4	20		
		bromodichloromethane	57420-006	<	0.50	ug/L				20		
		dibromochloromethane	57420-006	<	0.50	ug/L				20		
		bromoform	57420-006	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	57420-006		98	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57420-006		86	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCS2101774	chloroform			9.2	ug/L	10	92	70	130		
		bromodichloromethane			9.7	ug/L	10	97	70	130		
		dibromochloromethane			8.7	ug/L	10	87	70	130		
		bromoform			8.1	ug/L	10	81	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			95	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101774	chloroform			8.8	ug/L	10	88	70	130	4	20
		bromodichloromethane			9.7	ug/L	10	97	70	130	0	20
		dibromochloromethane			9.1	ug/L	10	91	70	130	4	20
		bromoform			8.8	ug/L	10	88	70	130	8	20
		4-bromofluorobenzene SUR			110	%			70	130		
		1,4-dichlorobenzene-D4 SUR			104	%			70	130		
		Total Trihalomethanes (THMs)										

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13984	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13984	Manganese	57380-048	0.020	mg/L				1	20
E200.8	LCS13984	Calcium		2.7	mg/L	2.5	108	85	115	
		Iron		0.52	mg/L	0.5	103	85	115	
		Magnesium		0.50	mg/L	0.5	100	85	115	
		Manganese		0.50	mg/L	0.5	101	85	115	
		Sodium		4.9	mg/L	5	98	85	115	
		Zinc		0.52	mg/L	0.5	105	85	115	
E200.8	LCSD13984	Calcium		2.7	mg/L	2.5	108	85	115	1
		Iron		0.53	mg/L	0.5	106	85	115	2
		Magnesium		0.50	mg/L	0.5	101	85	115	1
		Manganese		0.51	mg/L	0.5	102	85	115	1
		Sodium		4.9	mg/L	5	99	85	115	1
		Zinc		0.51	mg/L	0.5	102	85	115	2
E200.8	MS13984	Manganese	57380-048	0.50	mg/L	0.5	97	70	130	
E200.8	MS13984	Manganese	57380-057	0.48	mg/L	0.5	95	70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101730	Bromide		<	0.1	mg/L				
		Chloride		<	0.5	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		ortho-phosphate as P		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101730	Nitrate-N	57407-003	4.3	mg/L				1	10
		Nitrite-N	57407-003	<	0.1	mg/L				10
E300.0A	LCS2101730	Bromide		9.9	mg/L	10	99	90	110	
		Chloride		100	mg/L	100	100	90	110	
		Nitrate-N		10	mg/L	10	101	90	110	
		Nitrite-N		15	mg/L	15	99	90	110	
		ortho-phosphate as P		9.8	mg/L	10	98	90	110	
		Sulfate		99	mg/L	100	99	90	110	
E300.0A	LCSD2101730	Bromide		9.9	mg/L	10	99	90	110	0
		Chloride		100	mg/L	100	100	90	110	0
		Nitrate-N		10	mg/L	10	100	90	110	0
		Nitrite-N		15	mg/L	15	98	90	110	0
		ortho-phosphate as P		10	mg/L	10	101	90	110	3
		Sulfate		99	mg/L	100	99	90	110	0
E300.0A	MS2101730	Nitrate-N	57407-003	5.2	mg/L	1.66	58 *	90	110	
		Nitrite-N	57407-003	2.5	mg/L	2.53	99	90	110	
E300.0A	MS2101730	Chloride	57435-003	85	mg/L	16	12	90	110	
		Nitrate-N	57435-003	5.2	mg/L	1.66	56 *	90	110	
		Nitrite-N	57435-003	2.4	mg/L	2.53	93	90	110	
		Sulfate	57435-003	34	mg/L	16	81 *	90	110	
E365.3	DUP2101846	Total Phosphorus as P	57521-001	0.04	mg/L				11	20
E365.3	LCS2101846	Total Phosphorus as P		0.29	mg/L	0.3	96	75	125	
E365.3	LCSD2101846	Total Phosphorus as P		0.30	mg/L	0.3	101	75	125	5
E365.3	MS2101846	Total Phosphorus as P	57521-002	0.30	mg/L	0.3	96	75	125	
E365.3	PB2101846	Total Phosphorus as P		<	0.01	mg/L				
SM2120B	DUP2101741	Apparent Color	57435-002	<	5	CU				20
SM2120B	LCS2101741	Apparent Color		35	CU	35		30	40	
SM2120B	PB2101741	Apparent Color		<	5	CU		5		
SM2120B	DUP2101742	True Color	57435-002	<	5	CU				20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)		6.04	pH			5.94 6.06		
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)		3.99	pH			3.94 4.06		
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)		4.03	pH			3.94 4.06		
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57411-001	120	mg/L				0	10
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57435-002	59	mg/L				2	10
SM2320B	LCS2101762	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110		
SM2320B	LCSD2101762	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90 110	1	10
SM2320B	PB2101762	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101781	Conductivity		<	5	uS/cm				
SM2510B	DUP2101781	Conductivity	57435-004	460	uS/cm				0	20
SM2510B	LCS2101781	Conductivity		1500	uS/cm	1409	103	90 110		
SM2510B	LCSD2101781	Conductivity		1400	uS/cm	1409	103	90 110		20
SM2540C	DUP2101745	Total Dissolved Solids (TDS)	57400-002	95	mg/L				1	5
SM2540C	LCS2101745	Total Dissolved Solids (TDS)		79.0	mg/L	99.2	80	75 125		
SM2540C	PB2101745	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101813	pH	57432-001	7.3	pH					
SM4500H+B	DUP2101813	pH	57476-001	8.0	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

Sample Receipt Condition Report

57434

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 3 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:			
HCl	40mL(G)	3	250mL(P)		500mL(P)	1L(G)	pH = 2 500mL(P) Typo pH = 2 *pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>(N)</u>			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1				
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)							
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)	Syringe				
None (water)	40ml (G)		60mL(P)	2	125mL(P)	3				
NH ₄ Cl	60ml(G)	3			250mL(P)	1	500mL(P)	1	1L(G)	1L(P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			less than pea-sized bubble in -02
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NH ₄ , o-PPE, pH, BOD, Coliform/E. coli (P/A) or MPN, Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			* DBV, AN, ASD, SEM
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: WJ

Date/Time: 6/15/21 16:20

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/30/2021
Work Order #: 2106-03285
Client Job #:
Date Received: 06/21/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/30/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-03285-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57434
Simulated-Sim
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 06/15/2021 10:15AM
DATE AND TIME RECEIVED: 06/21/2021 10:03AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 08:52AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 08:52AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 08:52AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/24/2021 08:52AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/24/2021 08:52AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 08:52AM
2,3-Dibromopropionic Acid	101	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/24/2021 08:52AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57434

ANALYSIS REQUEST

Company Name: **Kleinfelder**

Company Address: **4 Technology Drive, Westborough, MA**

Report To: **Alex Bishop**

Phone #: **914-406-9598**

Invoice to: **Kleinfelder**

Email: **abbishop@kleinfelder.com**

PO #:

Project Name: **Barnstable, Straightway 2**
Simmons Pond Low/Low

Project #: **Straightway 2**

Project Location: NH **MA** ME VT _____

Accreditation Required? N/Y: **Y**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting: QAPP GW-1 S-1

Limits: EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane
<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	Gases-List: TTHMS	<input checked="" type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	Gases-List: TTHMS
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pesti/PCB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pesti/PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> Conductivity
<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input checked="" type="checkbox"/> Turbidity
<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TS	<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals
<input checked="" type="checkbox"/> Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn	<input checked="" type="checkbox"/> Hardness		<input checked="" type="checkbox"/> Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn	<input checked="" type="checkbox"/> Hardness	
<input type="checkbox"/> Dissolved Metals-list:		<input type="checkbox"/> Ammonia	<input type="checkbox"/> Dissolved Metals-list:		<input type="checkbox"/> Ammonia
<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN
<input checked="" type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input checked="" type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Cyanide	<input checked="" type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Cyanide	<input checked="" type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite
<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals
<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide
Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos		Total Coliform	Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos		Total Coliform
		HAAs			HAAs
		Grab (G) or Composite (C)			Grab (G) or Composite (C)

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57434d	Simulated-SM SM	8	X			Non Preserved					06/15/21	1015	WC
		1				Thio							
		1				X							
		2				X							
		2				NH4Cl							
		3				X							
		1				X							
			X										

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) **abbishop@kleinfelder.com & kryan@kleinfelder.com**

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO

TEMPERATURE **3** °C

U Chauhan@kleinfelder.com

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler: <i>[Signature]</i>	Date: 6/15/21	Time: 1700	Received by: <i>[Signature]</i>	Date: 6/15/21	Time: 1200
	Relinquished by: <i>[Signature]</i>	Date: 6/15/21	Time: 1900	Received by: <i>[Signature]</i>	Date: 6-15	Time: 2pm
	Relinquished by: <i>[Signature]</i>	Date: 6-15	Time: _____	Received by Laboratory: <i>[Signature]</i>	Date: 6/15/21	Time: 1800

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop
Kleinfelder
4 Technology Dr.
Suite 110
Westborough, MA 01581

PO Number: None
Job ID: 57432
Date Received: 6/15/21

Project: Barnstable Simmons Pond, L/L

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 7/2/2021
Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Finished-SIM	Water	6/15/2021 11:45	57432-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Handling to Subcontract Lab Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A ortho-Phosphate in water (PO4) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Total Phosphorus in water as P by 365.3 True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Project ID: Barnstable Simmons Pond, L/L

Job ID: 57432

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	14:10	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	14:10	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101774	6/17/21	14:10	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101774	6/17/21	14:10	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101774	6/17/21	14:10	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	96	70-130		%	1	LMM			2101774	6/17/21	14:10	E524.2
1,4-dichlorobenzene-D4 SUR	91	70-130		%	1	LMM			2101774	6/17/21	14:10	E524.2

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.24 J	0.25	0.12	ug/L	1	LMM			2101754	6/16/21	14:56	SW8260Dmod

Project ID: Barnstable Simmons Pond, L/L

Job ID: 57432

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Parameter	Result	Reporting			Units	Instr Dil'n Factor	Prep		Batch	Analysis		
		Limit	DL				Analyst	Date		Time	Date	Time
Calcium	14	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:05	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:42	E200.8
Magnesium	4.6	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:42	E200.8
Manganese	0.0054 J	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:42	E200.8
Sodium	72	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:42	E200.8
Zinc	0.12	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	3:42	E200.8
Hardness (as CaCO3)	55	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Project ID: Barnstable Simmons Pond, L/L

Job ID: 57432

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	78	5	0.47	mg/L	1	DJM			2101762	6/16/21	11:00	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101741	6/16/21	15:29	SM2120B
Bromide	U	0.1	0.021	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
Chloride	74	0.5	0.36	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
Nitrate-N	3.9	0.1	0.038	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
ortho-phosphate as P	0.3	0.1	0.069	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
Sulfate	21	0.5	0.21	mg/L	1	DBV			2101730	6/15/21	16:36	E300.0A
Total Dissolved Solids (TDS)	240	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
Total Phosphorus as P	0.89	0.02	0.016	mg/L	2	SFM			2101846	6/23/21	13:00	E365.3
True Color	U	5.0	2.5	CU	1	SFM			2101742	6/16/21	15:29	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
Conductivity	470	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	7.3 H			pH	1	SFM			2101813	6/16/21	10:46	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101761	6/16/21	15:47	SM2130B

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	17:09	SM5310C

Project ID: Barnstable Simmons Pond, L/L

Job ID: 57432

Sample#: 57432-001

Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.44	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.39	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.11	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	WAS	6/16/21	13970	6/17/21	3:32
Surrogate Recovery		Limits								
13C2-PFHxA SUR	93	70-130		%	1	WAS	6/16/21	13970	6/17/21	3:32
13C2-PFDA SUR	99	70-130		%	1	WAS	6/16/21	13970	6/17/21	3:32
D5-NEtFOSAA SUR	100	70-130		%	1	WAS	6/16/21	13970	6/17/21	3:32
13C3-HFPO-DA SUR	90	70-130		%	1	WAS	6/16/21	13970	6/17/21	3:32
Sum of MA PFAS6 Analytes (MAPFAS6)	1.8 U	1.8		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57432

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101774	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			94	%			70	130		
		1,4-dichlorobenzene-D4 SUR			92	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101774	chloroform	57420-006		5.0	ug/L			4	20		
		bromodichloromethane	57420-006	<	0.50	ug/L						
		dibromochloromethane	57420-006	<	0.50	ug/L						
		bromoform	57420-006	<	0.50	ug/L						
		4-bromofluorobenzene SUR	57420-006		98	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57420-006		86	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCS2101774	chloroform			9.2	ug/L	10	92	70	130		
		bromodichloromethane			9.7	ug/L	10	97	70	130		
		dibromochloromethane			8.7	ug/L	10	87	70	130		
		bromoform			8.1	ug/L	10	81	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			95	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101774	chloroform			8.8	ug/L	10	88	70	130	4	20
		bromodichloromethane			9.7	ug/L	10	97	70	130	0	20
		dibromochloromethane			9.1	ug/L	10	91	70	130	4	20
		bromoform			8.8	ug/L	10	88	70	130	8	20
		4-bromofluorobenzene SUR			110	%			70	130		
		1,4-dichlorobenzene-D4 SUR			104	%			70	130		
		Total Trihalomethanes (THMs)										
SW8260Dmod	BLK2101754	1,4-dioxane		<	0.25	ug/L						
SW8260Dmod	LCS2101754	1,4-dioxane			9.1	ug/L	8	113	70	130		
SW8260Dmod	LCSD2101754	1,4-dioxane			10	ug/L	8	130	70	130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13984	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13984	Manganese	57380-048	0.020	mg/L				1	20
E200.8	LCS13984	Calcium		2.7	mg/L	2.5	108	85	115	
		Iron		0.52	mg/L	0.5	103	85	115	
		Magnesium		0.50	mg/L	0.5	100	85	115	
		Manganese		0.50	mg/L	0.5	101	85	115	
		Sodium		4.9	mg/L	5	98	85	115	
		Zinc		0.52	mg/L	0.5	105	85	115	
E200.8	LCSD13984	Calcium		2.7	mg/L	2.5	108	85	115	1
		Iron		0.53	mg/L	0.5	106	85	115	2
		Magnesium		0.50	mg/L	0.5	101	85	115	1
		Manganese		0.51	mg/L	0.5	102	85	115	1
		Sodium		4.9	mg/L	5	99	85	115	1
		Zinc		0.51	mg/L	0.5	102	85	115	2
E200.8	MS13984	Manganese	57380-048	0.50	mg/L	0.5	97	70	130	
E200.8	MS13984	Manganese	57380-057	0.48	mg/L	0.5	95	70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101730	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		ortho-phosphate as P		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101730	Nitrate-N	57407-003		4.3	mg/L			1	10		
		Nitrite-N	57407-003	<	0.1	mg/L				10		
E300.0A	LCS2101730	Bromide			9.9	mg/L	10	99	90	110		
		Chloride			100	mg/L	100	100	90	110		
		Nitrate-N			10	mg/L	10	101	90	110		
		Nitrite-N			15	mg/L	15	99	90	110		
		ortho-phosphate as P			9.8	mg/L	10	98	90	110		
		Sulfate			99	mg/L	100	99	90	110		
E300.0A	LCSD2101730	Bromide			9.9	mg/L	10	99	90	110	0	10
		Chloride			100	mg/L	100	100	90	110	0	10
		Nitrate-N			10	mg/L	10	100	90	110	0	10
		Nitrite-N			15	mg/L	15	98	90	110	0	10
		ortho-phosphate as P			10	mg/L	10	101	90	110	3	10
		Sulfate			99	mg/L	100	99	90	110	0	10
E300.0A	MS2101730	Nitrate-N	57407-003		5.2	mg/L	1.66	58 *	90	110		
		Nitrite-N	57407-003		2.5	mg/L	2.53	99	90	110		
E300.0A	MS2101730	Chloride	57435-003		85	mg/L	16	12	90	110		
		Nitrate-N	57435-003		5.2	mg/L	1.66	56 *	90	110		
		Nitrite-N	57435-003		2.4	mg/L	2.53	93	90	110		
		Sulfate	57435-003		34	mg/L	16	81 *	90	110		
E365.3	DUP2101846	Total Phosphorus as P	57521-001		0.04	mg/L			11	20		
E365.3	LCS2101846	Total Phosphorus as P			0.29	mg/L	0.3	96	75	125		
E365.3	LCSD2101846	Total Phosphorus as P			0.30	mg/L	0.3	101	75	125	5	20
E365.3	MS2101846	Total Phosphorus as P	57521-002		0.30	mg/L	0.3	96	75	125		
E365.3	PB2101846	Total Phosphorus as P		<	0.01	mg/L						
SM2120B	DUP2101741	Apparent Color	57435-002	<	5	CU				20		
SM2120B	LCS2101741	Apparent Color			35	CU	35		30	40		
SM2120B	PB2101741	Apparent Color		<	5	CU			5			
SM2120B	DUP2101742	True Color	57435-002	<	5	CU				20		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)		6.04	pH			5.94 6.06		
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)		3.99	pH			3.94 4.06		
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)		4.03	pH			3.94 4.06		
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57411-001	120	mg/L				0	10
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57435-002	59	mg/L				2	10
SM2320B	LCS2101762	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110		
SM2320B	LCSD2101762	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90 110	1	10
SM2320B	PB2101762	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101781	Conductivity		<	5	uS/cm				
SM2510B	DUP2101781	Conductivity	57435-004	460	uS/cm				0	20
SM2510B	LCS2101781	Conductivity		1500	uS/cm	1409	103	90 110		
SM2510B	LCSD2101781	Conductivity		1400	uS/cm	1409	103	90 110		20
SM2540C	DUP2101745	Total Dissolved Solids (TDS)	57400-002	95	mg/L				1	5
SM2540C	LCS2101745	Total Dissolved Solids (TDS)		79.0	mg/L	99.2	80	75 125		
SM2540C	PB2101745	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101813	pH	57432-001	7.3	pH					
SM4500H+B	DUP2101813	pH	57476-001	8.0	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		98			%			70	130	
		13C2-PFDA SUR		106			%			70	130	
		D5-NETFOSAA SUR		98			%			70	130	
		13C3-HFPO-DA SUR		93			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57407-001	5.5	1.8	0.45	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57407-001	0.32 J	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57407-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57407-001	5.4	1.8	0.30	ng/L				4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001	27	1.8	0.35	ng/L				2	30
		perfluorohexanoic acid (PFHXA)	57407-001	12	1.8	0.31	ng/L				4	30
		perfluorononanoic acid (PFNA)	57407-001	1.8	1.8	0.40	ng/L				7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001	34	1.8	0.36	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57407-001	14	1.8	0.30	ng/L				9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57407-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57407-001	99			%			70	130	
		13C2-PFDA SUR	57407-001	99			%			70	130	
		D5-NETFOSAA SUR	57407-001	98			%			70	130	
		13C3-HFPO-DA SUR	57407-001	95			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	2.0	0.30	ng/L	40	89	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	2.0	0.39	ng/L	40	100	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorobutane sulfonic acid (PFBS)		31	2.0	0.50	ng/L	35	88	70 130		
		perfluorodecanoic acid (PFDA)		42	2.0	0.34	ng/L	40	104	70 130		
		perfluorododecanoic acid (PFDOA)		40	2.0	0.43	ng/L	40	101	70 130		
		perfluoroheptanoic acid (PFHPA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorohexane sulfonic acid (PFHXS)		32	2.0	0.40	ng/L	38	85	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	98	70 130		
		perfluorooctane sulfonic acid (PFOS)		33	2.0	0.40	ng/L	38	87	70 130		
		perfluorooctanoic acid (PFOA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorotetradecanoic acid (PFTEA)		45	2.0	0.50	ng/L	40	113	70 130		
		perfluorotridecanoic acid (PFTRIA)		44	2.0	0.13	ng/L	40	111	70 130		
		perfluoroundecanoic acid (PFUNA)		39	2.0	0.32	ng/L	40	98	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	2.0	0.39	ng/L	37	93	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	2.0	0.40	ng/L	37	94	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	2.0	0.18	ng/L	37	91	70 130		
		13C2-PFHxA SUR		92			%			70 130		
		13C2-PFDA SUR		103			%			70 130		
		D5-NETFOSAA SUR		90			%			70 130		
		13C3-HFPO-DA SUR		90			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	1.7	0.26	ng/L	3.48	95	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	1.7	0.34	ng/L	3.48	100	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	1.7	0.28	ng/L	3.48	101	50 150		
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	1.7	0.44	ng/L	3.08	89	50 150		
		perfluorodecanoic acid (PFDA)	57432-001	3.7	1.7	0.30	ng/L	3.48	107	50 150		
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	1.7	0.37	ng/L	3.48	111	50 150		
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	1.7	0.29	ng/L	3.48	102	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	1.7	0.34	ng/L	3.31	89	50 150		
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	1.7	0.30	ng/L	3.48	97	50 150		
		perfluorononanoic acid (PFNA)	57432-001	3.6	1.7	0.39	ng/L	3.48	103	50 150		
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	1.7	0.35	ng/L	3.34	92	50 150		
		perfluorooctanoic acid (PFOA)	57432-001	3.3	1.7	0.29	ng/L	3.48	96	50 150		
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	1.7	0.43	ng/L	3.48	117	50 150		
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	1.7	0.11	ng/L	3.48	107	50 150		
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	1.7	0.28	ng/L	3.48	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	1.7	0.34	ng/L	3.29	90	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	1.7	0.35	ng/L	3.25	90	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	1.7	0.16	ng/L	3.29	102	50 150		
		13C2-PFHxA SUR	57432-001	94			%			70 130		
		13C2-PFDA SUR	57432-001	100			%			70 130		
		D5-NETFOSAA SUR	57432-001	95			%			70 130		
		13C3-HFPO-DA SUR	57432-001	92			%			70 130		

Sample Receipt Condition Report

57432

Absolute Resource Associates

Job Number: _____

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments: _____

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)					
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL(P)	500mL(P)	T phos pH=2	
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	2					*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 Pest608 Bacteria ResCl ✓ by analyst	
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	1						
MeOH	20mL(G)		40mL(G)						PC Dry applicable? Y N	
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)	2	60mL(P)	3	125mL(P)	3	250mL(P)	1	500mL(P)	1
NH ₄ Cl	100mL	3								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			PB-05
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NH ₃ -N, PC, pH, BOD, Coliform/E. coli (PA or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	X			DBV, SFM, AND
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?	✓			
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JD

Date/Time: 6/15/21 16:52

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	<input type="checkbox"/> -references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	<input type="checkbox"/> -wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/30/2021
Work Order #: 2106-03287
Client Job #:
Date Received: 06/21/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/30/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-03287-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57432
Finished-Sim
MA

DATE AND TIME COLLECTED: 06/15/2021 11:45AM
DATE AND TIME RECEIVED: 06/21/2021 10:02AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✕
Attention	⚠

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 09:32AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 09:32AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 09:32AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/24/2021 09:32AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/24/2021 09:32AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 09:32AM
2,3-Dibromopropionic Acid	94	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/24/2021 09:32AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57432

ANALYSIS REQUEST

Company Name: **Kleinfelder**

Company Address: **4 Technology Drive, Westborough, MA**

Report To: **Alex Bishop**

Phone #: **914-406-9598**

Invoice to: **Kleinfelder**

Email: **abbishop@kleinfelder.com**

PO #:

Project Name: **Barnstable, Straight Way 2, Simmons Pond, L/L**

Project #: _____

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: **Y**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
EPA DW Other

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane *	<input checked="" type="checkbox"/> TTHMS	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Cases-List:	<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TVS	<input checked="" type="checkbox"/> Acidity	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness	Total Metals-list: Fe, Ca, Mg, Mn, Na, Zn									
<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TON	<input checked="" type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input checked="" type="checkbox"/> X-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input checked="" type="checkbox"/> Sulfide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input checked="" type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	Total Coliform	HAAS	Grab (G) or Composite (C)														
<input checked="" type="checkbox"/> WATER																																																	
Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix	Preservation Method	Sampling																																												
57432-01	Finished-SW2	8		Non Preserved	DATE	TIME	SAMPLER																																										
		1		Thio																																													
		1		X																																													
		2		X																																													
		2																																															
		3		NH4Cl																																													
		1		X																																													
		2		Triz																																													
		2		Non Preserved																																													

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

*use reporting limit of 0.13 ug/l for 1,4-Dioxane

REPORTING INSTRUCTIONS

PDF (e-mail address) **abbishop@kleinfelder.com & kryan@kleinfelder.com**

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO

TEMPERATURE _____ °C

Uchaugan@kleinfelder.com

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	6/15/21	12:00		6/15/21	12:00
	Relinquished by:	6/15/21	14:00		6-15	2pm
	Relinquished by:	Date:	Time:	Received by Laboratory:	Date:	Time:
		6-15			6/15	1600

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 521470
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4932329	L2132280/Finished-SIM	317.0	06/15/21 11:45	Client	06/17/21 09:40
4932330	L2132280/Simulated-SIM	317.0	06/15/21 10:15	Client	06/17/21 09:40

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.



ASIM

06/27/2021

Authorized Signature

Title

Date

Client Name: Alpha Analytical

Report #: 521470

Client Name: Alpha Analytical

Report #: 521470

Sampling Point: L2132280/Finished-SIM

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	2.1	ug/L	---	06/24/21 23:47	4932329

Sampling Point: L2132280/Simulated-SIM

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 00:37	4932330

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

428699
6/17/21

Alpha Job Number
L2132280
521470

Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617



Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Information
Project Location: MA
Project Manager: Nathalie Lewis
Turnaround & Deliverables Information
Due Date: 06/29/21
Deliverables:

Client Information
Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019
Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2132280
Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
428699 6/17/21 QC	FINISHED-SIM SIMULATED-SIM	06-15-21 11:45 06-15-21 10:15	DW DW	Bromate Bromate	
Client Provided Sample Container					
Relinquished By:		Date/Time:	Received By:		Date/Time:
C. Seaman		6/16/21	[Signature]		6/17/21 0940
Form No: AL_subcoc					

Temp. 1.4°



8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

CHAIN OF CUSTODY

PAGE _____ OF _____

Date Rec'd in Lab: 6/15/21

ALPHA Job #: L2132280

Project Information

Project Name: Benstable

Project Location: Simpsons Pond-Lawrence

Project #:

Project Manager: Alex Bishop

ALPHA Quote #:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved!)

Date Due:

Report Information - Data Deliverables

ADEx EMAIL

Billing Information

Same as Client info PO #:

Client Information

Client: Kleinfelder

Address: 4 Technology Drive
Westborough, MA

Phone: 914-406-9598

Email: abbishop@kleinfelder.com

Additional Project Information:

Regulatory Requirements & Project Information Requirements

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

VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	METALS: <input type="checkbox"/> RCRAS <input type="checkbox"/> RCRAB <input type="checkbox"/> RCP 13	EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	PCB: <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	SAMPLE INFO Filtration <input type="checkbox"/> Field <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do
ANALYSIS <i>Bromate</i>								

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		

32280-01	Finished - SIM	06/15/21	1145	DW	UC
-02	Simulated - SIM	1	1015	DW	UC

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

Preservative
 A= None
 B= HCl
 C= HNO3
 D= H2SO4
 E= NaOH
 F= MeOH
 G= NaHSO4
 H= Na2S2O3
 I= Ascorbic Acid
 J= NH4Cl
 K= Zn Acetate
 O= Other

Container Type	P
Preservative	A

Relinquished By: <i>Alex Bishop</i>	Date/Time 6/15/21 1200	Received By: <i>Mark...</i>	Date/Time 6/15/21 1433
--	---------------------------	--------------------------------	---------------------------

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
 FORM NO: 01-01 (rev. 12-Mar-2012)

TOTAL # BOTTLES



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2132280

Client Information

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

Phone: 508.439.5170
Email: nlewis@alphalab.com

Project Information

Project Location: MA
Project Manager: Nathalie Lewis

Turnaround & Deliverables Information

Due Date: 06/29/21
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2132280

Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	FINISHED-SIM SIMULATED-SIM	06-15-21 11:45 06-15-21 10:15	DW DW	Bromate Bromate	

Relinquished By:

C. Sebeau

Date/Time:

6/14/21

Received By:

Date/Time:

APPENDIX D
OXIDATION BYPRODUCTS DISCUSSION

APPENDIX D: DISCUSSION OF THE OXIDATION BYPRODUCT FOR 1,4-DIOXANE AND PER- AND POLY-FLUORINATED COMPOUNDS

The purpose of this appendix is to satisfy the MassDEP approval condition, (Item 7) of the pilot study of the Mary Dunn, Airport, Straightway, Simmons Pond, and Hyannis Port Wells dated February 9, 2021 (Transmittal No X287209). Item 7 states that the pilot report shall “include a discussion... of information available from the vendor and EPA’s Treatability Database on the information of oxidation byproducts for 1,4-Dioxane and per- and polyfluorinated compounds (PFAS).”

Degradation of 1,4-Dioxane:

1,4-Dioxane (1,4-D) is a colorless volatile organic carbon that was used in many manufacturing processes, including as a stabilizer for 1,1,1-trichloroethane². Although the Clean Air Act has phased out the use of 1,1,1-trichloroethane in the 1990s which reduced the production and use of 1,4-D, it is still used as a solvent for many commercial or industrial products^{1,2}. 1,4-D is biodegradable in air, but it is resistant to biodegradation and completely miscible in water^{2,6}. Therefore, it readily leaches into groundwater sources through water or soil and is persistent in aqueous environments, effecting many drinking water sources in the US today.

The US EPA considers 1,4-Dioxane to be a probable human carcinogen². Exposure can occur through inhalation, dermal contact, and ingestion through contaminated drinking water. Studies have shown that toxicity occurs in the liver and kidney at high level exposure over a short period of time². Animal studies have also shown evidence that 1,4-D is a carcinogen in male rats, leading to the EPA classifying it as a Group B2 carcinogen, which is defined by as a possible human carcinogen². Currently, there are no federal drinking water standards developed for 1,4-D⁵. The EPA listed 1,4-Dioxane under the third Unregulated Contaminant Monitoring Rule (UCMR 3) published on May 2, 2012 with a minimum reporting level of 0.00007 mg/L (or 0.07 µg/L)⁶. The Massachusetts Office of Research and Standards developed a guideline value (ORSG) for 1,4-D in drinking water, that is 0.0003 mg/L (or 0.3 µg/L)³.

Typically, air stripping and carbon filter absorption removes Volatile Organic Compounds (VOCs) from drinking water, but both technologies are ineffective in removing 1,4-D. According to the EPA treatability database, the primary technology used to breakdown 1,4-D in drinking water is through an advanced oxidation process (AOP) with hydrogen peroxide and ultraviolet (UV) light. AOP can also be used with ozone for treatment. Degradation byproducts resulting from the breakdown of 1,4-D with AOP-UV and hydrogen peroxide are the following^{4,7}:

- mono- and diformate esters of 1,2-ethanediol
- methoxyacetic acid

- formic acid
- glycolic acid
- glyoxal
- oxalic acid
- acetic acid
- glyoxylic acid
- formaldehyde
- and acetaldehyde

These degradation byproducts are not currently listed under the EPA or Massachusetts drinking water standards and guidelines.

PFAS:

The EPA treatability database reports that UV-AOP is typically ineffective in breaking down per- and polyfluorinated compounds (PFAS), as degradation byproducts of PFAS for UV-AOP are insignificant to nonexistent⁶. Therefore, no degradation byproducts are expected to result from the use of UV-AOP⁶. Granular Activated Carbon (GAC) is widely accepted as the leading treatment technology for PFAS, as its congeners readily adsorb to the media removing them from finished water. Since adsorption is the mechanism for GAC, no degradation byproducts of PFAS are likely to form.

References:

1. Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological profile for 1,1,1-Trichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
2. Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological profile for 1,4-Dioxane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
3. MADEP. 2020. Standards and Guidelines for Contaminants in Massachusetts drinking waters. Massachusetts Department of Environmental Protection.
4. Stefan, M. and Bolton, J.; 1998; Mechanism of the degradation of 1,4-dioxane in dilute aqueous solution using the UV/hydrogen peroxide process; Environ. Sci. Technol.; 32:11:1588
5. USEPA. 2017. Technical Fact Sheet – 1,4-Dioxane. United States Environmental Protection Division.
6. USEPA. 2011. Drinking Water Treatability Database. United States Environmental Protection Division.

7. Wang, F, Cassidy, K, and Lum, B. *Incineration alternatives for combustible waste ultraviolet/hydrogen peroxide process. Annual report, FY 1992*. United States: N. p., 1993. Web. doi:10.2172/10177262.

APPENDIX E
BLUELEAF PILOT STUDY REPORT

APPENDIX D: DISCUSSION OF THE OXIDATION BYPRODUCT FOR 1,4-DIOXANE AND PER- AND POLY-FLUORINATED COMPOUNDS

The purpose of this appendix is to satisfy the MassDEP approval condition, (Item 7) of the pilot study of the Mary Dunn, Airport, Straightway, Simmons Pond, and Hyannis Port Wells dated February 9, 2021 (Transmittal No X287209). Item 7 states that the pilot report shall “include a discussion... of information available from the vendor and EPA’s Treatability Database on the information of oxidation byproducts for 1,4-Dioxane and per- and polyfluorinated compounds (PFAS).”

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- methoxyacetic acid

- formic acid
- glycolic acid
- glyoxal
- oxalic acid
- acetic acid
- glyoxylic acid
- formaldehyde
- and acetaldehyde

These degradation byproducts are not currently listed under the EPA or Massachusetts drinking water standards and guidelines.

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References:

1. Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological profile for 1,1,1-Trichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
2. Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological profile for 1,4-Dioxane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
3. MADEP. 2020. Standards and Guidelines for Contaminants in Massachusetts drinking waters. Massachusetts Department of Environmental Protection.
4. Stefan, M. and Bolton, J.; 1998; Mechanism of the degradation of 1,4-dioxane in dilute aqueous solution using the UV/hydrogen peroxide process; Environ. Sci. Technol.; 32:11:1588
5. USEPA. 2017. Technical Fact Sheet – 1,4-Dioxane. United States Environmental Protection Division.
6. USEPA. 2011. Drinking Water Treatability Database. United States Environmental Protection Division.

7. Wang, F, Cassidy, K, and Lum, B. *Incineration alternatives for combustible waste ultraviolet/hydrogen peroxide process. Annual report, FY 1992*. United States: N. p., 1993. Web. doi:10.2172/10177262.

PILOT STUDY REPORT FOR
PFAS REMOVAL
BY GAC ADSORPTION AND
1,4 DIOXANE TREATMENT WITH UVAOP
WITH PRETREATMENT FOR
IRON AND MANGANESE REMOVAL
BY GREENSANDPLUS™
PRESSURE FILTRATION

STRAIGHTWAY 1 AND 2, SIMMONS POND
AND HYANNISPORT WELLS
BARNSTABLE, MASSACHUSETTS

MARCH - JUNE 2021

Submitted by: Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

For: Kleinfelder
4 Technology Drive, Suite 110
Westborough, MA 01581

Submitted: July 22, 2021

SUMMARY

This report details the methods and results of a pilot study conducted at the Straightway 1, Straightway 2, Simmons Pond and Hyannisport Wells in Barnstable, Massachusetts for the evaluation of treatment processes for the removal of iron, manganese, 1,4-Dioxane, and Per- and Poly- Fluoroalkyl Substances (PFAS) compounds. The pilot study was conducted for the Town of Barnstable DPW Water Supply Division under the direction of the consulting engineering firm, Kleinfelder.

The study was performed from March 16 through June 15, 2021. Raw water concentrations for the contaminants of concern as measured during the pilot study are compared to their respective regulatory limits in Table 0.01. Cells highlighted in yellow exceeded the limit.

Table 0.01: Raw Water Contaminants as Measured During the Pilot Study

Source	Total Fe (mg/L)	Total Mn (mg/L)	1,4 Dioxane (µg/L)	PFAS6 (ng/L)
Straightway 1 Well	<0.30 mg/L	0.112	<0.30	44
Straightway 2 Well	0.42 – 0.46	0.765 – 0.961	0.66 – 1.0	85 - 93
Simmons Pond Well	<0.30 mg/L	0.129 – 0.148	0.15 – 0.40	79 - 80
Hyannisport Well	<0.30 mg/L	0.126	<0.30	45

With respect to the PFAS6 designation in the table, the MaDEP has a PFAS public drinking water standard or maximum contaminate level (MCL) of 20 nanograms per liter (ng/L) or parts-per-trillion (ppt) for the sum of six specific PFAS compounds. These six specific PFAS compounds are often referred to as the PFAS6. The PFAS6 include:

- perfluoroheptanoic acid (PFHpA)
- perfluorohexane sulfonic acid (PFHxS)
- perfluorooctanoic acid (PFOA)
- perfluorononanoic acid (PFNA)
- perfluorooctane sulfonic acid (PFOS)
- perfluorodecanoic acid (PFDA)

Comparison of the raw water quality to historical water quality is made in Section 4.1 of this report. The analysis shows that the raw iron concentration at the Straightway 1 Well was significantly different than the concentration reported in the "Evaluation of Treatment Options for Straightway and Hyannis Port Facilities Hyannis Water System" report dated August 2020. The mean concentration of eighteen field analyses was 0.04 mg/L Fe and the single lab sample result was below the reporting limit of 0.05 mg/L. The August 2020 report contained a value that represented a single data point of 1.96 mg/L. Blueleaf suspects that the historical data value is anomalous. A raw iron concentration of 2.0 mg/L would significantly impact contaminant loading of filters and the conclusions of this report. Review of other historical data would be worthwhile to validate or invalidate the historical data point.

The pilot study evaluated three different treatment processes:

1. Iron and Manganese Removal by Adsorption with Greensand Filtration
2. 1,4-Dioxane Removal by Advanced Oxidation with UV (UV AOP)
3. PFAS Removal by Adsorption with GAC Contactors

Iron and manganese removal evaluated adsorptive pressure filtration with four identical filters operated in parallel, all containing 24" of GreensandPlus™ media and 12" of anthracite. 23 individual filter runs were completed at the four well sources. Pilot filtration trials were performed at Filter Surface Loading Rates (FSLR) of 4 to 8 gpm/sf. The raw well water was chemically pretreated with sodium hypochlorite during all trials. Sodium hydroxide was utilized to adjust pH from ambient to 6.8 in two filters and to 7.4 in the other two filters.

Greensand pilot filter effluent effectively met the project goals for iron and manganese at all four sources with one exception. There was evidence that manganese removal was less effective at treating the high manganese source at the Straightway 2 Well when using the lower target pH of 6.8.

Low iron concentrations at Straightway 1, Simmons Pond and Hyannisport Wells allowed for filter runs which typically exceeded 100 hours. Operating with only Straightway 2 Well would be the most limiting condition for filter runtimes due to higher raw contaminant loading. At the higher FSLR of 8 gpm/sf filter runtimes were near 30 hours at termination due to contaminant breakthrough for both high and low pH filters. Operating at the lower FSLR of 4 gpm/sf the high pH filters operated for approximately 50 hours and the low pH filters for approximately 100 hours before exceeding 10 psi of headloss.

Backwashing was completed at a rate of 12 gpm/sf for 10 minutes without air scour to maintain effective filter operations during the study. The introduction of 10% supernatant recycle caused a slight increase of approximately 0.01 NTU in effluent turbidity during the Straightway 2 recycle period but turbidities remained below the contaminant breakthrough threshold of 0.1 NTU. Similarly, a slight instantaneous drop in differential pressure was observed at the start of the recycle period at the Hyannisport Well but the rate of headloss development remained consistent. Effluent iron and manganese remained at acceptable levels without any obvious impact from the introduction of recycle supernatant during both recycle trials.

The Trojan UV AOP system was operated at Straightway 2 and Simmons Pond Wells which had the highest raw 1,4 dioxane concentrations. The average UV transmittance of influent was greater than 99%. UV AOP was effective in destruction of raw 1,4-Dioxane to concentrations below laboratory detection limits in eight out of nine UV effluent samples. The one sample with detectable 1,4 dioxane was below the regulatory limit of 0.3 µg/L. Ballast power of 60% and 100% were evaluated during the study. Hydrogen peroxide doses of 5 and 10 mg/L were evaluated during the Straightway 2 trials. Hydrogen peroxide doses of 3.5 and 8 mg/L were evaluated during the Simmons Pond trials. There was no visual evidence of UV lamp sleeve fouling based on a final inspection of one of the sleeves used during piloting. The same sleeve was shipped to Trojan for UVT analysis and was reported to be at 99.3% of the UV transmittance of a new unused sleeve.

Successful removal of PFAS compounds was achieved with 120 inches of GAC (Calgon Filtrasorb 400) media allowing 10 minutes of empty bed contact time. Treatment by GAC adsorption reduced all PFAS6 compounds to non-detectable concentrations in 6 out of 7 GAC contactor effluent samples. The one sample with detectable PFAS6 was below the regulatory limit and was also questionable due to possible sample contamination. The GAC contactor treated 3,706 bed volumes of water during the pilot study without contaminant breakthrough based on the lab testing. There was very little headloss development during the pilot study as differential headloss remained well below 10 psi in all three vessels.

Blueleaf collected water quality samples at the full-scale Maher Treatment Plant for corrosion control parameters. Blueleaf noted, that the operating conditions observed and the water quality data from the samples collected at the Maher Treatment Plant, were inconsistent with operating conditions and results used during the pilot study conducted at the Maher site in 2017, and the current pilot study at Straightway and Hyannisport stations. Blueleaf met with the operators to discuss the operation of the Maher WTP and agreed to include the comments in this report to document issues that may be important to discuss during the design and construction of additional treatment facilities with similar processes. These observations and comments are included in the Discussion and Conclusions sections of this report.

This report has been prepared to describe the methods and results of the field testing performed on this project. This report does not include recommendations for full-scale implementation of any process.

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LIMITATIONS

This pilot test report was prepared for Kleinfelder and the Town of Barnstable DPW - Water Supply Division, for the purpose of evaluating treatment of iron, manganese, 1,4-Dioxane, and Per- and Poly-Fluoroalkyl Substances (PFAS) from Straightway Wells 1 and 2, located at 228 Straightway and Simmons Pond and Hyannisport Wells located at 132 Smith Street in Hyannis, MA. The findings provided in this report are based solely on the information contained and referenced herein. All field operations, field analyses, data compilation, data analysis and reporting were completed in a fair and impartial manner and are intended to be an accurate representation of treatment performance. Additional quantitative information regarding the raw water, or other treatment goals and concerns that were not available to Blueleaf, Inc. at the time of the pilot study may result in modification of the stated findings. Note that bench and/or pilot scale studies may not identify issues arising from long-term changes to source water quality, nor predict long-term performance of the treatment processes tested.

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ABBREVIATIONS

1,4 D	1,4-Dioxane
ANOVA	Analysis of Variance
BDL	Below Detection Limit
BW	Backwash
CBW	Composite Backwash (sample)
cf	Cubic foot
FSLR	Filter Surface Loading Rate
gpd	Gallons per Day
gpm	Gallons per minute
gpm/sf	Gallons per minute per square foot (of filter surface area)
gr	Gram
GSP	GreensandPlus™
HP	Horsepower
KMnO ₄	Potassium Permanganate
L	Liter
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg	Milligram
MG	Million Gallons
mg/L	Milligrams per liter
MGD	Million gallons per day
min	Minutes
MRL	Minimum Reporting Limit
N/A	Not available / not applicable
NaOCl	Sodium Hypochlorite
ND	Not detected (at laboratory MRL)
NPDWR	National Primary Drinking Water Regulations (primary standards)
NTU	nephelometric turbidity units
ORSGL	Massachusetts Office of Research and Standards Guidelines
PFAS	Per- and Poly- Fluoroalkyl Substances
PFAS6	PFDA + PFHpA + PFHxS + PFNA + PFOA + PFOS
PFDA	Perfluorodecanoic Acid
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PID	Proportional Integral Derivative
RDL	Report detection limit
S.U.	Standard Units
sf	Square foot

SM	Standard Methods
SMCL	Secondary Maximum Contaminant Limit
SSN	Settled supernatant (backwash decant sample)
TSS	Total Suspended Solids
UV	Ultraviolet
UV AOP	Advanced Oxidation Process with UV
µg/L	Micrograms per Liter (equivalent to ppb)
UV	Ultraviolet

1 INTRODUCTION

1.1 BACKGROUND

The Town of Barnstable DPW Water Supply Division (also known as Hyannis Water) operates eleven ground water wells that provide public drinking water to the Barnstable water system. Straightway Wells 1 and 2 are located at 228 Straightway in Hyannis, MA. Simmons Pond Well and Hyannisport Well are located at 132 Smith Street. These four wells contain varying concentrations of iron, manganese, 1,4-Dioxane, and Per- and Poly- Fluoroalkyl Substances (PFAS). These contaminants exceed the regulatory limits in some circumstances. Specific data is provided in Section 1.2.

The raw water is currently treated through the addition of sodium hydroxide (NaOH) for pH adjustment and zinc orthophosphate for corrosion control. Water from all four wells is then pumped through GAC contactors located at the Straightway site for PFAS removal. Currently there is no 1,4 dioxane or iron and manganese removal processes for these wells.

The Town is pursuing implementation of new water treatment processes for removal of the contaminants. The Town retained Kleinfelder to provide consulting engineering services. Kleinfelder hired Blueleaf to perform the pilot study for evaluation of three treatment processes:

1. Iron and manganese removal by Greensand filtration with adsorptive media.
2. 1,4-Dioxane removal by advanced oxidation process (AOP) with UV.
3. PFAS removal by pressure filtration with granular activated carbon (GAC) media.

A similar study evaluating all three treatment processes was completed in 2017 for the Maher Wells in Barnstable.

Kleinfelder prepared and submitted the Pilot Study Protocol to the Southeast Region of the Massachusetts Department of Environmental Protection under Transmittal # X287209. The study conducted complied with the Pilot Study Protocol, and this report describes the methods, and results of the field work in partial fulfillment of the requirements for the overall pilot study. It is anticipated that this report will be appended to a report prepared by Kleinfelder with additional analyses, recommendations, and costs which will fulfill the requirements of MaDEP Policy 90-04.

Raw water quality presented as Table 1 in the Kleinfelder Pilot Study Protocol is reproduced as Table 1.01 below.

Table 1.01: Historical Raw Water Quality from Pilot Study Protocol

Well	Fe (mg/L)	Mn (Mg/L)	1,4-Dioxane (µg/L)	PFAS6 (ng/L)
<i>Level of Concern</i>	<i>0.3</i>	<i>0.05</i>	<i>0.3</i>	<i>20</i>
Straightway 1	1.96	0.084	ND	20
Straightway 2	0.52	0.87	0.85	86
Hyannisport	ND	0.31	0.10	36
Simmons Pond	0.12	0.16	0.22	69

Results that are bolded represent concentrations that exceed the Level of Concern

1.2 REGULATORY REQUIREMENTS

1.2.1 Iron and Manganese

Iron and manganese concentrations were compared to the Secondary Maximum Contaminant Levels (SMCL) of 0.3 mg/L for iron and 0.05 mg/L for manganese per the secondary standards of the National Secondary Drinking Water Regulations (NSDWR). The current Massachusetts Office of Research and Standards Guidelines (ORSGL) also has a standard of 0.3 mg/L for manganese. The Secondary Maximum Contaminant Level was used as the pilot study treatment goal for manganese removal. The historical data presented above in Table 1.01 shows that the Straightway 1 and 2 Wells exceed the regulatory limit for iron and that all four wells exceed the regulatory limit for manganese.

1.2.2 1,4 Dioxane

Raw water quality data showed that 1,4-Dioxane concentrations for the Straightway 2 Well exceeded the recommended limit of 0.3 µg/L as defined by the Massachusetts Office of Research and Standards Guideline Level (ORSGL).

1.2.3 PFAS

In May 2016, the United State Environmental Protection Agency (EPA) issued a lifetime Health Advisory (HA) of 70 parts per trillion (0.07 µg/L) for the combination of two PFAS chemicals, PFOS and PFOA, in drinking water. In June 2018, MassDEP established an ORSGL of 70 parts per trillion (ppt) for drinking water for a subgroup of five closely related PFAS compounds. This subgroup included perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA).

On October 2, 2020, MassDEP published its PFAS public drinking water standard or maximum contaminant level (MCL) of 20 nanograms per liter (ng/L) or parts-per-trillion (ppt). Individually or for the sum of the concentrations of six specific PFAS. These PFAS are perfluorooctane sulfonic acid (PFOS),

perfluorooctanoic acid (PFOA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA). These six PFAS compounds are often referred to by the MassDEP as “PFAS6”. If any PFAS concentrations are reported below the report limit then they are totaled using “0 ng/L” in the PFAS6 calculation. Below is an example of the PFAS6 calculation with concentrations below the reporting limit:

PFHpA = 5.09 ng/L
PFHxS = 2.97 ng/L
PFOA = 13.5 ng/L
PFNA = ND (< 1.79 ng/L)
PFOS = 5.70 ng/L
PFDA = ND (< 1.79 ng/L)

$$\begin{aligned} \text{Total PFAS6 Concentration } \left(\frac{\text{ng}}{\text{L}}\right) &= \text{PFHpA} + \text{PFHxS} + \text{PFOA} + \text{PFNA} + \text{PFOS} + \text{PFDA} \\ \text{Total PFAS6 Concentration } \left(\frac{\text{ng}}{\text{L}}\right) &= 5.09 + 2.97 + 13.5 + 0 + 5.70 + 0 \\ \text{Total PFAS6 Concentration } \left(\frac{\text{ng}}{\text{L}}\right) &= 27.26 \frac{\text{ng}}{\text{L}} \end{aligned}$$

All four wells exceeded the new MCL for PFAS6 of 20 ng/L.

1.3 PILOT STUDY GOALS

The goals of the pilot study were as follows:

1. Demonstrate the ability of Greensand filtration with adsorptive media to remove iron and manganese to concentrations below the ORSGL limit (0.30 mg/L Mn) and SMCL (0.050 mg/L Mn and 0.3 mg/L Fe).
2. Demonstrate the ability of advanced oxidation process with UV to remove 1,4-Dioxane.
3. Confirm that the UV lamp sleeves are not fouled during the duration of the pilot study.
4. Demonstrate the ability of granular activated carbon (GAC) contactors to remove PFAS.
5. Provide water quality that meets both federal and state drinking water quality requirements under representative source water quality conditions.
6. Evaluate operational and performance characteristics such as chemical feed rates and hydraulic loading rates.

1.4 TREATMENT APPROACH

During the first phase of the pilot study iron and manganese removal were evaluated without downstream processes to establish effective treatment conditions including chemical doses and filter loading rates. This information was then used during the second phase of the study to operate larger high-capacity filters in order to produce adequate water (20 gpm) for the downstream UV pilot system.

1.4.1 Iron and Manganese Treatment by Adsorptive Media Filtration

The pilot study tested iron and manganese treatment by pressure filtration using Greensand Plus™ adsorptive filtration media. Raw iron and manganese are typically oxidized by chemical pretreatment before filtration. Oxidation converts dissolved ferrous iron to ferric hydroxide, and dissolved manganese to any of several oxides of manganese (MnO_x). Oxidation can be accomplished with chlorination using sodium hypochlorite or with other alternative oxidants.

The adsorptive properties of the filtration media must be maintained by regeneration. Regeneration consists of exposing the media to an oxidant. With Continuous Regeneration (CR) the oxidant is fed continuously during filtration at a dose that is sufficient to both (1) satisfy the oxidant demand of the raw water, and (2) provide an excess for media regeneration.

Iron precipitates are often large enough to be removed by mechanical filtration, i.e. entrapment within the interstices of the filtration media. Iron can also be removed by adsorption to the filtration media. The manganese precipitates are usually too small to be effectively removed by mechanical filtration. The primary mechanism for manganese removal is adsorption.

Iron and manganese removal are usually not highly sensitive to pH within the normal pH range for drinking water sources. pH control is sometimes necessary for effective treatment at some sites, but this must usually be determined by piloting. pH control is sometimes required for purposes unrelated to contaminant removal, for example to minimize corrosion or leaching within the distribution system.

1.4.2 Advanced Oxidation Process

Advanced oxidation uses ultraviolet (UV) light with hydrogen peroxide to remove 1,4-dioxane. UV oxidation is a photochemical process that breaks down chemical constituents into their physiologically-inert component parts. This process includes the addition of hydrogen peroxide to the influent water followed by a photochemical reaction that occurs almost instantly within the UV reactor. The irradiation of hydrogen peroxide by UV light breaks the hydrogen peroxide into two hydroxyl radicals. These highly reactive radicals oxidize 1,4-dioxane, breaking it down into its non-toxic molecular components. In addition, the UV oxidation system is capable of breaking down and reducing the concentrations of pharmaceuticals, personal care products, and other volatile organic compounds that may be present in the source water.

1.4.3 PFAS Treatment by GAC Filtration

Like adsorptive media filtration for removal of iron and manganese, granulated activated carbon (GAC) filtration has proven to be effective in removal of PFAS from drinking water. Unlike iron and manganese

removal, PFAS does not require oxidation to adsorb to the GAC media. The GAC filters also provide a secondary function of quenching any residual hydrogen peroxide from the advanced oxidation process.

2 METHODS AND MATERIALS

Section 2 - Methods and Materials describes the equipment, procedures, and analytical methods utilized during the pilot testing effort.

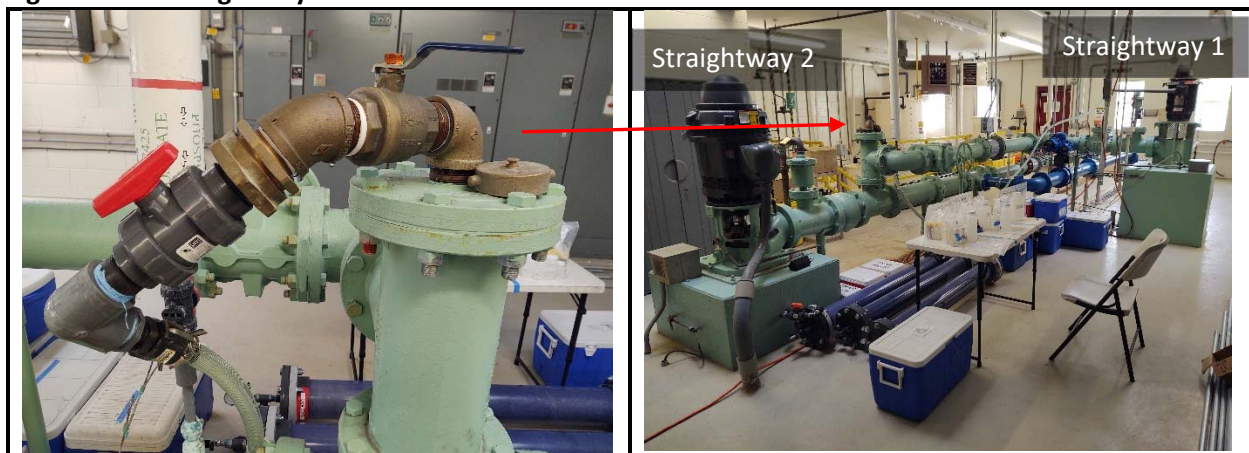
2.1 PILOT SYSTEMS

Sections 2.1.1 to 2.1.5 describe the mechanisms for raw water supply of each well, the three different unit processes utilized for treatment, and field laboratory facilities utilized for treatment of the four wells, Straightway 1, Straightway 2, Simmons Pond and Hyannisport, in Barnstable, MA.

2.1.1 Raw Water Supply

Raw water from Straightway Wells 1 and 2 were supplied from a connection to the raw water piping in the Straightway pump station. Both well sources were able to be supplied from the same connection point as the piping was common to both wells. Only one well was operated at a time so that the sources were not blended. SUEZ operated each well to waste or through the full-scale GAC contactors depending on operations requirements and maintained continuous flow for the respective pilot evaluation period. The wells were operated at typical operational flows to produce representative water quality. The piping connection is shown in the left photo in Figure 2.01. The well pumps for Straightway 1 and 2 and the process piping are shown in the right photo in Figure 2.01. The red arrow identifies the connection point.

Figure 2.01: Straightway Wells 1 and 2 Connection



During the initial Greensand phase of the pilot a 1-inch nylabraid hose supplied water from the interior pipe connection to the pilot system via a roof hatch in the pump station. During the high-capacity phase of the study the one-inch hose was replaced with fire hose. Outside of the station a wye fitting provided a branch for the pilot feed connection while the other side flowed to waste. The right photo in Figure 2.02 shows the wye fitting setup at the Hyannisport station.

Raw water from the Simmons Pond and Hyannisport Wells were also supplied from a common connection in the raw water piping in the Hyannisport pump station. The piping connection is shown in the left photo in Figure 2.02. Fire hose supplied water to the pilot through a roof hatch to a wye fitting on the exterior of the building. The wye connection is shown in the right photo in Figure 2.02.

Figure 2.02: Simmons Pond and Hyannisport Wells Connection



Raw water was discharged into a 150-gallon hydraulic break tank (Figure 2.02) which provided an air gap (Figure 2.03) between the supply connection at the top of the tank and the tank overflow which regulated the operating elevation in the tank at approximately 1 foot lower. A 1-inch hose connection at the base of the tank supplied a ½ HP booster pump which fed the Greensand pilot system and maintained between 30 and 35 psi of influent pressure.

Figure 2.03: Raw Water Break Tank



2.1.2 Greensand Filtration

The greensand pilot filtration system and field laboratory were contained in a cargo style trailer. The greensand pilot filtration system removed iron and manganese from the raw water. Figure 2.04 shows the pilot trailer which contained the Greensand filtration system.

Figure 2.04: Greensand Pilot Trailer at Hyannisport Station

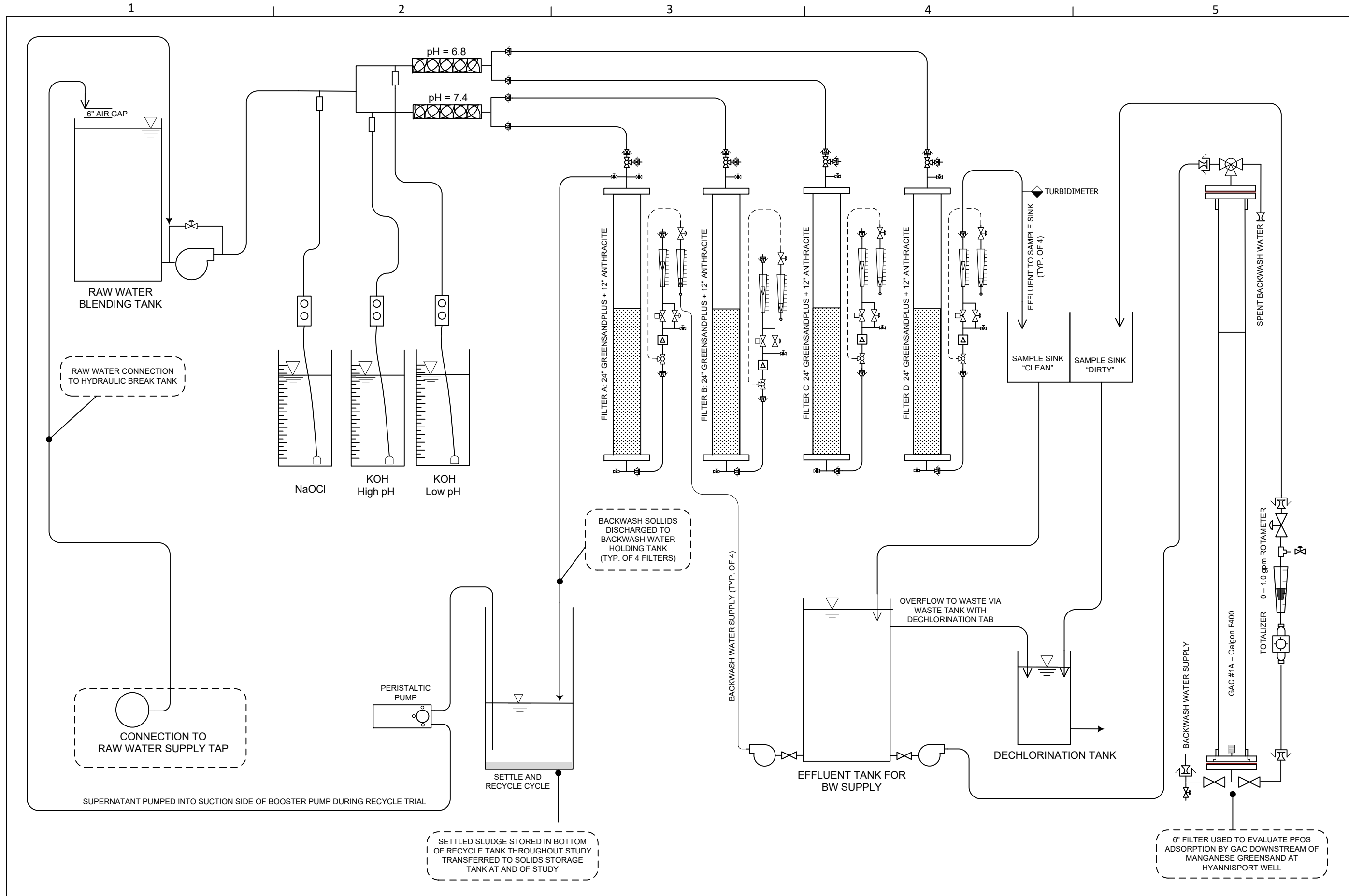


Figure 2.05 shows the interior of the greensand pilot trailer.

Figure 2.05: Interior of Pilot Filtration Trailer



The pilot filtration system included equipment for chemical pretreatment, flow control, four pressure filters operating in parallel, a data acquisition system, and sample points for all relevant sample streams. A process flow diagram of the greensand pilot system is shown in Figure 2.06.



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FIGURE 2.06: PROCESS FLOW DIAGRAM OF GREENSANDPLUS PILOT SYSTEM

DRAWN BY
 E. GROTTON

FILE NAME
 11204_06

DATE
 09JUL2021

SIZE: 11' X 17"

SCALE: NONE

DWG NO
 2.06

2.1.2.1 Chemical Pretreatment

The greensand pilot system influent was pretreated using sodium hypochlorite (NaOCl) for oxidation and media regeneration, and sodium hydroxide (NaOH) for pH adjustment.

Each of the four pilot filters were supplied with chemically pretreated water via 3/4-inch nylon braided hose. NaOCl was injected into the common supply for all four filters. The common NaOCl injection location is indicated by the blue circle in Figure 2.07. NaOH was injected downstream of a tee which split raw water flow into two trains to allow for the evaluation of two different pH levels. The two NaOH injection locations are indicated by the yellow circles. The direction of flow is indicated by the two orange arrows.

Figure 2.07: Pilot Trailer Chemical Feed Area

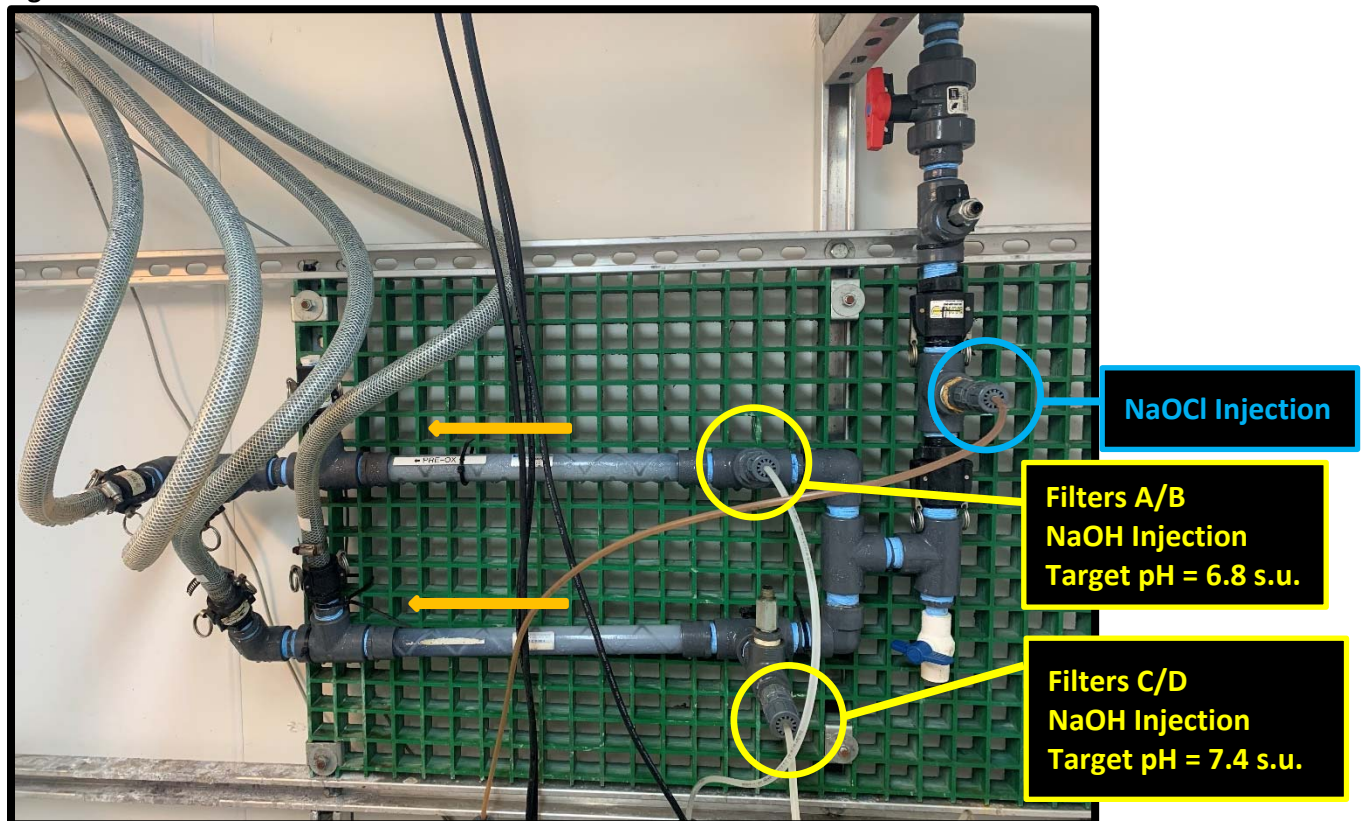


Figure 2.08 shows the sodium hypochlorite (NaOCl) feed pump as well as the two NaOH feed pumps. The chemical feed pumps were Grundfos DDA diaphragm pumps. The suction tubing from the pumps withdrew diluted NaOCl and NaOH stock stored in 55-liter day tanks located below the pumps.

The pumps had a maximum capacity of 7.5 liters per hour and a minimum capacity of 2.5 mL/hour (milliliters per hour). Typical feed rates were 125 to 250 mL/hr. The feed rates were calibrated by recording the drawdown versus elapsed time in the graduated day tank. The feed pumps injected into the 1-inch PVC raw water supply line via an injection quill.

The oxidant feed rate for NaOCl was manually set by the operator to obtain the desired residual chlorine concentration in the filter effluents.

The feed rates for the two NaOH feed pumps were controlled by a Hach SC200 two-channel controller to maintain the setpoint pH levels in the filter influent to Filters A&B (low-pH) and Filters C&D (high-pH). The pH was monitored in each stream of pretreated filter influent water, referred to herein as "POX" samples (acronym for post-oxidized). Each of the two POX sample flows ran continuously into a sample cup with a dedicated Hach online pH probe connected to the SC200 controller. The controller sent a separate 4-20 milliamp signal to each NaOH feed pump, and the feed pump trimmed the feed rate to maintain the setpoint pH (either low or high) per a PID (Proportional Integral Derivative) control algorithm.

Figure 2.08: Sodium Hypochlorite and Potassium Hydroxide Feed Pumps



Pretreated water was sampled via ¼-inch POX sample lines connected to the filter inlets of Filter A, B, C, D. The pretreated sample line was used to monitor various water quality parameters, including chlorine (free and total), iron (total and dissolved), manganese (total and dissolved), and pH.

2.1.2.2 GreensandPlus™ Adsorptive Media

The pilot filter utilized GreensandPlus™ (GSP) media which is a non-proprietary filtration media with the same adsorptive coating and treatment performance as standard manganese greensand, but the adsorptive coating is fused to a silica core. This allows GreensandPlus™ to withstand higher differential pressures than standard greensand without breakdown of the particles, and without stripping the adsorptive coating from the substrate. GreensandPlus™ can operate at filter loading rates 8 gpm/sf or greater, depending upon water quality, compared to 2 to 5 gpm/sf for standard manganese greensand.

GreensandPlus™ has a manganese dioxide coating that both catalyzes the oxidation/reduction of manganese and is adsorptive to manganese. The manganese dioxide coating is maintained by feeding an oxidant, typically either permanganate or chlorine. Pre-oxidation for contaminant removal or disinfection can provide sufficient oxidant to also maintain the adsorptive qualities of the media, but it is sometimes necessary to perform specific media regeneration procedures. Regeneration can be performed continuously by feeding permanganate or chlorine during filter service (continuous regeneration, CR), or intermittently by occasionally backwashing or soaking with permanganate (intermittent regeneration, IR).

GreensandPlus™ filters are typically backwashed at 12 gpm/sf minutes, with or without air scour. A terminal differential pressure (DP) of 10 psi is often used to trigger backwash, but the manufacturer claims GreensandPlus™ is capable of withstanding DPs substantially greater than 10 psi.

A product data sheet for GreensandPlus is included in Appendix F.

Table 2.01 summarizes the pilot filter configurations.

Table 2.01: Pilot Filter Configurations

Parameter	Filters A, B, C, D (Initial Testing)	Filters 1 and 2 (High Capacity Testing)
Adsorptive filtration media	GreensandPlus™ with Anthracite	GreensandPlus™ with Anthracite
Adsorptive media depth	24 inches (61 cm)	24 inches (61 cm)
Anthracite filter cap	12 inches (30 cm)	12 inches (30 cm)
Total filter bed depth	36 inches (91 cm)	36 inches (91 cm)
Filtration media volume	0.4 ft ³ (11.3 L)	4.8 ft ³ (11.3 L)
Anthracite volume	0.2 ft ³ (5.7 L)	2.4 ft ³ (5.7 L)
Total media volume	0.6 ft ³ (17.0 L)	7.2 ft ³ (17.0 L)
Freeboard above filter surface	24 inches (61 cm)	24 inches (61 cm)
Filter vessel diameter	6 inches (15 cm)	21 inches (53 cm)
Filter surface area	0.20 ft ² (182 cm ²)	2.40 ft ² (2,230 cm ²)
Filter vessel height	60 inches (1.52 m)	60 inches (1.52 m)
Filter vessel empty volume	27.6 gallons (104.5 L)	89.8 gallons (340 L)

2.1.2.3 Flow Control and Instrumentation

There were four parallel flow control assemblies, one per filter. Each flow control assembly included separate components for filtration and backwash operations. Forward flow had automated control capability. A flow meter controlled an automatic modulating valve via a PC-based PLC program with a PID loop. The PLC continuously monitored and logged filter flow rates, filter inlet and outlet pressures, filter effluent turbidities, and filter influent pH. The flow rate to the turbidimeters was manually adjusted and periodically measured.

Four pilot filters were operated in parallel during all trials. Each pilot filter was 6 inches in diameter by 60 inches high. Pilot filters were constructed from 6-inch clear PVC schedule 40 pipe. Each filter had an underdrain consisting of a 2" stainless steel slotted media-retention nozzle with No. 8-12 garnet surrounding the nozzle. All four filters contained 24 inches of GreensandPlus™ (GSP) filtration media, with a 12" anthracite coal filter cap.

Figure 2.09 shows the flow control assembly for the pilot filters.

Figure 2.09: Pilot Filter with Flow Control Panel

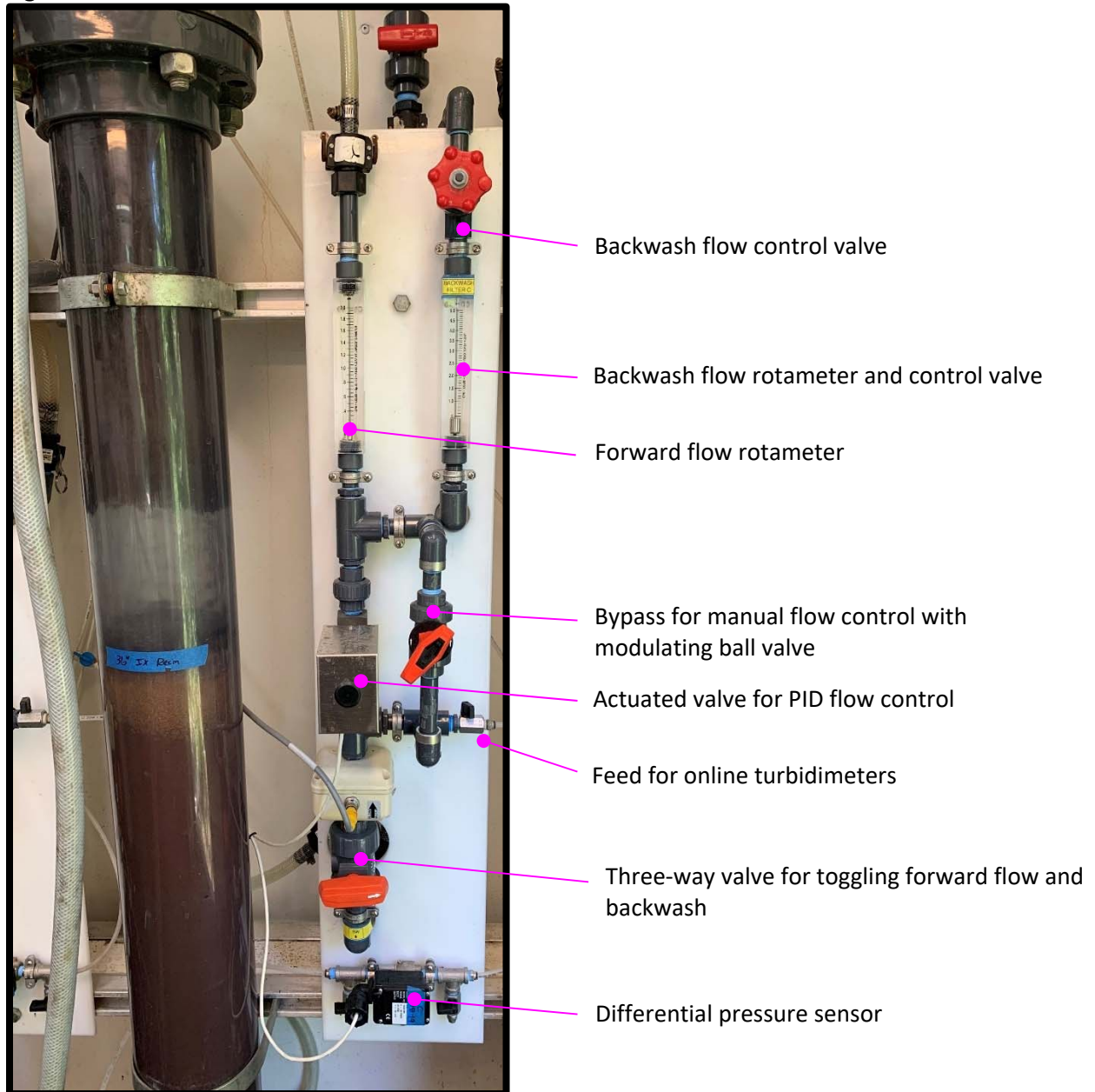


Figure 2.10 shows the sample sink, with ½” hoses for pilot filter effluent, 3/8” lines for discharge from the four Hach 1720e flow-through turbidimeters, and the 1/4” sample lines for untreated raw water, and pretreated filter influent. The pretreated filter influent sample lines flowed into a common sample cup with an online pH meter, connected to a Hach SC200 controller. The pH controller provided automated control of the potassium hydroxide feed pump to maintain the target filter influent pH.

Figure 2.10: Pilot Trailer Sample Sink



The four ½” filter effluent hoses are shown grouped together and discharging into a 2” standpipe which collected the combined flow. The combined Greensand filter effluent then flowed by gravity to the filter effluent storage tank in the adjacent storage container as the source water for the PFAS treatment system.

Each filter effluent flow had a dedicated flow-through Hach 1720E low range turbidimeter. The four effluent turbidimeters were connected to two Hach SC200 2-channel controllers. Filter effluent turbidimeters and SC200 controllers are shown in Figure 2.11. Filter effluent grab samples were collected from the individual filter effluent streams at the points of discharge into the sample sink.

Figure 2.11: Hach 1720E Low Range Turbidimeters



2.1.2.4 Backwash Water Feed Tank, Pump, and Connections

During backwashes a booster pump supplied backwash water from the filter effluent storage tank to the pilot system. Backwash flows were controlled on the upstream, clean-water side of the filters while in reverse flow mode. Each filter had a dedicated 0-5 gpm rotameter and flow control valve.

All filters were backwashed at a nominal flow rate of 2.4 gpm (12 gpm/sf) for a period of 10 minutes. For each filter, the entire backwash volume was collected in a 30-gallon tank, and backwashing continued until a volume of 24-gallons was collected. A bulk backwash sample was typically collected to evaluate settling and characterize the backwash water. After sampling, the backwash water was discharged either to a backwash tank for future recycle trials or to waste.

2.1.2.5 High-Capacity Modifications to Supply UV Pilot System

The following modifications were made to the Greensand filtration system in order to supply adequate flow the pilot UV system.

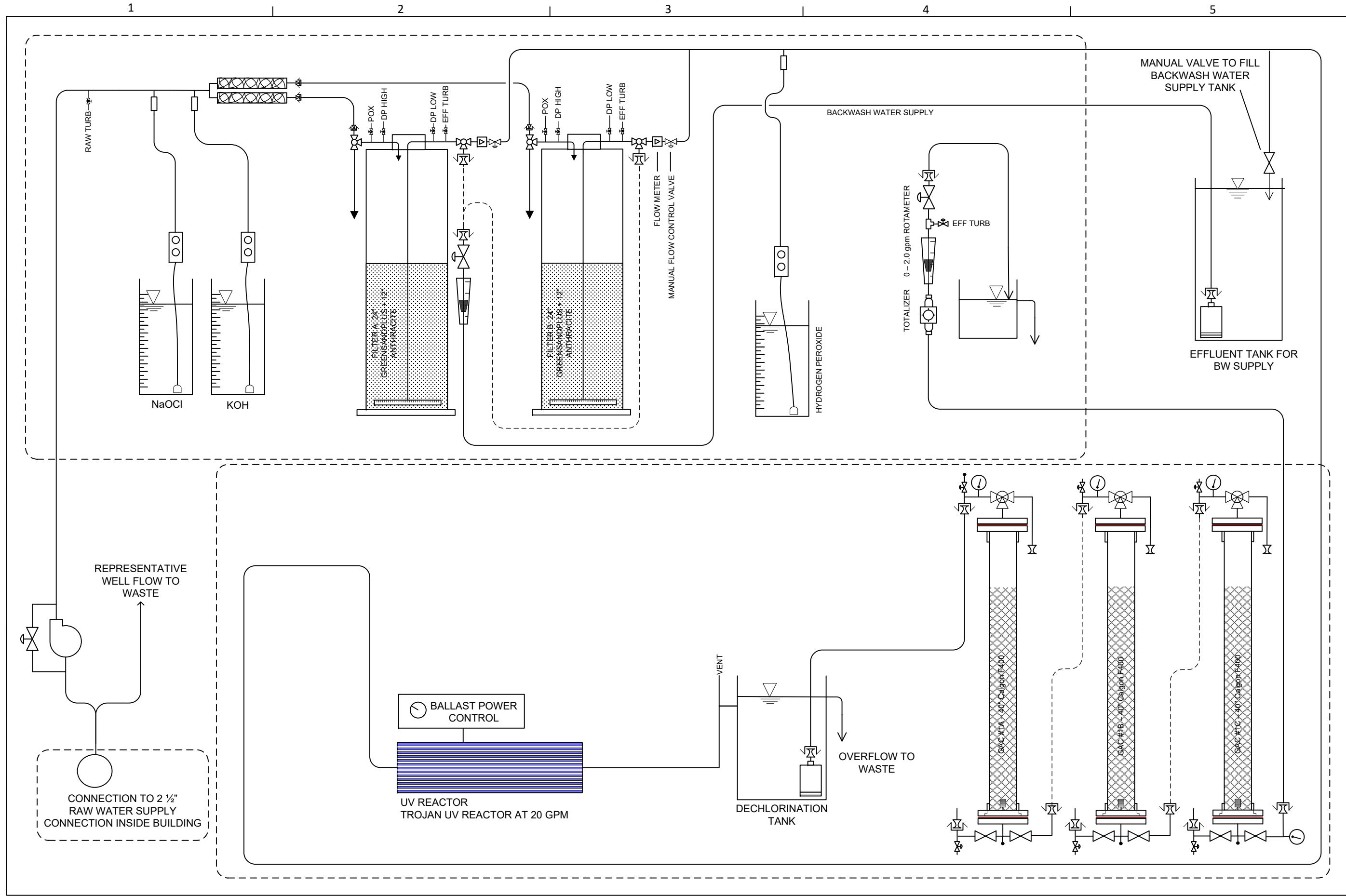
1. Replaced ½ HP pilot feed booster pump with 1 HP booster pump in order to pressurize the Greensand filtration system and the downstream UV pilot system.
2. Fed neat undiluted NaOCl instead of 1/10 dilution.
3. Replaced the four 6-inch diameter pilot filters with two 21-inch diameter filters. The new filter are shown in Figure 2.12.

4. Replaced 0 to 3 gpm flow meters with 0 to 20 flow meters.
5. Maintained manual flow control through the filters instead of automated flow control. The pilot operator monitored the flow rate and adjusted flows manually in response to declining flow rate due to headloss development.
6. Greensand filter effluent flowed to downstream UV pilot system instead of to sample sink.
7. Greensand filter samples were collected from turbidimeters instead of effluent tubing.
8. Increased the size of the backwash storage tank from 200 to 500 gallons and also increased backwash pump and flow control proportionally.

Figure 2.12: 21-inch High-Capacity Greensand Filters



A schematic of the comprehensive pilot system including the high-capacity Greensand filters, UV AOP equipment and the GAC contactors is included in Figure 2.13.



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FIGURE 2.13: COMPREHENSIVE FLOW DIAGRAM OF HIGH CAPACITY GREENSAND, UV-AOP AND GAC PILOT SYSTEMS

PILOT SYSTEMS

TABLE:

DRAWN BY	E. GROTTON
FILE NAME	11204_06
DATE	09JULY2021
SIZE:	11" X 17"
SCALE:	NONE
DWG NO	2.13

2.1.3 Advanced Oxidation Process with UV

The following are key dates for delivery, installation and operation of the UV pilot treatment system.

- The pilot UV system was delivered to the site on Friday, May 7, 2021 and installed into a 20-foot shipping container as shown in Figure 2.14.
- Installation of the high-capacity filters, the UV pilot system and connecting piping was completed the week of May 10 to 14.
- Media conditioning, startup and optimization of the high-capacity filters, the UV pilot system and pretreatment chemicals was completed the week of May 17 to 21.
- Evaluation of UV trials on Straightway 2 Well was completed on May 24 to June 7.
- All pilot systems were shutdown, dismantled, and relocated from the Straightway station to the Hyannisport station on June 7.
- Evaluation of UV trials on the Simmons Pond Well were completed from June 7 to June 15.
- Piloting was concluded on June 15 and UV sleeves were inspected for fouling.

Water was supplied to the UV pilot system from the pressurized discharge from the two high-capacity Greensand filters. Filter flows were manually controlled to operate at 10 gpm each providing a combined 20- gpm of flow to the UV pilot system. Filter effluent was discharged into 1" nylabraid tubing. The tubing from each filter was connected to a 1 ½" tee fitting between the two filters. 35% hydrogen peroxide was also injected into the tee using a Grundfos diaphragm metering pumps drawing directly from the 15-gallon chemical drum.

Figure 2.14: UV Pilot Skid Installed in Shipping Container

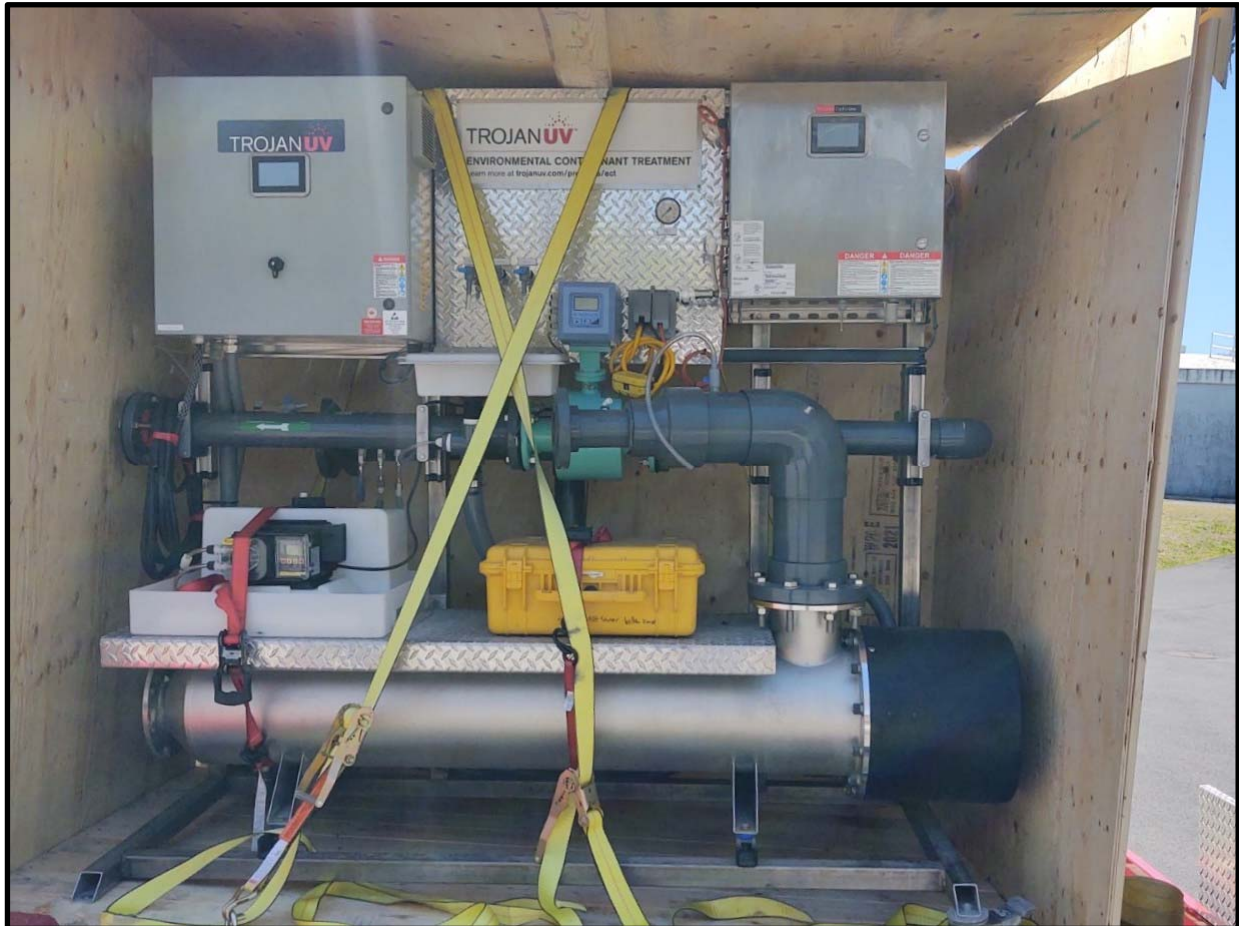


The combined pretreated water then flowed through 1 ½" nylabraid tubing outside of the Greensand filtration trailer and then into the shipping container that housed the UV pilot system. The 1 ½" tubing was connected to the 3-inch influent flange on the UV pilot skid. This connection can be seen above in Figure 2.14. The water flowed through the 3-inch PVC skid piping, including a static mixer and a flow meter, and then into the 12" diameter UV chamber. Water was discharged from the chamber through a 6-inch pipe connection at the top which transitioned to 3-inch piping. 1 ½" nylabraid tubing was adapted to the 3-inch effluent flange and transferred the UV effluent outside of the container to the dechlorination tank.

Trojan Technologies™ provided the TrojanUVPhox™ 12AL30 UV-Oxidation System. The system required single phase 240-volt power. The reactor chamber was 76 inches x 12 inches diameter and contained 12 amalgam lamps contained in transparent glass sleeves. The pilot system was provided with 3-inch piping and 3-inch influent and effluent flanges for field connections.

The pilot system included a control system with an operator interface screen. Lamp power could be turned on or off or dimmed from the control screen. Lamp sleeves were equipped with a wiper system which was also controlled from the control screen. The wiper system was operated every 4 hours during the study. Pilot system instrumentation included a flow meter and UVT analyzer. Figure 2.15 is a photo of the pilot UV system at the site prior to being removed from the shipping crate.

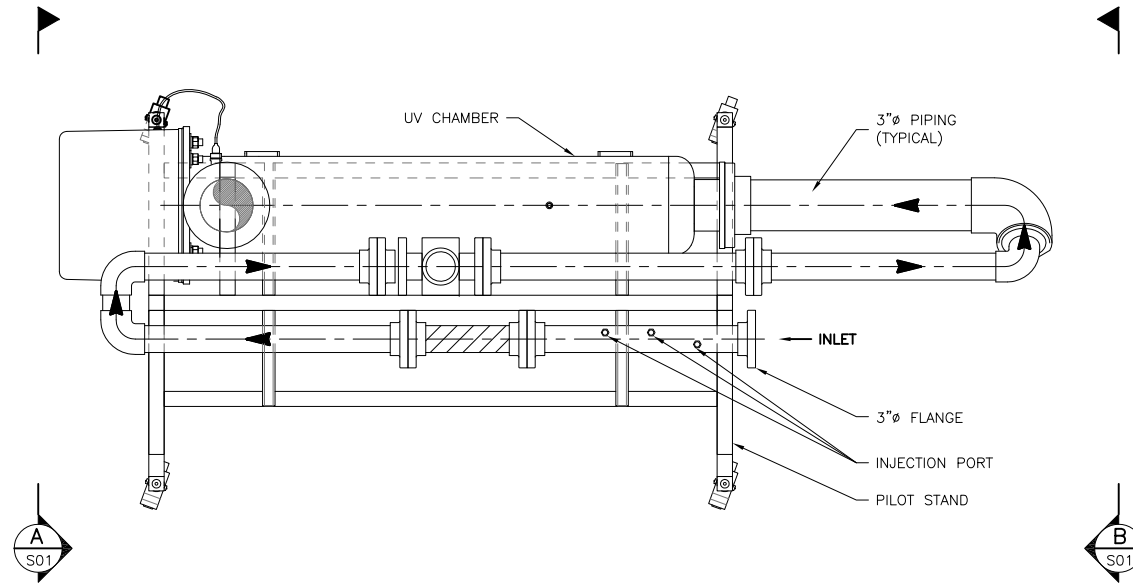
Figure 2.15: Trojan Pilot UV System Photo



The pilot skid had sample taps to provide continuous pre-UV and post-UV samples which flowed into a sample sink. A separate sample tap provided continuous flow of UV influent to the OptiView™ UVT analyzer.

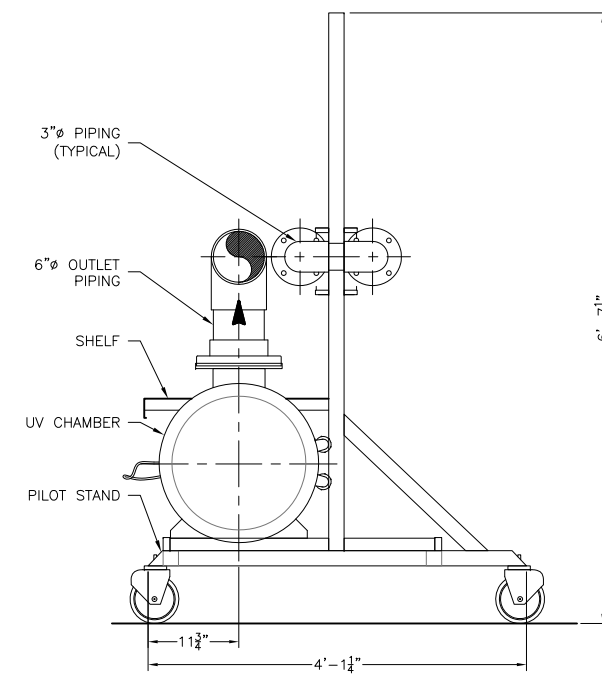
Figure 2.16 provides layout drawings for the Trojan UV pilot system.

Figure 2.16: Trojan UV Pilot System Layout Drawing



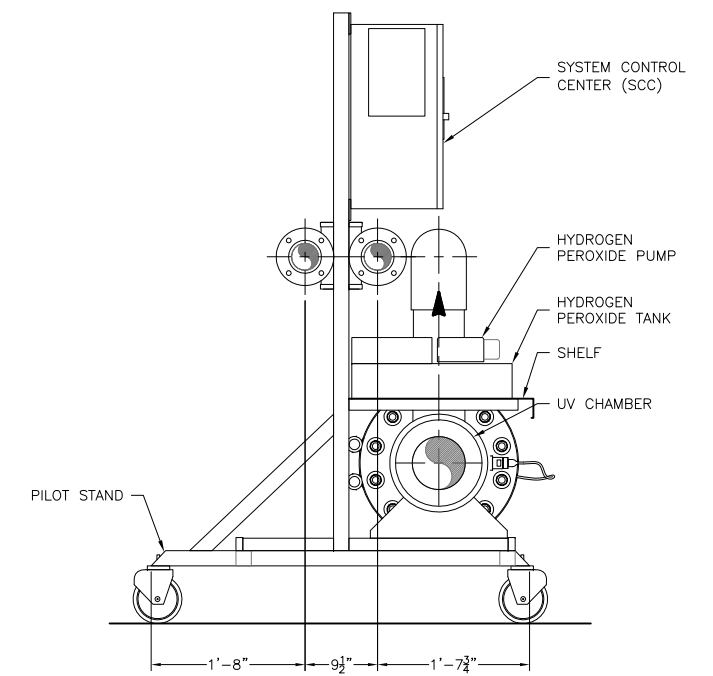
PLAN VIEW

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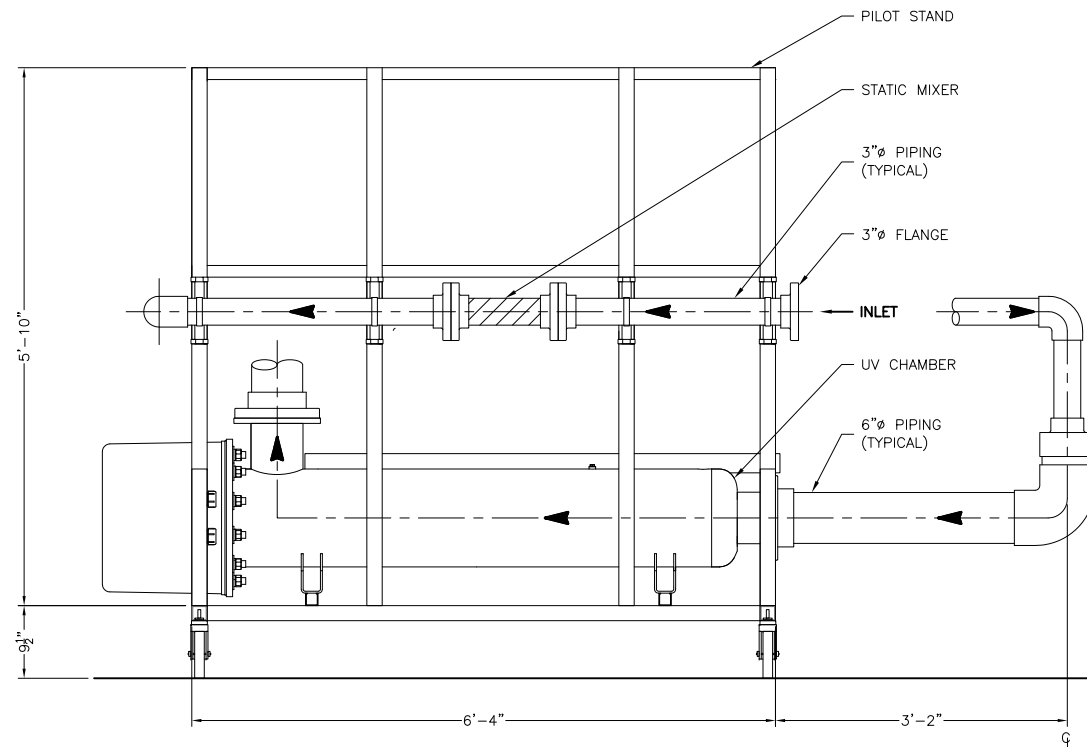
SIDE VIEW A

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NOTE: SCC, OPTIVIEW™ AND HYDROGEN PEROXIDE TANK & PUMP NOT SHOWN FOR CLARITY.



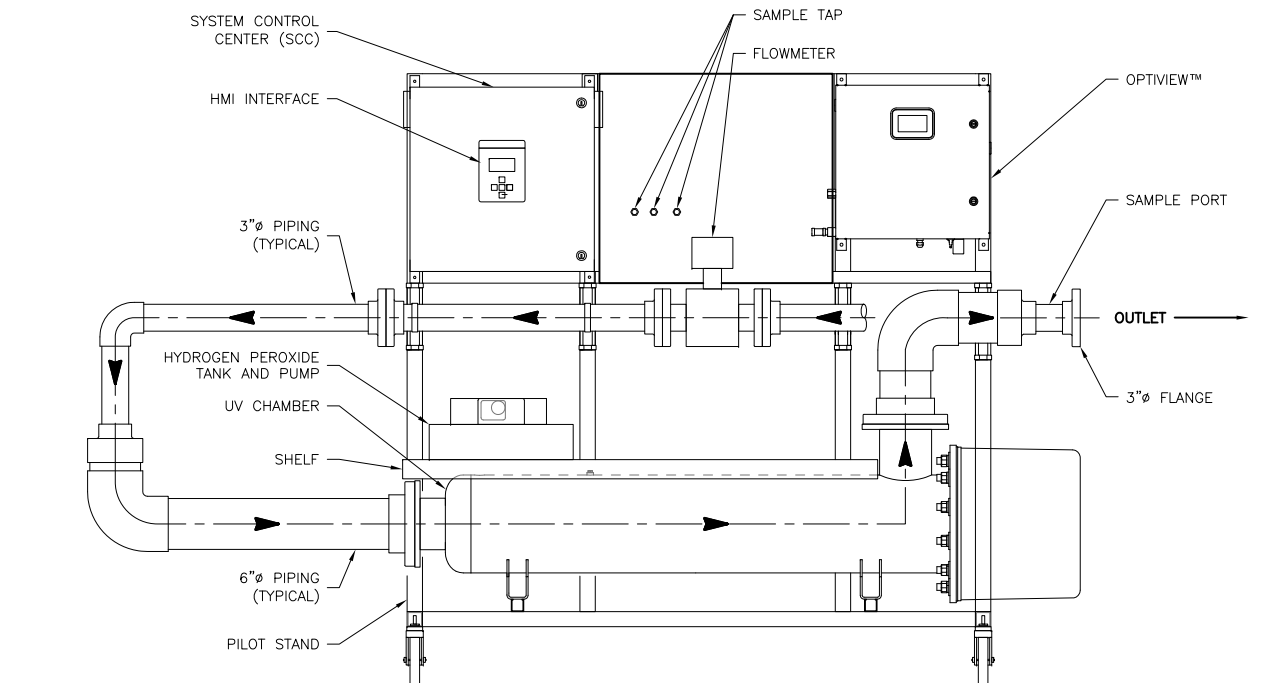
SIDE VIEW B

SCALE: NOT TO SCALE



PANEL VIEW

SCALE: NOT TO SCALE



UV CHAMBER VIEW

SCALE: NOT TO SCALE

<p>TROJAN UV WATER TECHNOLOGIES BUSINESS</p> <p>CONFIDENTIALITY NOTICE Copyright © 2016 by Trojan Technologies. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form, without the written permission of Trojan Technologies.</p>	DESCRIPTION:		QUOTE NO.
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2.1.4 GAC Contactor

The GAC contactor was operated for PFAS removal during initial Greensand testing when utilizing the Hyannisport Well and then during all high-capacity trials downstream of UV AOP treatment. The GAC contactor was operated downstream of the Greensand filters during initial testing from April 26 to May 3, 2021, at Hyannisport Well. Figure 2.17 shows the GAC contactor setup at the Hyannisport station.

Figure 2.17: GAC Contactor at Hyannisport Station



The GAC contactor was then relocated to the shipping container housing the UV system during the high-capacity trials. Figure 2.18 shows the GAC contactor arrangement inside the container.

Figure 2.18: GAC Contactors Setup Inside Shipping Container



During the initial phase of piloting Greensand filter effluent was supplied to the GAC contactor by a ½ HP booster pump. The suction side of the pump was connected to the Greensand filter effluent tank which contained dechlorination tabs. During the high-capacity second phase of testing the GAC contactor was supplied with UVAOP treated effluent. During this phase a 1/3 HP sump pump was placed into the dechlorination tank to pump water to the GAC contactor.

The GAC contactor contained a total depth of 10-feet of GAC media. The contactor was constructed as a series of three 5-foot-tall vessels containing 40 inches of GAC media each and were operated to function as a single contactor. Each vessel was constructed of 6-inch diameter clear PVC.

The three vessels each had an underdrain consisting of a 2-inch stainless steel slotted media-retention nozzle. Each top flange was connected to a ¾-inch three-way valve, where one position was forward flow (feed) and the other was reverse flow (backwash). The vessel bottoms had two ¾-inch connections, each equipped with ¾-inch ball valves. One connection was used as the discharge of the contactor (forward flow) and the other for backwashing (reverse flow). Figures 2.19 and 2.20 show the contactor top and bottom configurations.

Figure 2.19: Contactor Inlet

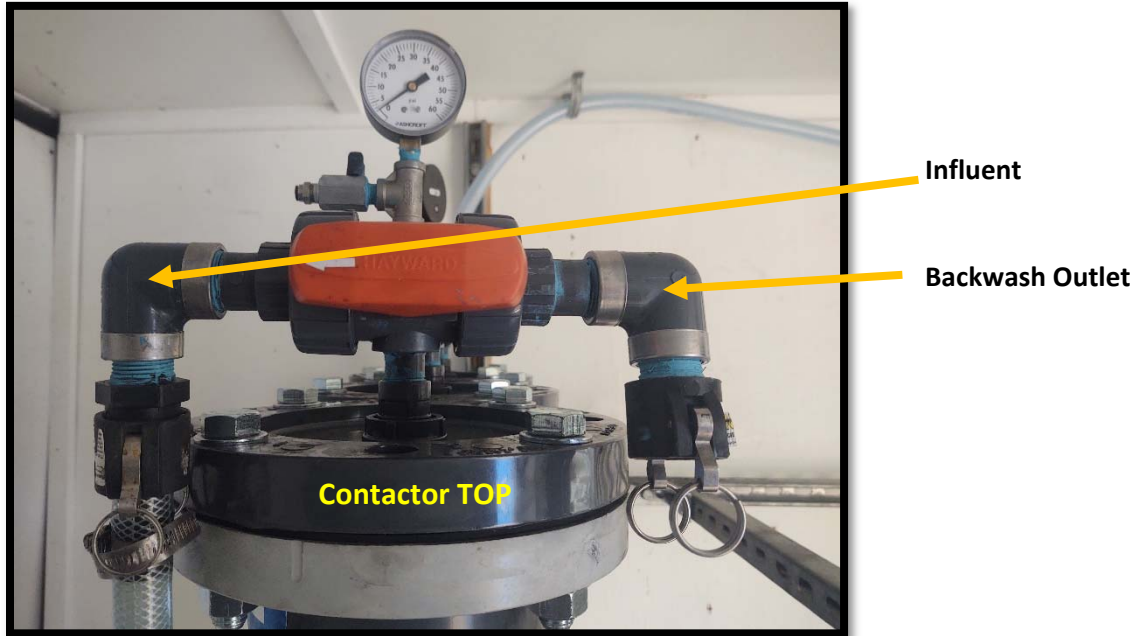
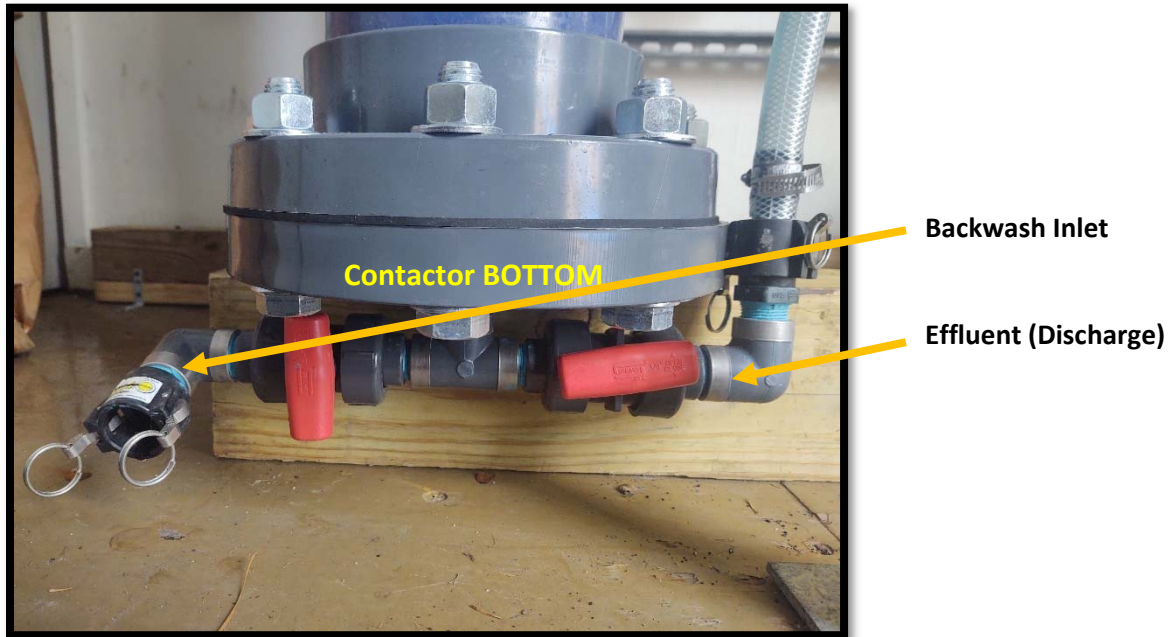


Figure 2.20: Contactor Outlet



The three identical 5-foot tall 6-inch diameter contactors each containing 40''' of Calgon GAC were operated in series. The first GAC vessel (GAC #1A) received greensand filter effluent (initial phase) or UV effluent (high-capacity phase) and the second and third GAC vessels (GAC #1B, GAC #1C) received effluent from the previous GAC vessel. All three GAC vessels were hydraulically connected and operated at the same flow rate to function as a single contactor with a total depth of 10' of media. Separate GAC contactor vessels were constructed as opposed to one taller GAC contactor to provide sufficient headspace for backwashing the GAC and due to height restrictions, and ease of construction/installation. The total volume of media was approximately 2.0 cubic feet, or 14.7 gallons, and the contactor operated at 10 minutes EBCT at a flow rate of 1.5 gallons/minute.

The granular activated carbon (GAC) utilized for the pilot study was Calgon's F-400. The GAC media was soaked and backwashed prior to pilot operation to remove media fines.

Manufacturer media descriptions are included in Appendix E.

Table 2.02 summarizes the pilot contactor configurations.

Table 2.02: Pilot Contactor Configuration

Parameter	GAC Contactor			
	Vessel 1	Vessel 2	Vessel 3	Total
Media Type	Calgon Filtrasorb 400			
Adsorptive media depth	40" (3'4")			120" (10')
Adsorptive media volume	4.9 gal			14.7 gal
Freeboard above filter surface	20" (1'8")			60" (5')
Contactor vessel diameter	6"			6"
Contactor surface area	0.2 ft ²			0.2 ft ²
Contactor vessel height	5'			15'
Filter vessel empty volume	7.34 gal			22 gal

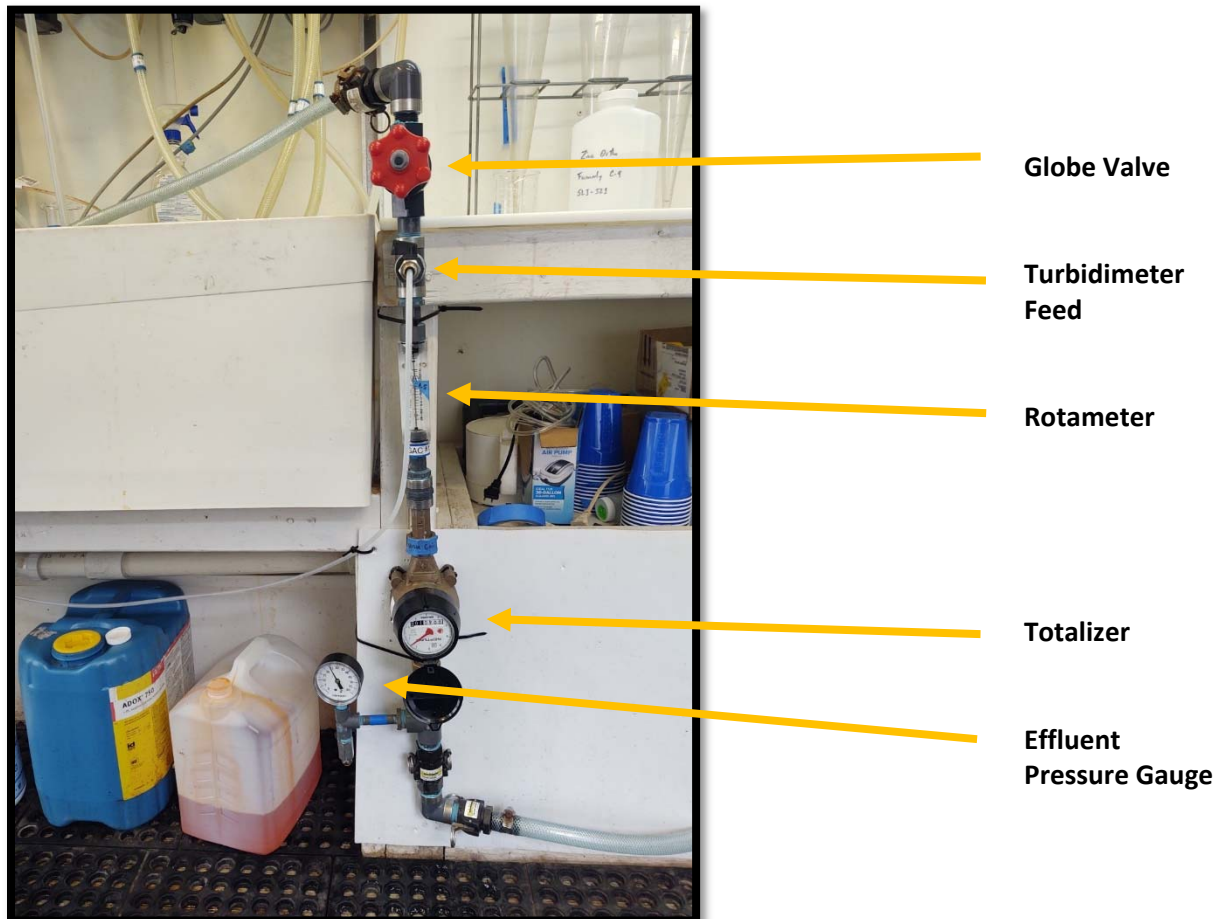
GAC contactor effluent from the third and final vessel flowed through a ¾" Nylabraid hose out of the shipping container and into the Greensand filtration trailer where the flow control assembly and effluent turbidimeter could be monitored.

The flow control and monitoring assembly consisted of a globe valve for flow control, a rotameter for manual flow readings, a totalizer for quantifying the total volume of water treated, and ¼" connection to feed a turbidimeter and provide a sample.

0-60 psi pressure gauges were used to monitor differential pressure (headloss) development of the pilot scale contactor. Each vessel had differential pressure monitoring capability. Each contactor had a dedicated outlet pressure tap connected to a pressure gauge. Contactor differential pressures (DPs) were calculated using the inlet and outlet pressures for each contactor.

Figure 2.21 shows the contactor flow control assembly. Important components such as the globe valve, rotameter, totalizer (water meter), and pressure tap are identified.

Figure 2.21: PFAS Contactor Flow Control Assembly



The GAC contactor effluent was discharge through ½” Nylabraid hose at the top of the flow control assembly into the sample sink in the Greensand filtration trailer.

2.1.4.1 Calgon Filtrasorb® 400 Granular Activated Carbon (GAC)

Calgons product data sheet describes FILTRASORB ® 400. The data sheet in included in Appendix F.

FILTRASORB 400 is a granular activated carbon for the removal of dissolved organic compounds from water and wastewater as well as industrial and food processing streams. These contaminants include taste and odor compounds, organic color, total organic carbon (TOC), industrial organic compounds such as TCE and PCE, and PFAS. This activated carbon is made from select grades of bituminous coal through a process known as reagglomeration to produce a high activity, durable, granular product capable of withstanding the abrasion associated with repeated backwashing, hydraulic transport, and reactivation for reuse. Activation is carefully controlled to produce a significant volume of both low and high energy pores for effective adsorption of a broad range of high and low molecular weight organic contaminants. FILTRASORB 400 is formulated to comply with all the applicable provisions of the AWWA Standard for Granular Activated Carbon (B604) and Food Chemicals Codex. This product may also be certified to the requirements of ANSI/NSF Standard 61 for use in municipal water treatment facilities. Only products bearing the NSF Mark are certified to the NSF/ANSI 61 - Drinking Water System Components - Health Effects standard. Certified Products will bear the NSF Mark on packaging or documentation shipped with the product.

2.1.5 Field Laboratory and Analytical Testing Equipment

The greensand pilot trailer was equipped with a field laboratory to provide an area to complete field analyses (Figure 2.22). Glassware, reagents, and analytical equipment necessary to complete the analyses described in Section 2.3 were included in the field laboratory.

Figure 2.22: Greensand Pilot Trailer Field Laboratory



The following sample locations were used during the pilot study:

Initial Phase – Greensand Testing

- RAW – Raw water sample from the well source depending on which well was being treated.
- POX AB – Post Oxidized influent to the Greensand Filters A/B collected from filter influent tap.
- POX CD – Post Oxidized influent to the Greensand Filters C/D collected from filter influent tap.
- FILTER A – Filter Effluent from Filter A collected at the point of discharge to the sample sink.
- FILTER B – Filter Effluent from Filter B collected at the point of discharge to the sample sink.
- FILTER C – Filter Effluent from Filter C collected at the point of discharge to the sample sink.
- FILTER D – Filter Effluent from Filter D collected at the point of discharge to the sample sink.
- CBW A – Combined Backwash Filter A collected from homogenized backwash.
- CBW B – Combined Backwash Filter B collected from homogenized backwash.
- CBW C – Combined Backwash Filter C collected from homogenized backwash.
- CBW D – Combined Backwash Filter D collected from homogenized backwash.
- GAC – Filter Effluent from GAC Contactor (Hyannisport Well Only)

Second Phase – High-Capacity Testing with UVAOP and GAC

- RAW – Raw water sample from the well source depending on which well was being treated.
- POX – Post Oxidized influent to the Greensand Filters 1 and 2 collected from filter influent tap.
- FILTER 21-1 – Filter Effluent from the 21” diameter high-capacity Filter 21-1 collected at the point of discharge to the sample sink.
- FILTER 21-2 – Filter Effluent from the 21” diameter high-capacity Filter 21-2 collected at the point of discharge to the sample sink.
- CBW GSP– Combined Backwash from Greensand filter collected from homogenized backwash.
- Pre-UV – UV Influent after addition of 35% hydrogen peroxide collected at sample tap on skid.
- UV Effluent (Post UV) – UVAOP treated water collected at sample tap on skid.
- GAC –Effluent from GAC contactor collected at point of discharge to the sample sink.

2.2 PRETREATMENT

Liquid pretreatment chemicals were diluted with filtered water at measured volumetric ratios to produce feed stocks with the desired concentrations. The objective was to maintain chemical feed rates within the mid-range of the feed pumps to allow for dose adjustments up or down as required.

- Sodium hydroxide (NaOH) was used to achieve the target pH of each filtration process.
- Sodium hypochlorite (NaOCl) was used for oxidation of dissolved iron and maintenance of an oxidative environment for media regeneration.
- Hydrogen peroxide was used for advanced oxidation with UV which requires the addition of hydrogen peroxide upstream of the UV system. The irradiation of hydrogen peroxide by ultraviolet light breaks down the hydrogen peroxide into highly reactive radicals which oxidize the 1,4-Dioxane.

Table 2.03 summarizes the pretreatment chemical properties.

Table 2.03: Pretreatment Chemical Properties

Product	Formula	Function	Stock Strength	Specific Gravity
Sodium Hypochlorite	NaOCl	Oxidant/Disinfection	7.5%	1.10
Sodium Hydroxide	NaOH	pH Adjustment	50%	1.53
Hydrogen Peroxide	H ₂ O ₂	Advanced Oxidation	35%	1.13

The liquid chemicals were added to graduated day tanks shown in Figure 2.23, which allowed measurement of daily drawdown rates. The drawdown rates were used to calculate chemical feed rates and doses. Field dilutions were as follows:

- NaOH was used at a dilution of the stock NaOH by 33% (1/3). The diluted NaOH was placed in a day tank with a volume of up to 60 L, with graduations at 1 L (1000 mL) intervals.
- NaOCl was used at a dilution of the stock by 10% (1/10) during the initial Greensand testing and then as undiluted neat product during the high capacity testing. The NaOCl stock was placed in a day tank with a volume of up to 60 L, with graduations at 1 L (1000 mL) intervals.
- H₂O₂ was utilized undiluted directly from the 15-gallon drum.

Figure 2.23: Chemical Day Tanks



2.2.1 Dose Calculation for NaOCl

NaOCl doses were calculated based on the stock concentration of the product, the dilution of the stock product with make-up water, the chemical feed rate, and the flow rate of the process water. The NaOCl dose based on volume of product was determined using the following formula:

$$Cl_2 \text{ Dose (ppm)} = \left[\frac{(R)(D)(10^6 \text{ ppm})}{(Q)(3,785 \text{ mL/gal})(60 \text{ min/hr})} \right]$$

Where: R = chemical feed rate (mL/hour) per day tank drawdown measurements
 Q = process water flow rate (gpm)
 D = dilution factor of chemical in day tank (dimensionless ratio)

The concentration of free available chlorine in sodium hypochlorite stock solution was not determined during the pilot study. Typical store-bought sodium hypochlorite stock solution is assumed to have an available chlorine concentration of 7.5%. For determining the mass based NaOCl dose, the stock

solution is assumed to have a free chlorine concentration of 7.5% by weight and a specific gravity of 1.10. The NaOCl dose based on mass was determined using the following formula:

$$Cl_2 \text{ Dose (mg/L)} = \left[\frac{(R)(D)(1.10)(7.5\%)(10^6 \text{ mg/L})}{(Q)(3,785 \text{ mL/gal})(60 \text{ min/hr})} \right]$$

Where: R = chemical feed rate (mL/hour) per day tank drawdown measurements
 Q = process water flow rate (gpm)
1.10 = specific gravity of the product (dimensionless)
7.5% = weight percentage of the product (% NaOCl)
 D = dilution factor of chemical in day tank (dimensionless ratio)

2.2.2 Dose Calculation for NaOH

NaOH doses were calculated based on the specific gravity and stock concentration of the product, the dilution of the stock product with make-up water, the chemical feed rate, and the flow rate of the process water. The doses were calculated in terms of mg/L as NaOH. The product had a weight percentage of 45%, and a specific gravity of 1.45. Doses were calculated as:

$$NaOH \text{ Dose (mg/L)} = \left[\frac{(R)(D)(1.53)(50\%)(10^6 \text{ mg/L})}{(Q)(3,785 \text{ mL/gal})(60 \text{ min/hr})} \right]$$

Where: R = chemical feed rate (mL/hour) per day tank drawdown measurements
 Q = process water flow rate (gpm)
1.53 = specific gravity of the product (dimensionless)
50% = weight percentage of the product (% NaOH)
 D = dilution factor of chemical in day tank (dimensionless ratio)

2.2.3 Dose Calculation for H₂O₂

H₂O₂ doses were calculated based on the specific gravity and stock concentration of the product, the dilution of the stock product with make-up water, the chemical feed rate, and the flow rate of the process water. The doses were calculated in terms of mg/L as H₂O₂. The product had a weight percentage of 35%, and a specific gravity of 1.13. Doses were calculated as:

$$H_2O_2 \text{ Dose (mg/L)} = \left[\frac{(R)(D)(1.13)(35\%)(10^6 \text{ mg/L})}{(Q)(3,785 \text{ mL/gal})(60 \text{ min/hr})} \right]$$

Where: R = chemical feed rate (mL/hour) per day tank drawdown measurements
 Q = process water flow rate (gpm)
1.13 = specific gravity of the product (dimensionless)
35% = weight percentage of the product (% H₂O₂)
 D = dilution factor of chemical in day tank (dimensionless ratio - if diluted)

2.3 FIELD ANALYTICAL METHODS

2.3.1 Chlorine, Free and Total

Chlorine (free and total) samples were prepared in accordance with Hach methods #8021 and #8167, respectively. 10 ml samples were placed in sample vials, and reagents (either total chlorine or free chlorine powder pillows) were added. The total chlorine reagent required a reaction time of 3 minutes. The free chlorine samples were analyzed within 30 seconds following addition of the reagent. The prepared chlorine samples were read using a Hach DR5000. The DR5000 was zeroed before each set of readings with a blank from the appropriate sample site. The estimated detection limit for both methods was 0.02 mg/L.

2.3.2 Iron - FerroVer

Iron samples for raw water, pilot influent and intermediate filtrations steps were analyzed in accordance with Hach (Loveland CO) FerroVer® method #8008. Samples with iron concentrations above 3.3 mg/L were diluted with distilled water by a ratio appropriate to bring them into a measurable range. Samples were distributed to 25 ml sample vials. FerroVer iron reagent was added to each sample vial and mixed, and 3 minutes were allowed for reaction. The samples were read using a Hach DR 5000, or DR 890 colorimeter. The colorimeter was zeroed with each set of readings using a blank from the appropriate sample site. The estimated detection limit for the method was 0.04 mg/L.

2.3.3 Manganese – PAN Method (Field Method)

Manganese samples were analyzed using the PAN (1-(2 Pyridylazo)-2 Naphthol) method in accordance with Hach method #8149. 10 mL samples were measured into 25 ml sample vials. Ascorbic acid, alkaline cyanide and 0.1% PAN indicator solution were added using autoburettes set to dispense 0.5 mLs of ascorbic acid, 0.4 mLs of alkaline cyanide, and 0.4 mLs of PAN reagent. The vials were mixed and 2 minutes were allowed for reaction. The samples were read using a Hach DR 5000 or DR 890 colorimeter. The colorimeter was zeroed with each set of readings with a blank of DI water, prepared identically to the samples according to the PAN method. A new blank was prepared with each set of manganese samples that were analyzed. The results were displayed in mg/L of total manganese.

2.3.4 Alkalinity

Alkalinity was analyzed in accordance with the Standard Methods 2320 Titration Method. Either 100 or 200 mL samples were titrated using 0.020N H₂SO₄. The endpoint of the titration was a pH of 4.5 SU.

For alkalinity samples of 30 mg/L or greater, the total alkalinity was determined as follows:

$$\text{Total Alkalinity (mg/L CaCO}_3\text{)} = \frac{A \times N \times 50,000}{\text{mL Sample}}$$

Where:

A = mL titrant to recorded pH (4.5 SU), and
N = Normality of Titrant (0.02 N)

For alkalinity samples less than 30 mg/L, the total alkalinity was determined as follows:

$$\text{Total Alkalinity (mg/L CaCO}_3\text{)} = \frac{(2B - C) \times N \times 50,000}{\text{mL Sample}}$$

Where:

B = mL titrant to first recorded pH (4.5 SU)
C = total mL titrant to reach pH 0.3 unit lower, and
N = Normality of Titrant (0.02 N)

Results were expressed as mg/L of calcium carbonate per liter (mg CaCO₃/L).

2.3.5 Carbon Dioxide

Carbon dioxide was determined in accordance with Standard Method 4500-CO₂ and an Orion 3-star pH meter. A titration was performed on 100 mL samples using 0.02 N NaOH while pH was continuously monitored. The titration was complete when the pH reached approximately 8.3. The volume of titrant added was then used to calculate the concentration of carbon dioxide using the following formula:

$$\frac{\text{mg CO}_2}{\text{L}} = \frac{\text{Volume of Titrant (mL)} \times 0.02 \text{ N NaOH} \times 44,000}{100 \text{ mL}}$$

2.3.6 pH Measurements

Manual pH measurements were made in accordance with Standard Methods 4500-H+B using an Orion glass pH Triode with temperature compensation, and an Orion 3-Star pH meter. A two-point calibration was performed using standard buffer solutions of pH 4.00 SU and pH 7.00 SU, or pH 7.00 SU and pH 10.00 SU.

Online pH probes were HACH pHd differential pH (HACH #DRC1R5N) sensors connected to a SC200 controller. Online pH was monitored by placing the probe in a sample container in the sample sink; the sample container was continuously filling with fresh sample and overflowing at a constant level.

2.3.7 Turbidity

Turbidity was monitored by Hach Model 1720D turbidimeters installed in the pilot trailer. The turbidimeters were connected to pressurized sample ports via ¼" OD tubing, and flow rates were controlled by ¼" ball valves. Sample flow rates were periodically checked and maintained at 100-450 ml/minute. The turbidimeter controllers displayed instantaneous turbidities in Nephelometric Turbidity Units (NTU). The controllers provided a signal to a PC based data acquisition system that recorded data continuously for all turbidimeters.

2.3.8 Hydrogen Peroxide

Hydrogen peroxide concentrations were monitored using a CHEMetrics Hydrogen Peroxide CHEMets® Kit. A CHEMet ampoule is inserted into a 25 mL sample and the tip snapped off. The ampoule will fill with sample. Mix the sample by inverting the ampoule several times. Wipe the ampoule dry and allow

30 seconds for reaction. The presence of hydrogen peroxide will produce an orange color. Compare the ampoule color with the low or high range comparator and record the corresponding concentration.

2.3.9 UV Transmittance

Ultraviolet Transmittance (UVT) was monitored by a Optiview™ online UVT analyzer. UVT refers to the percentage of light that passes through a water sample at the wavelength of 254 nm. UVT relates to the organics, colloidal solids, and suspended particles that absorb and scatter this UV light wavelength. The amount of UV light absorbed by the sample is known as the UV Absorbance (expressed as A_{254}).

Absorbance and transmittance are relevant by this logarithmic function $A = \log_{10} (1/T)$. UV light, at wavelength 254 nm, is passed through a path of the water sample. The result is compared to a light intensity measured in pure water and the UVT percentage displayed. The Optiview analyzer provided a signal to a PLC based data acquisition system that recorded data continuously.

2.4 STATISTICAL METHODS

2.4.1 Paired t-test

The paired t-test procedure is used to analyze the differences between paired observations. The procedures are used to determine if the mean difference for the population is likely to be different from zero. The paired t-procedure is used to compare two opposing hypotheses:

H_0 (the null hypothesis): That the mean of the differences in the population is equal to zero
- or -

H_1 (the alternative hypothesis): That the mean of the differences in the population is not equal to zero.

The paired t test results are normally displayed as a confidence interval, which is a range of likely values for the difference between the two sample sets. Confidence intervals that contain zero normally indicate that the null hypothesis has not been disproven, i.e. that there was not a significant difference in paired values.

The t-test results also provide two statistics to test of the mean difference: a t-value and a p-value. The t-value is not very informative by itself, but it is used to determine the p-value. The p-value indicates how likely it is that H_0 is true. High p-values suggest that there is no difference between paired values, while low p-values suggest that there is a statistically significant difference between paired values.

2.4.2 Analysis Of Variance (ANOVA)

When appropriate, Minitab software was used to perform an Analysis Of Variance (ANOVA) to compare the effects of two or more factors upon a specific response. For example, an ANOVA might be used to compare effluent iron concentrations (the response) at different surface loading rates (the factor). The following explanation was adapted from the software documentation.

An ANOVA tests the hypothesis that the means of two or more populations are equal. The procedure uses variances to determine whether the means are different, by comparing the variance between group means versus the variance within groups. In this way the ANOVA determines whether the different groups are all part of one larger population, or can be statistically distinguished as separate populations with different characteristics. An ANOVA requires data from normally distributed populations with roughly equal variances between factor levels.

An example of the output from an ANOVA is shown below on Table 2.04. The ANOVA tested a data set to determine whether the Factor had a statistically significant affect upon the Response. The Factor had two levels. Level 1 included 22 data points, and Level 2 included 10 data points.

Table 2.04: Example of One-Way ANOVA Response versus Factor with Two Levels

Source	DF	SS	MS	F	P
Trial	1	0.071783	0.071783	234.91	0.000
Error	30	0.009167	0.000306		
Total	31	0.080950			

S = 0.01748 R-Sq = 88.68% R-Sq(adj) = 88.30%

Individual 90% CIs For Mean Based on
Pooled StDev

Level	N	Mean	StDev
1	22	0.12318	0.02009
2	10	0.02100	0.00876

-----+-----+-----+-----+-----
 (-*-)
 -----+-----+-----+-----+-----
 0.030 0.060 0.090 0.120

Pooled StDev = 0.01748

The most important aspects of the ANOVA are described below.

2.4.2.1 Null Hypothesis

The ANOVA determines whether the null hypothesis should be accepted or rejected. For all ANOVAs herein, the null hypothesis and its alternative hypothesis were as follows:

- The Null Hypothesis (H_0) states that all population means are equal.
- The Alternative Hypothesis (H_1) states that at least one population mean is different.

If the null hypothesis is rejected, it indicates that the population means were different, and it follows that the Factor had a statistically significant affect upon the Response. If the null hypothesis is accepted, then it follows that the factor did not have a significant effect upon the response.

2.4.2.2 Probability Value

The probability value (p-value) reports the probability that the null hypothesis can be accepted. The p-value is tested against an alpha value (α), often called the level of significance. Alpha was chosen to be 0.05 (5%) for all ANOVAs herein. If the p-value is greater than alpha ($p > 0.05$) then there was greater than 5% probability that the population means were the same (or alternatively less than 95% probability that the means were different) and the null hypothesis cannot be rejected. If the p-value is less than alpha ($p < \alpha$), then the null hypothesis can be rejected, and it can be concluded that at least one mean is different than the others to a certainty of >95%.

In the example above, the p-value was 0.000, which indicates <0.1% probability that the null hypothesis is correct, or conversely >99.9% probability that the null hypothesis can confidently be rejected.

2.4.2.3 Confidence Intervals

A confidence level of 90% was chosen for all ANOVAs herein. The ANOVA output includes a plot of the 95% confidence intervals. For each data set (Levels 1 and 2) the asterisk (*) indicates the mean value, and 95 out of 100 data fall within the 95% confidence interval indicated between the parentheses.

In the example above, there is no overlap of the confidence intervals. The data sets corresponding to Level 1 and Level 2 are clearly different. This indicates that the Factor at Levels 1 and 2 had a significant effect upon the response.

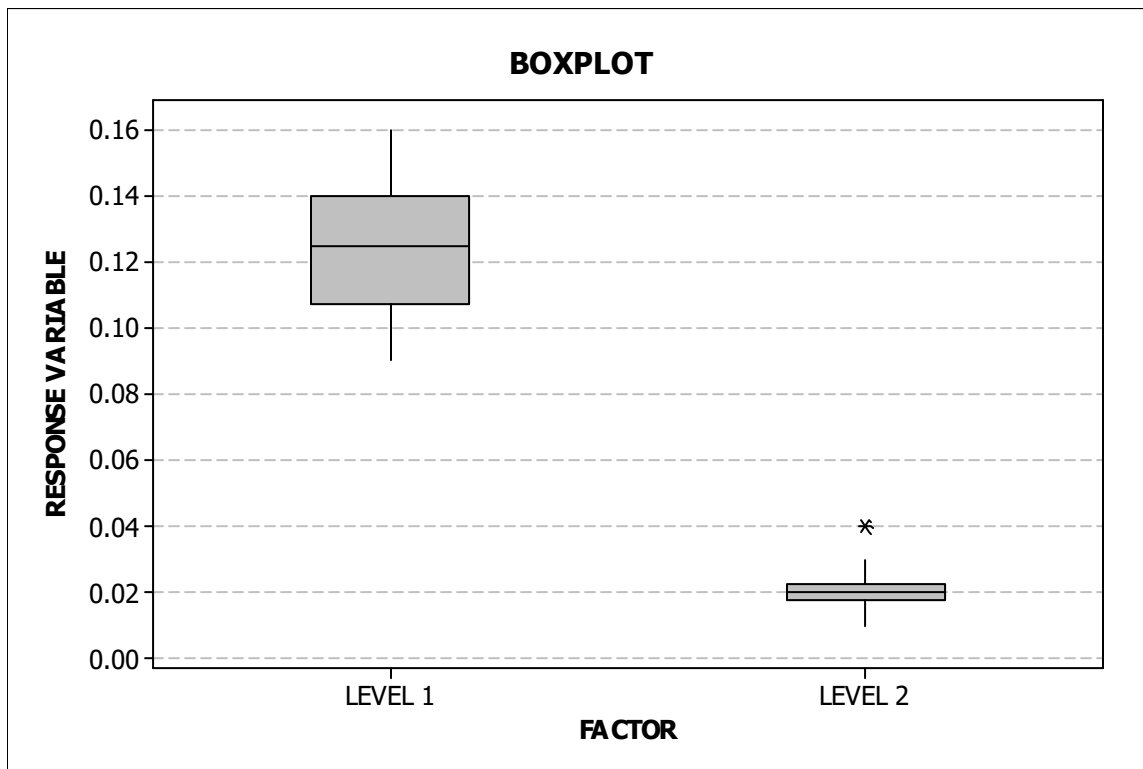
2.4.2.4 Mean and Standard Deviation

The ANOVA reports the mean, standard deviation, and sample count (N) for each data set. In the example above, Level 1 had a mean of 0.123 and a standard deviation of 0.020, while Level 2 had a mean of 0.021 and a standard deviation of 0.009. Level 2 had a lower mean and a smaller standard deviation than Level 1.

2.4.3 Boxplots

Boxplots are used to provide a graphical summary of the distribution of a sample. Minitab can include a boxplot as part of the output of an ANOVA. A boxplot shows the shape, central tendency, and variability of the sample. Figure 2.24 was from the same data used for the ANOVA example, above. One factor was tested at two levels. The boxplot shown here suggests that Level 2 resulted in a lower median response than Level 1, and also had a narrower range of variation than Level 1.

Figure 2.24: Boxplot Example



The important aspects of the boxplot are described below:

1. The upper whisker extends to the maximum data point within 1.5 box heights from the top of the box.
2. The interquartile range box contains the middle 50% of the data.

- a. The top line indicates the third quartile (Q3). 75% of the data are less than or equal to this value.
 - b. The middle line indicates the median (Q2). 50% of the data are less than or equal to this value, and 50% of the data are greater than this value.
 - c. The bottom line indicates the first quartile (Q1). 25% of the data are less than or equal to this value.
3. The lower whisker extends to the minimum data point within 1.5 box heights from the bottom of the box.
 4. An asterisk (*) denotes an outlier, an observation that is beyond the upper or lower.

3 RESULTS

Section 3 – Results, presents the data and results collected during the pilot testing effort.

Data in this section are reported as follows:

1. Analytical data from continuously logged online instrumentation are typically reported as:
Mean ± standard deviation [N = number of data]
2. Analytical data from grab samples or manually recorded data:
 - a. Three or more data are reported as:
Median (minimum – maximum) [N]
 - b. Two or fewer data are reported as:
Two data: (minimum – maximum) [N]
One data: **Value** [1]
Zero data: **No Data** [0]

Tabulated results **highlighted in yellow** represent data in exceedance of regulatory limits.

3.1 RAW WATER QUALITY

Table 3.01 summarizes the raw water quality analyzed by field analyses during the pilot study.

Laboratory results are shown in Tables 3.02 and 3.03. Table 3.02 presents general analyses while Table 3.03 presents the raw PFAS data collected during the study.

Table 3.01: Raw Water Quality by Field Analyses

Parameter	Straightway 1 Well	Straightway 2 Well		Simmons Pond Well		Hyannisport Well
	Greensand Testing March 15 - 23	Greensand Testing April 12 - 19	High Capacity Testing May 18 – Jun 7	Greensand Testing April 19 - 26	High Capacity Testing June 7 - 15	Greensand Testing Apr 26 – May 3
Total Iron, mg/L	0.04 (0.00-0.16) [18]	0.42 (0.37-0.71) [17]	0.46 (0.43-0.71) [27]	0.04 (0.01-0.07) [11]	0.04 (0.01-0.08) [14]	0.03 (0.00-0.09) [15]
Dissolved Iron, mg/L	0.03 (0.00-0.08) [16]	0.39 (0.34-0.53) [14]	0.42 (0.34-0.55) [26]	0.03 (0.01-0.18) [12]	0.04 (0.01-0.06) [14]	0.02 (0.00-0.13) [15]
Total Manganese, mg/L	0.112 (0.084-0.206) [16]	0.961 (0.882-1.32) [16]	0.765 (0.300-0.788) [27]	0.129 (0.078-0.148) [12]	0.148 (0.143-0.189) [14]	0.126 (0.115-0.136) [15]
Dissolved Manganese, mg/L	0.110 (0.076-0.189) [16]	0.962 (0.900-1.27) [13]	0.743 (0.308-0.771) [26]	0.121 (0.089-0.142) [12]	0.143 (0.131-0.158) [14]	0.122 (0.106-0.137) [14]
pH (Handheld), s.u.	5.33 (5.05-5.71) [32]	6.55 (6.17-6.67) [18]	6.53 (6.31-6.64) [38]	6.48 (6.35-6.58) [18]	6.36 (6.32-6.5) [20]	5.45 (5.41-6.45) [18]
Temperature, °C	13 (10.3-13.2) [16]	12.1 (12-12.2) [8]	12.3 (12.0-12.6) [18]	12.3 (11.9-12.6) [9]	12.4 (12.2-12.9) [10]	12.7 (12.5-13) [9]
Carbon Dioxide (mg/L)	47	42	34 (32-37) [3]	34	41	51
Dissolved Oxygen (mg/L)	5.8 +- 0.3 [1123]	3.3 +- 0.3 [1559]		4.6 +- 0.5 [1563]		4.5 +- 0.1 [1653]
ORP (mV)	434 +- 10 [1011]	505 +- 66 [1559]		652 +- 67 [1563]		719 +- 75 [1658]

Table 3.02: Raw Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)													
		56226 L2113238	56580 L2118928	57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	56696 L2120551	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	56792 L2122099	
		Sample Date and Time													
		03/17/21 10:00	04/14/21 10:00	05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/02/21 10:00	06/03/21 10:00	04/22/21 9:30	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	04/29/21 9:30	
STRAIGHTWAY 1	STRAIGHTWAY 2						SIMMONS POND						HYANNISPORT		
1,4 Dioxane	µg/l	<0.25	0.98	0.81	0.66	0.92	0.89	1.0	0.40	0.23	0.31	0.20	0.15	<0.25	
PFAS6	ng/L	44.0	*		93.0			84.6	80.3			80.1	79.4	45.4	
Total Iron	mg/L	<0.050	0.56		0.68			0.81	<0.050				0.044	<0.050	
Dissolved Iron	mg/L	<0.050	0.49		0.41			0.43	<0.050				0.023	<0.050	
Total Manganese	mg/L	0.096	1.20		1.00			0.97	0.140				0.150	0.120	
Dissolved Manganese	mg/L	0.097	1.20		1.00			0.98	0.140				0.140	0.120	
Calcium	mg/L	9.3	17		19				21				19	8.8	
Magnesium	mg/L	4.0	4.8		5.5				5.8				5.3	3.3	
Sodium	mg/L	53	25		26				47				48	68	
Zinc	mg/L	0.013	<0.010		0.0097				<0.010				0.0068	<0.010	
Hardness	mg/L	40	63		70				75				70	36	
Alkalinity	mg/L	<5	42		48			47	42				38	6	
Color, Apparent	s.u.	<5.0	<5.0		<2.5			5.0	<2.5				<2.5	<5.0	
Color, True	s.u.	<5.0	<5.0		<2.5			<2.5	<2.5				<2.5	<5.0	
Bromide	mg/L	<0.1		<0.1				0.1					0.070	<0.1	
Chloride	mg/L	81	47		47				83				81	98	
Sulfate	mg/L	15	21		19				22				20	15	
Total Dissolved Solids	mg/L	200	170		170				250				230	230	
Nitrate-N	mg/L				0.5						4.3				
Nitrite-N	mg/L				<0.019						0.019				
Total Coliform	Col/100mL	absent	absent		absent			absent	absent				absent	absent	
Escherichia Coliform	Col/100mL	absent	absent		absent			absent	absent				absent	absent	
Conductivity	umhos/cm	380	280		280				420				430	420	
pH	s.u.	5.5	6.8		6.8			6.8	6.6				6.7	6.1	
Turbidity	NTU	<1.0	<1.0		<0.4			2.8	<0.4				<0.4	<1.0	
Total Organic Carbon	mg/L	<1.0	<1.0		0.63			0.84	<1.0				<0.59	<1.0	
Carbon Dioxide	mg/L	76	120		200				150				180	79	
Dissolved Oxygen	mg/L	8.3	3.2		1.1				3.9				3.7	4.9	
Oxygen-Reduction Potential	mV	250	150		140				170				200	200	

Table 3.03: Raw Water Quality by Laboratory Analyses – PFAS Compounds

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)													
		56226 L2113238	56580 L2118928	57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	56696 L2120551	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	56792 L2122099	
		Sample Date and Time													
		03/17/21 10:00	04/14/21 10:00	05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/02/21 10:00	06/03/21 10:00	04/22/21 9:30	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	04/29/21 9:30	
STRAIGHT- WAY 1	STRAIGHTWAY 2						SIMMONS POND						HYANNIS- PORT		
2,3,3,3-tetrafluoro-2(heptafluoropropoxy) propanoic acid (GenX acid)(HFPODA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
Perfluorobutanesulfonic Acid (PFBS)	ng/L	6.1	<1.7		3.8			3.6	5.0			5.6	5.4	5.8	
Perfluorodecanoic Acid (PFDA)	ng/L	<1.8	<1.7		0.70*			0.36*	0.40*			<1.7	<1.8	<1.8	
Perfluorododecanoic Acid (PFDoA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
Perfluoroheptanoic Acid (PFHpA)	ng/L	4.9	<1.7		6.8			4.8	5.1			5.1	4.8	3.5	
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	13	<1.7		29			25	30			28	27	19	
Perfluorohexanoic Acid (PFHxA)	ng/L	13	<1.7		11			11	11			12	11	7.2	
Perfluorononanoic Acid (PFNA)	ng/L	2.1	<1.7		2.2			1.8	1.8			<1.7	1.6	1.0*	
Perfluorooctanesulfonic Acid (PFOS)	ng/L	12	<1.7		36			35	30			34	33	16	
Perfluorooctanoic Acid (PFOA)	ng/L	12	<1.7		19			18	13			13	13	6.9	
Perfluorotetradecanoic Acid (PFTEA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
Perfluorotridecanoic Acid (PFTRIA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
Perfluoroundecanoic Acid (PFUnA)	ng/L	<1.8	<1.7		0.66			<1.8	<1.8			<1.7	<1.8	<1.8	
11-Chloroeicosafuoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ng/L	<1.8	<1.7		<1.7			<1.8	<1.8			<1.7	<1.8	<1.8	
Total PFAS6 (Reported Above in Table 3.02)	ng/L	44.0	<1.7 [#]		93.0			84.6	80.3			80.1	79.4	45.4	

* Estimated Concentrations Below Reporting Limit Not Counted Toward Total PFAS6 Calculation Based on MADEP Method

A lab error reported that the field blank was spilled, but it appears more likely that the Raw sample was spilled, and the field blank analyzed as Raw. Data not used. The downstream GSP Filter Effluent PFAS Concentration was 85.73 ng/L.

3.2 PRETREATMENT CONDITIONS

3.2.1 Pretreatment for Iron and Manganese Removal

Raw water was treated with sodium hypochlorite (NaOCl) for oxidation and sodium hydroxide (NaOH) for pH control during Greensand filtration pilot testing for iron and manganese removal.

3.2.1.1 NaOCl Doses

Sodium hypochlorite doses were calculated as described in Section 2.2.1. The doses utilized during the pilot are summarized in Table 3.04 for each of the four wells tested. The chlorine dose is provided in mg/L and ppm due to the inconsistency in the percentage of active chlorine in commercial bleach (stock sodium hypochlorite used during the pilot study).

Table 3.04: Pretreatment Sodium Hypochlorite Doses- Greensand Filtration

Source	NaOCl Dose* ¹ (mg/L)	Bleach Dose as Product (ppm)
Straightway 1	0.9	21.2
Straightway 2	3.7	44.2
Simmons Pond	2.8	33.8
Hyannisport	2.1	26.0

*1 - The labelled stock concentration of the bleach used during the pilot was 7.5%.

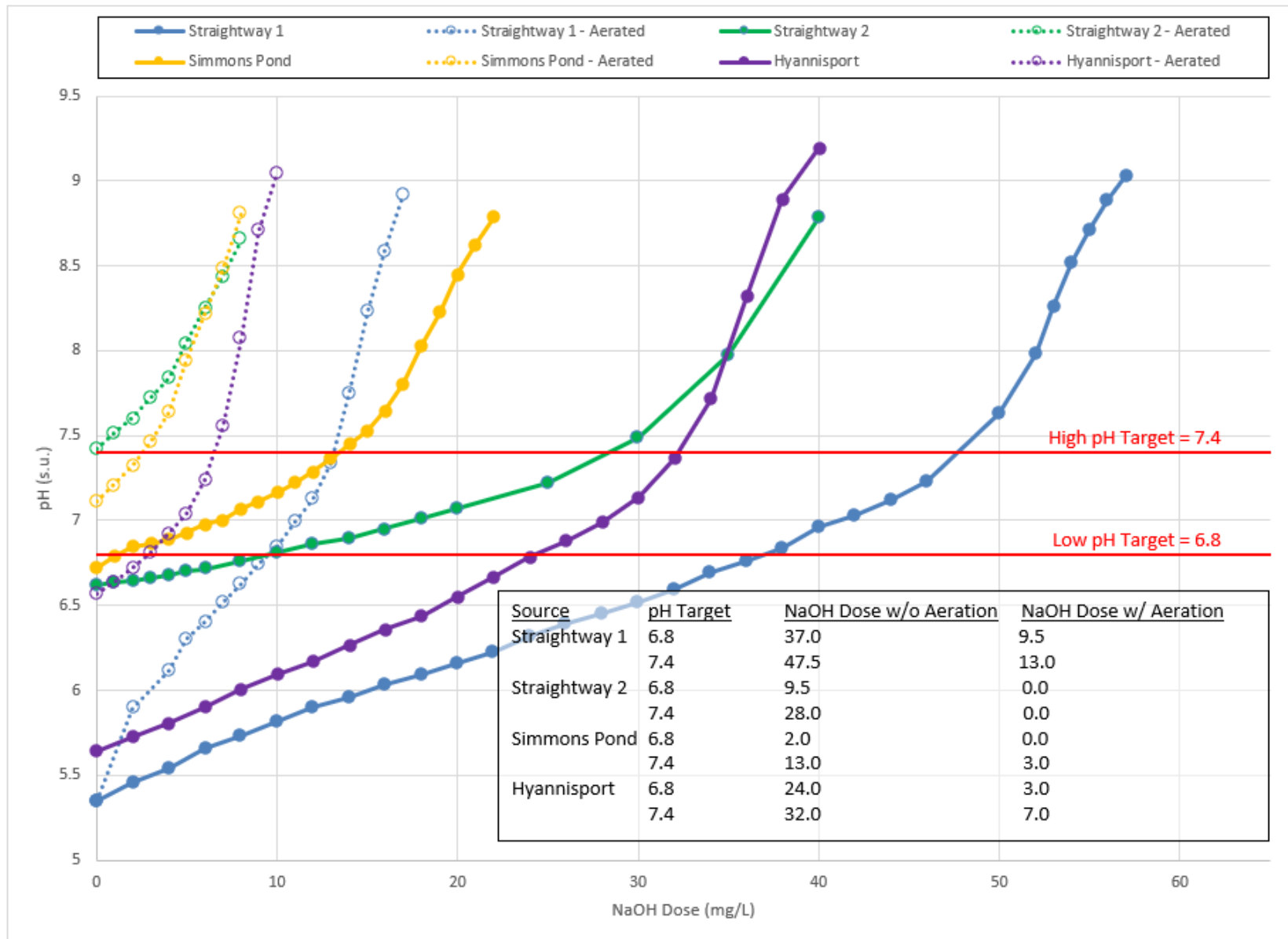
3.2.1.2 Bench Scale pH Titrations

The dose of NaOH required for pH control was evaluated by bench titration. A 0.02N NaOH standard was titrated into 1 L of raw water sample from each source while the pH was continuously monitored. A second experiment was conducted at each source to evaluate whether the NaOH dose for pH adjustment could be reduced by aeration to strip dissolved carbon dioxide (CO₂) from the raw water prior to NaOH injection; a 1 L sample of raw water was first aerated for 5 minutes and then titrated with the 0.02N NaOH standard. Figure 3.01 shows the results (adjusted pH vs. NaOH dose in mg/L) of the NaOH titrations.

- Solid data points (circles) and solid lines indicate titration data for un-aerated raw water samples.
- Open data points and dashed lines indicate titration data for samples after 5 minutes of aeration.
- The upper red line indicates the High-pH target (7.4 s.u.) and the lower red line indicates the Low-pH target (6.8 s.u.).

The doses required for the target pH levels are summarized in the table within the figure. The required NaOH dose was decreased after aeration for each of the four wells. If the wells were equally blended the average NaOH dose required to increase the pH to 7.4 would be approximately 30 mg/L without aeration and 6 mg/L with aeration.

Figure 3.01: Raw Water NaOH Titrations with and without Aeration (5 min)



3.2.1.3 Greensand Filtration Pretreated Water Quality

Pretreatment included pH adjustment with NaOH to increase raw pH to targets of 6.8 and 7.4 and sodium hypochlorite to oxidize dissolved iron and manganese such that they could be removed as precipitated particles or adsorbed onto the adsorptive media. The pretreated water quality by field analyses is summarized by trial in Tables 3.05 and 3.06.

Table 3.05: Pretreated Water Quality Data for Low pH (6.8) Conditions (POX AB) from Field Analyses

Source	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)	Benchtop pH (s.u.)
Straightway 1	1.04 (0.28-2.18) [10]	2.09 (1.17-2.92) [9]	0.01 (0.00-0.05) [10]	0.082 (0.074-0.108) [10]	6.79 (6.55-7.50) [20]
Straightway 2	1.67 (0.54-2.14) [9]	2.20 (1.07-2.20) [9]	0.02 (0.00-0.41) [9]	0.884 (0.680-1.226) [9]	6.62 (6.53-6.85) [18]
Simmons Pond	1.42 (1.17-1.76) [10]	1.72 (1.51-1.87) [9]	0.00 (0.00-9.00) [9]	0.105 (0.070-0.120) [9]	6.62 (6.38-6.70) [18]
Hyannisport	1.38 (0.99-1.66) [9]	1.60 (1.43-1.82) [9]	0.00 (0.00-0.01) [9]	0.098 (0.068-0.105) [9]	6.79 (6.53-6.94) [14]

Table 3.06: Pretreated Water Quality Data for High pH (7.4) Conditions (POX CD) from Field Analyses

Source	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)	Benchtop pH (s.u.)
Straightway 1	0.26 (0.08-2.69) [11]	1.76 (0.09-2.89) [10]	0.01 (0.00-0.05) [11]	0.088 (0.033-0.960) [11]	7.25 (6.56-7.82) [22]
Straightway 2	1.82 (0.65-2.04) [9]	1.99 (1.04-2.20) [9]	0.03 (0.00-0.23) [9]	0.768 (0.642-1.140) [9]	7.64 (6.66-7.82) [18]
Simmons Pond	1.49 (0.96-1.64) [10]	1.65 (0.98-1.77) [9]	0.00 (0.00-0.00) [9]	0.095 (0.060-0.109) [9]	7.52 (7.19-7.80) [16]
Hyannisport	1.36 (0.85-1.62) [9]	1.54 (1.44-1.74) [9]	0.00 (0.00-0.01) [9]	0.083 (0.052-0.106) [9]	7.31 (7.11-8.13) [14]

3.2.2 Pretreatment for 1,4-Dioxane Removal

Raw water was treated with hydrogen peroxide (H₂O₂) for advanced oxidation with UV during piloting for 1,4-Dioxane removal.

The Trojan UV system operated at a target flow rate of 20 gpm during the pilot study. A high and low range of peroxide doses were determined for each of the two water sources tested in consultation with Trojan Technologies based on analysis of water samples shipped to their headquarters in London, Ontario. The target dose and measured concentration are shown in Table 3.07.

Table 3.07: 1,4-Dioxane Removal Pretreatment Doses

Well	Trial Conditions BPL/ H ₂ O ₂ Dose	UV Ballast Power Level (BPL)	Target H ₂ O ₂ Dose (ppm)	Measured H ₂ O ₂ Concentration In UV Influent (mg/L)
Straightway 2	High/High	100%	10	9.0 (6.5-9.0) [5]
	Low/High	60%	10	9.0 (8.0-9.0) [4]
	High/Low	100%	5	3.5 (3.5-4.5) [3]
	Low/Low	60%	5	4.5 (3.5-6.0) [5]
Simmons Pond	High/High	100%	8	7.0 (6.0-8.0) [5]
	Low/High	60%	8	7.0 (6.5-7.0) [3]
	High/Low	100%	3.5	3.0 [2]
	Low/Low	60%	3.5	3.5 [2]

3.2.3 Pretreatment for PFOS/PFOA Removal

UV Effluent was discharged to a dechlorination tank to remove any residual chlorine prior to being pumped to the GAC contactors for PFAS removal. The dechlorination tank contained LPD-Chlor™ dechlorination tablets. GAC contactor influent was checked periodically to confirm there was no chlorine present. All confirmation data indicated that chlorine was effectively quenched.

3.3 TREATED WATER QUALITY

3.3.1 Performance of Greensand Filtration for Iron and Manganese Removal

The initial Greensand filtration trials were operated specifically for evaluation and optimization of Greensand treatment at the four different wells tested. Different loading rates were evaluated to determine the effect on filter run times, and different operating pHs were tested to determine if there was a difference in effluent water quality with elevated filter pH. The information and data presented in this section is primarily from the initial Greensand filtration trials. Four identical 6" diameter filters (designated as Filter A, B, C and D) were operated in parallel during this period.

The high-capacity 21" diameter filters Greensand filters were operated under optimized conditions in order to provide an adequate supply of iron and manganese free water during the UV AOP trials. Operating conditions did not vary through the high-capacity filters during this period.

3.3.1.1 Greensand Filter Performance Summary Tables

Tables 3.08 through 3.11 summarize filter performance data for Filters A through D, respectively. Performance data includes filter operating conditions, hydraulic performance data, and the continuously logged filter effluent turbidity data. The filter effluent water quality data are presented separately in Section 3.3.1.3. Data may be presented in any of the following formats:

- i. Median (minimum – maximum) [number of samples]
- ii. Average \pm standard deviation [number of samples]
- iii. For sets with only 1 data, the results are presented as: x [1], where x is the individual value.
- iv. For sets with only 2 data, the results are presented as: $x_1 - x_2$ [2], where x_1 and x_2 are the individual values.

The following information is tabulated for each filter:

- "Trial" – The Trial number.
- "Fig. No." – The figure number corresponding to the trial. Figures are included in Section 3.3.2.
- "Description" – Provides the well source and information relative to recycle periods.
- "Start Time" – The date and time that the filter run began.
- "End Time" – The date and time that the filter run ended.
- "Trial Duration (hours)" – The total run time of the filter run from Start to End, in hours.
- "FSLR (gpm/sf)" – The actual filter surface loading rate being processed through the filter, in gpm/sf. This was calculated using recorded online flow rates, divided by the surface area of the pilot filter (0.196 sf for each filter). The data are presented as average \pm standard deviation [sample count].
- "Clean Bed to Terminal Headloss" – The parameters of the linear regression on the DP versus Runtime data:
 - » "Clean Bed Headloss (psid)" – The y-axis intercept of the regression line. This is the coefficient "b" in the DP vs. Runtime relationship ($y = mx + b$) and indicates the initial clean bed DP at the start of filter service operations (runtime = 0 hours).
 - » "Slope (psi/hr)" – The slope of the regression line. This is the coefficient "m" in the DP vs. Runtime relationship ($y = mx + b$) and indicates the time-rate at which DP increases across the filter bed.

- » “Runtime to 10 psi” – The estimated runtime (in hours) to develop a DP of 10 psid, based on the regression equation: $\text{Runtime (hours)} = (10 \text{ psi} - b) \div m$.
- “Runtime to Breakthrough (hours)” – The observed filter runtime until the filter reached contaminant breakthrough. Breakthrough never occurred during any of the filter trials, therefore there are no data in these columns.
- “All Turbidity Data (NTU)” – Statistics of all the turbidity data collected during the filter run, including data from initial post-backwash operation, spikes resulting from process disturbances, and post-breakthrough data. The data are presented as average \pm standard deviation [sample count].
- “Representative Turbidity Data (NTU)” – Statistics of the representative turbidity data, excluding the presumed filter-to-waste post-backwash period, the post-breakthrough period, and spikes related to identifiable operational upsets. The data are presented as average \pm standard deviation [sample count].

Table 3.12 summarizes the operating conditions for the high-capacity trials with the 21” diameter filters. The data is grouped by source instead of trial because the filters were operated at the same conditions throughout the UV AOP trials.

Table 3.08: Filter A Performance Data (Low FSLR – Low pH Filter)

Trial	Fig. No.	Description	Start Time	End Time	Trial Duration (hours)	FSLR (gpm/sf)	Clean Bed to Terminal Headloss			Runtime to Break-through (hours)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
							Clean Bed Headloss (psid)	Slope (psi/hr)	Runtime to 10 psi (hrs)			
A.1	E-1	STRAIGHTWAY 1	03/16/21 09:20	03/23/21 08:40	167.3	4.24 ± 0.17 [2005]	1.25	0.02	403.2	-	0.019 ± 0.112 [2009]	0.018 ± 0.111 [2004]
A.2	E-5	STRAIGHTWAY 2	04/12/21 12:10	04/16/21 08:15	92.1	4.11 ± 0.20 [1104]	1.40	0.02	403.8	-	0.039 ± 0.031 [1106]	0.039 ± 0.022 [1105]
		Before Recycle	04/12/21 12:10	04/15/21 10:30	70.3	4.17 ± 0.18 [844]	-	-	-	-	0.029 ± 0.017 [845]	0.029 ± 0.017 [845]
		During Recycle	04/15/21 10:35	04/15/21 14:35	4.0	3.89 ± 0.01 [49]	-	-	-	-	0.064 ± 0.005 [49]	0.064 ± 0.005 [49]
		After Recycle	04/15/21 14:40	04/16/21 08:15	17.6	3.89 ± 0.01 [211]	-	-	-	-	0.070 ± 0.044 [212]	0.070 ± 0.003 [211]
A.3	E-9	STRAIGHTWAY 2	04/16/21 08:50	04/19/21 09:30	72.7	5.83 ± 0.02 [872]	1.70	0.09	95.7	-	0.029 ± 0.020 [873]	0.028 ± 0.005 [870]
A.4	E-13	SIMMONS POND	04/19/21 14:35	4/24/21 23:20	128.7	4.13 ± 0.07 [1545]	1.20	0.01	792.8	-	0.035 ± 0.002 [1546]	0.035 ± 0.002 [1545]
A.5	E-17	HYANNISPORT	4/27/21 11:10	5/03/21 11:20	144.2	4.08 ± 0.26 [1671]	1.60	0.01	1254.0	-	0.034 ± 0.004 [1731]	0.034 ± 0.004 [1730]
		Before Recycle	4/27/21 11:10	4/29/21 14:45	51.6	4.10 ± 0.03 [615]	-	-	-	-	0.034 ± 0.002 [620]	0.034 ± 0.002 [620]
		During Recycle	4/29/21 14:50	4/29/21 16:50	2.0	4.09 ± 0.01 [25]	-	-	-	-	0.033 ± 0.001 [25]	0.033 ± 0.001 [25]
		After Recycle	4/29/21 16:55	5/03/21 11:20	90.4	4.07 ± 0.33 [1031]	-	-	-	-	0.034 ± 0.005 [1086]	0.034 ± 0.005 [1085]

Table 3.09: Filter B Performance Data (High FSLR – Low pH Filter)

Trial	Fig. No.	Description	Start Time	End Time	Trial Duration (hours)	FSLR (gpm/sf)	Clean Bed to Terminal Headloss			Runtime to Break-through (hours)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
							Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)			
B.1	E-2	STRAIGHTWAY 1	03/16/21 09:20	03/23/21 08:40	167.3	6.70 ± 0.02 [2004]	0.45	0.05	188.4	-	0.027 ± 0.111 [2009]	0.026 ± 0.111 [2004]
B.2	E-6	STRAIGHTWAY 2	04/12/21 12:10	04/14/21 08:55	44.8	8.53 ± 0.03 [537]	1.05	0.09	96.1	33.3	0.060 ± 0.066 [538]	0.028 ± 0.014 [399]
B.3	E-10	STRAIGHTWAY 2	04/14/21 09:15	04/16/21 08:15	47.0	7.83 ± 0.26 [562]	0.85	0.12	77.3	47.0	0.049 ± 0.030 [565]	0.049 ± 0.027 [563]
		Before Recycle	04/14/21 09:15	04/15/21 10:30	25.3	7.91 ± 0.33 [302]	-	-	-	-	0.026 ± 0.014 [304]	0.026 ± 0.007 [303]
		During Recycle	04/15/21 10:35	04/15/21 14:35	4.0	7.74 ± 0.04 [49]	-	-	-	-	0.057 ± 0.011 [49]	0.057 ± 0.011 [49]
		After Recycle	04/15/21 14:40	04/16/21 08:15	17.6	7.74 ± 0.03 [211]	-	-	-	-	0.080 ± 0.018 [212]	0.080 ± 0.008 [211]
B.4	E-14	STRAIGHTWAY 2	04/16/21 08:50	04/19/21 09:30	72.7	5.80 ± 0.02 [872]	0.15	0.09	112.7	-	0.024 ± 0.017 [873]	0.024 ± 0.004 [870]
B.5	E-18	SIMMONS POND	04/19/21 14:35	4/24/21 23:20	128.7	8.11 ± 0.20 [1545]	0.70	0.02	402.6	-	0.022 ± 0.001 [1546]	0.022 ± 0.001 [1545]
B.6	E-21	HYANNISPORT	4/27/21 11:10	5/03/21 10:30	143.3	7.98 ± 0.57 [1663]	0.60	0.04	230.4	-	0.021 ± 0.004 [1721]	0.021 ± 0.002 [1720]
		Before Recycle	4/27/21 11:10	4/29/21 14:45	51.6	8.02 ± 0.07 [615]	-	-	-	-	0.022 ± 0.002 [620]	0.022 ± 0.002 [620]
		During Recycle	4/29/21 14:50	4/29/21 16:50	2.0	8.03 ± 0.05 [25]	-	-	-	-	0.021 ± 0.000 [25]	0.021 ± 0.000 [25]
		After Recycle	4/29/21 16:55	5/03/21 10:30	89.6	7.95 ± 0.72 [1023]	-	-	-	-	0.021 ± 0.004 [1076]	0.021 ± 0.002 [1075]

Table 3.10: Filter C Performance Data (Low FSLR – High pH Filter)

Trial	Fig. No.	Description	Start Time	End Time	Trial Duration (hours)	FSLR (gpm/sf)	Clean Bed to Terminal Headloss			Runtime to Break-through (hours)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
							Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)			
C.1	E-3	STRAIGHTWAY 1	03/16/21 09:20	03/23/21 08:40	167.3	3.81 ± 0.09 [2008]	1.75	0.03	304.4	-	0.019 ± 0.111 [2009]	0.019 ± 0.111 [2004]
C.2	E-7	STRAIGHTWAY 2	04/12/21 12:10	04/16/21 08:15	92.1	4.10 ± 0.16 [1104]	1.65	0.06	141.5	-	0.078 ± 0.086 [1106]	0.029 ± 0.020 [1105]
		Before Recycle	04/12/21 12:10	04/15/21 10:30	70.3	4.16 ± 0.14 [844]	-	-	-	-	0.071 ± 0.096 [845]	0.021 ± 0.016 [845]
		During Recycle	04/15/21 10:35	04/15/21 14:35	4.0	3.91 ± 0.06 [49]	-	-	-	-	0.082 ± 0.011 [49]	0.044 ± 0.005 [49]
		After Recycle	04/15/21 14:40	04/16/21 08:15	17.6	3.92 ± 0.03 [211]	-	-	-	-	0.104 ± 0.033 [212]	0.055 ± 0.008 [211]
C.3	E-11	STRAIGHTWAY 2	04/16/21 08:50	04/19/21 09:30	72.7	5.87 ± 0.02 [872]	2.30	0.16	47.5	-	0.038 ± 0.019 [873]	0.019 ± 0.008 [870]
C.4	E-15	SIMMONS POND	04/19/21 14:35	4/24/21 23:20	128.7	4.10 ± 0.07 [1545]	5.25	-0.0028	N/A	-	0.033 ± 0.008 [1546]	0.016 ± 0.001 [1545]
C.5	E-19	HYANNISPORT	4/27/21 11:15	5/03/21 11:10	143.9	4.05 ± 0.27 [1666]	1.40	0.02	401.4	-	0.031 ± 0.007 [1728]	0.016 ± 0.009 [1726]
		Before Recycle	4/27/21 11:15	4/29/21 14:45	51.5	4.07 ± 0.03 [615]	-	-	-	-	0.032 ± 0.002 [619]	0.016 ± 0.002 [618]
		During Recycle	4/29/21 14:50	4/29/21 16:50	2.0	4.08 ± 0.04 [25]	-	-	-	-	0.032 ± 0.001 [25]	0.015 ± 0.000 [25]
		After Recycle	4/29/21 16:55	5/03/21 11:10	90.3	4.04 ± 0.34 [1026]	-	-	-	-	0.031 ± 0.008 [1084]	0.016 ± 0.012 [1083]

Table 3.11: Filter D Performance Data (High FSLR – High pH Filter)

Trial	Fig. No.	Description	Start Time	End Time	Trial Duration (hours)	FSLR (gpm/sf)	Clean Bed to Terminal Headloss			Runtime to Break-through (hours)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
							Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)			
D.1	E-4	STRAIGHTWAY 1	03/16/21 09:20	03/23/21 08:40	167.3	7.90 ± 0.04 [2005]	2.40	0.09	82.8	-	0.034 ± 0.201 [2009]	0.034 ± 0.202 [2003]
D.2	E-8	STRAIGHTWAY 2	04/12/21 12:10	04/14/21 09:10	45.0	8.27 ± 0.22 [536]	2.50	0.14	55.0	32.1	0.086 ± 0.115 [541]	0.036 ± 0.011 [381]
D.3	E-12	STRAIGHTWAY 2	04/14/21 09:25	04/16/21 08:15	46.8	8.07 ± 0.28 [561]	2.45	0.19	39.9	33.7	0.067 ± 0.042 [563]	0.051 ± 0.025 [400]
		Before Recycle	04/14/21 09:25	04/15/21 10:30	25.1	8.26 ± 0.26 [301]	-	-	-	-	0.039 ± 0.025 [302]	0.038 ± 0.014 [301]
		During Recycle	04/15/21 10:35	04/15/21 14:35	4.0	7.85 ± 0.07 [49]	-	-	-	-	0.082 ± 0.011 [49]	0.082 ± 0.012 [49]
		After Recycle	04/15/21 14:40	04/16/21 08:15	17.6	7.84 ± 0.03 [211]	-	-	-	-	0.104 ± 0.033 [212]	0.095 ± 0.004 [50]
D.4	E-16	STRAIGHTWAY 2	04/16/21 08:50	04/19/21 09:30	72.7	5.88 ± 0.04 [871]	1.80	0.15	56.3	-	0.038 ± 0.019 [873]	0.037 ± 0.009 [869]
D.5	E-20	SIMMONS POND	04/19/21 14:35	04/23/21 09:10	90.6	8.15 ± 0.19 [1087]	3.45	0.08	81.4	-	0.032 ± 0.010 [1088]	0.032 ± 0.002 [1087]
D.6	E-22	SIMMONS POND	04/23/21 09:30	4/24/21 23:20	37.8	8.05 ± 0.02 [454]	2.10	0.01	1549.0	-	0.034 ± 0.003 [455]	0.034 ± 0.003 [454]
D.7	E-23	HYANNISPORT	4/27/21 11:15	5/03/21 10:55	143.7	8.01 ± 0.52 [1662]	2.05	0.06	131.0	-	0.031 ± 0.007 [1725]	0.031 ± 0.002 [1724]
		Before Recycle	4/27/21 11:15	4/29/21 14:45	51.5	8.04 ± 0.03 [614]	-	-	-	-	0.032 ± 0.002 [619]	0.032 ± 0.002 [619]
		During Recycle	4/29/21 14:50	4/29/21 16:50	2.0	8.04 ± 0.03 [25]	-	-	-	-	0.032 ± 0.001 [25]	0.032 ± 0.001 [25]
		After Recycle	4/29/21 16:55	5/03/21 10:55	90.0	7.99 ± 0.66 [1023]	-	-	-	-	0.031 ± 0.008 [1081]	0.031 ± 0.001 [1080]

Table 3.12: Filter 21-1 and 21-2 Performance Data

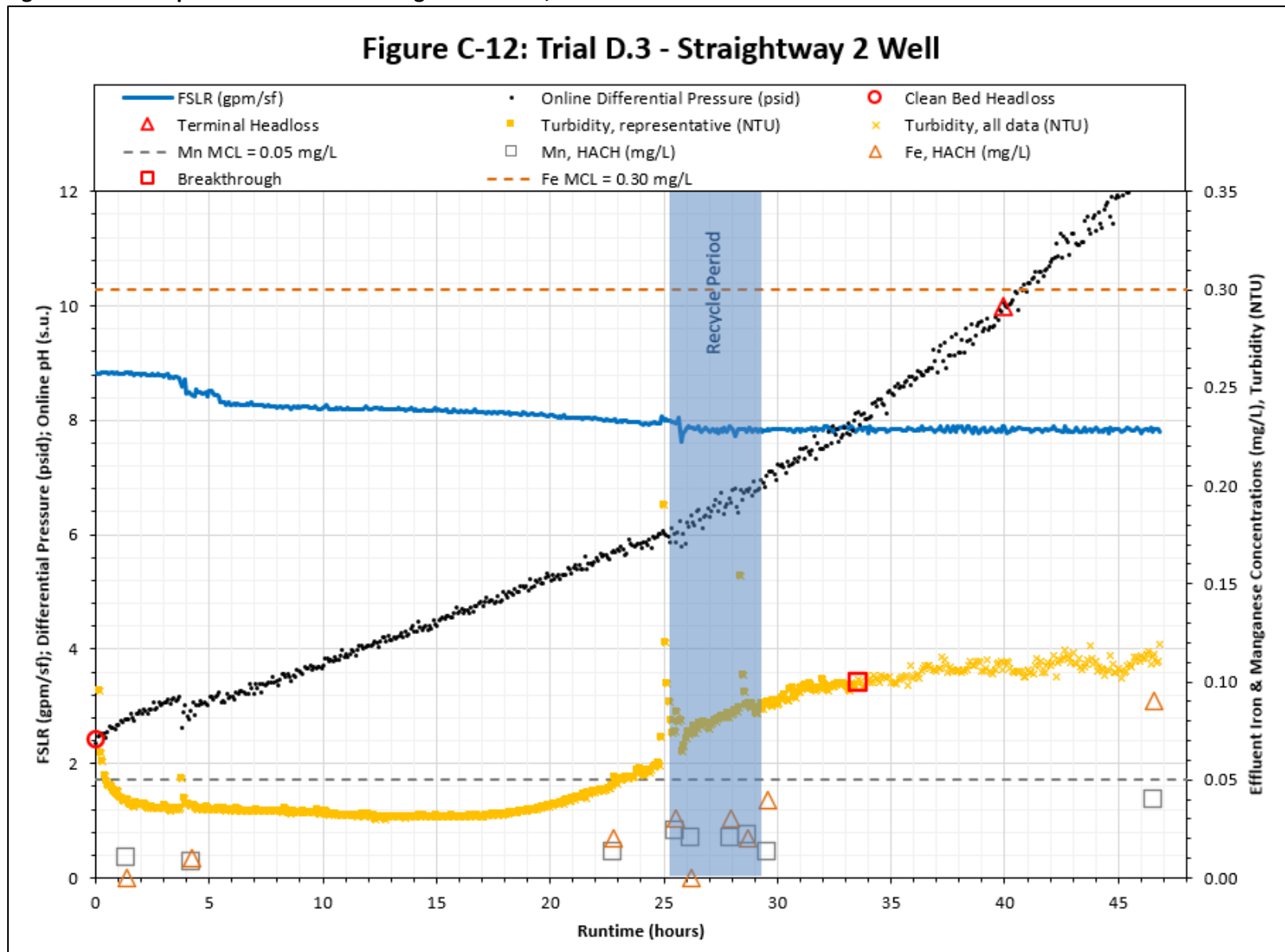
Filter	Well Source	Start Time	End Time	FSLR (gpm/sf)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
21-1	STRAIGHTWAY 2	05/24/21 11:03	6/7/21 08:42	4.07 ± 0.43 [6673]	0.026 ± 0.078 [6674]	0.024 ± 0.009 [6657]
	SIMMONS POND	6/7/21 13:51	6/15/21 15:15	3.81 ± 0.32 [3869]	0.028 ± 0.018 [3869]	0.028 ± 0.017 [3863]
21-2	STRAIGHTWAY 2	05/24/21 11:03	6/7/21 08:42	4.06 ± 0.43 [6673]	0.029 ± 0.093 [6674]	0.026 ± 0.009 [6651]
	SIMMONS POND	6/7/21 13:51	6/15/21 15:15	3.86 ± 0.32 [3869]	0.022 ± 0.024 [3869]	0.022 ± 0.009 [3863]

3.3.1.2 Greensand Filter Performance Figures

For each filter run, online data was logged every 5 minutes by the PLC, and grab samples were collected and analyzed periodically throughout the day. A figure was prepared for each of the 23 filter trials, showing important operating conditions and effluent iron and manganese concentrations for the filter run. An example Filter Performance Figure is shown in Figure 3.02, and all figures are included in Appendix E. Information included in each figure is described below:

- X-axis is presented in units of hours of filter run time, with 0 hours set at the time the filter was placed online.
- Field data for effluent iron concentrations are presented as orange triangles in units of mg/L and represent results of field analyses of grab samples. The data are plotted using the right y-axis.
- Field data for effluent manganese concentrations are presented as gray squares in units of mg/L and represent results of field analyses of grab samples.
- Filter effluent iron goal is presented as an orange dashed line plotted in units of mg/L using the right y-axis. The effluent iron goal was set to 0.30 mg/L to match the Mn SMCL (<0.30 mg/L Mn).
- Filter effluent manganese goal is presented as a gray dashed line plotted in units of mg/L using the right y-axis. The effluent manganese goal was set to 0.050 mg/L to match the Mn SMCL (<0.05 mg/L Mn).
- All recorded filter effluent turbidity data are presented as orange "x". These are all the turbidity data logged by the PLC during the filter trial in units of NTUs. The data are plotted using the right y-axis.
- Representative filter effluent turbidity data are presented as orange squares. These are the turbidity recorded after the filter-to-waste period, and prior to breakthrough in units of NTUs. The data are plotted using the right y-axis.
- The filter surface loading rate (FSLR) is shown as a blue line. Loading rate was calculated from the effluent flow rate and the surface area of the filters (0.2 ft²). The FSLR is included in the figures to show when flow rates were stable, when flow rate adjustments were made, and when the filter experienced declining rate conditions. The FSLR is presented in gpm/sf and is plotted using the left y-axis.
- Differential pressure (DP) is shown as solid black circles in units of psid and is plotted using the left y-axis. DP was calculated from the differential pressure transducer connected to the inlet and outlet of the filter.
- The Clean Bed Headloss is shown as a hollow red circle on the left-most y-axis.
- The Terminal Headloss is shown as a hollow red triangle where 10 psid was observed.
- Turbidity Breakthrough is shown as a hollow red square where breakthrough was observed.
- The supernatant recycle period is shown as a semi-transparent blue region for those trials which included a recycle period.

Figure 3.02: Example Filter Performance Figure - Filter D, Trial 3



Filter DP increased as iron and manganese accumulated on the filter media. The rate of DP development is primarily dependent upon contaminant mass loading rates, and fluid velocities. In practice, these factors are mainly affected by FSLR and chemical pretreatment:

- FSLR – higher filter surface loading rates cause higher mass loading rates, assuming constant influent contaminant concentrations. Higher mass loading increases DP by increasing the rate at which contaminant mass is accumulated in the filter (within the interstices, or adsorbed onto media surfaces). There is also a kinetic component to the increased DP, because higher FSLRs result in higher velocities through the media, and higher velocities produce greater losses. As filtered particulates accumulate within the media, the effective cross-sectional area of the filter is decreased still more, which adds to kinetic losses.
- Pretreatment chemicals – Sodium hypochlorite is often sufficient for the complete oxidation and precipitation of dissolved iron at most of the raw water supplies tested. For manganese removal potassium permanganate (which was not used in Barnstable) typically increases the rate of DP development because it (a) contains manganese, which is additional mass that must be removed and retained in or on the filter media, and (2) reacts with the dissolved manganese in the raw water to form a precipitate that is trapped in the media interstices. Sodium hypochlorite typically does not form filterable manganese precipitates (although it may form colloidal-sized precipitates), but oxidizes and/or destabilizes dissolved manganese for effective adsorption to the filtration media. Manganese that enters the media bed in the precipitated state, and is trapped in the media interstices normally created greater DP in the filter bed. KMnO_4 both adds to contaminant mass loading, and forms bulkier precipitates that occupy more of the interstitial volume of the filter.

3.3.1.3 Greensand Filtered Water Quality

Water quality results from field analyses for each Filter are shown in Tables 3.13 to 3.17. The initial Greensand filter trial data is summarized in Table 3.13 to 3.16. Table 3.17 summarizes the field water quality collected during the UV AOP trials using the high-capacity Greensand filters.

General laboratory data is reported in Tables 3.18 and 3.19 with disinfection byproduct data in Table 3.20. The data presented in Table 3.18 is specific to the initial Greensand Filter Trials. The data presented in Tables 3.19 and 3.20 is specific to the high-capacity Greensand Filters operated during the UV AOP trials.

Table 3.13: Greensand Filtered Water Quality (Low pH – Low FSLR) - Filter A, Field Analyses

Trial	Source	Nominal FSLR (gpm/sf)	Cl2 (f) (mg/L)	Cl2 (t) (mg/L)	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
A.1	STRAIGHTWAY 1	4	1.22 (0.03-1.94) [21]	1.06 (0.12-2.28) [12]	0.01 (0.00-0.04) [14]	0.011 (0.000-0.036) [14]	6.95 (6.42-7.03) [14]
A.2	STRAIGHTWAY 2	4	0.78 (0.16-1.32) [11]	1.11 (0.37-1.68) [8]	0.00 (0.00-0.10) [14]	0.009 (0.000-0.030) [14]	6.62 (6.56-6.70) [7]
A.2 BR	Before Recycle	4	0.55 (0.16-0.93) [9]	0.69 (0.37-1.42) [6]	0.00 (0.00-0.05) [8]	0.000 (0.000-0.023) [8]	6.60 (6.56-6.70) [5]
A.2 DR	During Recycle	4	1.32 [1]	1.44 [1]	0.02 (0.00-0.05) [4]	0.019 (0.014-0.021) [4]	6.67 [1]
A.2 AR	After Recycle	4	1.26 [1]	1.68 [1]	0.04-0.10 [2]	0.008-0.030 [2]	6.65 [1]
A.3	STRAIGHTWAY 2	4	1.53 (0.86-1.69) [4]	1.30-2.03 [2]	0.00 (0.00-0.00) [3]	0.012 (0.009-0.017) [3]	6.55-6.64 [2]
A.4	SIMMONS POND	4	1.06 (0.75-1.19) [11]	1.16 (0.80-1.25) [9]	0.00 (0.00-0.00) [12]	0.010 (0.002-0.040) [12]	6.67 (6.55-6.71) [9]
A.5	HYANNISPORT	4	1.11 (1.01-1.26) [10]	1.20 (1.12-1.43) [9]	0.00 (0.00-0.00) [14]	0.002 (0.000-0.016) [13]	6.87 (6.60-6.98) [7]
A.5 BR	Before Recycle	4	1.09 (1.01-1.26) [6]	1.17 (1.12-1.43) [5]	0.00 (0.00-0.00) [7]	0.004 (0.000-0.012) [6]	6.91 (6.60-6.98) [3]
A.5 DR	During Recycle	4	1.11 [1]	1.19 [1]	0.00 (0.00-0.00) [3]	0.000 (0.000-0.016) [3]	6.86 [1]
A.5 AR	After Recycle	4	1.10 (1.03-1.11) [3]	1.22 (1.20-1.28) [3]	0.00 (0.00-0.00) [4]	0.002 (0.000-0.016) [4]	6.87 (6.82-6.88) [3]

Table 3.14: Greensand Filtered Water Quality (Low pH – High FSLR) - Filter B, Field Analyses

Trial	Source	Nominal FSLR (gpm/sf)	Cl2 (f) (mg/L)	Cl2 (t) (mg/L)	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)	Dissolved Oxygen (mg/L)	ORP (mV)
B.1	STRAIGHTWAY 1	8	1.30 (0.00-2.09) [17]	0.82 (0.12-2.18) [11]	0.00 (0.00-0.06) [14]	0.008 (0.000-0.049) [14]	6.97 (6.86-7.04) [14]	6.4 +- 0.0 [161]	378 +- 10 [130]
B.2	STRAIGHTWAY 2	8	0.70 (0.23-1.15) [6]	0.83 (0.50-1.24) [4]	0.00 (0.00-0.00) [4]	0.025 (0.000-0.048) [4]	6.54-6.55 [2]	3.1 +- 0.2 [7909]	667 +- 125 [7995]
B.3	STRAIGHTWAY 2	8	1.22 (0.99-1.42) [4]	1.73 (1.57-1.81) [4]	0.03 (0.00-0.04) [8]	0.034 (0.024-0.068) [8]	6.63 (6.59-6.68) [4]		
B.3 BR	Before Recycle	8	0.99-1.34 [2]	1.57-1.66 [2]	0.02 (0.00-0.03) [3]	0.067 (0.040-0.068) [3]	6.59-6.60 [2]		
B.3 DR	During Recycle	8	1.42 [1]	1.79 [1]	0.03 (0.00-0.04) [4]	0.031 (0.029-0.036) [4]	6.68 [1]		
B.3 AR	After Recycle	8	1.09 [1]	1.81 [1]	0.04 [1]	0.024 [1]	6.66 [1]		
B.4	STRAIGHTWAY 2	8	1.33 (0.88-1.66) [4]	1.15-1.73 [2]	0.00 (0.00-0.00) [3]	0.010 (0.003-0.016) [3]	6.55-6.65 [2]		
B.5	SIMMONS POND	8	1.25 (1.05-1.32) [11]	1.34 (1.25-1.42) [9]	0.00 (0.00-0.00) [12]	0.006 (0.000-0.016) [12]	6.68 (6.59-6.75) [9]	4.7 +- 0.2 [6119]	802 +- 46 [6138]
B.6	HYANNISPORT	8	1.16 (0.59-1.31) [10]	1.23 (0.77-1.41) [9]	0.00 (0.00-0.00) [14]	0.003 (0.000-0.028) [13]	6.87 (6.66-6.97) [7]	4.4 +- 0.4 [6893]	825 +- 59 [6948]
B.6 BR	Before Recycle	8	1.08 (0.59-1.31) [6]	1.13 (0.77-1.40) [5]	0.00 (0.00-0.00) [7]	0.003 (0.000-0.008) [6]	6.92 (6.66-6.97) [3]		
B.6 DR	During Recycle	8	1.11 [1]	1.21 [1]	0.00 (0.00-0.00) [3]	0.000 (0.000-0.007) [3]	6.87 [1]		
B.6 AR	After Recycle	8	1.17 (1.16-1.25) [3]	1.26 (1.23-1.41) [3]	0.00 (0.00-0.00) [4]	0.006 (0.000-0.028) [4]	6.87 (6.87-6.92) [3]		

Table 3.15: Greensand Filtered Water Quality (High pH – Low FSLR) - Filter C, Field Analyses

Trial	Source	Nominal FSLR (gpm/sf)	Cl2 (f) (mg/L)	Cl2 (t) (mg/L)	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
C.1	STRAIGHTWAY 1	4	0.96 (0.00-2.06) [21]	1.31 (0.13-2.21) [13]	0.00 (0.00-0.03) [15]	0.004 (0.000-0.029) [15]	7.40 (6.94-7.73) [15]
C.2	STRAIGHTWAY 2	4	0.75 (0.13-1.20) [11]	1.02 (0.36-1.46) [8]	0.00 (0.00-0.06) [14]	0.011 (0.000-0.029) [14]	7.52 (7.36-7.59) [6]
C.2 BR	Before Recycle	4	0.58 (0.13-1.03) [9]	0.83 (0.36-1.32) [6]	0.00 (0.00-0.02) [8]	0.001 (0.000-0.015) [8]	7.45 (7.36-7.53) [4]
C.2 DR	During Recycle	4	1.20 [1]	1.46 [1]	0.01 (0.00-0.03) [4]	0.021 (0.016-0.022) [4]	7.59 [1]
C.2 AR	After Recycle	4	1.12 [1]	1.45 [1]	0.03-0.06 [2]	0.007-0.029 [2]	7.59 [1]
C.3	STRAIGHTWAY 2	4	1.45 (0.90-1.61) [4]	1.04-1.97 [2]	0.00 (0.00-0.01) [3]	0.009 (0.001-0.017) [3]	7.57-7.60 [2]
C.4	SIMMONS POND	4	1.16 (0.83-1.34) [11]	1.26 (1.03-1.36) [9]	0.00 (0.00-0.00) [12]	0.007 (0.000-0.017) [12]	7.50 (7.26-7.66) [8]
C.5	HYANNISPORT	4	1.18 (0.90-1.35) [10]	1.23 (1.07-1.45) [9]	0.00 (0.00-0.00) [14]	0.000 (0.000-0.015) [13]	7.32 (7.13-7.42) [7]
C.5 BR	Before Recycle	4	1.17 (0.90-1.35) [6]	1.23 (1.07-1.45) [5]	0.00 (0.00-0.00) [7]	0.005 (0.000-0.012) [6]	7.32 (7.20-7.42) [3]
C.5 DR	During Recycle	4	1.09 [1]	1.23 [1]	0.00 (0.00-0.00) [3]	0.000 (0.000-0.001) [3]	7.42 [1]
C.5 AR	After Recycle	4	1.19 (1.17-1.19) [3]	1.23 (1.22-1.28) [3]	0.00 (0.00-0.00) [4]	0.000 (0.000-0.015) [4]	7.30 (7.13-7.36) [3]

Table 3.16: Greensand Filtered Water Quality (High pH – High FSLR) - Filter D, Field Analyses

Trial	Source	Nominal FSLR (gpm/sf)	Cl2 (f) (mg/L)	Cl2 (t) (mg/L)	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
D.1	STRAIGHTWAY 1	8	1.47 (0.07-2.23) [22]	1.34 (0.19-2.98) [13]	0.00 (0.00-0.04) [15]	0.006 (0.000-0.033) [15]	7.46 (6.99-7.66) [15]
D.2	STRAIGHTWAY 2	8	0.73 (0.22-0.97) [6]	0.75 (0.44-1.14) [4]	0.00 (0.00-0.00) [4]	0.002 (0.000-0.004) [4]	7.36-7.38 [2]
D.3	STRAIGHTWAY 2	8	1.22 (1.12-1.38) [4]	1.48 (1.30-1.59) [4]	0.02 (0.00-0.04) [8]	0.017 (0.008-0.024) [8]	7.54 (7.52-7.60) [4]
D.3 BR	Before Recycle	8	1.12-1.12 [2]	1.30-1.39 [2]	0.01 (0.00-0.02) [3]	0.010 (0.008-0.013) [3]	7.52-7.52 [2]
D.3 DR	During Recycle	8	1.32 [1]	1.59 [1]	0.03 (0.00-0.03) [4]	0.021 (0.020-0.024) [4]	7.56 [1]
D.3 AR	After Recycle	8	1.38 [1]	1.57 [1]	0.04 [1]	0.013 [1]	7.60 [1]
D.4	STRAIGHTWAY 2	8	1.18 (0.81-1.29) [4]	1.10-1.56 [2]	0.00 (0.00-0.01) [3]	0.011 (0.002-0.022) [3]	7.52 [1]
D.5	SIMMONS POND	8	1.33 (1.09-1.41) [10]	1.42 (1.09-1.47) [8]	0.00 (0.00-0.00) [11]	0.007 (0.000-0.012) [11]	7.52 (7.26-7.58) [6]
D.6	SIMMONS POND	8	1.30 [1]	1.40 [1]	0.00 [1]	0.009 [1]	7.41 [1]
D.7	HYANNISPORT	8	1.24 (0.86-1.40) [10]	1.33 (1.00-1.55) [9]	0.00 (0.00-0.00) [14]	0.003 (0.000-0.013) [13]	7.31 (7.09-7.43) [5]
D.7 BR	Before Recycle	8	1.28 (0.81-1.41) [25]	1.41 (1.00-1.59) [20]	0.00 (0.00-0.04) [30]	0.010 (0.000-0.024) [29]	7.52 (7.26-7.60) [14]
D.7 DR	During Recycle	8	1.20 [1]	1.31 [1]	0.00 (0.00-0.00) [3]	0.000 (0.000-0.007) [3]	7.40 [1]
D.7 AR	After Recycle	8	1.28 (0.81-1.41) [22]	1.40 (1.00-1.56) [17]	0.00 (0.00-0.01) [25]	0.007 (0.000-0.022) [24]	7.43 (7.26-7.58) [11]

Table 3.17: Greensand Filtered Water Quality – High-Capacity Trials by Field Analyses

Filter	Source	Nominal FSLR (gpm/sf)	Cl2 (f) (mg/L)	Cl2 (t) (mg/L)	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
21-1	Straightway 2	4	0.91 (0.18-1.55) [20]	1.10 (0.29-1.94) [18]	0.00 (0.00-0.05) [22]	0.010 (0.000-0.023) [22]	7.42 (7.06-7.61) [16]
	Simmons Pond	4	0.99 (0.84-1.25) [14]	1.11 (0.98-1.49) [11]	0.00 (0.00-0.00) [13]	0.007 (0.000-0.016) [13]	7.15 (7.05-7.35) [9]
21-2	Straightway 2	4	0.78 (0.16-1.36) [20]	0.93 (0.23-1.52) [18]	0.00 (0.00-0.01) [22]	0.006 (0.000-0.020) [22]	7.40 (7.10-7.61) [16]
	Simmons Pond	4	0.84 (0.60-1.09) [14]	0.95 (0.78-1.23) [11]	0.00 (0.00-0.00) [13]	0.008 (0.000-0.014) [13]	7.18 (7.01-7.33) [9]

Table 3.18: Greensand Filtered Water Quality by Laboratory Analyses – Initial Greensand Trials

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)			
		56226 L2113238	56580 L2118928	56696 L2120551	56792 L2122099
		Sample Date and Time			
		03/17/21 10:00	04/14/21 10:00	04/22/21 9:30	04/29/21 9:30
		Straightway 1	Straightway 2	Simmons Pond	Hyannisport
1,4 Dioxane	µg/l				
PFAS6	ng/L				
Total Iron	mg/L	<0.050	<0.050	<0.050	<0.050
Dissolved Iron	mg/L	<0.050	<0.050	<0.050	<0.050
Total Manganese	mg/L	<0.010	0.062	<0.010	<0.010
Dissolved Manganese	mg/L	<0.010	0.065	<0.010	<0.010
Calcium	mg/L	9.2	18	21	8.6
Magnesium	mg/L	4.0	4.8	5.6	3.4
Sodium	mg/L	78	27	51	93
Zinc	mg/L	<0.010	0.012	<0.010	<0.010
Hardness	mg/L	39	64	74	35
Alkalinity	mg/L	54	42	50	56
Color, Apparent	s.u.	<5.0	<5.0	<5.0	<5.0
Color, True	s.u.	<5.0	<5.0	<5.0	<5.0
Bromide	mg/L				
Chloride	mg/L	82	49	83	100
Sulfate	mg/L	13	21	22	15
Total Dissolved Solids	mg/L	230	170	260	270
Nitrate-N	mg/L				
Nitrite-N	mg/L				
Total Coliform	Col/100mL	absent	absent	absent	absent
Escherichia Coliform	Col/100mL	absent	absent	absent	absent
Conductivity	umhos/cm	460	290	450	510
pH	s.u.	6.4	6.9	7.1	7.4
Turbidity	NTU	<1.0	<1.0	<1.0	<1.0
Total Organic Carbon	mg/L	<1.0	<1.0	<1.0	<1.0
Carbon Dioxide	mg/L	170	120	140	170
Dissolved Oxygen	mg/L	8.4	4.2	5.0	4.8
Oxygen-Reduction Potential	mV	640	120	690	600
Total Residual Chlorine	mg/L	0.68	1.7	1.2	2.0
Residual Free Chlorine	mg/L	<0.050	<0.050	<0.050	1.1

Table 3.19: Greensand Filtered Water Quality by Laboratory Analyses – High Capacity Trials

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)							
		57189 L2128319	57190 L2128315	57224 L2128998	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277
		Sample Date and Time							
		05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/03/21 10:00	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00
		Straightway 2				Simmons Pond			
1,4 Dioxane	µg/l	0.59	0.91	0.83	0.85	<0.12	<0.13	0.14	<0.12
PFAS6	ng/L								
Total Iron	mg/L		<0.050		<0.050				0.0100
Dissolved Iron	mg/L		<0.050		<0.050				0.0077
Total Manganese	mg/L		0.0010		<0.010				0.0015
Dissolved Manganese	mg/L		0.0046		0.0016				0.0023
Calcium	mg/L		18						20
Magnesium	mg/L		5.3						5.4
Sodium	mg/L		42						56
Zinc	mg/L		<0.010						<0.010
Hardness	mg/L		68						71
Alkalinity	mg/L		74		70				58
Color, Apparent	s.u.		<2.5		<2.5				<2.5
Color, True	s.u.		<2.5		<2.5				<2.5
Bromide	mg/L								
Chloride	mg/L		50						83
Sulfate	mg/L		19						20
Total Dissolved Solids	mg/L		190						250
Nitrate-N	mg/L		0.5		0.5				
Nitrite-N	mg/L		<0.1		<0.1				
Total Coliform	Col/100mL		absent		absent				absent
Escherichia Coliform	Col/100mL		absent		absent				absent
Conductivity	umhos/cm		340						470
pH	s.u.		7.5		7.4				7.3
Turbidity	NTU		<1.0		<0.4				<0.4
Total Organic Carbon	mg/L		1.1		0.84				<0.59
Carbon Dioxide	mg/L		180						190
Dissolved Oxygen	mg/L		3.5						6.4
Oxygen-Reduction Potential	mV		610						600
Total Residual Chlorine	mg/L		1.0		1.1				0.92
Residual Free Chlorine	mg/L		<0.050		<0.050				<0.05

Table 3.20: Greensand Filtered Water Quality by Laboratory Analyses – Disinfection Byproducts – High Capacity Trials

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)							
		57189 L2128319	57190 L2128315	57224 L2128998	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277
		Sample Date and Time							
		05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/03/21 10:00	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00
		Straightway 2				Simmons Pond			
Chloroform	µg/L	<0.50	<0.50	<0.50		<0.50	<0.50		<0.50
Dibromodichloromethane	µg/L	0.53	<0.50	<0.50		<0.50	<0.50		0.063*
Bromodichloromethane	µg/L	<0.50	<0.50	<0.50		<0.50	<0.50		<0.50
Bromoform	µg/L	<0.50	<0.50	<0.50		<0.50	<0.50		<0.50
Total THMs	µg/L	0.53	<0.50	<0.50		<0.50	<0.50		<0.50
Dibromoacetic Acid	µg/L	<1	<1	<1		<1	<1		<1
Dichloroacetic Acid	µg/L	<1	<1	<1		<1	<1		<1
Monobromoacetic Acid	µg/L	<1	<1	<1		<1	<1		<1
Monochloroacetic Acid	µg/L	<1	<1	<1		<1	<1		<1
Total HAAs	µg/L	<1	<1	<1		<1	<1		<1

* Estimated Concentration Below Reporting Limit Not Counted Toward Total THM Calculation

3.3.1.4 Greensand Filter Spent Backwash Water Analyses

Table 3.21 shows the laboratory results for general analyses for the filter composite backwash (CBW) while Table 3.22 show the laboratory results for PFAS compounds.

Composite backwash samples were collected from the total volume of backwash water for each filter backwash during the initial Greensand trials. Figure 3.03 plots the volume of settled solids in a 1000 ml Imhoff settling cone against settling time. The data is organized by the source well. Straightway 2 Well had the highest contaminant concentrations and the highest solids volume.

Table 3.21: Spent Backwash Water Quality by Laboratory Analyses – General Analyses

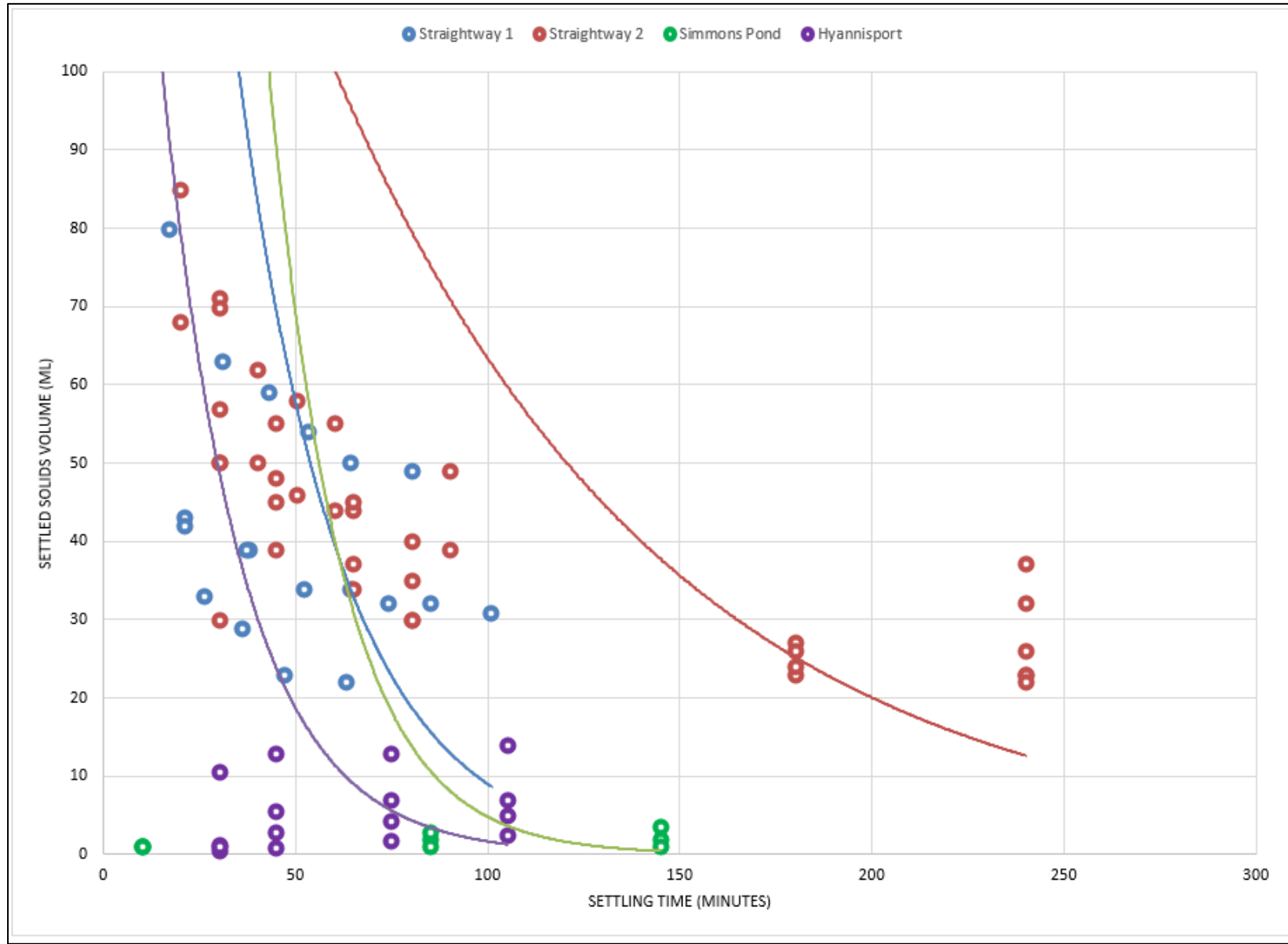
Analysis	Units	Laboratory Report												
		L2114524	56580		56700	57190	57224	57383	56792		57382	57465	56824	
		03/23/21 9:10	04/14/21 9:30		04/19/21 9:30	05/26/21 12:30	06/01/21 9:00	06/04/21 9:45	04/26/21 14:00		06/11/21 9:00	06/15/21 10:00	05/03/21 10:35	
STRAIGHTWAY 1		STRAIGHTWAY 2						SIMMONS POND				HYANNISPORT		
Pilot Trials		Initial GSP	Initial GSP		Initial GSP	High Capacity	High Capacity	High Capacity	Initial GSP			High Capacity	High Capacity	Initial GSP
Filter		B	B	D	D	21-Inch	21-Inch	21-Inch	A	B	D	21-Inch	21-Inch	B
Filter Surface Loading Rate	gpm/sf	8	8	8	8	4	4	4	4	8	8	4	4	8
Target pH	s.u.	6.8	6.8	7.4	7.4	7.4	7.4	7.4	6.7	6.7	7.4	7.4	7.4	6.8
1,4 Dioxane	µg/l		0.82	0.77	0.74	0.53	0.46		<0.25	0.37	0.34	<0.12	<0.12	
PFAS6	ng/L		83.4	84.4	78.0	88.3	90.0	79.7	75.9	78.6	75.6	63.0	80.7	
TSS	mg/L	260	180			220				<50			26	70

Table 3.22: Spent Backwash Water Quality by Laboratory Analyses – PFAS Compounds

Analysis		Laboratory Report												
		L2114524	56580		56700	57190	57224	57383	56792		57382	57465	56824	
		Sample Date and Time												
		03/23/21 9:10	04/14/21 9:30		04/19/21 9:30	05/26/21 12:30	06/01/21 9:00	06/04/21 9:45	04/26/21 14:00			06/11/21 9:00	06/15/21 10:00	05/03/21 10:35
		STRAIGHT- WAY 1	STRAIGHTWAY 2						SIMMONS POND					HYANNIS- PORT
Pilot Trials		Initial GSP	Initial GSP		Initial GSP	High Capacity	High Capacity	High Capacity	Initial GSP			High Capacity	High Capacity	Initial GSP
Filter		B	B	D	D	21-Inch	21-Inch	21-Inch	A	B	D	21-Inch	21-Inch	B
Filter Surface Loading Rate	gpm/sf	8	8	8	8	4	4	4	4	8	8	4	4	8
Target pH	s.u.	6.8	6.8	7.4	7.4	7.4	7.4	7.4	6.7	6.7	7.4	7.4	7.4	6.8
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy) propanoic acid (GenX acid)(HFPODA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Perfluorobutanesulfonic Acid (PFBS)	ng/L		4.4	4.0	4.1	3.6	3.6	3.5	5.0	5.1	5.0	4.0	6.1	
Perfluorodecanoic Acid (PFDA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Perfluorododecanoic Acid (PFDoA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Perfluoroheptanoic Acid (PFHpA)	ng/L		5.4	5.5	5.0	5.2	4.9	4.7	5.9	5.7	5.6	4.1	4.7	
Perfluorohexanesulfonic Acid (PFHxS)	ng/L		30	30	30	26	26	25	30	31	31	22	31	
Perfluorohexanoic Acid (PFHxA)	ng/L		11	12	10	12	12	11	12	12	12	8.3	11	
Perfluorononanoic Acid (PFNA)	ng/L		<1.9	1.9	<2.0	2.1	2.1	<2.0	<1.8	1.9	<1.8	<2.0	1.2*	
Perfluorooctanesulfonic Acid (PFOS)	ng/L		31	30	26	36	39	33	26	26	26	27	32	
Perfluorooctanoic Acid (PFOA)	ng/L		17	17	17	19	18	17	14	14	13	9.9	13	
Perfluorotetradecanoic Acid (PFTEA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Perfluorotridecanoic Acid (PFTRIA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Perfluoroundecanoic Acid (PFUnA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
11-Chloroeicosafuoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ng/L		<1.9	<1.9	<2.0	<1.9	<2.0	<2.0	<1.8	<1.8	<1.8	<2.0	<2.0	
Total PFAS6 (Reported Above in Table 3.02)	ng/L		83.4	84.4	78.0	88.3	90.0	79.7	75.9	78.6	75.6	63.0	80.7	

* Estimated Concentrations Below Reporting Limit Not Counted Toward Total PFAS6 Calculation Based on MADEP Method

Figure 3.03: Backwash Settled Solids vs Settling Time



3.3.2 Performance of Advanced Oxidation Process (AOP) for 1,4-Dioxane Removal

Four different UV AOP treatment combinations were evaluated at Straightway 2 Well and then repeated at Simmons Pond Well for removal of 1,4-Dioxane. The data in this section is organized based on the treatment combinations. The hydrogen peroxide doses to be evaluated were determined by Trojan Technologies analysis of the well water prior to the start of the pilot study.

Table 3.23 summarizes the treatment combinations and operating conditions evaluated during the UV AOP trials. Field data for hydrogen peroxide concentrations pre and post treatment are also included. Influent UVT was recorded twice daily, and this data is also included in the table.

Straightway 2 Well was considered to be the most challenging well to treat due to the highest concentrations of 1,4 dioxane, PFAS, iron and manganese. The UV AOP treatment process was evaluated for 14 days at Straightway 2 Well and then for 7 days at Simmons Pond Well.

Table 3.24 summarizes the field water quality for UV AOP treated water. Tables 3.25 and 3.26 summarize the UV AOP effluent water quality data from laboratory analyses for the duration of the pilot study. Table 3.25 presents general analyses while Table 3.26 presents DPB data.

3.3.2.1 UVAOP Operations Summary Table

Table 3.23: UV AOP Effluent – Operating Conditions and Field Analyses

Well	Start Time	End Time	Trial Conditions BPL/ H ₂ O ₂ Dose	UV Ballast Power Level (BPL)	Target H ₂ O ₂ Dose (mg/L)	H ₂ O ₂ Concentration by Field Analyses (ppm)		Influent UVT (%)	Effluent Turbidity (NTU)
						Pre-UV	Post-UV		
Straightway 2	5/24/21 12:35	5/27/21 13:00	High/High	100%	10	9.0 (6.5-9.0) [5]	4.0 (3.5-4.5) [5]	100 (99.5-100) [5]	0.033 ± 0.018 [6483]
	5/27/21 13:00	6/01/21 11:15	Low/High	60%	10	9.0 (8.0-9.0) [4]	5.0 (3.5-5.5) [4]	99.8 (98.3-99.8) [4]	
	6/01/21 11:15	6/02/21 13:15	High/Low	100%	5	3.5 (3.5-4.5) [3]	2.5 (1.5-2.5) [3]	100 [3]	
	6/02/21 13:15	6/07/21 8:35	Low/Low	60%	5	4.5 (3.5-6.0) [5]	3.0 (2.5-4.0) [5]	100 [4]	
Simmons Pond	6/07/21 13:45	6/10/21 12:55	High/High	100%	8	7.0 (6.0-8.0) [5]	3.0 (2.5-3.0) [5]	100 [5]	0.020 ± 0.007 [3458]
	6/10/21 12:55	6/14/21 8:25	Low/High	60%	8	7.0 (6.5-7.0) [3]	4.5 (3.5-4.5) [3]	100 (99.7-100) [3]	
	6/14/21 8:25	6/14/21 14:45	High/Low	100%	3.5	3.0 [2]	1.5 [2]	100 [2]	
	6/14/21 14:45	6/15/21 13:20	Low/Low	60%	3.5	3.5 [2]	1.5 [2]	100 [2]	

3.3.2.2 UVAOP Water Quality

Table 3.24: UV AOP Treated Water Quality by Field Analyses

Source	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
Straightway 2	0.00 (0.00-0.02) [21]	0.008 (0.000-0.026) [21]	7.36 (7.07-7.53) [16]
Simmons Pond	0.00 (0.00-0.00) [12]	0.004 (0.000-0.014) [12]	7.16 (6.99-7.34) [8]

Table 3.25: UV AOP Treated Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)									
		57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	
		Sample Date and Time									
		05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/02/21 10:00	06/03/21 10:00	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	
		Straightway 2					Simmons Pond				
Ballast Power – H ₂ O ₂ Condition		High/High	High/High	Low/High	High/Low	Low/Low	High/High	Low/High	High/Low	Low/Low	
1,4 Dioxane	µg/l	<0.12	<0.12	0.19	<0.12	<0.12	<0.12	<0.13	<0.12	<0.12	
PFAS6	ng/L										
Total Iron	mg/L										
Dissolved Iron	mg/L										
Total Manganese	mg/L										
Dissolved Manganese	mg/L										
Calcium	mg/L		19							20	
Magnesium	mg/L		5.3							5.4	
Sodium	mg/L		43							56	
Zinc	mg/L		<0.010							<0.010	
Hardness	mg/L		68							71	
Alkalinity	mg/L		73							55	
Color, Apparent	s.u.										
Color, True	s.u.										
Bromide	mg/L										
Chloride	mg/L		50							83	
Sulfate	mg/L		21							20	
Total Dissolved Solids	mg/L		190							250	
Nitrate-N	mg/L	0.5		0.5			4.3	4.3	4.3	4.3	
Nitrite-N	mg/L	<0.019		<0.019			0.022	0.019	<0.019	<0.019	
Total Coliform	Col/100mL										
Escherichia Coliform	Col/100mL										
Conductivity	umhos/cm		340							470	
pH	s.u.		7.6							7.0	
Turbidity	NTU										
Total Organic Carbon	mg/L		1.0			1.3		0.65		0.68	
Carbon Dioxide	mg/L		200							200	
Dissolved Oxygen	mg/L		6.6							8.7	
Oxygen-Reduction Potential	mV		300							340	
Bromate	µg/l	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	

Table 3.26: UV AOP Treated Water Quality by Laboratory Analyses – Disinfection Byproducts

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)									
		57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	
		Sample Date and Time									
		05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/02/21 10:00	06/03/21 10:00	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	
		Straightway 2					Simmons Pond				
Chloroform	µg/L	<0.50	<0.50	<0.50			<0.50	<0.50		<0.50	
Dibromodichloromethane	µg/L	<0.50	<0.50	<0.50			<0.50	<0.50		<0.50	
Bromodichloromethane	µg/L	<0.50	<0.50	<0.50			<0.50	<0.50		<0.50	
Bromoform	µg/L	<0.50	<0.50	<0.50			<0.50	<0.50		<0.50	
Total THMs	µg/L	<0.50	<0.50	<0.50			<0.50	<0.50		<0.50	
Dibromoacetic Acid	µg/L	<1	<1	<1			<1	<1		<1	
Dichloroacetic Acid	µg/L	<1	<1	<1			<1	<1		<1	
Monobromoacetic Acid	µg/L	<1	<1	<1			<1	<1		<1	
Monochloroacetic Acid	µg/L	<1	<1	<1			<1	<1		<1	
Total HAAs	µg/L	<1	<1	<1			<1	<1		<1	

3.3.3 Performance of GAC Contactor for PFAS Removal

A GAC contactor for treatment of PFAS was operated during both phases of the pilot study.

1. During initial Greensand filtration trials, the GAC contactor was operated downstream of Greensand filtration during treatment of the Hyannisport Well.
2. During all UV AOP trials the UV AOP system operated downstream of the high capacity greensand filters and the GAC contactor operated downstream of the UV AOP.

3.3.3.1 GAC Contactor Operations Summary Table

Table 3.27 provides a summary of the operating conditions for the GAC contactor.

Table 3.27: GAC Contactor Operating Conditions

Source	Start Date	End Date	Duration (days)	Upstream Processes	Nominal Flow Rate (gpm)	EBCT (min)
Hyannisport	4/26/2021	5/3/2021	7	Greensand Filtration	1.5	10
Straightway 2	5/24/2021	6/07/2021	14	Greensand Filtration and UV AOP		
Simmons Pond	6/07/2021	6/15/2021	7			

Tables 3.28 and 3.29 summarize additional operating parameters for the pilot contactors for the two trial periods. Table 3.28 summarizes the data for the GAC contactor when operating downstream of the Greensand filtration trials at Hyannisport Well. Table 3.29 summarizes the data for the GAC contactor when operating downstream of the pilot UV AOP system at Straightway 2 and Simmons Pond Wells. The following information is included for each filter trial:

- A. "Recorded Flow Rate" is the flow rate in gallons per minute as read on the rotometer style flow meter. This data was manually recorded on a data log each data.
- B. "Recorded Totalizer Volume" is the total volume of water in gallons registered by the totalizing residential style flow meter. This data was manually recorded on a data log each data.
- C. "Elapsed Time" is the calculated elapsed time in minutes from the startup of the pilot contactor.
- D. "Actual Flow Rates" is the calculated flow rate in gallons per minute. The recorded totalizer volume (gal) was divided by the elapsed time (min).
- E. "FSLR" is the actual filter loading rate processed through the filters, in gallons per minute per square foot (gpm/sf). The FSLR was calculated using recorded online flowrate (gpm) and dividing by the surface area of the pilot filter (0.2 ft²). Data is presented as "average ± standard deviation [count]."
- F. "EBCT" is the empty bed contact time in minutes. Empty bed contact time is calculated as the empty bed volume (gal) divided by the actual flow rate (gal/min).
- G. "Total Bed Volumes Treated" is the number of empty bed volumes (BV) treated through the contactor as calculated by dividing the total volume of water treated (gal) by the empty bed volume (gal).

Table 3.28: GAC Contactor Flows, EBCTs, and Bed Volumes For Initial Greensand Filtration Trials at Hyannisport Well

Date/Time	Recorded Flowrates (gpm)	Recorded Totalizer Volumes (gal)	Elapsed Time (min)	Actual Flow Rates (gpm)	EBCT (min)	Total Bed Volumes (BV) Treated
4/27/2021 15:00	1.5	36205	0			0
4/28/2021 10:00	1.5	37860.2	1140	1.45	10.1	113
4/29/2021 9:00	1.5	39943	2520	1.48	9.9	254
4/30/2021 9:40	1.5	42150	4000	1.49	9.9	404
5/01/2021 7:00	GAC Contactor Feed Pump Tripped Power Over Weekend. Off Until May 3.					
5/3/2021 8:20	1.5	44081	0			536
5/3/2021 11:14	1.5	44333	174	1.45	10.2	553
Final Rates and Volumes				1.45	10.2	553

Table 3.29: GAC Contactor Flows, EBCTs, and Bed Volumes for UV AOP Trials at Straightway 2 and Simmons Pond Wells

Date/Time	Recorded Flowrates (gpm)	Recorded Totalizer Volumes (gal)	Elapsed Time (min)	Actual Flow Rates (gpm)	EBCT (min)	Total Bed Volumes (BV) Treated
5/24/2021 13:50	0	44333	0			553
5/25/2021 14:50	1.5	46946	1500	1.74	8.4	731
5/26/2021 7:50	1.5	48538	2520	1.67	8.8	839
5/26/2021 14:50	1.5	49032.5	2940	1.60	9.2	873
5/27/2021 8:30	1.5	50636.5	4000	1.58	9.3	982
5/28/2021 8:00	1.5	52867.5	5410	1.58	9.3	1134
5/28/2021 11:10	1.5	53039.5	5600	1.55	9.5	1145
6/1/2021 11:15	1.5	61720.5	11365	1.53	9.6	1736
6/2/2021 8:00	1.5	63693.7	12610	1.54	9.6	1870
6/2/2021 14:50	1.5	64344.5	13020	1.54	9.6	1914
6/3/2021 7:00	1.5	65853	13990	1.54	9.6	2017
6/3/2021 14:45	1.5	66574.5	14455	1.54	9.6	2066
6/4/2021 7:45	1.5	68175.3	15475	1.54	9.5	2175
6/4/2021 11:45	1.5	68369.5	15715	1.53	9.6	2188
6/8/2021 10:30	1.5	74828.5	21400	1.43	10.3	2627
6/8/2021 15:00	1.5	75240	21670	1.43	10.3	2655
6/9/2021 7:45	1.5	76809	22675	1.43	10.3	2762
6/9/2021 12:30	1.5	77241	22960	1.43	10.3	2792
6/10/2021 7:45	1.5	79020.5	24115	1.44	10.2	2913
6/10/2021 12:55	1.5	79497	24425	1.44	10.2	2945
6/11/2021 7:50	1.5	81236	25560	1.44	10.2	3063
6/11/2021 11:25	1.5	81457.5	25775	1.44	10.2	3078
6/14/2021 14:45	1.5	88584	30295	1.46	10.1	3563
6/15/2021 7:40	1.5	90179.5	31310	1.46	10.0	3672
6/15/2021 13:00	1.5	90682	31630	1.47	10.0	3706
Final Rates and Volumes				1.47	10.0	3,706

3.3.3.2 GAC Contactor Hydraulic Performance Summary Table

Table 3.30 summarizes the recorded pressure data and calculated differential pressure through the contactor vessels. 0-60 psi pressure gauges were used to monitor differential pressure (headloss) development for each of the pilot scale contactors. All three pilot vessels had differential pressure monitoring capability. Inlet pressure for the initial contactor vessel was monitored and recorded. Each contactor had a dedicated outlet pressure tap connected to a pressure gauge. Contactor differential pressures (DPs) were calculated using the inlet and outlet pressures for each contactor. DPs for first vessel in the GAC trains was calculated using the inlet pressure and that vessels outlet pressure. DPs for the second and third contactors in the GAC trains were calculated using the outlet pressure for the upstream contactor vessel and the outlet pressure for the contactor vessel of interest.

Table 3.30: PFAS Contactor Pressures and Differential Pressures

Date/Time	Inlet	Recorded Pressures (PSI) Calibration Corrected			Differential Pressure (PSI)		
		GAC Contactor			GAC Contactor		
		Vessel 1	Vessel 2	Vessel 3	Vessel 1	Vessel 2	Vessel 3
Initial Greensand Filtration Trials at Hyannisport Well							
4/27/2021 15:00	26.9	25.6	24.5	22.1	1.3	1.1	2.4
4/28/2021 10:00	27.4	26.3	25.3	22.6	1.1	1.0	2.7
4/29/2021 9:00	26.4	25.6	24.5	22.4	0.8	1.1	2.1
4/30/2021 9:40	24.9	25.1	23.9	21.4	-0.2	1.2	2.5
5/3/2021 11:14	26.2	25.4	24.2	23	0.8	1.2	1.2
UV AOP Trials							
5/25/2021 14:50	8.7	7.3	7.7	7.4	1.4	-0.4	0.3
5/26/2021 7:50	8.8	7.5	7.7	7.3	1.3	-0.2	0.4
5/26/2021 14:50	8.7	7.2	7.2	7.3	1.5	0.0	-0.1
5/27/2021 8:30	8.8	7.1	7.3	7.4	1.7	-0.2	-0.1
5/28/2021 8:00	8.7	7.2	7.3	7.4	1.5	-0.1	-0.1
5/28/2021 11:10	8.7	7.1	7.2	7.4	1.6	-0.1	-0.2
6/1/2021 11:15	8.6	6.7	6.8	6.8	1.9	-0.1	0.0
6/2/2021 8:00	8.8	6.6	6.8	6.9	2.2	-0.2	-0.1
6/2/2021 14:50	8.7	6.7	6.7	6.9	2.0	0.0	-0.2
6/3/2021 7:00	8.7	6.8	6.9	6.8	1.9	-0.1	0.1
6/3/2021 14:45	8.7	6.6	6.7	6.8	2.1	-0.1	-0.1
6/4/2021 7:45	8.7	6.6	6.7	6.8	2.1	-0.1	-0.1
6/4/2021 11:45	8.7	6.6	6.7	6.8	2.1	-0.1	-0.1
6/7/2021 8:15	8.5	6.4	6.4	6.8	2.1	0.0	-0.4
6/8/2021 10:30	8.7	6.7	7	7	2.0	-0.3	0.0
6/8/2021 15:00	8.8	6.9	7.1	7.1	1.9	-0.2	0.0
6/9/2021 7:45	8.8	6.9	7.1	7.1	1.9	-0.2	0.0
6/9/2021 12:30	8.8	6.9	7.1	7.1	1.9	-0.2	0.0
6/10/2021 7:45	8.8	7	7.1	7.1	1.8	-0.1	0.0
6/10/2021 12:55	8.8	7.1	7.2	7.2	1.7	-0.1	0.0
6/11/2021 7:50	8.8	7	7.2	7.1	1.8	-0.2	0.1
6/11/2021 11:25	8.8	7.1	7.2	7.1	1.7	-0.1	0.1
6/14/2021 8:25	8	6.4	7.4	7.1	1.6	-1.0	0.3
6/14/2021 14:45	8.8	6.9	7	7.1	1.9	-0.1	-0.1
6/15/2021 7:40	8.8	6.8	7	7.1	2.0	-0.2	-0.1
6/15/2021 13:00	9	7.4	6.9	7.1	1.6	0.5	-0.2

3.3.3.3 GAC Contactor Effluent Water Quality

GAC effluent water quality data by field analyses is summarized in Table 3.31. Laboratory data is reported in Tables 3.32 to 3.34. General analyses are summarized in Table 3.32, disinfection byproduct data in Table 3.33 and PFAS compound data in Table 3.34.

Table 3.31: GAC Contactor Treated Water Quality by Field Analyses

Source	Fe(t) (mg/L)	Mn(t) (mg/L)	pH (s.u.)
Straightway 2	0.00 (0.00-0.05) [21]	0.008 (0.000-0.049) [21]	7.24 (7.12-7.44) [16]
Simmons Pond	0.00 (0.00-0.00) [12]	0.006 (0.000-0.013) [12]	7.15 (6.88-7.24) [7]

Table 3.32: GAC Contactor Treated Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)													
		56226 L2113238	56580 L2118928	57189 L2128319	57190 L2128315	57224 L2128998	57271 L2129637	56696 L2120551	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	56824	56792 L2122099	
		Sample Date and Time													
		03/17/21 10:00	04/14/21 10:00	05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/03/21 10:00	04/22/21 9:30	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	04/28/21 12:00	04/29/21 9:30	
STRAIGHTWAY 1		STRAIGHTWAY 2				SIMMONS POND						HYANNISPORT			
1,4 Dioxane	µg/l														
PFAS6	ng/L				6.1		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7	
Total Iron	mg/L												<0.050		
Dissolved Iron	mg/L												<0.050		
Total Manganese	mg/L												<0.010		
Dissolved Manganese	mg/L												<0.010		
Calcium	mg/L				18						21		8.8		
Magnesium	mg/L				5.4						5.4		3.4		
Sodium	mg/L				43						56		99		
Zinc	mg/L				<0.010						<0.010		<0.010		
Hardness	mg/L				68						74		36		
Alkalinity	mg/L				71						60		58		
Color, Apparent	s.u.														
Color, True	s.u.														
Chloride	mg/L				51						82		100		
Sulfate	mg/L				22						20		18		
Total Dissolved Solids	mg/L				190						250		270		
Nitrate-N	mg/L														
Nitrite-N	mg/L														
Total Coliform	Col/100mL														
Escherichia Coliform	Col/100mL														
Conductivity	umhos/cm				350						460		540		
pH	s.u.				7.9						7.1		7.3		
Turbidity	NTU														
Total Organic Carbon	mg/L				<0.59						<0.59		<1.0		
Carbon Dioxide	mg/L				200						210				
Dissolved Oxygen	mg/L				3.4						4.5				
Oxygen-Reduction Potential	mV				340						350				
Total Residual Chlorine	mg/L				<0.02						<0.02				
Residual Free Chlorine	mg/L				<0.20						<0.05				
Bromate	µg/L				<1.0						<1.0				

Table 3.34: GAC Contactor Treated Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)												
		56226	56580	57189	57190	57224	57271	56696	57365	57382	57407	57435	56824	56792
		Sample Date and Time												
		03/17/21 10:00	04/14/21 10:00	05/25/21 12:15	05/27/21 10:00	06/01/21 11:00	06/03/21 10:00	04/22/21 9:30	06/10/21 9:00	06/11/21 8:30	06/14/21 11:00	06/15/21 10:00	04/28/21 12:00	04/29/21 9:30
STRAIGHT- WAY 1	STRAIGHTWAY 2					SIMMONS POND					HYANNISPORT			
2,3,3,3-tetrafluoro-2(heptafluoropropoxy) propanoic acid (GenX acid)(HFPODA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorobutanesulfonic Acid (PFBS)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorodecanoic Acid (PFDA)	ng/L				2.0		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorododecanoic Acid (PFDoA)	ng/L				0.95		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluoroheptanoic Acid (PFHpA)	ng/L				1.6*		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorohexanesulfonic Acid (PFHxS)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorohexanoic Acid (PFHxA)	ng/L				0.84		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorononanoic Acid (PFNA)	ng/L				2.2		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorooctanesulfonic Acid (PFOS)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorooctanoic Acid (PFOA)	ng/L				1.9		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorotetradecanoic Acid (PFTEA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluorotridecanoic Acid (PFTRIA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Perfluoroundecanoic Acid (PFUnA)	ng/L				1.4		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
11-Chloroeicosafuoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ng/L				<1.7		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
Total PFAS6 (Reported Above in Table 3.02)	ng/L				6.1		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7

* Estimated Concentrations Below Reporting Limit Not Counted Toward Total PFAS6 Calculation Based on MADEP Method

3.4 MAHER TREATMENT PLANT WATER QUALITY

Water quality samples were collected at the Town of Barnstable DPW Water Supply Division's Maher Water Treatment Plant to provide background data for corrosion control modeling by Kleinfelder. The samples were collected on May 27, June 3 and June 10, 2021. Table 3.35 summarizes the general analyses; Table 3.36 summarizes disinfection byproduct data; and Table 3.37 summarizes PFAS compounds.

Table 3.35: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)											
		57190/L2128315				57271/L2129637				57365/L2131271			
		Sample Date and Time											
		05/27/21 10:00				06/03/21 10:00				06/10/21 9:00			
		RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED
1,4 Dioxane	µg/l	<0.12	<0.12	<0.12		0.43	0.37	<0.12		0.23	0.25	<0.12	
PFAS6	ng/L	153.0	142.5	145.3	<1.8	154.2	131.3	133.4		142.8	145.8	143.2	
Total Iron	mg/L	0.044	<0.0032	<0.0032	<0.0032	0.081	<0.0032	<0.0032	<0.0032	0.056	<0.0032	<0.0032	
Dissolved Iron	mg/L								<0.0032				<0.0032
Total Manganese	mg/L	0.065	0.035	0.035	0.0039	0.080	0.026	0.024	0.0023	0.075	0.062	0.059	
Dissolved Manganese	mg/L								0.0026				0.0025
Calcium	mg/L	5.9	5.9	6.0	5.2	7.9	8.1	8.0	7.6	6.1	7.0	6.7	7.1
Magnesium	mg/L	2.7	2.6	2.6	2.4	3.2	3.2	3.1	3.0	2.7	3.0	2.8	2.9
Sodium	mg/L	16	17	17	18	21	19	20	22	20	24	22	23
Zinc	mg/L	0.0052	0.0030	0.0033	0.0039	0.0049	<0.0028	0.0028	0.17	0.0081	0.0037	0.0029	0.17
Hardness	mg/L	26	25	26	23	33	33	33	31	26	30	29	30
Alkalinity	mg/L	12	15	14	15	21	20	20	21	12	15	15	20
Color, Apparent	s.u.	<2.5	<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	<2.5	<2.5	
Color, True	s.u.	<2.5	<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	<2.5	<2.5	
Bromide	mg/L	0.045								0.044			
Chloride	mg/L	29	28	29	28	35	35	36	35	38	42	40	40
Sulfate	mg/L	7.3	7.5	7.4	7.1	8.9	8.2	8.2	8.2	7.5	7.8	7.7	7.9
Total Dissolved Solids	mg/L	83	80	86	87	110	110	110	95	91	100	97	110
Nitrate-N	mg/L	0.6		0.6		0.6		0.6		0.6		0.6	
Nitrite-N	mg/L	<0.019		<0.019		<0.019		<0.019		<0.019		<0.019	
Total Coliform	Col/100mL	absent	absent	absent		absent	absent	absent		absent	absent	absent	
Escherichia Coliform	Col/100mL	absent	absent	absent		absent	absent	absent		absent	absent	absent	
Conductivity	umhos/cm	140	150	150	140	180	170	180	180	170	180	180	190
pH	s.u.	6.1	6.4	7.3	7.5	6.5	6.4	7.2	7.4	6.2	6.1	6.8	7.2
Turbidity	NTU	<0.40	<0.40	<0.40		<0.40	<0.40	<0.40		<0.40	<0.40	<0.40	
Total Organic Carbon	mg/L	1.0	0.62			0.82	1.20			<0.59	<0.59		
Carbon Dioxide	mg/L	94	94	62	43	120	110	76	51	89	81	58	46
Dissolved Oxygen	mg/L	3.5	9.6	8.0	3.7	2.0	4.8	7.6	10.0	4.6	5.0	13.0	11.0
Oxygen-Reduction Potential	mV	360	390	300	610	200	210	220	580	190	210	220	540
Total Residual Chlorine	mg/L				1.2				1.3				0.79
Residual Free Chlorine	mg/L				<0.05				<0.05				0.68
Bromate	µg/L			<1.0				<1.0				<1.0	

Table 3.36: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)											
		57190 L2128315				57271 L2129637				57365 L2131271			
		05/27/21 10:00				06/03/21 10:00				06/10/21 9:00			
		RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED
Chloroform	µg/l		<0.50	<0.50			<0.50	<0.50			<0.50	<0.50	
Dibromodichloromethane	ng/L		<0.50	<0.50			<0.50	<0.50			<0.50	<0.50	
Bromodichloromethane	mg/L		<0.50	<0.50			<0.50	<0.50			<0.50	<0.50	
Bromoform	mg/L		<0.50	<0.50			<0.17*	<0.50			<0.50	<0.50	
Total THMs	mg/L		<0.50	<0.50			<0.50	<0.50			<0.50	<0.50	
Dibromoacetic Acid	mg/L		<1	<1			<1	<1			<1	<1	
Dichloroacetic Acid	mg/L		<1	<1			<1	<1			<1	<1	
Monobromoacetic Acid	mg/L		<1	<1			<1	<1			<1	<1	
Monochloroacetic Acid	mg/L		<1	<1			<1	<1			<1	<1	
Total HAAs	mg/L		<1	<1			<1	<1			<1	<1	

* Estimated Concentration Below Reporting Limit Not Counted Toward Total THM Calculation

Table 3.37: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses

Analysis	Units	Laboratory Report # (Absolute#/Alpha#)											
		57190 L2128315				57271 L2129637				57365 L2131271			
		05/27/21 10:00				06/03/21 10:00				06/10/21 9:00			
		RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED	RAW	GREENSAND TREATED	UV TREATED	GAC TREATED
2,3,3,3-tetrafluoro-2(heptafluoropropoxy) propanoic acid (GenX acid)(HFPODA)	ng/L	0.81	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
Perfluorobutanesulfonic Acid (PFBS)	ng/L	2.2	1.9	2.0	<1.8	2.0	2.3	2.3		1.9	1.9	2.0	
Perfluorodecanoic Acid (PFDA)	ng/L	1.1*	0.41*	0.39*	<1.8	0.51*	0.42*	0.41*		0.49*	0.54*	0.54*	
Perfluorododecanoic Acid (PFDoA)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
Perfluoroheptanoic Acid (PFHpA)	ng/L	13	12	13	<1.8	15	12	13		13	14	14	
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	40	33	36	<1.8	34	32	32		32	32	31	
Perfluorohexanoic Acid (PFHxA)	ng/L	24	27	27	<1.8	33	28	31		28	30	33	
Perfluorononanoic Acid (PFNA)	ng/L	7.0.	7.5	7.3	<1.8	9.2	6.3	6.4		7.8	7.8	8.2	
Perfluorooctanesulfonic Acid (PFOS)	ng/L	78	75	75	<1.8	79	67	69		75	76	74	
Perfluorooctanoic Acid (PFOA)	ng/L	15	15	14	<1.8	17	14	13		15	16	16	
Perfluorotetradecanoic Acid (PFTEA)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
Perfluorotridecanoic Acid (PFTRIA)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
Perfluoroundecanoic Acid (PFUnA)	ng/L	0.58	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
11-Chloroeicosafuoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS)	ng/L	<1.7	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	ng/L	1.4	<1.7	<1.8	<1.8	<1.7	<1.7	<1.7		<1.7	<1.7	<1.7	
Total PFAS6 (Reported Above in Table 3.02)	ng/L	153.0	142.5	145.3	<1.8	154.2	131.3	133.4		142.8	145.8	143.2	

* Estimated Concentrations Below Reporting Limit Not Counted Toward Total PFAS6 Calculation Based on MADEP Met

4 DATA ANALYSIS AND DISCUSSION

Section 4 – Data Analysis provides analysis and discussion of the data presented in Section 3. This Section contains comparisons of Filter Trials and discussion of data from separate parts of Section 3. Issues and questions that are addressed in this Section were developed by the pilot operators to answer questions that are generally of interest when testing PFAS, 1,4 dioxane, and iron and manganese removal in general.

4.1 RAW WATER QUALITY

4.1.1 Comparison of Raw Water Quality to Historical Data

Raw water iron and manganese concentrations collected during the pilot study, and analyzed by field methods, were compared to the historical data provided by Kleinfelder. Similarly, raw water 1,4-dioxane and PFAS6 concentrations for samples collected during the pilot study and measured by a certified laboratory were compared to the historical data provided. The historical data consists of a data point for each contaminant at each well source.

Figures 4.01 to 4.04 are box plots which show raw iron, raw manganese, raw 1,4-dioxane and raw PFAS6 concentrations measured during the pilot study from all four well sources compared with historical data. The respective secondary maximum contaminant limits (SMCLs) for iron and manganese, the ORSL for 1,4-dioxane and the MCL for PFAS6 are also displayed on the figures.

Figure 4.01: Raw Iron Concentrations Compared to Historical Data

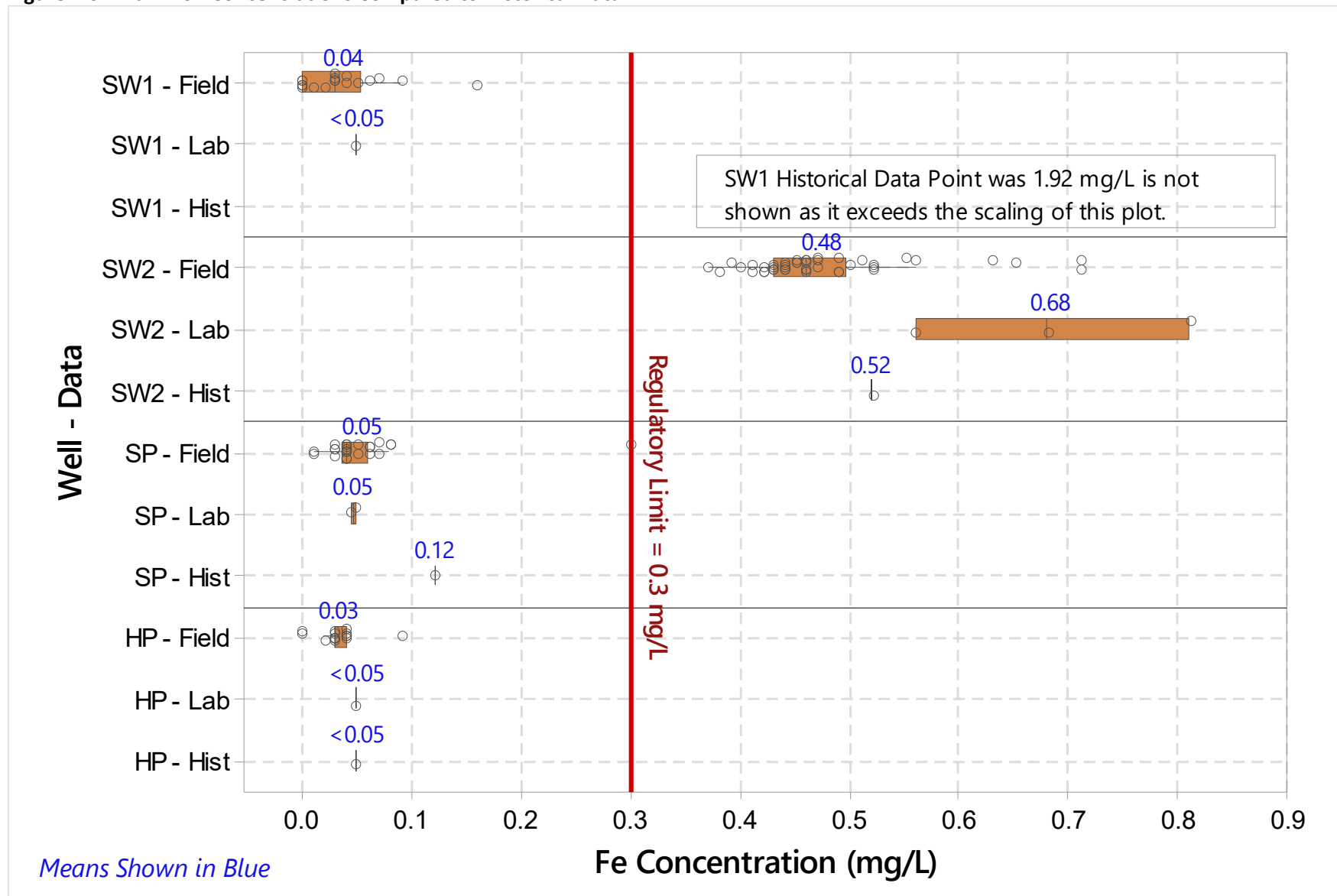


Figure 4.02: Raw Manganese Concentrations Compared to Historical Data

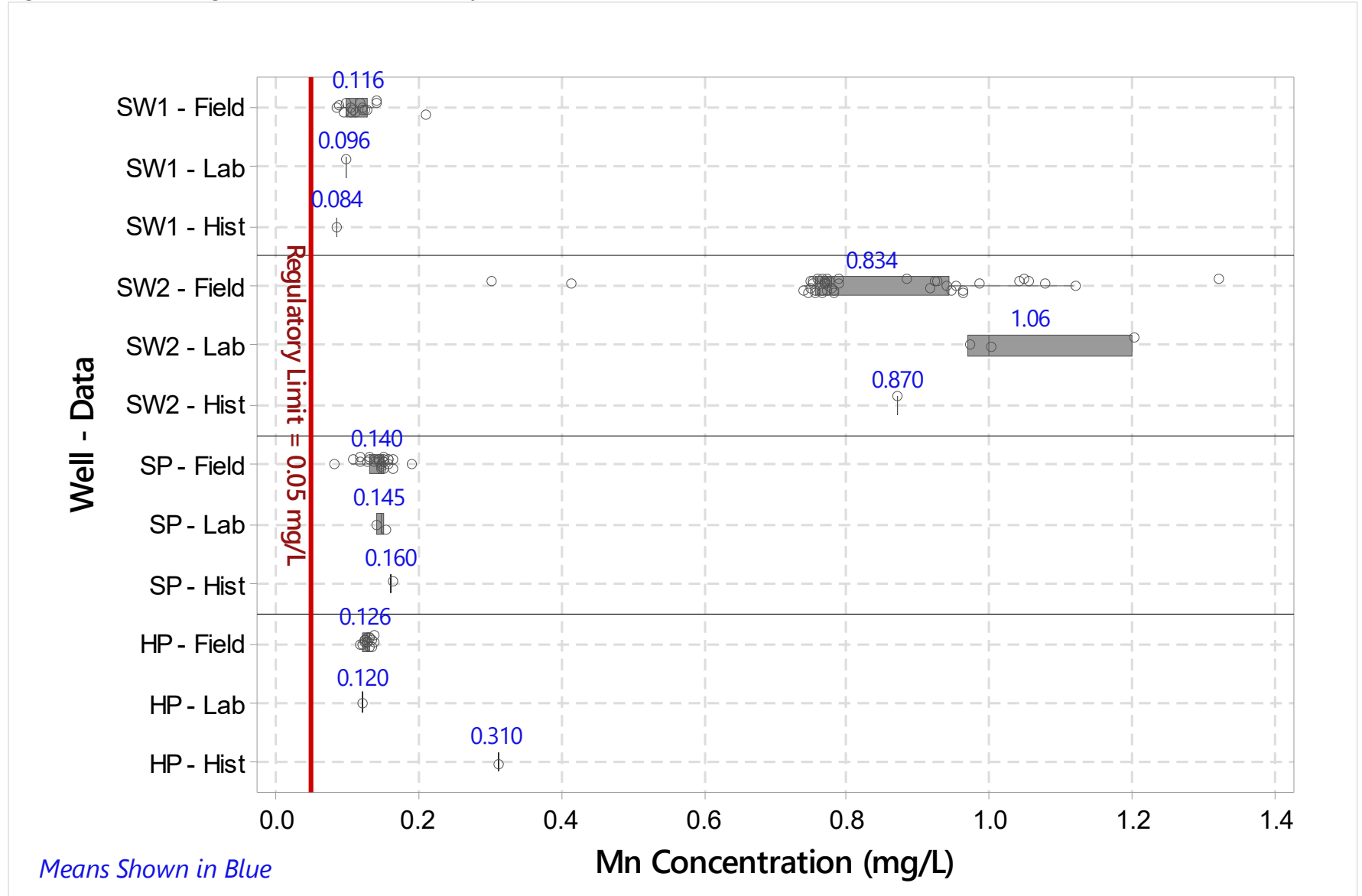


Figure 4.03: Raw 1,4-Dioxane Concentrations Compared to Historical Data

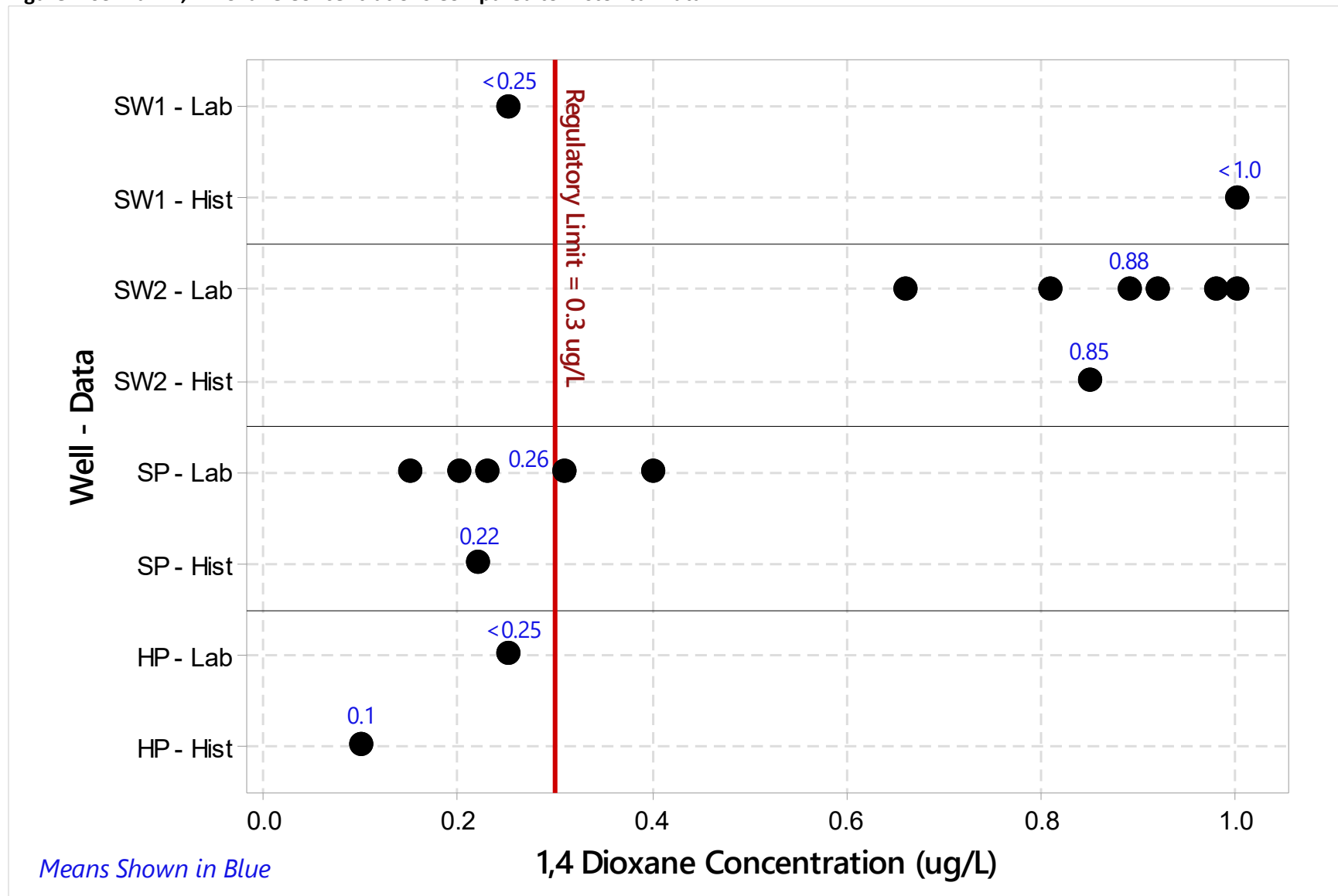
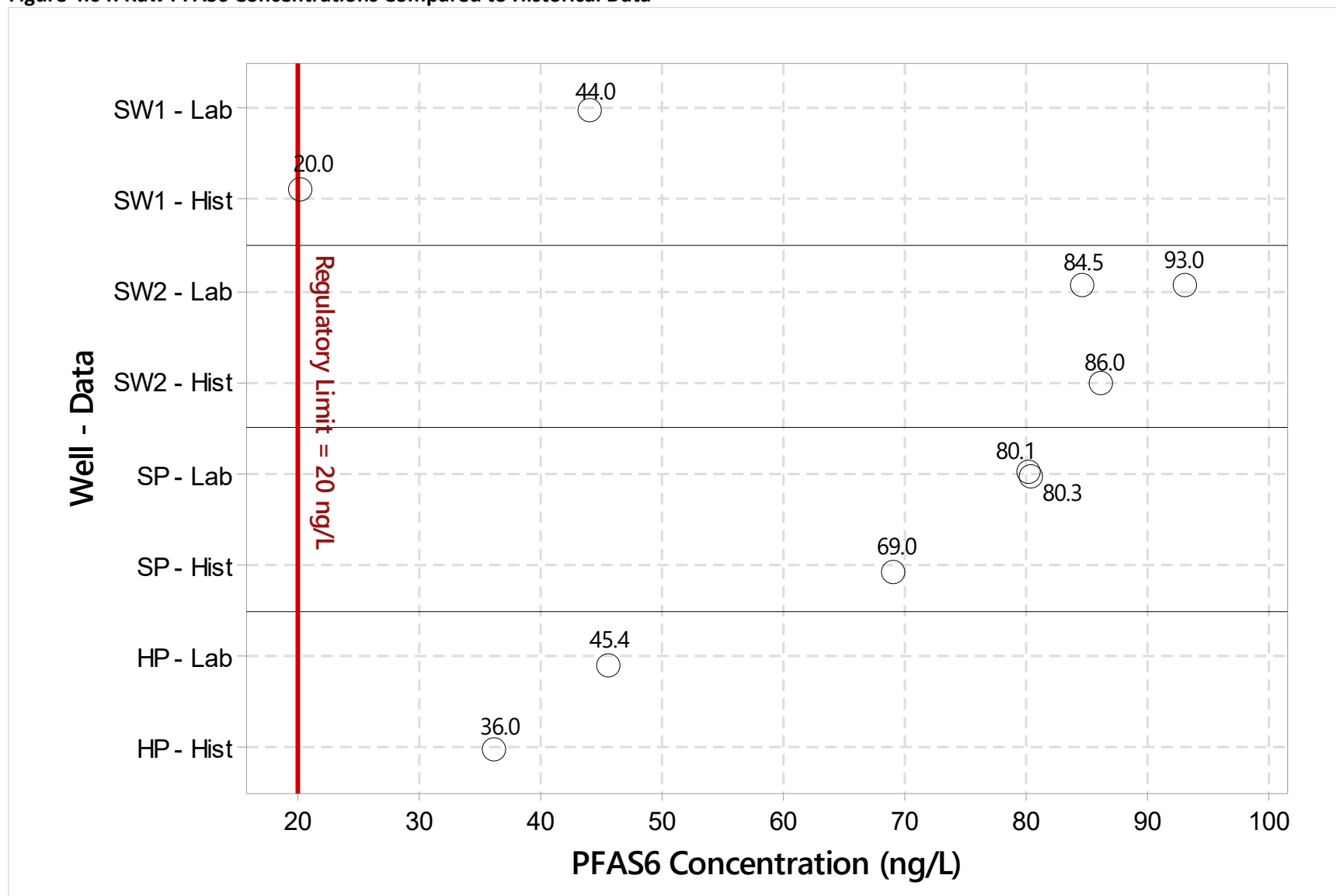


Figure 4.04: Raw PFAS6 Concentrations Compared to Historical Data



Comparison of Raw Iron

Figure 4.01 shows the box plots for raw iron concentrations measured during the pilot study by the HACH FerroVer® method as well as the lab data produced during the pilot study and the historical data point.

- For Straightway 1 Well there was agreement between the field and lab data. The lab result was reported as <0.05 mg/L while the median of 18 field results was 0.04 mg/L. The historical data point, however, was 1.92 mg/L and greatly exceeded the pilot study data. Straightway 1 has been shut down for extended periods of time and it is possible that the elevated historical data point is the result of sampling soon after restarting the well while corrosion from the well casing may have been present in the sample. With a single point we are unable to determine if this point is anomalous and therefore unable to conclude whether the raw iron concentrations produced during the pilot study were representative of historical data.
- For Straightway 2 Well there was overlap between all three data sources. The median of 44 field data was 0.48 mg/L, the median of three lab data was 0.68 mg/L and the historical data point was 0.52 mg/L.
- For Simmons Pond Well the medians of the field data and lab data were at the lab detection limit for iron of 0.5 mg/L while the historical data point was 0.12 mg/L.
- For Hyannisport Well all three data sources were below the laboratory detection limit of 0.5 mg/L/.
- The pilot study data showed that only Straightway 2 well exceeded the SMCL of 0.3 mg/L.

Raw iron concentrations appear to be similar to the historical data points provided for Straightway 2, Simmons Pond and Hyannisport Wells. The Straightway 1 historical raw iron data point greatly exceeded the data produced during the pilot study. This data point may be anomalous but if iron concentrations can vary at Straightway 1 Well as high as 2.0 mg/l it would significantly increase the contaminant loading and decrease filter runtimes for the Greensand filters.

Comparison of Raw Manganese

- For Straightway 1, Straightway 2 and Simmons Pond Wells there was overlap between the field, lab and historical data sources. Based on the data these wells supplied water with manganese concentrations similar to their respective historical data points.
- For Hyannisport Well there was agreement between the field and lab data that the raw manganese concentration was near 0.12 mg/L while the historical data point was more than double that at 0.310 mg/L.
- All raw manganese data for all four wells exceeded the SMCL of 0.05 mg/L.

Comparison of 1,4-Dioxane

- Straightway 1 and Hyannisport Wells each had a single lab data point to compare with the historical data point. For Straightway 1 both data points were reported as below the detection limit. The reporting limit for the pilot study lab report was 0.25 µg/L while the historical data

point was <1.0 µg/L. The reporting limit for the historical data point exceeds the ORGSL of 0.3 µg/L and therefore it is difficult to determine if the two data points are similar.

- The lab result for the Hyannisport Well was also below the reporting limit of 0.25 µg/L compared with the historical data point of 0.1 µg/L. These data are both below the regulatory limit and appear to be similar.
- The historical data points for Straightway 2 and Simmons Pond Wells fell within the range of lab data reported during the pilot study. There were six lab data points for Straightway 2 Well and five lab data points for Simmons Pond. More data is available for these two wells because they were utilized during UV AOP testing. The pilot study data are similar to the historical data points. All data for the Straightway 2 Well exceed the regulatory limit. The range of data for Simmons Pond Well spans the regulatory threshold with some data reported below the limit and some data reported above the limit.

Comparison of PFAS 6

- There were one or two pilot study lab data points to compare to the historical data points.
- The Straightway 1 pilot study data point was 44 ng/L and more than twice the historical data point of 20 ng/L.
- The pilot study data for Straightway 2, Simmons Pond and Hyannisport Wells were generally similar to their respective historical data points.
- Five of the six pilot study data points were greater than their respective historical data points.
- All pilot study data for all four wells exceeded the MCL of 20 ng/L.

There were one or two pilot study lab data points to compare to the historical data points.

The Straightway 1 pilot study data point was 44 ng/L and more than twice the historical data point of 20 ng/L. The pilot study data for Straightway 2, Simmons Pond and Hyannisport Wells were generally similar to their respective historical data points. Five of the six pilot study data points were greater than their respective historical data points. All pilot study data for all four wells exceeded the MCL of 20 ng/L.

4.2 IRON AND MANGANESE REMOVAL WITH GREENSAND FILTRATION

4.2.1 Effectiveness of Adsorptive Media Filtration for Mn Removal

This section compares the effectiveness of adsorptive media filtration for the removal of raw iron and manganese by operational variables such as well source, filter surface loading rate (4, 6, 8 gpm/sf) and pH setting (6.8, 7.4).

4.2.1.1 Iron Removal

To determine if the pilot filters met the SMCL for Fe (Fe < 0.30 mg/L), a t-test was performed comparing effluent iron by field analysis to the SMCL. The variable inputs for the t-test were labeled as “Well”, “-Filter Surface Loading Rate-”, and “pH”; for example, “HP-4-6.8” indicates that the data was collected from the effluent of a filter from Hyannisport Well operating at a target filter surface loading rate of 4 gpm/sf at a pH target of 7.4. The results of the t-test are presented in Table 4.01.

Table 4.01: Results of t-test for Effluent Fe (HACH FerroVer® Method) versus SMCL

Test of $\mu = 0.3$ vs < 0.3									
Well-FSLR-pH	N	Mean	StDev	SE Mean	95% Upper Bound	T	P		
HP - 4 - 6.8	14	0.000000	0.000000	0.000000	0.000000	*	*		
HP - 4 - 7.4	14	0.000000	0.000000	0.000000	0.000000	*	*		
HP - 8 - 6.8	14	0.000000	0.000000	0.000000	0.000000	*	*		
HP - 8 - 7.4	14	0.000000	0.000000	0.000000	0.000000	*	*		
SP - 4 - 6.8	12	0.000000	0.000000	0.000000	0.000000	*	*		
SP - 4 - 7.4	12	0.000000	0.000000	0.000000	0.000000	*	*		
SP - 8 - 6.8	12	0.000000	0.000000	0.000000	0.000000	*	*		
SP - 8 - 7.4	12	0.000000	0.000000	0.000000	0.000000	*	*		
SW1 - 4 - 6.8	14	0.01429	0.01604	0.00429	0.02188	-66.67	0.000		
SW1 - 4 - 7.4	15	0.00400	0.00828	0.00214	0.00777	-138.44	0.000		
SW1 - 8 - 6.8	13	0.01385	0.01981	0.00549	0.02364	-52.09	0.000		
SW1 - 8 - 7.4	15	0.00600	0.01056	0.00273	0.01080	-107.87	0.000		
SW2 - 4 - 6.8	13	0.01538	0.02145	0.00595	0.02599	-47.83	0.000		
SW2 - 4 - 7.4	13	0.00769	0.01166	0.00323	0.01345	-90.41	0.000		
SW2 - 6 - 6.8	6	0.000000	0.000000	0.000000	0.000000	*	*		
SW2 - 6 - 7.4	6	0.00333	0.00516	0.00211	0.00758	-140.72	0.000		
SW2 - 8 - 6.8	12	0.01500	0.01679	0.00485	0.02370	-58.81	0.000		
SW2 - 8 - 7.4	12	0.01250	0.01485	0.00429	0.02020	-67.08	0.000		

* Indicates that all data is zero (or 0.00 mg/L Fe) and no P value is calculated.

Results show the upper bound of the 95% confidence limit (the average is 95% likely to be less than the concentrations shown highlighted in green in Table 4.01). The p-values for each condition indicate the likelihood that the concentrations are less than the SMCL. All p-values are shown in yellow and where calculated were less than 0.05, indicating a greater than 95% likelihood that the condition met the Fe removal goal. Where a p-value was not calculated (noted as *) all data was reported as 0.00 mg/L Fe.

The t-test shows that raw iron for all four wells was effectively reduced to less than the SMCL when operating at loading rates between 4 and 8 gpm/sf and at both pH conditions evaluated. All operating combinations produced mean concentrations of less than 0.03 mg/L Fe in the filter effluent. All four wells and were included in this statistical comparison but it should be noted that only Straightway 2 Well raw water exceeded the SMCL. Because the effluent manganese concentrations were comparatively

low and practically similar further statistical analysis to evaluate significant differences in treatment by loading rate or pH are not necessary.

4.2.1.2 Manganese Removal

To determine if the pilot filters met the SMCL for Mn (Mn < 0.05 mg/L), a t-test was performed comparing effluent manganese by field analysis to the SMCL. The variable inputs are the same as described above for the iron removal comparison. The results of the t-test are presented in Table 4.02.

Table 4.02: Results of t-test for Effluent Mn (PAN Method) versus Project Goal

Test of $\mu = 0.05$ vs < 0.05								
Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P	
HP - 4 - 6.8	13	0.00492	0.00620	0.00172	0.00799	-26.22	0.000	
HP - 4 - 7.4	13	0.00346	0.00516	0.00143	0.00601	-32.53	0.000	
HP - 8 - 6.8	13	0.00508	0.00775	0.00215	0.00891	-20.90	0.000	
HP - 8 - 7.4	13	0.00438	0.00501	0.00139	0.00686	-32.83	0.000	
SP - 4 - 6.8	12	0.01108	0.00983	0.00284	0.01618	-13.71	0.000	
SP - 4 - 7.4	12	0.00683	0.00476	0.00138	0.00930	-31.39	0.000	
SP - 8 - 6.8	12	0.00625	0.00445	0.00129	0.00856	-34.02	0.000	
SP - 8 - 7.4	12	0.00650	0.00442	0.00128	0.00879	-34.08	0.000	
SW1 - 4 - 6.8	14	0.01386	0.01232	0.00329	0.01969	-10.98	0.000	
SW1 - 4 - 7.4	15	0.00747	0.00863	0.00223	0.01139	-19.10	0.000	
SW1 - 8 - 6.8	14	0.01214	0.01335	0.00357	0.01846	-10.61	0.000	
SW1 - 8 - 7.4	15	0.00847	0.00983	0.00254	0.01294	-16.37	0.000	
SW2 - 4 - 6.8	13	0.00938	0.00900	0.00249	0.01383	-16.28	0.000	
SW2 - 4 - 7.4	13	0.00954	0.00884	0.00245	0.01391	-16.51	0.000	
SW2 - 6 - 6.8	6	0.01117	0.00512	0.00209	0.01537	-18.60	0.000	
SW2 - 6 - 7.4	6	0.01033	0.00824	0.00336	0.01711	-11.79	0.000	
SW2 - 8 - 6.8	12	0.03527	0.01899	0.00548	0.04511	-2.69	0.011	
SW2 - 8 - 7.4	12	0.01150	0.00853	0.00246	0.01592	-15.63	0.000	

Results show the upper bound of the 95% confidence limit (the average is 95% likely to be less than the concentrations shown highlighted in green in Table 4.01). The p-values for each condition indicate the likelihood that the concentrations are less than the SMCL. All p-values are shown in yellow and were less than 0.05, indicating a greater than 95% likelihood that the condition met the Mn removal goal.

The t-test shows that raw manganese from all four wells was effectively reduced to less than the SMCL when operating at loading rates between 4 and 8 gpm/sf and at both pH conditions evaluated. All operating combinations produced mean concentrations of less than 0.05 mg/L Mn in the filter effluent.

All P values were reported to be 0.000 with the exception of filter trials at Straightway 2 operating at the high loading rate and low pH condition. While the P value of 0.011 is statistically acceptable the 95% upper bound of 0.045 mg/L is higher than other conditions. To identify what operating conditions may be more or less optimal for manganese removal a box plot was prepared and is presented in Figure 4.05.

Figure 4.05: Box Plot of Effluent Manganese Concentrations by Operating Conditions

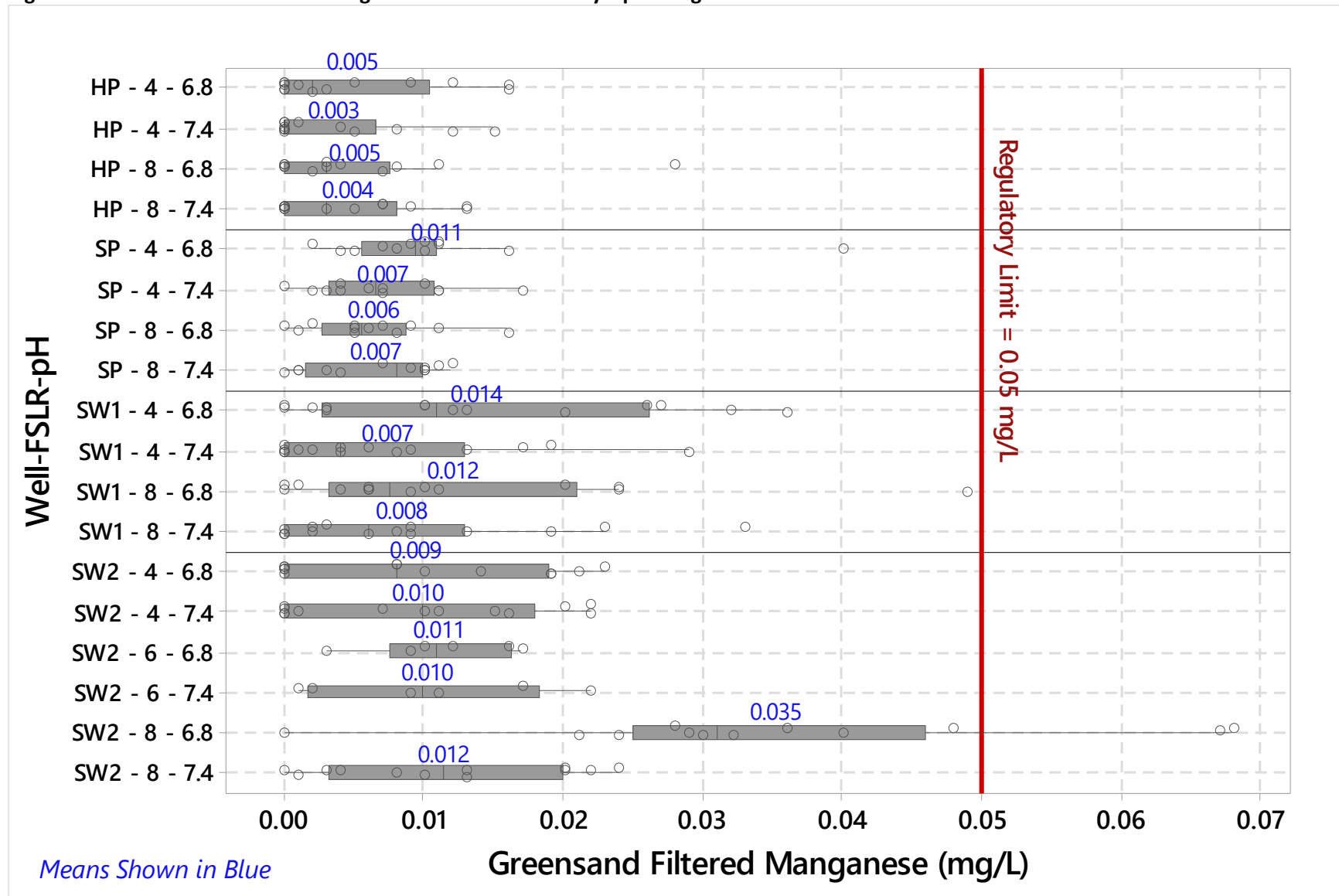


Figure 4.05 shows that the manganese removal when operating at Straightway 2 at the higher loading rate of 8.0 gpm/sf and the lower influent pH of 6.8 appears to be challenged when compared to the other operating conditions for Straightway 2 Well and the other wells. Two data points exceeded the SMCL. An Analysis of Variance (ANOVA) was performed on the data to compare the different operating conditions and determine if manganese removal is statistically different at specific conditions.

Table 4.03: ANOVA of Greensand Filtered Mn by Operating Condition

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Well-FSLR-pH	17	0.01016	0.000598	6.95	0.000
Error	202	0.01738	0.000086		
Total	219	0.02753			

S	R-sq	R-sq(adj)	R-sq(pred)
0.0092745	36.89%	31.58%	25.53%

Means

Well-FSLR-pH	N	Mean	StDev	95% CI
HP - 4 - 6.8	13	0.00492	0.00620	(-0.00015, 0.01000)
HP - 4 - 7.4	13	0.00346	0.00516	(-0.00161, 0.00853)
HP - 8 - 6.8	13	0.00508	0.00775	(0.00000, 0.01015)
HP - 8 - 7.4	13	0.00438	0.00501	(-0.00069, 0.00946)
SP - 4 - 6.8	12	0.01108	0.00983	(0.00580, 0.01636)
SP - 4 - 7.4	12	0.00683	0.00476	(0.00155, 0.01211)
SP - 8 - 6.8	12	0.00625	0.00445	(0.00097, 0.01153)
SP - 8 - 7.4	12	0.00650	0.00442	(0.00122, 0.01178)
SW1 - 4 - 6.8	14	0.01386	0.01232	(0.00897, 0.01874)
SW1 - 4 - 7.4	15	0.00747	0.00863	(0.00274, 0.01219)
SW1 - 8 - 6.8	14	0.01214	0.01335	(0.00726, 0.01703)
SW1 - 8 - 7.4	15	0.00847	0.00983	(0.00374, 0.01319)
SW2 - 4 - 6.8	13	0.00938	0.00900	(0.00431, 0.01446)
SW2 - 4 - 7.4	13	0.00954	0.00884	(0.00447, 0.01461)
SW2 - 6 - 6.8	6	0.01117	0.00512	(0.00370, 0.01863)
SW2 - 6 - 7.4	6	0.01033	0.00824	(0.00287, 0.01780)
SW2 - 8 - 6.8	12	0.03527	0.01899	(0.02999, 0.04055)
SW2 - 8 - 7.4	12	0.01150	0.00853	(0.00622, 0.01678)

Pooled StDev = 0.00927451

Tukey Pairwise Comparisons
 Grouping Information Using the Tukey Method and 95% Confidence

Well-FSLR-pH	N	Mean	Grouping
SW2 - 8 - 6.8	12	0.03527	A
SW1 - 4 - 6.8	14	0.01386	B
SW1 - 8 - 6.8	14	0.01214	B
SW2 - 8 - 7.4	12	0.01150	B
SW2 - 6 - 6.8	6	0.01117	B
SP - 4 - 6.8	12	0.01108	B
SW2 - 6 - 7.4	6	0.01033	B
SW2 - 4 - 7.4	13	0.00954	B
SW2 - 4 - 6.8	13	0.00938	B
SW1 - 8 - 7.4	15	0.00847	B
SW1 - 4 - 7.4	15	0.00747	B
SP - 4 - 7.4	12	0.00683	B
SP - 8 - 7.4	12	0.00650	B
SP - 8 - 6.8	12	0.00625	B
HP - 8 - 6.8	13	0.00508	B
HP - 4 - 6.8	13	0.00492	B
HP - 8 - 7.4	13	0.00438	B
HP - 4 - 7.4	13	0.00346	B

Means that do not share a letter are significantly different.

The results of the ANOVA shown in Table 4.03 determined a p-value of 0.000 which indicated that the two data sets were statistically different, and the alternative hypothesis is accepted ($0.000 < 0.050$). This indicated that at least one of the data sets was statistically different from the other data sets.

Table 4.03 also contains a Tukey Comparison, which groups data sets with statistical similarities. The Group A results show that manganese removal when operating at Straightway 2 at the higher loading rate of 8.0 gpm/sf and the lower influent pH of 6.8 belonged to a unique grouping which did not include other data sets for other operating conditions. Group B shows statistical similarity between all other 17 operating conditions. The p-value combined with the Tukey grouping indicate that the operating condition in question (Straightway 2 – 8 gpm/sf – pH 6.8) is in fact statistically different when compared to manganese removal at the other condition.

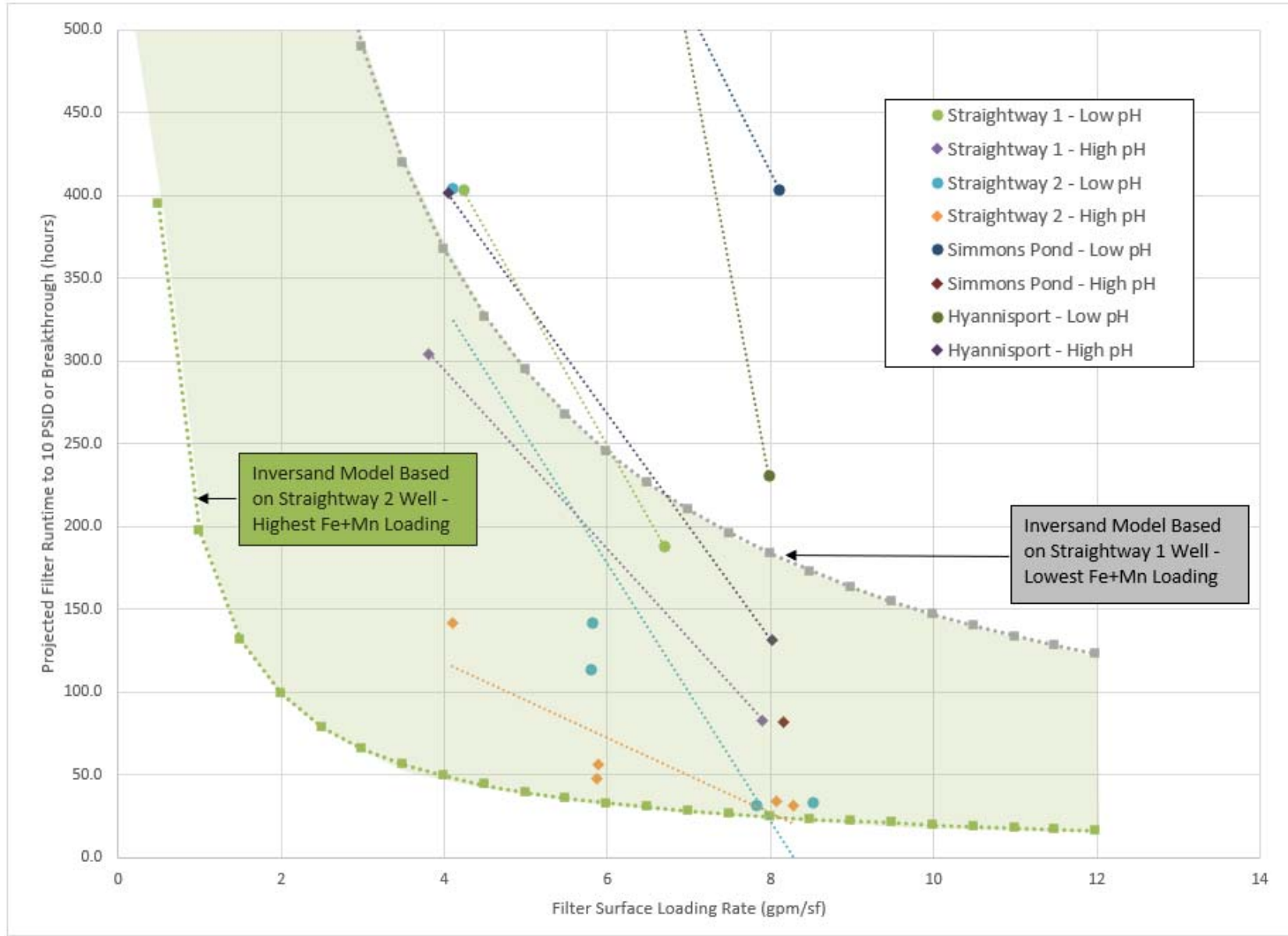
The Straightway 2 well has an elevated raw manganese concentration near 1.0 mg/L. Greensand filtration appears to be challenged to provide full manganese removal when operating at a loading rate 8 gpm/sf and the lower pH of 6.8. It appears that operating at the higher pH of 7.4 provides a more suitable environment for oxidation and removal of dissolved manganese by adsorptive Greensand media on this well source.

4.2.2 Filter Surface Loading Rates versus Filter Runtimes

Figure 4.06 plots runtime estimates to 10 psi of differential pressure for filter trials treating all four wells. Where the actual termination of the trial was observed during the study due to achieving 10 psid or contaminant breakthrough this data was used. Otherwise, the data was extrapolated based on the clean bed headloss and rate of headloss development for the filter trial. The clean bed headloss and slopes are summarized in Tables 3.08 to 3.11 in the Results section. The plot includes data from the media capacity model produced by Inversand. The shaded region represents the expected range of filter runtimes based on the raw iron and manganese concentrations from each well. The lower limit of the model is based on water quality from Straightway 2 which had the highest iron and manganese concentrations, and the upper limit was based on water quality from Straightway 1 which had the lowest iron and manganese concentrations.

The data is organized by well and operating pH for the filters. The round markers are used for the low pH trials and the diamond shaped markers are used for the high pH trials. A trend line for the data is also plotted for use as a tool in predicting runtimes based on other loading rates not tested.

Figure 4.06: Filter Surface Loading Rate versus Runtimes



Straightway 1, Simmons Pond and Hyannisport Wells had iron concentrations that were below the Secondary MCL and typically less than 0.05 mg/L. Low iron concentrations make it difficult to predict filter runtimes because without the removal of precipitated iron particles there is a low rate of headloss development. The manganese removal mechanism is adsorption which does not contribute significantly to headloss development.

Figure 4.05 shows that 14 data points fell within the predicted runtime range for the model, while six data points exceeded the model. Two of the data points exceeded the 500-hour upper limit of the figure. The data points which exceeded the model were all from the three wells with low iron concentrations.

The runtime data for Straightway 2 Well predominantly fell within the model and represented the lower range of runtimes as expected due to the presence of iron in the raw water. Operating with only Straightway 2 Well would be the most limiting condition for filter runtimes. The orange trendline shown on the figure plots the loading rate to runtime relationship for the high pH trials at Straightway 2 and the teal trendline plots the same for the low pH trials at Straightway 2. At the highest loading rate of 8 gpm/sf tested during the pilot study these trendline intersect at near 30 hours. Operating at the lower loading rate of 4 gpm/sf the high pH filters could be expected to operate for over 50 hours and the low pH filters for over 100 hours. It should be noted that the previous section indicated low pH filters operating on the Straightway 2 well source were challenged to achieve full manganese removal.

The trendlines for each well source indicate that the high pH filters had lower runtimes when compared to the matching low pH filters on all four water sources. This is likely due to the fact that a greater fraction of the raw dissolved iron and manganese is precipitated at a higher pH and therefore increases the amount of particle filtration and headloss development.

Four trials were terminated due to observed contaminant breakthrough. All four breakthrough observations were on the high-rate filters operating at Straightway 2 Well. Five other trials were operated until actual observance of 10 psid headloss development. Four of these five trials utilized Filter D, the high loading rate/high pH filter. All of the other 13 filter trials were terminated due to the pilot schedule prior to the observance of breakthrough or 10 psid of headloss development. For those trials filter runtimes are predicted based on the rate of headloss and it is unknown if breakthrough may have occurred first.

4.2.3 Supernatant Recycle Performance

Two supernatant recycle periods were evaluated during the pilot study. The first recycle period was conducted while operating on Straightway 2 Well using the stored backwash water supernatant from Straightway 1 Well operations. The second recycle period was conducted while operating on Hyannisport Well using the stored backwash water supernatant from Simmons Pond Well operations.

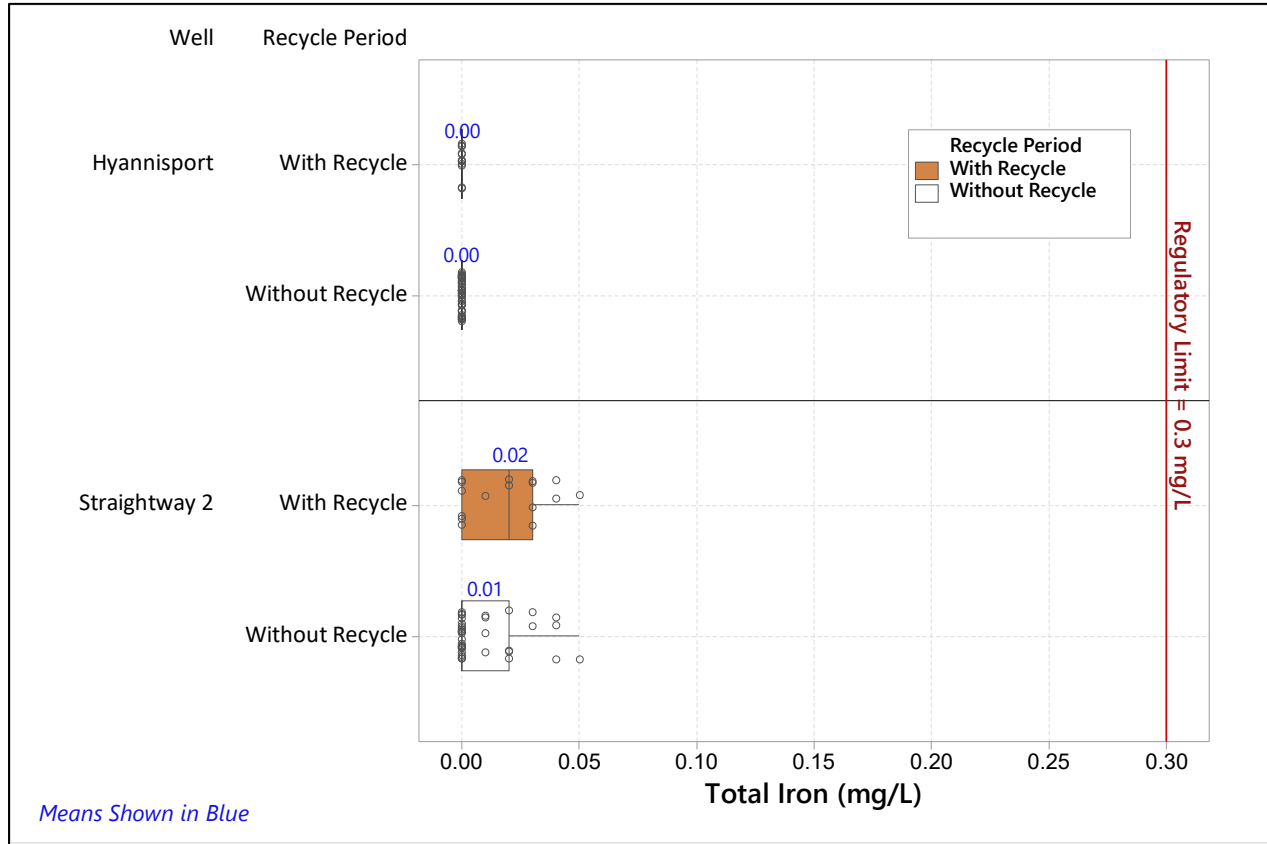
Settled supernatant was pumped into the raw water feed of the pilot filters for approximately 4 hours during operations at Straightway 2 and for 2 hours at Hyannisport. Recycle flow ended when the supernatant volume had reached a low level to avoid disturbing solids settled at the bottom of the supernatant storage tank. The performance data for the Straightway 2 recycle period are shown in Appendix D in Figures D-5, D-7, D-10 and D-12. The performance data for the Hyannisport recycle period are shown in Figures D-17, D-19, D-21 and D-23. The period of supernatant recycle is highlighted in blue in those figures.

The figures show that most operating parameters were unchanged during and after the supernatant recycle was added with the exception that there was an adjustment in filter turbidity during the Straightway 2 recycle period and an adjustment in differential pressure during the Hyannisport recycle period.

- All four filters displayed a slight increase of approximately 0.01 NTU in effluent turbidity during the Straightway 2 recycle period but turbidities remained below the contaminant breakthrough threshold of 0.1 NTU.
- Filters B and D showed a slight instantaneous drop in differential pressure at the start of the recycle period at the Hyannisport Well. After the drop in differential pressure the figures show that the slope of headloss development remained consistent.

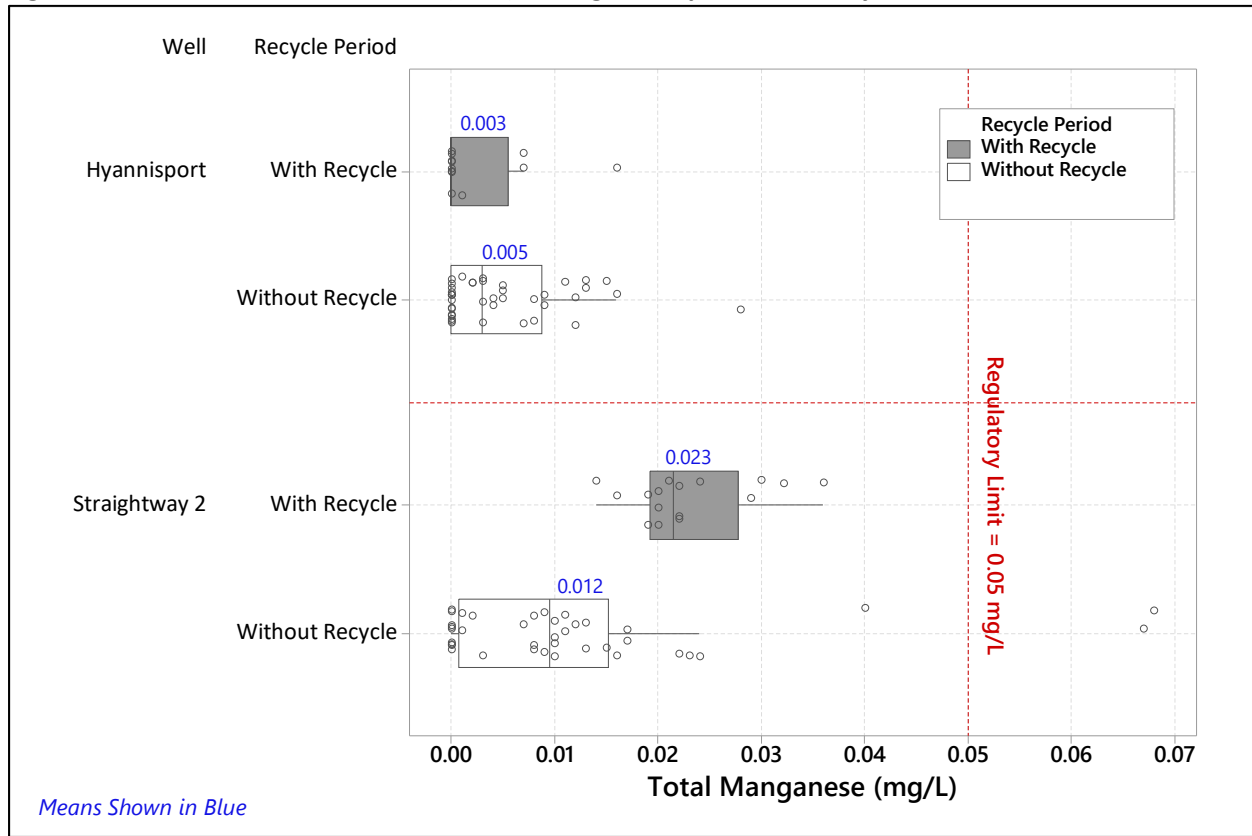
Water quality was collected throughout the supernatant recycle trial from all four filters. Figures 4.07 and 4.08 are box plots of the data collected throughout the trials which included the recycle periods. The data is organized to compare data collected during the recycle period to data collected before or after the recycle period without recycle. Figure 4.07 is a box plot comparing effluent iron concentrations and Figure 4.08 is a box plot comparing the manganese data.

Figure 4.07: Greensand Effluent Fe During the Supernatant Recycle Trials



All effluent iron data was below the regulatory limit and even below 0.05 mg/L with or without 10% recycle supernatant. The mean iron concentrations for the two data sets are within 0.01 mg/L for the recycle trials at both Straightway 2 Well and Hyannisport Well.

Figure 4.08: Greensand Effluent Mn (PAN) During the Supernatant Recycle Trials



The effluent manganese data displayed variability in the box plot and an analysis of variance (ANOVA) was performed on the effluent manganese data sets to compare the data with and without recycle for each Well. Table 4.04 presents the ANOVA for the Hyannisport Well recycle trial and Table 4.05 presents the ANOVA for the Straightway 2 Recycle Trial.

Table 4.04: One-way ANOVA: Mn versus Recycle Period for Hyannisport Well

Null hypothesis	All means are equal				
Alternative hypothesis	At least one mean is different				
Significance level	$\alpha = 0.05$				
Rows unused	8				
Equal variances were assumed for the analysis.					
Factor	Levels	Values			
Recycle Period	2	With Recycle, Without Recycle			
Analysis of Variance					
Source	DF	Adj SS	Adj MS	F-Value	P-Value
Recycle Period	1	0.000055	0.000055	1.56	0.218
Error	50	0.001768	0.000035		
Total	51	0.001823			
Model Summary					
	S	R-sq	R-sq(adj)	R-sq(pred)	
	0.0059462	3.02%	1.08%	0.00%	
Means					
Recycle Period	N	Mean	StDev	95% CI	
With Recycle	12	0.00258	0.00500	(-0.00086, 0.00603)	
Without Recycle	40	0.005025	0.006187	(0.003137, 0.006913)	
Pooled StDev = 0.00594625					

Table 4.05: One-way ANOVA: Mn versus Recycle Period for Straightway 2 Well

Null hypothesis	All means are equal				
Alternative hypothesis	At least one mean is different				
Significance level	$\alpha = 0.05$				
Rows unused	14				
Equal variances were assumed for the analysis.					
Factor	Levels	Values			
Recycle Period	2	With Recycle, Without Recycle			
Analysis of Variance					
Source	DF	Adj SS	Adj MS	F-Value	P-Value
Recycle Period	1	0.001277	0.001277	6.81	0.012
Error	52	0.009748	0.000187		
Total	53	0.011026			
Model Summary					
	S	R-sq	R-sq(adj)	R-sq(pred)	
	0.0136919	11.58%	9.88%	6.34%	
Means					
Recycle Period	N	Mean	StDev	95% CI	
With Recycle	16	0.02289	0.00597	(0.01602, 0.02976)	
Without Recycle	38	0.01224	0.01578	(0.00778, 0.01669)	
Pooled StDev = 0.0136919					

The results of the Hyannisport Well ANOVA shown in Table 4.03 determined a p-value of 0.218 which concluded a statistical similarity between the two data sets. This result concludes there is no statistically significant difference in effluent manganese concentration during the recycle period when compared to the data from before and after the recycle period.

The results of the Straightway 2 Well ANOVA shown in Table 4.04 determined a p-value of 0.012 which indicated that the two data sets were statistically different, and the alternative hypothesis is accepted ($0.012 < 0.050$). This confirmed that the introduction of 10% recycle while piloting Straightway 2 Well produced effluent manganese results which were statistically different from the effluent manganese results from before and after the recycle period. While the data was statistically different it was not practically different as the treated water quality remained below regulatory limits during the recycle period.

Summarizing the observations in this section:

- Hyannisport Well Recycle Trial
 - Filters B and D showed a slight drop in differential pressure at the start of the recycle period at the Hyannisport Well. After the drop in differential pressure the figures show that the slope of headloss development remained consistent.
 - Other operating parameters monitored (turbidity and filter surface loading rate) appeared to be unaffected by the introduction of settled supernatant.
 - Effluent iron and manganese concentrations were similar with and without 10% supernatant recycle.
- Straightway 2 Well Recycle Trial
 - All four filters displayed a slight increase of approximately 0.01 NTU in effluent turbidity during the Straightway 2 recycle period but turbidities remained at acceptable levels and below the contaminant breakthrough threshold of 0.1 NTU.
 - Other operating parameters monitored (differential pressure and filter surface loading rate) appeared unaffected without any obvious impact from the introduction of recycle supernatant.
 - Effluent iron concentration remained below 0.05 mg/L with and without the introduction of supernatant recycle.
 - Effluent manganese concentrations increased during the recycle period by a statistically significant amount. The mean effluent manganese concentration increased from 0.012 to 0.023 mg/L but still provided acceptable manganese removal. Raw manganese of near 1.0 mg/L was reduced to below the SMCL of 0.05 mg/L with and without supernatant recycle.

4.3 EFFECTIVENESS OF ADVANCED OXIDATION PROCESS FOR 1,4-DIOXANE REMOVAL

The UV AOP process was operated at the Straightway 2 Well, which had the highest raw 1,4 dioxane concentrations, from May 24 to June 7, 2021, and at Simmons Pond Well from June 7 to 15, 2021. A UV AOP effluent sample was collected at each well site under four different operating conditions:

1. High Ballast Power Level/High Hydrogen Peroxide Dose
2. Low Ballast Power Level/High Hydrogen Peroxide Dose
3. High Ballast Power Level/Low Hydrogen Peroxide Dose
4. Low Ballast Power Level/Low Hydrogen Peroxide Dose

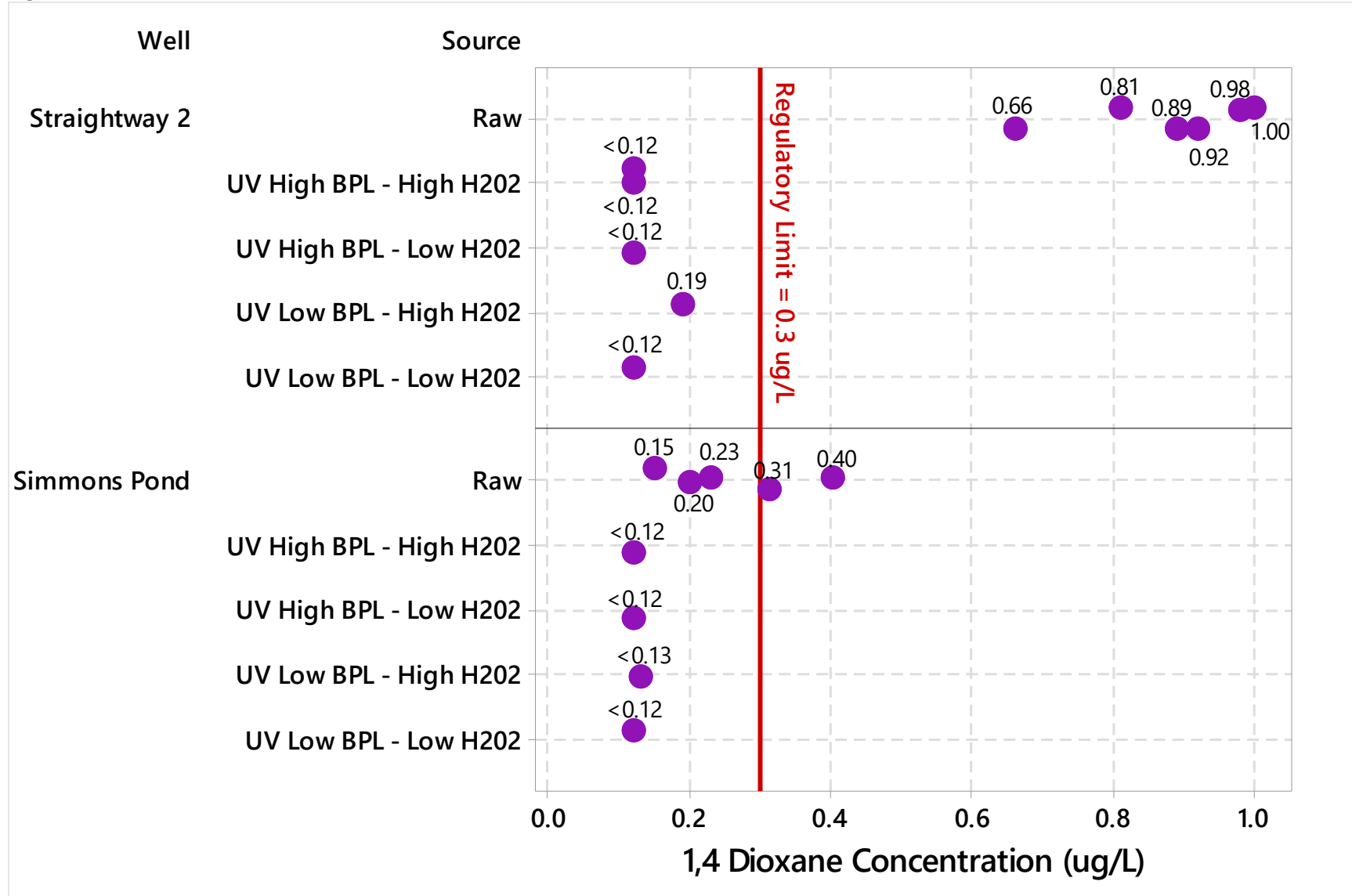
The ballast power levels (BPL) evaluated were 100% and 60% BPL at both sites. The hydrogen peroxide doses tested during the pilot study were based on analysis of water samples by Trojan Technologies. The pilot study evaluated doses of 10 and 5 mg/L H₂O₂ at Straightway 2 and 8 and 3.5 mg/L H₂O₂ at Simmons Pond.

Figure 4.09 is an individual values plot of the raw and UV AOP effluent 1,4-Dioxane data for the pilot study organized by the operating conditions listed above. Each data point is labeled with the respective concentration. The raw 1,4-Dioxane concentration for Straightway 2 Well ranged from 0.66 to 1.0 µg/L and for Simmons Pond Well ranged from 0.15 to 0.40 µg/L.

All but one UV AOP effluent sample was reported as below detection. Results reported as below detection were plotted at the detection limit and labeled as less than the detection limit (i.e. "<0.12").

Destruction of 1,4 dioxane to undetectable levels was successful in all conditions with the exception of the Low BPL/High H₂O₂ condition while treating Straightway 2 Well, which resulted in 0.19 µg/L of 1,4 dioxane in the UV effluent. This result was lower than the Massachusetts ORGSL of 0.3 µg/L. The UVAOP effluent for the Low/Low condition was reported as below detection limits.

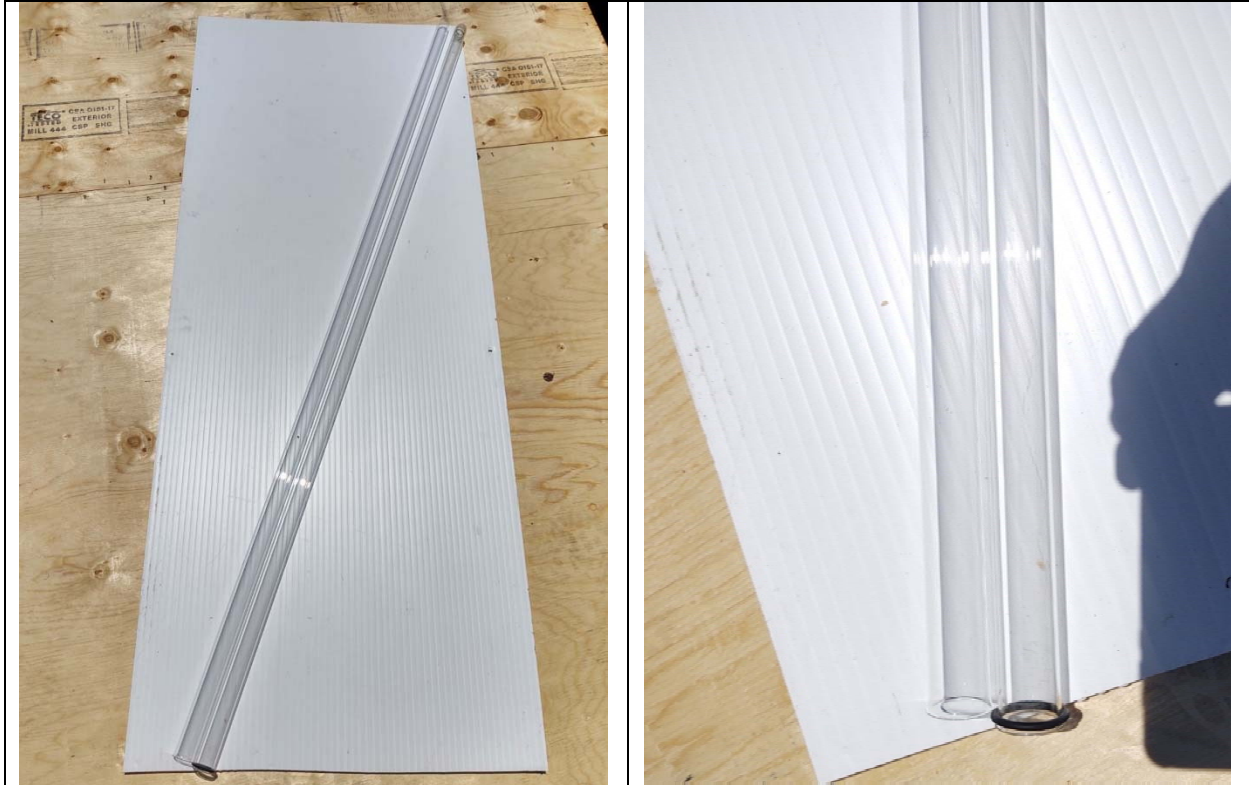
Figure 4.09: Raw and UV AOP Treated 1,4-Dioxane Data



4.3.1 Lamp Fouling Observations

At the completion of the pilot study, and 23 days of continuous operation, the UV system was shut down and drained and one of the twelve lamp sleeves was removed for visual inspection of potential fouling. There was no visual indication of fouling based on the observation of the sleeve on a white surface. Figure 4.10 is a photo of the used sleeve side by side with an unused sleeve. The sleeve with the black o-ring is the used sleeve from the Barnstable pilot study.

Figure 4.10: Final Observation for Lamp Sleeve Fouling and Comparison to Unused Sleeve



The same lamp sleeve was packaged and labeled prior to shipment back to Trojan Technologies for UVT analysis and comparison to a new sleeve. The sleeve test results indicated that the UV transmittance of the used sleeve was 99.3 of a new sleeve. The test results are included as Appendix G.

4.4 PFAS REMOVAL WITH GAC CONTACTORS

4.4.1 Was GAC Adsorption Effective for PFAS Removal

Figures 4.11 and 4.12 are stacked column plots of the certified lab results for the PFAS6 compounds for the raw water and the GAC contactor effluent. Figure 4.11 plots the data collected at Hyannisport Well while conducting the initial Greensand filtration trials with the GAC contactor downstream of the Greensand filters. Figure 4.12 plots the data collected at Straightway 2 and Simmons Pond Wells while conducting the UV AOP trials downstream of the high-capacity Greensand filters and the UV AOP system.

MaDEP has a PFAS public drinking water standard or maximum contaminate level (MCL) of 20 nanograms per liter (ng/L) or parts-per-trillion (ppt) for the sum of six specific PFAS. These six specific PFAS are often referred to as the PFAS6. The PFAS6 include:

- perfluoroheptanoic acid (PFHpA)
- perfluorohexane sulfonic acid (PFHxS)
- perfluorooctanoic acid (PFOA)
- perfluorononanoic acid (PFNA)
- perfluorooctane sulfonic acid (PFOS)
- perfluorodecanoic acid (PFDA)

The 20 ng/L regulatory limit is plotted on the figures as a dashed red line. Lab results reported as non-detect (ND) are plotted at their respective minimum detection limits and not as zero (i.e. <1.89 ng/L is plotted at 1.89). The following are observations from Figures 4.11 and 4.12:

- Figure 4.11 shows that Raw PFAS6 concentration at Hyannisport Well was 45 ng/L during the pilot study. Both samples of GAC effluent were reported as below detection for all PFAS6 compounds.
- Figure 4.12 shows that Raw PFAS6 concentration at Straightway 2 Well were 93 and 85 ng/L during the pilot study. One sample of GAC effluent was reported as below detection for all PFAS6 compounds. The second sample reported 6.1 mg/L of PFAS6 compounds. This result is questionable as the GAC effluent contained detectable perfluorodecanoic acid (PFDA) while neither of the raw samples contained PFDA at greater than 10X the total PFAS6 concentration. If PFDA was undetectable in the raw sample is unlikely to be detected in the GAC effluent. It is possible there was field or lab contamination of the sample. The field blank was reported as below detection for all PFAS compounds.
- Figure 4.12 shows that the Raw PFAS6 concentration at Simmons Pond Well were 80 ng/L in three samples collected during the pilot study. Three samples of GAC effluent were reported as below detection for all PFAS6 compounds.
- Treatment by GAC adsorption reduced all PFAS6 compounds to non-detectable concentrations in 6 out of 7 GAC contactor effluent samples. The one sample with detectable PFAS6 was below the regulatory limit and was also questionable due to possible sample contamination as noted above.

Figure 4.11: Raw and Treated PFAS Concentrations at Hyannisport Well During Initial Greensand Trials

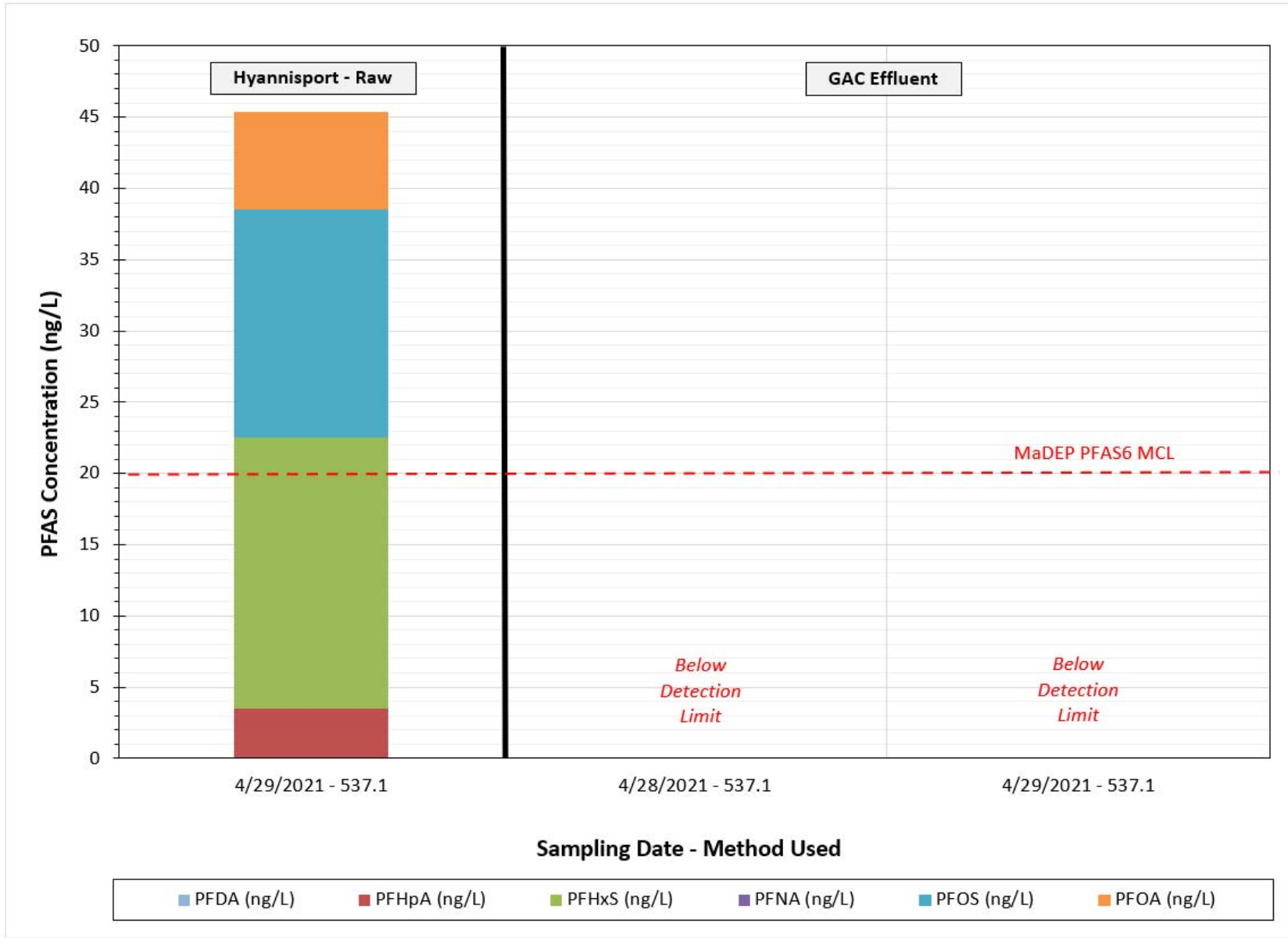
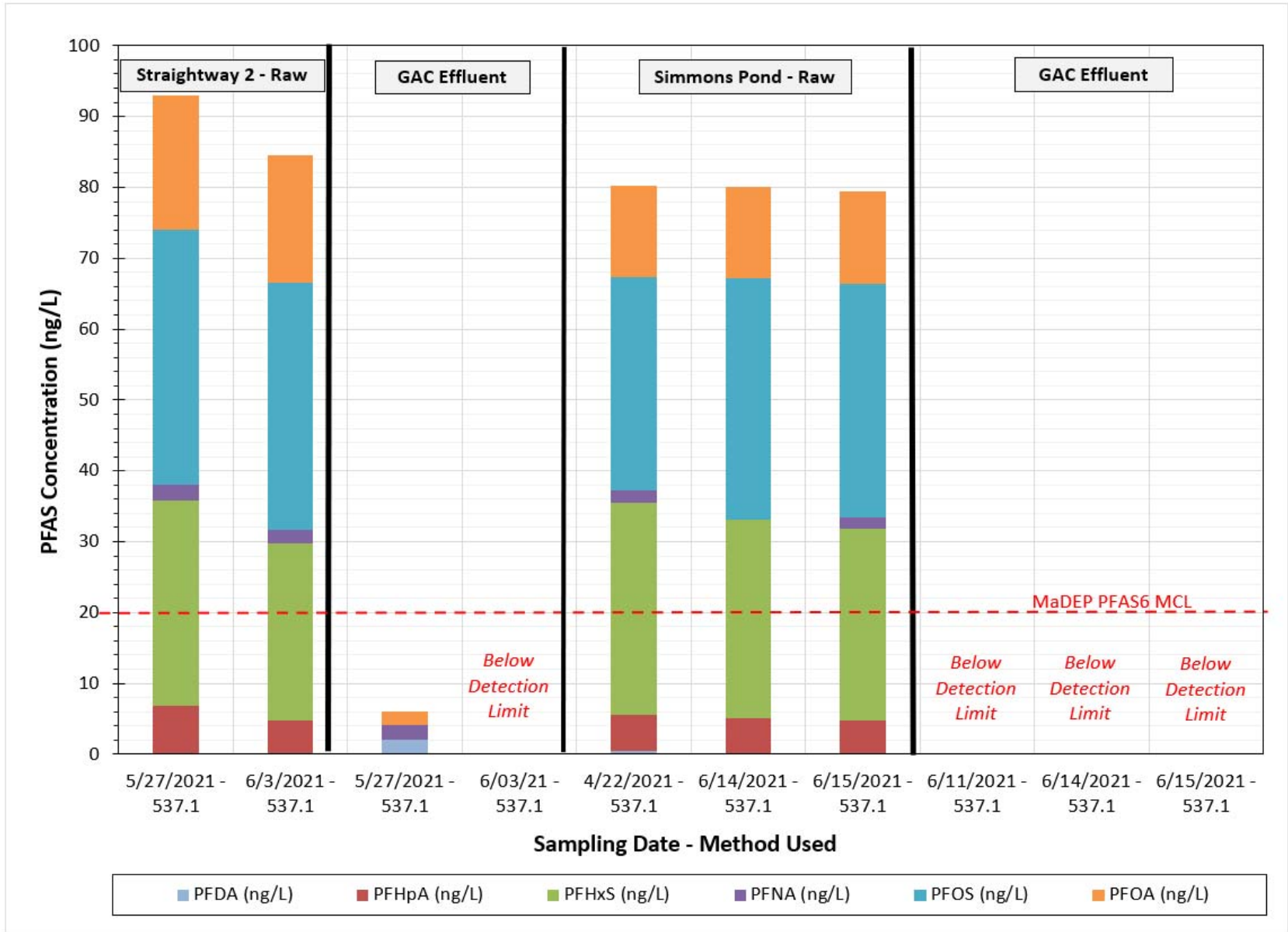


Figure 4.12: Raw and Treated PFAS Concentrations at Straightway 2 and Simmons Pond Wells During UVAOP Trials



4.4.2 Was GAC and Ion Exchange Hydraulic Performance Acceptable

Influent and effluent pressures for all three GAC contactor vessels were monitored and recorded during the pilot study. The differential pressures were calculated and are presented in Table 3.30 in Section 3.3.3.2. Figure 4.13 plots the differential pressure data for the period of time the GAC contactor was operated at Straightway 2 and Simmons Ponds Wells during the UV AOP trials. Data from the period that the GAC contactor was operated at the Hyannisport Well during initial Greensand trials is not included as there were minimal data points to develop a trend. The differential pressures during operation at Hyannisport Well were similar to those plotted below.

Figure 4.13: Differential Pressures for PFAS Contactors During Pilot Study

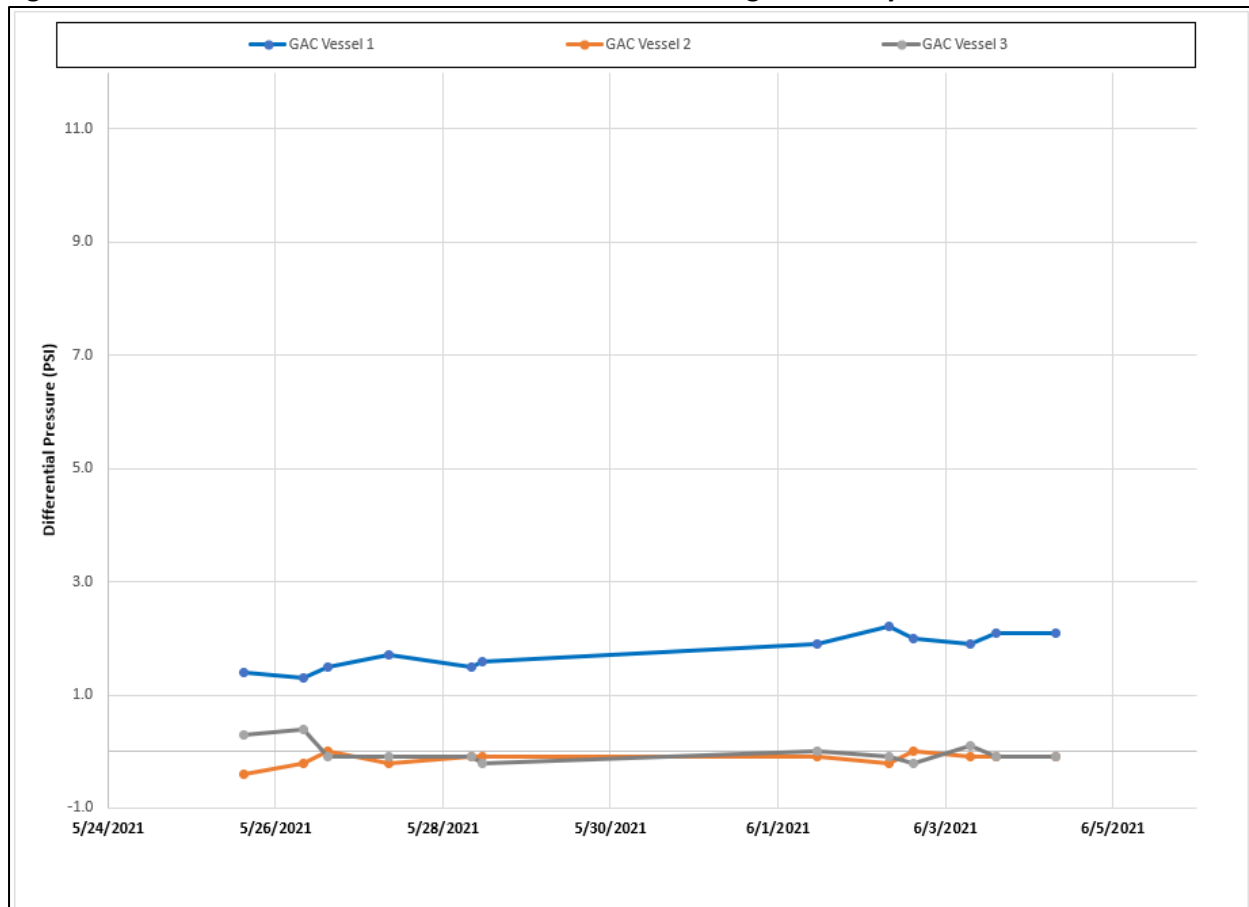


Figure 4.13 shows that there was minimal headloss development during the three weeks of operation downstream of iron and manganese removal and UV treatment. GAC Contactor Vessel 1 shows some headloss development, but less than 1 psi over the three-week duration. Contactor Vessels 2 and 3 which operated in series downstream of Contactor Vessel 1 showed no headloss development during the duration of the study. Differential headloss remained well below 10 psi in all vessels which is considered to be an indicator for backwashing.

4.5 MAHER TREATMENT PLANT DATA AND OBSERVATIONS

Water samples were collected from four sample sites at the Maher Treatment Plant on three different dates during the pilot study. The samples were submitted to a certified laboratory for water quality analyses to provide the consulting engineer, Kleinfelder, with corrosion control parameter data from a full-scale water treatment plant within the Barnstable Water system. Data was collected from the following sample locations.

1. Raw Water (Blended)
2. Greensand Filter Effluent
3. UV AOP Treated Water
4. GAC Contactor Effluent/Finished Water

The data was collected on May 27, June 3 and June 10, 2021, and is summarized in Results Section 3.4.

Blueleaf noted that the operating conditions and water quality results from samples collected at the Maher Treatment Plant were inconsistent with operating conditions and results used during the pilot study conducted at the Maher site in 2017, and the current pilot study at Straightway and Hyannisport stations. Blueleaf met with the operators to discuss the operation of the Maher WTP and agreed to include the comments in this report to document issues that may be important to discuss during the design and construction of additional treatment facilities with similar processes. Blueleaf observations and comments are as follows:

1. pH of water through Manganese Greensand process - The operating pH for the Greensand filters at the Maher plant was observed to be near 5.4 s.u. based on an online HACH pH probe and SC200 display. The lab data summarized above in Section 3.4 provided pH values that were slightly higher than the online probe (6.1 to 6.4 s.u.), but lab data for pH is often higher than the field data as the samples off-gas over time. Both measurements of pH suggest that the pH is lower than Blueleaf considers to be an optimal pH (typically 6.5 to 8.0) for manganese greensand filters. During the 2017 Maher study the filter pH was maintained at 6.8 with successful iron and manganese removal. During the current study at Straightway and Hyannisport, a high pH (7.4) and low pH (6.8) were evaluated. Both pH levels provided acceptable treatment, though there is some evidence that the elevated pH provided better treatment of manganese at the Straightway 2 Well.

2. Manganese removal through the Manganese Greensand Process - The lab results for the samples collected at the Maher plant, and presented above in Table 3.35, indicate that influent manganese was slightly greater than the SMCL of 0.05 mg/L Mn. The treated water samples from the Greensand filters ranged from 0.26 to 0.62 mg/L of manganese. Currently, the excess manganese passing through the Greensand filters is being removed by the GAC filters.

3. Chlorine residual through the Manganese Greensand Process - It was also noted that the chlorine residual in the manganese greensand effluent was near 0.05 mg/L, which is lower than typical. Blueleaf typically targets a free chlorine residual of 0.5 to 1.0 mg/L to ensure full oxidation of iron and manganese and to maintain continuous regeneration of the oxidized coating of the media surface in the vessels. It is possible that the operators are keeping the chlorine residual through the Greensand filters

low to maintain a low chlorine residual through the GAC media. Blueleaf did not investigate the methods used to dechlorinate water entering the GAC filters.

4. Sodium Hydroxide Dosing - The plant operators indicated that increasing pH prior to the Greensand filters requires a much higher NaOH dose than is required to adjust pH after treatment through the plant. This is due to the fact that pre-treatment with NaOH is upstream of aeration, while post-treatment NaOH addition is downstream of aeration. Aeration strips CO₂ from the water, dramatically decreasing the volume of NaOH needed. When adding NaOH prior to aeration, the dose must be increased until it neutralizes the CO₂ present. After the CO₂ has been neutralized there is a more direct effect on pH by NaOH and a lower dose is required to reach the target pH. It is unclear why the aeration system was placed downstream of the Manganese Greensand process, but the effect is to increase the overall use of NaOH at the WTP and reduce one of the benefits of aeration.

5. Blueleaf suspects that if the operating pH for these filters is increased to 6.5 s.u. or greater that the greensand effluent manganese concentration would be reduced, and the manganese loading onto the GAC and UV systems would similarly be reduced.

6. Blueleaf recommends that the Maher operators increase the pH to approximately 6.5 s.u, and the chlorine residual in the greensand effluent to 0.5 mg/L (f) for improved manganese removal through the Greensand filters. Increasing the pH upstream of the manganese greensand process will result in an increase in cost (since it is prior to aeration). The Maher operators should be advised to make the changes to pH and chlorine slowly, perhaps over a period of a few weeks), and to collect field analyses for manganese to monitor results and to watch for a release of accumulated manganese from the filter media.

7. Blueleaf recommends that aeration be placed upstream of the manganese greensand process if utilized at one of the Water Treatment Facilities at the Straightway or Hyannisport sites to reduce overall caustic demand and cost.

5 CONCLUSIONS

5.1 RAW WATER

1. Field analyses of raw water mean iron concentrations were:
 - a. Straightway 1 Well = **0.04** (0.00-0.16) [18]
 - b. Straightway 2 Well (Greensand Trials) = **0.42** (0.37-0.71) [17]
 - c. Straightway 2 Well (UV AOP Trials) = **0.46** (0.43-0.71) [27]
 - d. Simmons Pond Well (Greensand Trials) = **0.04** (0.07-0.07) [11]
 - e. Simmons Pond Well (UV AOP Trials) = **0.04** (0.01-0.08) [14]
 - f. Hyannisport Well = **0.03** (0.00-0.09) [15]

Only Straightway 2 Well had a mean iron concentration which exceeded the SMCL of 0.3 mg/L. Raw iron concentrations appear to be similar to the historical data points provided for Straightway 2, Simmons Pond and Hyannisport Wells. The Straightway 1 historical raw iron data point greatly exceeded the data produced during the pilot study. This data point may be anomalous but if iron concentrations can vary at Straightway 1 Well as high as 2.0 mg/l it would significantly increase the contaminant loading and decrease filter runtimes for the Greensand filters.

2. Field analyses of raw water mean manganese concentrations were:
 - a. Straightway 1 Well = **0.112** (0.084-0.206) [16]
 - b. Straightway 2 Well (Greensand Trials) = **0.961** (0.882-1.32) [16]
 - c. Straightway 2 Well (UV AOP Trials) = **0.765** (0.300-0.788) [27]
 - d. Simmons Pond Well (Greensand Trials) = **0.129** (0.078-0.148) [12]
 - e. Simmons Pond Well (UV AOP Trials) = **0.148** (0.143-0.189) [14]
 - f. Hyannisport Well = **0.126** (0.115-0.136) [15]

All raw manganese data for all four wells exceeded the SMCL of 0.05 mg/L. For Straightway 1, Straightway 2 and Simmons Pond Wells there was overlap of similar data between the field, lab and historical data sources. Based on the data these wells supplied water with manganese concentrations similar to their respective historical data points. For Hyannisport Well there was agreement between the field and lab data that the raw manganese concentration was near 0.12 mg/L while the historical data point was more than double that at 0.310 mg/L.

3. All four wells appeared to supply water with 1,4 dioxane concentrations similar to their respective historical data. 1,4 dioxane concentrations for Straightway 1 and Hyannisport Wells were reported to be below the reportable concentration of 0.25 µg/L. The historical data points for Straightway 2 and Simmons Pond Wells fell within the range of lab data reported during the pilot study. All data for the Straightway 2 Well exceed the regulatory limit. The range of data for Simmons Pond Well spans the regulatory threshold with some data reported below the 0.3 µg/L limit and some data reported above the limit.
4. All raw PFAS6 data for all four wells exceeded the MCL of 20 ng/L. There were one or two raw PFAS6 pilot study lab data points to compare to the individual historical data points. The Straightway 1 pilot study data point was 44 ng/L and more than twice the historical data point of 20 ng/L. The pilot study data for Straightway 2, Simmons Pond and Hyannisport Wells were generally

similar to their respective historical data points. Five of the six pilot study data points were greater than their respective historical data points.

5.2 REMOVAL OF IRON AND MANGANESE BY ADSORPTION WITH GREENSAND FILTRATION

5. Oxidation with sodium hypochlorite (NaOCl) required an applied dose of between 0.9 to 3.7 mg/L depending on well source.
6. Bench scale titrations were conducted to determine the sodium hydroxide dose necessary to raise the raw water pH from ambient to 6.8 and then further to 7.4. The experiment was repeated for each well with post aerated water to determine the possible benefits of aeration in reduced chemical costs. Five minutes of aeration reduced KOH doses by greater than half.
7. All filter trials met the Project Goal for total Fe < 0.30 mg/L at all four wells, at FSLR from 4 to 8 gpm/sf and at both pH settings (6.8 and 7.4).
8. All filter trials met the Project Goal for total Mn < 0.30 mg/L at Straightway 1, Simmons Pond and Hyannisport Wells, at FSLR from 4 to 8 gpm/sf and at both pH settings (6.8 and 7.4).
9. There was evidence that manganese removal was less effective treating the Straightway 2 Well at the lower target pH of 6.8. Trials conducted at the higher pH of 7.4 provided acceptable manganese removal.
10. Disinfection By Products in Greensand filter effluent were reported below detection limits in all six samples at Straightway 2 and Simmons Pond Wells.
11. Low iron concentrations at Straightway 1, Simmons Pond and Hyannisport Wells allowed for filter runs which typically exceeded 100 hours.
12. Operating with only Straightway 2 Well would be the most limiting condition for filter runtimes due to higher raw contaminant loading. At the higher FSLR of 8 gpm/sf filter runtimes were near 30 hours at termination due to contaminant breakthrough for both high or low pH filters. Operating at the lower FSLR of 4 gpm/sf the high pH filters could be expected to operate for near 50 hours and the low pH filters for near 100 hours before exceeding 10 psi of headloss.
13. Introduction of 10% recycle caused a slight increase of approximately 0.01 NTU in effluent turbidity during the Straightway 2 recycle period but turbidities remained below the contaminant breakthrough threshold of 0.1 NTU.
14. Introduction of 10% recycle caused a slight instantaneous drop in differential pressure at the start of the recycle period at the Hyannisport Well but the rate of headloss development remained consistent.
15. During both recycle periods effluent iron and manganese remained at acceptable levels without any obvious impact from the introduction of recycle supernatant.
16. Backwashing was completed at a rate of 12 gpm/sf for 10 minutes without air scour to maintain effective filter operations during the study.

5.3 REMOVAL OF 1-4 DIOXANE WITH UV AOP

17. The UV Transmittance of the UV pilot influent (Greensand filter effluent) was greater than 99% for both Straightway 2 and Simmons Pond Wells.

18. Effective advanced oxidation was achieved with four different ballast power level (BPL) / peroxide (H₂O₂) dose combinations at Straightway 2 Well; (1) 100% BPL and 10 mg/L H₂O₂, (2) 60% BPL and 10 mg/L H₂O₂, (3) 100% BPL and 5 mg/L H₂O₂, and (4) 60% BPL and 5 mg/L H₂O₂. All scenarios were operated at 20 gpm.
19. Destruction of 1,4 dioxane to undetectable levels was successful in all conditions evaluated at Straightway 2 Well with the exception of the Low BPL/High H₂O₂ condition, which resulted in 0.19 µg/L of 1,4 dioxane in the UV effluent. This result was lower than the Massachusetts ORGSL of 0.3 µg/L. However, the Low/Low condition reported 1,4 dioxane below detection limits.
20. Effective advanced oxidation was achieved with four different ballast power level (BPL) / peroxide (H₂O₂) dose combinations at Simmons Pond Well; (1) 100% BPL and 8 mg/L H₂O₂, (2) 60% BPL and 8 mg/L H₂O₂, (3) 100% BPL and 3.5 mg/L H₂O₂, and (4) 60% BPL and 3.5 mg/L H₂O₂. All scenarios were operated at 20 gpm.
21. Destruction of 1,4 dioxane to undetectable levels was successful in all conditions evaluated at Simmons Pond Well.
22. There was no visual evidence of UV lamp sleeve fouling based on a final inspection of one of the sleeves used during piloting. The same sleeve was shipped to Trojan for UVT analysis and was reported to be at 99.3% of the UV transmittance of a new unused sleeve.

5.4 REMOVAL OF PFAS WITH ADSORPTION BY GAC CONTACTORS

23. The successful removal of PFAS compounds was achieved with 120 inches of GAC (Calgon Filtrasorb 400) media allowing 10 minutes of empty bed contact time.
24. Treatment by GAC adsorption reduced all PFAS6 compounds to non-detectable concentrations in 6 out of 7 GAC contactor effluent samples. The one sample with detectable PFAS6 was below the regulatory limit and was also questionable due to possible sample contamination.
25. The GAC contactor treated 3,706 bed volumes of water during the pilot study without contaminant breakthrough based on the lab testing.
26. There was very little headloss development during the pilot study as differential headloss remained well below 10 psi in all three vessels.

5.5 MAHER TREATMENT PLANT DATA AND OBSERVATIONS

27. It was observed that the operating pH of the full scale Greensand filters was lower than what is common for Greensand filtration. At low pH (<6.0) iron and manganese are more likely to remain soluble.
28. Laboratory data confirmed that the Greensand filters were not achieving removal rates of manganese that were consistent with the original Maher pilot study, the current study, or typical performance of manganese greensand filtration.
29. It was observed that the Greensand filter effluent chlorine residual was lower than what is typically required to achieve full oxidation of iron and manganese and to maintain continuous regeneration of the oxidized coating of the media surface in the vessels.
30. It was noted during discussion with the plant operators that NaOH doses are greater when feeding pre-caustic before the Greensand filters than when feeding post-caustic prior to distribution. This

is due to the removal of carbon dioxide during aeration. Aeration strips CO₂ from the water, dramatically decreasing the volume of NaOH needed. When adding NaOH prior to aeration, the dose must be increased until it neutralizes the CO₂ present.

31. Blueleaf recommends that the Maher operators increase the pH to approximately 6.5 s.u, and the chlorine residual in the greensand effluent to 0.5 mg/L (f) for improved manganese removal through the Greensand filters. This should be done gradually.
32. Blueleaf recommends that aeration be placed upstream of the manganese greensand process if utilized at one of the Water Treatment Facilities at the Straightway or Hyannisport sites to reduce overall caustic demand and cost.

Appendix A – Field Water Quality – Greensand Trials

Sample Location Reference IDs

Sample ID	Sample Location/Description
01 RAW	Raw Water from Straightway 1, Straightway 2, Simmons Pond and Hyannisport Wells
11 POX AB	Filters A/B Post-oxidation sample, collected downstream of chemical addition (ClO ₂ , NaOH) and upstream of the filters.
12 POX CD	Filters C/D Post-oxidation sample, collected downstream of chemical addition (ClO ₂ , NaOH) and upstream of the filters.
21 EFF A	Filter A Effluent
22 EFF B	Filter B Effluent
23 EFF C	Filter C Effluent
24 EFF D	Filter D Effluent
31 CBW A	Combined Backwash – Filter A
32 CBW B	Combined Backwash – Filter B
33 CBW C	Combined Backwash – Filter C
34 CBW D	Combined Backwash – Filter D
41 SSN A	Settled Supernatant – Filter A
42 SSN B	Settled Supernatant – Filter B
43 SSN C	Settled Supernatant – Filter C
44 SSN D	Settled Supernatant – Filter D

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
3/15/21 13:55	01 RAW			0.16	0.08	0.206	0.189	5.48	5.71	10.3	
3/16/21 9:27	Start Trial A1										
3/16/21 9:27	Start Trial B1										
3/16/21 9:27	Start Trial C1										
3/16/21 9:27	Start Trial D1										
3/16/21 9:48	24 FILTER D	1.53	1.84								
3/16/21 10:45	21 FILTER A	0.88	1.32								
3/16/21 10:45	23 FILTER C	1.39	1.74								
3/16/21 11:18	Make large batch 1/3 NaOH (24L)										
3/16/21 11:18	01 RAW			0.00	0.04	0.126	0.111	5.34	5.28	12.50	
3/16/21 11:18	12 POX CD	0.22	0.38		0.00		0.099	6.73	6.56	13.00	
3/16/21 11:18	23 FILTER C	0.35	0.37	0.00		0.000		6.94	6.79	13.00	
3/16/21 11:18	24 FILTER D	0.28	0.49	0.00		0.000		6.99	6.89	13.60	
3/16/21 11:30	Replace NaOH pump for A/B										
3/16/21 12:35	Add 20L of NaOCl (1/10) to day tank										
3/16/21 12:56	01 RAW			0.00							
3/16/21 13:16	01 RAW			0.00	0.00	0.137	0.120	5.31	5.26	13.00	
3/16/21 13:16	11 POX AB	1.00			0.00		0.083	6.85	6.67	13.30	
3/16/21 13:16	12 POX CD	0.60			0.00		0.960	7.45	7.18	13.50	
3/16/21 13:16	21 FILTER A	0.59	0.35	0.00		0.012		6.92	6.89	14.10	
3/16/21 13:16	22 FILTER B	0.77	0.82	0.00		0.006		6.97	6.91	14.20	
3/16/21 13:16	23 FILTER C	0.66	0.13	0.00		0.019		7.20	7.03	14.00	
3/16/21 13:16	24 FILTER D	0.99	0.60	0.00		0.009		7.28	7.10	13.90	
3/16/21 14:02	Increase NaOCl feed from 250 mL/h to 300										
3/16/21 14:13	21 FILTER A	1.21	1.37								
3/16/21 14:13	22 FILTER B	1.30	1.59								
3/16/21 14:13	23 FILTER C	0.90	1.65								
3/16/21 14:13	24 FILTER D	1.40	1.90								
3/17/21 7:19	01 RAW			0.00	0.00	0.115	0.107	5.05	5.32	12.90	
3/17/21 7:19	11 POX AB	2.09	2.92		0.00		0.093	6.66	6.55	12.70	
3/17/21 7:19	12 POX CD	2.69	2.89		0.00		0.088	7.15	7.02	12.50	
3/17/21 7:19	21 FILTER A	1.23	2.28	0.00		0.003		6.91	6.77	12.7	
3/17/21 7:19	22 FILTER B	2.09	2.18	0.00		0.006		6.96	6.81	12.9	
3/17/21 7:19	23 FILTER C	1.93	2.21	0.00		0.000		7.38	7.20	12.3	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
3/17/21 7:19	24 FILTER D	2.01	2.98	0.00		0.009		7.46	7.29	12.5	
3/17/21 8:19	Decrease NaOCl feed from 300 to										
3/17/21 8:53	21 FILTER A	1.94									
3/17/21 8:53	24 FILTER D	2.23									
3/17/21 8:56	Decrease NaOCl feed from 270 to 230										
3/17/21 9:04	01 RAW										
3/17/21 9:20	Lab Bottles, Event A										
3/17/21 9:30	01 RAW			0.07							
3/17/21 9:30	21 FILTER A	1.38									
3/17/21 9:30	23 FILTER C	0.67									
3/17/21 9:36	Increase NaOCl feed from 230 mL/h to 250										
3/17/21 10:23	22 FILTER B	1.95									
3/17/21 10:23	24 FILTER D	2.04									
3/17/21 10:25	Decrease NaOCl feed from 250 to 240 mL/hr										
3/17/21 10:35	01 RAW			0.00	0.00	0.119	0.110	5.30	5.20	13.1	
3/17/21 10:35	21 FILTER A			0.00		0.003		7.02	6.91	13.5	
3/17/21 10:35	22 FILTER B			0.01		0.000		7.04	6.94	13.4	
3/17/21 10:35	23 FILTER C			0.00		0.000		7.38	7.20	13.4	
3/17/21 10:35	24 FILTER D			0.01		0.002		7.44	7.38	13.3	
3/17/21 11:49	21 FILTER A	0.33									
3/17/21 11:49	23 FILTER C	0.92									
3/17/21 11:49	24 FILTER D	1.91									
3/17/21 12:22	NaOH Titration (1L Raw Water, 0.02N NaOH) (see notes)										46.64
3/17/21 14:07	01 RAW			0.03	0.03	0.103	0.111	5.25	5.43	13.2	
3/17/21 14:07	11 POX AB	0.66	2.29		0.04		0.079	6.77	6.64	13.4	
3/17/21 14:07	12 POX CD	0.08	0.09		0.03		0.088	7.29	7.08	14.2	
3/17/21 14:07	21 FILTER A	1.60	0.80	0.00		0.010		7.00	6.9	15	
3/17/21 14:07	22 FILTER B	0.68	0.76	0.00		0.009		6.97	6.92	14.5	
3/17/21 14:07	23 FILTER C	1.39	1.69	0.00		0.004		7.47	7.35	15.2	
3/17/21 14:07	24 FILTER D	1.60	1.93	0.00		0.000		7.47	7.37	15.0	
3/18/21 7:27	01 RAW			0.05	0.01	0.095	0.102	5.17	5.16	13.1	
3/18/21 7:27	11 POX AB	1.08	2.11		0.05		0.087	6.93	6.75	13.1	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
3/18/21 7:27	12 POX CD	1.11	1.85		0.01		0.074	7.72	7.46	13.3	
3/18/21 7:27	21 FILTER A	1.28	1.40	0.02		0.013		6.94	6.79	13.1	
3/18/21 7:27	22 FILTER B	0.76	0.57	0.00		0.001		6.95	6.84	13.2	
3/18/21 7:27	23 FILTER C	0.96	0.80	0.00		0.008		7.51	7.33	13.3	
3/18/21 7:27	24 FILTER D	1.19	0.70	0.01		0.008		7.45	7.32	13.3	
3/18/21 8:03	Increase NaOCl feed from 240 to 245 mL/hr										
3/18/21 8:25	Aeration Raw Titration (0.02N) (1000mL) (see notes)										
3/18/21 9:04	22 FILTER B										15.84
3/18/21 9:22	23 FILTER C										5.94
3/18/21 10:26	01 RAW			0.09	0.02	0.108	0.099	5.34	5.30	13.1	
3/18/21 10:26	21 FILTER A			0.00		0.002		6.83	6.63	13.6	
3/18/21 10:26	22 FILTER B			0.00		0.011		6.86	6.64	13.7	
3/18/21 10:26	23 FILTER C			0.01		0.004		7.27	7.06	13.8	
3/18/21 10:26	24 FILTER D			0.00		0.003		7.39	7.15	13.8	
3/18/21 11:34	21 FILTER A	0.48									
3/18/21 11:34	24 FILTER D	1.29									
3/19/21 13:17	21 FILTER A	1.22									
3/18/21 13:17	22 FILTER B	1.71									
3/18/21 13:17	23 FILTER C	0.95									
3/18/21 13:17	24 FILTER D	0.84									
3/18/21 14:01	01 RAW			0.03	0.03	0.102	0.110	5.36	5.26	13.2	
3/18/21 14:01	11 POX AB	2.18	2.09		0.01		0.078	7.50	7.22	14.4	
3/18/21 14:01	12 POX CD	0.10	2.43		0.03		0.077	7.25	7.15	15.0	
3/18/21 14:01	21 FILTER A	1.71	1.62	0.02		0.010		7.02	6.92	14.4	
3/18/21 14:01	22 FILTER B	1.63	1.61	0.03		0.004		7.00	6.94	14.7	
3/18/21 14:01	23 FILTER C	1.09	1.31	0.03		0.002		7.40	7.31	15.0	
3/18/21 14:01	24 FILTER D	1.78	1.70	0.04		0.000		7.50	7.39	15.3	
3/18/21 14:52	NaOCl feed @ 249 mL/hr V=21.5										
3/18/21 14:52	NaOH feed @ 91.7+211.7 mL/hr V = 21.75										
3/19/21 8:20	01 RAW			0.03	0.08	0.120	0.096	5.33	5.36	12.7	
3/19/21 8:20	11 POX AB	0.34	1.17		0.01		0.080	6.80	6.63	12.3	
3/19/21 8:20	12 POX CD	0.23	0.55		0.04		0.066	7.32	7.25	12.5	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
3/19/21 8:20	21 FILTER A	0.09	0.29	0.00		0.026		6.95	6.79	12.2	
3/19/21 8:20	22 FILTER B	0.00	0.29	0.00		0.006		6.96	6.83	12.1	
3/19/21 8:20	23 FILTER C	0.30	1.08	0.00		0.006		7.73	7.50	11.9	
3/19/21 8:20	24 FILTER D	0.54	1.08	0.01		0.002		7.65	7.47	11.9	
3/19/21 9:04	Add 6L mixed NaOH, V1=18.5L, V2=24.5										
3/19/21 9:04	Add 6L mixed NaOCl, V1=17.0L, V2=27.0										
3/19/21 9:43	21 FILTER A	1.77									
3/19/21 9:43	22 FILTER B	1.69									
3/19/21 9:43	23 FILTER C	1.90									
3/19/21 9:43	24 FILTER D	2.12									
3/19/21 10:03	21 FILTER A	1.91									
3/19/21 10:03	22 FILTER B	1.98									
3/19/21 10:03	23 FILTER C	2.06									
3/19/21 10:03	24 FILTER D	2.18									
3/19/21 10:07	Lower NaOCl feed from 245 to 230 mL/hr										
3/19/21 10:30	01 RAW			0.03	0.01	0.123	0.137	5.42	5.38	12.8	
3/19/21 10:30	21 FILTER A			0.03		0.032		6.84	6.64	12.8	
3/19/21 10:30	22 FILTER B			0.03		0.049		6.94	6.76	12.8	
3/19/21 10:30	23 FILTER C			0.00		0.029		7.28	7.06	12.8	
3/19/21 10:30	24 FILTER D			0.00		0.033		7.43	7.24	12.7	
3/19/21 11:43	Add Dechlor tablets to waste tank										
3/19/21 12:08	21 FILTER A	1.44									
3/19/21 12:08	22 FILTER B	1.43									
3/19/21 12:08	23 FILTER C	1.44									
3/19/21 12:08	24 FILTER D	1.54									
3/19/21 12:32	01 RAW			0.02	0.050	0.137	0.122	5.44	5.40	12.9	
3/19/21 12:32	11 POX AB	1.98	2.32		0.00		0.108	6.78	6.65	13.3	
3/19/21 12:32	12 POX CD	1.64	1.84		0.020		0.116	7.69	7.43	13.1	
3/19/21 12:32	21 FILTER A	1.67	0.66	0.04		0.036		7.00	6.85	13.0	
3/19/21 12:32	22 FILTER B	1.74	2.02	0.00		0.024		7.01	6.89	13.0	
3/19/21 12:32	23 FILTER C	1.73	1.65	0.00		0.009		7.48	7.43	13.1	
3/19/21 12:32	24 FILTER D	1.79	1.63	0.00		0.006		7.45	7.32	13.1	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
3/23/21 7:37	01 RAW			0.04	0.06	0.084	0.086	5.24	5.21	12.9	
3/23/21 7:37	11 POX AB	0.74	2.03		0.02		0.074	6.65	6.84	13.2	
3/23/21 7:37	12 POX CD	0.26	2.23		0.01		0.033	7.11	6.99	13.2	
3/23/21 7:37	21 FILTER A	0.03	0.23	0.00		0.000		6.42	6.71	13.2	
3/23/21 7:37	22 FILTER B	0.00	0.12	0.01		0.020		6.96	6.86	13.3	
3/23/21 7:37	23 FILTER C	0.00	0.28	0.00		0.001		7.39	7.22	13.3	
3/23/21 7:37	24 FILTER D	0.07	0.29	0.00		0.019		7.48	7.28	13.3	
3/23/21 8:30	Shut valve in station for raw feed										
3/23/21 8:30	End Trial A1										
3/23/21 8:30	End Trial B1										
3/23/21 8:30	End Trial C1										
3/23/21 8:30	End Trial D1										
3/23/21 8:30	Shut off raw feed pump and filters and chem feed										
3/24/21 8:40	Backwash Filters										
4/12/21 11:45	Start Flow to Pilot Bump Filters										
4/12/21 12:05	Start Trial A2										
4/12/21 12:05	Start Trial B2										
4/12/21 12:05	Start Trial C2										
4/12/21 12:05	Start Trial D2										
4/12/21 12:51	21 FILTER A	0.23									
4/12/21 12:51	23 FILTER C	0.38									
4/12/21 14:10	21 FILTER A	0.40									
4/12/21 14:10	23 FILTER C	0.58									
4/12/21 14:20	01 RAW			0.71	0.46	1.320	1.270	6.38	6.56	12.0	
4/12/21 14:20	11 POX AB	1.56	2.16		0.41		1.226	6.71	6.85		
4/12/21 14:20	12 POX CD	1.72	1.96		0.23		1.140	6.66	6.70		
4/12/21 14:20	21 FILTER A	0.55	0.53	0.00		0.000		6.70	6.73		
4/12/21 14:20	22 FILTER B	0.70	0.98	0.00		0.000					
4/12/21 14:20	23 FILTER C	0.51	0.77	0.00		0.000					
4/12/21 14:20	24 FILTER D	0.72	1.14	0.00		0.000					
4/13/21 9:10	01 RAW			0.51	0.48	1.076	1.102	6.17	6.27	12.0	42.24
4/13/21 9:10	11 POX AB	0.54	1.07		0.17		0.974	6.61	6.58		
4/13/21 9:10	12 POX CD	0.65	1.04		0.05		0.934	7.65	7.69		
4/13/21 9:10	21 FILTER A	0.16	0.37	0.00		0.000		6.56	6.54		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/13/21 9:10	22 FILTER B	0.23	0.50	0.00		0.028		6.55	6.54		34.32
4/13/21 9:10	23 FILTER C	0.13	0.36	0.00		0.000		7.36	7.31		
4/13/21 9:10	24 FILTER D	0.22	0.44	0.00		0.001		7.36	7.31		7.04
4/13/21 11:45	01 RAW			0.55							
4/13/21 11:45	21 FILTER A	0.39	0.47	0.00		0.000					
4/13/21 11:45	22 FILTER B	0.52	0.68	0.00		0.021					
4/13/21 11:45	23 FILTER C	0.35	0.45	0.00		0.000					
4/13/21 11:45	24 FILTER D	0.48	0.46	0.00		0.004					
4/13/21 12:35	22 FILTER B	0.70									
4/13/21 12:35	24 FILTER D	0.73									
4/13/21 13:15	01 RAW			0.56	0.53	1.118	1.070	6.47	6.28	12.1	
4/13/21 13:15	11 POX AB	1.68	1.92		0.08		0.948	6.66	6.65		
4/13/21 13:15	12 POX CD	1.79	1.94		0.04		0.794	7.50	7.40		
4/13/21 13:15	21 FILTER A	0.78	0.84	0.00		0.000		6.57	6.59		
4/13/21 13:15	22 FILTER B	1.05	1.24	0.00		0.048		6.54	6.57		
4/13/21 13:15	23 FILTER C	0.75	0.88	0.00		0.001		7.38	7.21		
4/13/21 13:15	24 FILTER D	0.95	1.04	0.00		0.003		7.38	7.20		
4/14/21 8:30	01 RAW			0.52		1.052					
4/14/21 8:30	21 FILTER A	0.93		0.00		0.000					
4/14/21 8:30	22 FILTER B	1.15		0.25		0.173					
4/14/21 8:30	23 FILTER C	0.82		0.00		0.000					
4/14/21 8:30	24 FILTER D	0.97		0.25		0.090					
4/14/21 8:53	Shut off Filter B to BW										
4/14/21 9:06	Start Filter B @ 8 gpm/sf										
4/14/21 9:07	Shut off Filter D to BW										
4/14/21 9:17	Start Filter D @ 8 gpm/sf										
4/14/21 10:40	01 RAW			0.49		1.046					
4/14/21 10:40	21 FILTER A			0.00		0.008					
4/14/21 10:40	22 FILTER B			0.00		0.067					
4/14/21 10:40	23 FILTER C			0.00		0.010					
4/14/21 10:40	24 FILTER D			0.00		0.010					
4/14/21 13:30	01 RAW			0.52	0.50	1.040	1.062	6.56	6.54	12.2	
4/14/21 13:30	11 POX AB	1.67	2.20		0.08		0.896	6.62	6.60		
4/14/21 13:30	12 POX CD	1.67	1.99		0.03		0.768	7.72	7.61		
4/14/21 13:30	21 FILTER A	0.79	1.38	0.05		0.010		6.62	6.61		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/14/21 13:30	22 FILTER B	1.34	1.57	0.03		0.068		6.60	6.59		
4/14/21 13:30	23 FILTER C	1.03	1.15	0.01		0.011		7.53	7.44		
4/14/21 13:30	24 FILTER D	1.12	1.30	0.01		0.008		7.52	7.44		
4/14/21 14:55	NaOCl feed @ 600 mL/hr, V = 23.1L, NaOH @ 0.0 mL/hr AB, 59.1 mL/hr CD, V = 23.9L										
4/15/21 7:55	NaOCl feed @ 600 mL/hr, V = 12.9L, NaOH @ 0.0 mL/hr AB, 59.1 mL/hr CD, V = 22.8L										
4/15/21 8:05	01 RAW			0.47	0.40	0.984	0.994	6.53	6.47	12.0	
4/15/21 8:05	11 POX AB	1.79	2.20		0.02		0.884	6.59	6.53	12.0	
4/15/21 8:05	12 POX CD	1.82	1.90		0.03		0.758	7.42	7.28	12.1	
4/15/21 8:05	21 FILTER A	0.86	1.42	0.02		0.023		6.60	6.55	11.7	
4/15/21 8:05	22 FILTER B	0.99	1.66	0.02		0.040		6.59	6.56	11.7	
4/15/21 8:05	23 FILTER C	0.96	1.32	0.02		0.015		7.51	7.34	11.7	
4/15/21 8:05	24 FILTER D	1.12	1.39	0.02		0.013		7.52	7.37	11.8	
4/15/21 10:30	Start Recycle Trial										
4/15/21 10:50	01 RAW			0.42	0.38	0.924					
4/15/21 10:50	21 FILTER A			0.00		0.019					
4/15/21 10:50	22 FILTER B			0.02		0.030					
4/15/21 10:50	23 FILTER C			0.00		0.022					
4/15/21 10:50	24 FILTER D			0.03		0.024					
4/15/21 11:30	01 RAW			0.41	0.35	0.914	0.946	6.67	6.67	12.1	
4/15/21 11:30	11 POX AB	2.14	2.20		0.00		0.752	6.72	6.70	12.3	
4/15/21 11:30	12 POX CD	2.02	2.13		0.00		0.642	7.69	7.61	12.2	
4/15/21 11:30	21 FILTER A	1.32	1.44	0.00		0.021		6.67	6.67	12.8	
4/15/21 11:30	22 FILTER B	1.42	1.79	0.00		0.036		6.68	6.68	12.7	
4/15/21 11:30	23 FILTER C	1.20	1.46	0.00		0.022		7.59	7.51	13.0	
4/15/21 11:30	24 FILTER D	1.32	1.59	0.00		0.020		7.56	7.49	13.0	
4/15/21 13:15	01 RAW			0.41	0.34	0.882	0.924				
4/15/21 13:15	21 FILTER A			0.05		0.019					
4/15/21 13:15	22 FILTER B			0.04		0.029					
4/15/21 13:15	23 FILTER C			0.03		0.020					
4/15/21 13:15	24 FILTER D			0.03		0.020					
4/15/21 14:00	01 RAW			0.39	0.34	0.922	0.902				

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/15/21 14:00	21 FILTER A			0.04		0.014					
4/15/21 14:00	22 FILTER B			0.03		0.032					
4/15/21 14:00	23 FILTER C			0.01		0.016					
4/15/21 14:00	24 FILTER D			0.02		0.022					
4/15/21 14:30	End Reycle Trial										
4/15/21 14:50	01 RAW			0.40	0.38	0.962	0.924	6.64	6.59	12.2	
4/15/21 14:50	11 POX AB	1.97	2.20		0.02		0.680	6.65	6.62	12.5	
4/15/21 14:50	12 POX CD	1.97	2.20		0.04		0.792	7.82	7.68	12.3	
4/15/21 14:50	21 FILTER A	1.26	1.68	0.04		0.008		6.65	6.64		
4/15/21 14:50	22 FILTER B	1.09	1.81	0.04		0.024		6.66	6.65		
4/15/21 14:50	23 FILTER C	1.12	1.45	0.03		0.007		7.59	7.48		
4/15/21 14:50	24 FILTER D	1.38	1.57	0.04		0.013		7.60	7.48		
4/15/21 15:30	NaOCl feed @ 600 mL/hr, V = 17.2L, NaOH @ 0.0 mL/hr AB, 55.7 mL/hr CD, V = 22.5L										
4/16/21 7:46	Transfer ORP & DO probes to RAW										
4/16/21 7:46	Well Flow = 400 gpm										
4/16/21 7:50	01 RAW			0.42	0.39	0.950	0.962				
4/16/21 7:50	21 FILTER A			0.10		0.030					
4/16/21 7:50	22 FILTER B			0.13		0.056					
4/16/21 7:50	23 FILTER C			0.06		0.029					
4/16/21 7:50	24 FILTER D			0.09		0.040					
4/16/21 8:00	NaOCl feed @ 600 mL/hr, V = 7.2L, NaOH @ 0.0 mL/hr AB, 55.7 mL/hr CD, V = 21.7L										
4/16/21 8:10	End of Trial; Backwash										
4/16/21 8:40	Start All Filters @ 6 gpm/sf for weekend										
4/16/21 9:30	01 RAW			0.42	0.40	0.938	0.980	6.59	6.56	12.0	
4/16/21 9:30	11 POX AB	1.61	2.20		0.02		0.780	6.62	6.60	12.3	
4/16/21 9:30	12 POX CD	2.04	2.20		0.02		0.754	7.77	7.67	12,2	
4/16/21 9:30	21 FILTER A	1.59	2.03	0.00		0.009		6.64	6.62		
4/16/21 9:30	22 FILTER B	1.66	1.73	0.00		0.016		6.65	6.64		
4/16/21 9:30	23 FILTER C	1.61	1.97	0.01		0.001		7.57	7.52		
4/16/21 9:30	24 FILTER D	1.21	1.56	0.01		0.011		7.52	7.45		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/19/21 15:00	Well Flow = 191 gpm										
4/19/21 16:30	01 RAW			0.07	0.07	0.078	0.089	6.54	6.48	12.3	
4/19/21 16:30	11 POX AB	1.32	1.51		0.00		0.070	6.53	6.58	12.3	
4/19/21 16:30	12 POX CD	0.96	0.98		0.00		0.060	7.23	7.19	12.3	
4/19/21 16:30	21 FILTER A	0.75	0.80	0.00		0.040		6.57	6.59		
4/19/21 16:30	22 FILTER B	1.11	1.25	0.00		0.011		6.59	6.60		
4/19/21 16:30	23 FILTER C	0.83	1.03	0.00		0.002		7.26	7.22		
4/19/21 16:30	24 FILTER D	1.09	1.09	0.00		0.010		7.26	7.25		
4/19/21 17:00	NaOCl feed @ 400 mL/hr, V = 15.6L, NaOH @ 0.0 mL/hr AB, 57.4 mL/hr CD, V = 17.8L										
4/19/21 17:03	Move DO + ORP probes to Filter B										
4/20/21 8:24	Move DO + ORP probes to RAW										
4/20/21 8:25	01 RAW			0.06	0.06	0.104	0.100	6.47	6.49	12.2	
4/20/21 8:25	11 POX AB	1.40	1.87		0.00		0.080	6.55	6.55	12.3	
4/20/21 8:25	12 POX CD	1.56	1.73		0.00		0.076	7.55	7.50	12.4	
4/20/21 8:25	21 FILTER A	1.05	1.13	0.00		0.007		6.60	6.60		
4/20/21 8:25	22 FILTER B	1.32	1.33	0.00		0.001		6.63	6.61		
4/20/21 8:25	23 FILTER C	1.15	1.28	0.00		0.011		7.57	7.53		
4/20/21 8:25	24 FILTER D	1.35	1.43	0.00		0.004		7.57	7.52		
4/20/21 8:30	NaOCl feed @ 400 mL/hr, V = 9.2L, NaOH @ 10.0 mL/hr AB, 62.6 mL/hr CD, V = 16.9L										
4/20/21 9:05	Well Flow = 190 gpm										
4/20/21 9:40	01 RAW										33.88
4/20/21 9:40	22 FILTER B										29.04
4/20/21 11:10	01 RAW			0.30	0.18	0.125	0.121				
4/20/21 11:10	21 FILTER A			0.00		0.002					
4/20/21 11:10	22 FILTER B			0.00		0.002					
4/20/21 11:10	23 FILTER C			0.00		0.000					
4/20/21 11:10	24 FILTER D			0.00		0.001					
4/20/21 13:20	01 RAW			0.07	0.05	0.115	0.100	6.45	6.47	12.6	
4/20/21 13:20	11 POX AB	1.76	1.79		0.00		0.077	6.54	6.38	12.6	
4/20/21 13:20	12 POX CD	1.64	1.64		0.00		0.083	7.41	7.33	12.6	
4/20/21 13:20	21 FILTER A	1.08	1.14	0.00		0.010		6.63	6.57		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/20/21 13:20	22 FILTER B	1.31	1.32	0.00		0.005		6.63	6.60		
4/20/21 13:20	23 FILTER C	1.17	1.26	0.00		0.007		7.35	7.32		
4/20/21 13:20	24 FILTER D	1.37	1.47	0.00		0.010		7.40	7.32		
4/20/21 13:45	Decrease NaOCl feed to 375 mL/hr										
4/20/21 14:00	NaOCl feed @ 375 mL/hr, V = 34.7L, NaOH @ 8.3 mL/hr AB, 60.9 mL/hr CD, V = 16.4L										
4/20/21 14:25	21 FILTER A	1.06									
4/20/21 14:25	22 FILTER B	1.27									
4/20/21 14:25	23 FILTER C	1.26									
4/20/21 14:25	24 FILTER D	1.41									
4/20/21 14:30	Move DO + ORP probe to Filter B										
4/21/21 8:30	NaOCl feed @ 375 mL/hr, V = 27.1L, NaOH @ 8.3 mL/hr AB, 62.6 mL/hr CD, V = 15.1L										
4/21/21 8:38	Move DO + ORP probe to RAW										
4/21/21 8:40	01 RAW			0.04	0.03	0.115	0.121	6.47	6.45	12.5	
4/21/21 8:40	11 POX AB	1.33	1.72		0.00		0.088	6.55	6.54	12.5	
4/21/21 8:40	12 POX CD	1.50	1.77		0.00		0.086	7.61	7.60	12.5	
4/21/21 8:40	21 FILTER A	0.79	1.23	0.00		0.009		6.55	6.58		
4/21/21 8:40	22 FILTER B	1.25	1.29	0.00		0.005		6.60	6.59		
4/21/21 8:40	23 FILTER C	1.16	1.26	0.00		0.004					
4/21/21 8:40	24 FILTER D	1.25	1.34	0.00		0.001					
4/21/21 9:50	Well Flow = 194.5										
4/21/21 11:30	01 RAW			0.03	0.03	0.129	0.116				
4/21/21 11:30	21 FILTER A			0.00		0.005					
4/21/21 11:30	22 FILTER B			0.00		0.006					
4/21/21 11:30	23 FILTER C			0.00		0.007					
4/21/21 11:30	24 FILTER D			0.00		0.010					
4/21/21 13:30	01 RAW			0.03	0.02	0.129	0.121	6.54	6.58	12.6	
4/21/21 13:30	11 POX AB	1.54	1.54		0.00		0.105	6.70	6.70	12.6	
4/21/21 13:30	12 POX CD	1.34	1.67		0.00		0.095	7.80	7.78	12.6	
4/21/21 13:30	21 FILTER A	1.18	1.10	0.00		0.010		6.70	6.70		
4/21/21 13:30	22 FILTER B	1.31	1.38	0.00		0.005		6.70	6.71		
4/21/21 13:30	23 FILTER C	1.34	1.35	0.00		0.010		7.46	7.33		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/22/21 15:30	12 POX CD	1.51									
4/22/21 15:30	21 FILTER A	1.04									
4/22/21 15:30	22 FILTER B	1.20									
4/22/21 15:30	23 FILTER C	1.16									
4/22/21 15:30	24 FILTER D	1.31									
4/23/21 8:00	NaOCl feed @ 350 mL/hr, V = 9.9L, NaOH @ 16.7 mL/hr AB, 67.8 mL/hr CD, V = 11.6L										
4/23/21 8:05	01 RAW			0.03	0.03	0.148	0.142	6.45	6.41	12.2	
4/23/21 8:05	11 POX AB	1.36	1.59		0.00		0.115	6.64	6.65	12.4	
4/23/21 8:05	12 POX CD	1.59	1.65		0.00		0.101				
4/23/21 8:05	21 FILTER A	0.96	1.24	0.00		0.016		6.71	6.71		
4/23/21 8:05	22 FILTER B	1.05	1.34	0.00		0.016		6.70	6.70		
4/23/21 8:05	23 FILTER C	1.13	1.26	0.00		0.017		7.59	7.54		
4/23/21 8:05	24 FILTER D	1.19	1.30	0.00		0.012		7.56	7.54		
4/23/21 8:07	Move DO + ORP probes to RAW										
4/23/21 9:07	Shut off Filter D to BW										
4/23/21 9:16	Start Filter D @ 8 gpm/sf										
4/23/21 10:55	Operator turned Hyannisport well on for 10 min										
4/23/21 11:35	01 RAW			0.04	0.03	0.141	0.132	6.37	6.35	12.3	
4/23/21 11:35	11 POX AB	1.17	1.58		0.00		0.113	6.70	6.68	12.4	
4/23/21 11:35	12 POX CD	1.45	1.62		0.00		0.109	7.48	7.54	12.5	
4/23/21 11:35	21 FILTER A	1.09	1.16	0.00		0.008		6.70	6.74		
4/23/21 11:35	22 FILTER B	1.21	1.35	0.00		0.009		6.75	6.73		
4/23/21 11:35	23 FILTER C	1.18	1.24	0.00		0.004		7.52	7.56		
4/23/21 11:35	24 FILTER D	1.30	1.40	0.00		0.009		7.41	7.45		
4/23/21 12:00	Make up 30L NaOCl (1/10)										
4/23/21 12:15	NaOCl feed @ 350 mL/hr, V = 35.2L, NaOH @ 15.0 mL/hr AB, 60.9 mL/hr CD, V = 11.3L										
4/23/21 12:17	Move DO + ORP probes to Filter B										
4/23/21 12:25	Well Flow = 237.5 gpm										
4/26/21 8:30	Pilot shut down and vandalized										
4/26/21 14:00	Restart flow to pilot										

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/26/21 14:08	Backwash Filters A and B w/ raw water										
4/26/21 14:18	Backwash Filters C and D w/ raw water										
4/26/21 16:15	Swap to Hyannisport Well										
4/26/21 17:05	01 RAW			0.09	0.09	0.126	0.137				
4/26/21 17:05	11 POX AB	1.46	1.67								
4/26/21 17:05	12 POX CD	1.59	1.72								
4/26/21 17:30	NaOCl feed @ 350 mL/hr, V = 22.2L, NaOH @ 90 mL/hr AB, 172 mL/hr CD, V = 8.5L										
4/27/21 7:35	No flow to filters										
4/27/21 8:30	Start flow to filters										
4/27/21 10:35	Restart filters										
4/27/21 10:45	Backwash A and B w/ raw										
4/27/21 10:55	Backwash C and D w/ raw										
4/27/21 10:55	Filters A and B Start										
4/27/21 11:05	Filters C and D Start										
4/27/21 11:06	Start feed to chemicals										
4/27/21 11:10	Well Flow = 208 gpm										
4/27/21 12:30	01 RAW			0.04	0.03	0.136	0.129	5.42	5.46	12.8	
4/27/21 12:30	11 POX AB	1.27	1.52		0.01		0.103	6.53	6.49	12.9	
4/27/21 12:30	12 POX CD	0.85	1.44		0.01		0.106	7.16	7.11	12.7	
4/27/21 12:30	21 FILTER A	1.02	1.12	0.00		0.009		6.60	6.54		
4/27/21 12:30	22 FILTER B	0.59	0.77	0.00		0.008		6.66	6.59		
4/27/21 12:30	23 FILTER C	0.90	1.07	0.00		0.008		7.20	7.12		
4/27/21 12:30	24 FILTER D	0.86	1.00	0.00		0.013					
4/27/21 13:20	Start GAC Filters										
4/27/21 15:30	01 RAW			0.03	0.02	0.127	0.131	5.45	5.51	12.7	
4/27/21 15:30	11 POX AB	1.48	1.62		0.00		0.099				
4/27/21 15:30	12 POX CD	1.39	1.57		0.00		0.085				
4/27/21 15:30	21 FILTER A	1.01	1.12	0.00		0.012					
4/27/21 15:30	22 FILTER B	0.78	0.86	0.00		0.003					
4/27/21 15:30	23 FILTER C	1.02	1.11	0.00		0.012					
4/27/21 15:30	24 FILTER D	1.11	1.21	0.00		0.007					

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
4/29/21 7:40	01 RAW			0.04	0.02	0.121	0.112	5.43	5.45	12.5	
4/29/21 7:40	11 POX AB	1.66	1.82		0.00		0.088	6.94	6.85	12.5	
4/29/21 7:40	12 POX CD	1.54	1.71		0.00		0.075	7.35	7.35	12.6	
4/29/21 7:40	21 FILTER A	1.26	1.43	0.00		0.002		6.98	6.91		
4/29/21 7:40	22 FILTER B	1.31	1.40	0.00		0.002		6.97	6.90		
4/29/21 7:40	23 FILTER C	1.35	1.45	0.00		0.000		7.42	7.41		
4/29/21 7:40	24 FILTER D	1.40	1.55	0.00		0.000		7.43	7.41		
4/29/21 7:50	Lower NaOCl feed to 300 mL/hr										
4/29/21 10:30	21 FILTER A	1.19									
4/29/21 10:30	22 FILTER B	1.21									
4/29/21 10:30	23 FILTER C	1.21									
4/29/21 10:30	24 FILTER D	1.28									
4/29/21 11:15	01 RAW			0.04	0.04	0.127	0.125				
4/29/21 11:15	21 FILTER A			0.00		0.000					
4/29/21 11:15	22 FILTER B			0.00		0.000					
4/29/21 11:15	23 FILTER C			0.00		0.000					
4/29/21 11:15	24 FILTER D			0.00		0.000					
4/29/21 14:45	Start Recycle Trial										
4/29/21 15:15	01 RAW			0.03	0.02	0.121	0.106				
4/29/21 15:15	21 FILTER A			0.00		0.000					
4/29/21 15:15	22 FILTER B			0.00		0.000					
4/29/21 15:15	23 FILTER C			0.00		0.000					
4/29/21 15:15	24 FILTER D			0.00		0.000					
4/29/21 15:45	01 RAW			0.03	0.02	0.121	0.108	5.65	5.62	12.6	
4/29/21 15:45	11 POX AB	1.35	1.53		0.00		0.068	6.81	6.70	12.6	
4/29/21 15:45	12 POX CD	1.36	1.54		0.00		0.085	7.37	7.32	12.6	
4/29/21 15:45	21 FILTER A	1.11	1.19	0.00		0.000		6.86	6.76		
4/29/21 15:45	22 FILTER B	1.11	1.21	0.00		0.000		6.87	6.78		
4/29/21 15:45	23 FILTER C	1.09	1.23	0.00		0.000		7.42	7.34		
4/29/21 15:45	24 FILTER D	1.20	1.31	0.00		0.000		7.40	7.33		
4/29/21 16:30	01 RAW			0.03	0.02	0.125	0.116				
4/29/21 16:30	21 FILTER A			0.00		0.016					
4/29/21 16:30	22 FILTER B			0.00		0.007					
4/29/21 16:30	23 FILTER C			0.00		0.001					
4/29/21 16:30	24 FILTER D			0.00		0.007					

Appendix B – Field Water Quality - UVAOP Trials

Sample Location Reference IDs

Sample ID	Sample Location/Description
01 WELL 5	Raw Water from Straightway 2 and Simmons Pond Wells
11 POX	Filters A/B Post-oxidation sample, collected downstream of chemical addition (ClO ₂ , NaOH) and upstream of the filters.
21 GSP Filter 21-1	Filter 21-1 Effluent
22 GSP Filter 21-2	Filter 21-2 Effluent
31 CBW	Combined Backwash – Filter 21-1 or 21-2
41 UV Effluent	UV AOP Effluent
51 GAC Effluent	GAC Contactor Effluent

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
5/25/21 11:15	11 POX	2.20									
5/25/21 11:15	21 GSP FILTER 21-1	1.39									
5/25/21 11:15	22 GSP FILTER 21-2	1.24									
5/25/21 11:25	41 UV Effluent										13.64
5/25/21 11:30	51 GAC Effluent										12.32
5/25/21 11:50	11 POX	1.89									
5/25/21 11:50	21 GSP FILTER 21-1	1.10									
5/25/21 11:50	22 GSP FILTER 21-2	0.92									
5/25/21 12:00	01 RAW			0.43	0.42	0.767	0.769				
5/25/21 12:00	21 GSP FILTER 21-1			0.00		0.002					
5/25/21 12:00	22 GSP FILTER 21-2			0.00		0.000					
5/25/21 12:00	41 UV Effluent			0.00		0.002					
5/25/21 12:00	51 GAC Effluent			0.00		0.002					
5/25/21 14:10	01 RAW			0.45	0.39	0.779	0.767	6.55	6.54	12.3	
5/25/21 14:10	11 POX	1.94	2.20		0.00		0.653	7.47	7.46	12.5	
5/25/21 14:10	21 GSP FILTER 21-1	0.99	1.15	0.00		0.010		7.35	7.38		
5/25/21 14:10	22 GSP FILTER 21-2	0.84	0.97	0.00		0.017		7.40	7.38		
5/25/21 14:10	41 UV Effluent	0.00	0.02	0.00		0.026		7.37	7.31		
5/25/21 14:10	51 GAC Effluent			0.00		0.026		7.19	7.20		
5/26/21 8:05	01 RAW			0.46	0.42	0.770	0.742	6.53	6.52	12.1	
5/26/21 8:05	11 POX	1.80	2.19		0.00		0.643				
5/26/21 8:05	21 GSP FILTER 21-1	0.96	1.13	0.00		0.000		7.48	7.41		
5/26/21 8:05	22 GSP FILTER 21-2	0.77	0.92	0.00		0.000		7.48	7.41		
5/26/21 8:05	41 UV Effluent	0.00	0.21	0.00		0.000		7.44	7.38		
5/26/21 8:05	51 GAC Effluent			0.00		0.000		7.26	7.22		
5/26/21 12:18	Shut off GAC Filters, UV skid										
5/26/21 12:20	Shut off flow to GSP Filters										
5/26/21 12:35	Backwash F1										
5/26/21 12:45	Backwash F2										
5/26/21 12:50	Start F1 and F2 @ 10 gpm										
5/26/21 13:35	Turn on power to UV skid										
5/26/21 14:20	01 RAW			0.46	0.45	0.773	0.739	6.54	6.50	12.4	
5/26/21 14:20	11 POX	1.63	1.97		0.00		0.672	7.28	7.42		
5/26/21 14:20	21 GSP FILTER 21-1	0.90	0.97	0.00		0.013		7.31	7.32		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
5/26/21 14:20	22 GSP FILTER 21-2	0.78	0.85	0.00		0.009		7.32	7.31		
5/26/21 14:20	41 UV Effluent	0.29	0.00	0.00		0.015		7.25	7.23		
5/26/21 14:20	51 GAC Effluent			0.00		0.007		7.19	7.15		
5/27/21 7:45	Influent Pressure and Flow dropped from operator diverting flow to fill tanks										
5/27/21 8:10	Flows and pressure back to normal										
5/27/21 8:40	01 RAW			0.50	0.41	0.779	0.745	6.53	6.53		32.12
5/27/21 8:40	11 POX	1.44	2.15		0.00		0.671	7.37	7.35		
5/27/21 8:40	21 GSP FILTER 21-1	0.83	1.07	0.00		0.014		7.34	7.27		
5/27/21 8:40	22 GSP FILTER 21-2	0.72	0.90	0.00		0.000		7.31	7.26		
5/27/21 8:40	41 UV Effluent	0.00	0.38	0.00		0.001		7.28	7.24		
5/27/21 8:40	51 GAC Effluent			0.00		0.000		7.12	7.10		
5/27/21 10:48	Kleinfelder using DO + ORP probes for sampling										
5/27/21 11:40	Switch back to RAW DO + ORP										
5/27/21 13:00	Switch to UV Ballast Power of 60%										
5/27/21 14:15	01 RAW			0.46	0.42	0.788	0.771	6.56	6.56	12.5	
5/27/21 14:15	11 POX	1.36	1.79		0.10		0.658	7.58	7.49		
5/27/21 14:15	21 GSP FILTER 21-1	1.03	1.15	0.00		0.020		7.53	7.46		
5/27/21 14:15	22 GSP FILTER 21-2	0.93	1.12	0.00		0.009		7.46	7.43		
5/27/21 14:15	41 UV Effluent	0.00	0.40	0.00		0.015		7.45	7.42		
5/27/21 14:15	51 GAC Effluent			0.00		0.013		7.30	7.31		
5/28/21 8:00	01 RAW			0.44	0.39	0.787	0.755	6.53	6.51	12.1	
5/28/21 8:00	11 POX	1.38	1.85		0.17		0.698	7.93	7.94	12.2	
5/28/21 8:00	21 GSP FILTER 21-1	0.97	1.25	0.00		0.020		7.58	7.64		
5/28/21 8:00	22 GSP FILTER 21-2	0.81	1.09	0.00		0.004		7.61	7.69		
5/28/21 8:00	41 UV Effluent	0.00	0.36	0.00		0.006		7.53	7.59		
5/28/21 8:00	51 GAC Effluent			0.00		0.003		7.33	7.39		
5/28/21 8:40	Shut off flow to GAC Filters and power off UV skid										
5/28/21 8:41	Shut off flow to GSP Filters										
5/28/21 8:45	Backwash F2										
5/28/21 8:45	Backwash F1										
5/28/21 9:10	Start F1 @ 10 gpm										
5/28/21 9:10	Start F2 @ 10 gpm										
5/28/21 9:52	Start flow to UV skid, power on										
5/28/21 10:00	Start Flow to GAC filters										

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
5/28/21 10:45	01 RAW			0.44	0.42	0.749	0.736	6.58	6.59	12.2	
5/28/21 10:45	11 POX	1.93	2.20		0.14		0.657	7.22	7.09	12.2	
5/28/21 10:45	21 GSP FILTER 21-1	0.87	1.09	0.00		0.023		7.06	7.20		
5/28/21 10:45	22 GSP FILTER 21-2	0.80	0.93	0.00		0.019		7.10	7.06		
5/28/21 10:45	41 UV Effluent	0.00	0.32	0.00		0.025		7.07	7.05		
5/28/21 10:45	51 GAC Effluent			0.00		0.007		7.21	7.17		
6/1/21 8:25	Shutdown Lamps to UV skid										
6/1/21 8:25	Shutdown Flow to GSP Filters										
6/1/21 8:25	Backwash Filters 1 and 2										
6/1/21 9:10	Restart Filters, startup chem										
6/1/21 9:40	Turn on UV lamps; UV Ballast 60%, 10 mg/L H2O2										
6/1/21 10:00	Start Flow to GAC filters										
6/1/21 10:05	01 RAW			0.44	0.38	0.768	0.751	6.53	6.53	12.5	
6/1/21 10:05	11 POX	1.34	1.42		0.00		0.657				
6/1/21 10:05	21 GSP FILTER 21-1	0.69	0.90	0.00		0.012		7.61	7.56		
6/1/21 10:05	22 GSP FILTER 21-2	0.63	0.78	0.00		0.016		7.59	7.54		
6/1/21 10:05	41 UV Effluent	0.00	0.34	0.00		0.026		7.48	7.46		
6/1/21 10:05	51 GAC Effluent			0.00		0.014		7.29	7.29		
6/1/21 11:15	Switch UV Ballast to 100%										
6/1/21 11:15	Lower H2O2 feed to 57.5 mL/hr (Target: 5 mg/L)										
6/1/21 13:35	01 RAW			0.46	0.43	0.763	0.759				
6/1/21 13:35	21 GSP FILTER 21-1			0.00		0.001					
6/1/21 13:35	22 GSP FILTER 21-2			0.00		0.000					
6/1/21 13:35	41 UV Effluent			0.00		0.000					
6/1/21 13:35	51 GAC Effluent			0.00		0.007					
6/1/21 14:30	01 RAW			0.46	0.43	0.747	0.738	6.57	6.64	12.5	
6/1/21 14:30	11 POX	1.26	1.76		0.00		0.651				
6/1/21 14:30	21 GSP FILTER 21-1	0.89	1.10	0.00		0.000		7.23	7.31		
6/1/21 14:30	22 GSP FILTER 21-2	0.77	0.98	0.00		0.000		7.24	7.29		
6/1/21 14:30	41 UV Effluent	0.00	0.17	0.00		0.000		7.21	7.26		
6/1/21 14:30	51 GAC Effluent			0.00		0.004		7.17	7.22		
6/2/21 8:05	01 RAW			0.47	0.40	0.772	0.761	6.51	6.51	12.2	
6/2/21 8:05	11 POX	1.33	1.87		0.01		0.668	7.81	7.73	12.2	
6/2/21 8:05	21 GSP FILTER 21-1	0.68	0.97	0.00		0.008		7.40	7.38		

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
6/2/21 8:05	22 GSP FILTER 21-2	0.72	0.93	0.00		0.004		7.32	7.31		
6/2/21 8:05	41 UV Effluent	0.00	0.15	0.00		0.008		7.31	7.30		
6/2/21 8:05	51 GAC Effluent			0.00		0.008		7.27	7.27		
6/2/21 12:45	01 RAW			0.46	0.41	0.749	0.728				
6/2/21 12:45	21 GSP FILTER 21-1			0.00		0.009					
6/2/21 12:45	22 GSP FILTER 21-2			0.00		0.004					
6/2/21 12:45	41 UV Effluent			0.00		0.009					
6/2/21 12:45	51 GAC Effluent			0.00		0.009					
6/2/21 13:15	Switch UV Ballast to 60%										
6/2/21 14:30	01 RAW			0.45	0.41	0.743	0.748	6.55	6.54	12.6	
6/2/21 14:30	11 POX	1.54	1.92		0.00		0.636	7.79	7.61		
6/2/21 14:30	21 GSP FILTER 21-1	0.91	1.10	0.00		0.010		7.44	7.37		
6/2/21 14:30	22 GSP FILTER 21-2	0.89	0.99	0.00		0.002		7.39	7.34		
6/2/21 14:30	41 UV Effluent	0.00	0.23	0.00		0.001		7.34	7.31		
6/2/21 14:30	51 GAC Effluent			0.00		0.009		7.21	7.20		
6/3/21 7:15	01 RAW			0.65	0.43	0.767	0.732	6.51	6.51	12.0	
6/3/21 7:15	11 POX	0.93	1.53		0.00		0.660	8.05	7.82		
6/3/21 7:15	21 GSP FILTER 21-1	0.75	1.04	0.00		0.002		7.55	7.49		
6/3/21 7:15	22 GSP FILTER 21-2	0.58	0.91	0.00		0.011		7.51	7.47		
6/3/21 7:15	41 UV Effluent	0.00	0.20	0.00		0.004		7.51	7.45		
6/3/21 7:15	51 GAC Effluent			0.00		0.004		7.44	7.40		
6/3/21 8:20	01 RAW			0.71	0.43	0.756	0.720	6.55	6.56	12.3	36.96
6/3/21 13:20	01 RAW			0.49	0.41	0.764	0.731				
6/3/21 13:20	21 GSP FILTER 21-1			0.00		0.016					
6/3/21 13:20	22 GSP FILTER 21-2			0.00		0.014					
6/3/21 13:20	41 UV Effluent			0.00		0.009					
6/3/21 13:20	51 GAC Effluent			0.00		0.016					
6/3/21 14:15	01 RAW			0.43	0.43	0.765	0.737	6.53	6.53	12.2	
6/3/21 14:15	11 POX	1.99	2.20		0.00		0.635	7.57	7.75		
6/3/21 14:15	21 GSP FILTER 21-1	0.91	1.03	0.00		0.010		7.33	7.39		
6/3/21 14:15	22 GSP FILTER 21-2	0.78	0.93	0.00		0.019		7.27	7.30		
6/3/21 14:15	41 UV Effluent	0.00	0.19	0.00		0.017		7.23	7.26		
6/3/21 14:15	51 GAC Effluent			0.00		0.020		7.17	7.20		
6/4/21 7:50	01 RAW			0.45	0.39	0.755	0.752	6.53	6.52	12.2	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
6/4/21 7:50	11 POX	1.02	1.49		0.00		0.621	7.80	7.52	12.3	
6/4/21 7:50	21 GSP FILTER 21-1	0.76	1.11	0.00		0.009		7.51	7.52		
6/4/21 7:50	22 GSP FILTER 21-2	0.62	0.88	0.00		0.012		7.45	7.46		
6/4/21 7:50	41 UV Effluent	0.00	0.21	0.00		0.006		7.38	7.38		
6/4/21 7:50	51 GAC Effluent			0.00		0.007		7.34	7.35		
6/4/21 8:20	Shut off flow to GAC Filters, power off UV skid, shut down GSP filters										
6/4/21 8:50	Start GSP Filters @ 10 gpm										
6/4/21 9:50	Start UV skid										
6/4/21 10:15	Start Flow to GAC filters										
6/4/21 11:00	01 RAW			0.63	0.42	0.754	0.711	6.54	6.53	12.3	
6/4/21 11:00	11 POX	1.76	2.20		0.00		0.627	7.38	7.26	12.3	
6/4/21 11:00	21 GSP FILTER 21-1	0.92	1.12	0.00		0.008		7.24	7.19		
6/4/21 11:00	22 GSP FILTER 21-2	0.78	0.95	0.00		0.000		7.21	7.17		
6/4/21 11:00	41 UV Effluent	0.00	0.22	0.00		0.002		7.19	7.14		
6/4/21 11:00	51 GAC Effluent			0.00		0.012		7.15	7.13		
6/7/21 8:10	01 RAW			0.44	0.39	0.746	0.734				
6/7/21 8:10	11 POX	1.70	2.02		0.13		0.628				
6/7/21 8:10	21 GSP FILTER 21-1	0.75	0.97	0.05		0.014					
6/7/21 8:10	22 GSP FILTER 21-2	0.71	0.95	0.01		0.020					
6/7/21 8:10	41 UV Effluent	0.00	0.20	0.02		0.010					
6/7/21 8:10	51 GAC Effluent	0.07	0.08	0.05		0.014					
6/7/21 8:35	Shut off and move to Simmons Pond										
6/7/21 13:45	Start flow to GSP Filters										
6/7/21 14:45	21 GSP FILTER 21-1	0.98									
6/7/21 14:45	22 GSP FILTER 21-2	0.79									
6/7/21 14:50	01 RAW			0.08	0.05	0.161	0.158				
6/8/21 7:45	01 RAW			0.06	0.06	0.154	0.149	6.37	6.36	12.5	
6/8/21 7:45	11 POX	1.60	1.91		0.03		0.138	7.19	7.09	12.7	
6/8/21 7:45	21 GSP FILTER 21-1	1.25	1.49	0.00		0.000		7.23	7.12		
6/8/21 7:45	22 GSP FILTER 21-2	1.09	1.23	0.00		0.009		7.21	7.12		
6/8/21 8:40	Start UV skid										
6/8/21 8:50	Start Flow to GAC filters										
6/8/21 10:45	01 RAW			0.04	0.04	0.156	0.133				
6/8/21 10:45	21 GSP FILTER 21-1	1.11		0.00		0.000					

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
6/8/21 10:45	22 GSP FILTER 21-2	0.98		0.00		0.007					
6/8/21 10:45	41 UV Effluent			0.00		0.000					
6/8/21 10:45	51 GAC Effluent			0.00		0.000					
6/8/21 12:45	01 RAW										40.92
6/8/21 13:00	21 GSP FILTER 21-1										8.8
6/8/21 13:05	21 GSP FILTER 21-1	1.00									
6/8/21 13:05	22 GSP FILTER 21-2	0.94									
6/8/21 13:20	41 UV Effluent										8.36
6/8/21 13:30	51 GAC Effluent										8.36
6/8/21 14:25	01 RAW			0.04	0.04	0.148	0.140	6.37	6.34	12.9	
6/8/21 14:25	11 POX	1.40	1.44		0.00		0.134				
6/8/21 14:25	21 GSP FILTER 21-1	0.84	0.98	0.00		0.007		7.22	7.16		
6/8/21 14:25	22 GSP FILTER 21-2	0.80	0.89	0.00		0.009		7.20	7.15		
6/8/21 14:25	41 UV Effluent	0.00	0.25	0.00		0.005		7.17	7.13		
6/8/21 14:25	51 GAC Effluent			0.00		0.009		7.19	7.16		
6/9/21 8:00	01 RAW			0.04	0.04	0.163	0.141	6.36	6.36	12.6	
6/9/21 8:00	11 POX	1.01	1.26		0.00		0.138	7.16	7.14		
6/9/21 8:00	21 GSP FILTER 21-1	0.94	1.07	0.00		0.014		7.15	7.09		
6/9/21 8:00	22 GSP FILTER 21-2	0.80	0.88	0.00		0.011		7.14	7.08		
6/9/21 8:00	41 UV Effluent	0.00	0.23	0.00		0.014		7.14	7.09		
6/9/21 8:00	51 GAC Effluent			0.00		0.013		7.15	7.10		
6/9/21 10:30	01 RAW			0.04	0.04	0.146	1.310				
6/9/21 10:30	21 GSP FILTER 21-1			0.00		0.007					
6/9/21 10:30	22 GSP FILTER 21-2			0.00		0.000					
6/9/21 10:30	41 UV Effluent			0.00		0.000					
6/9/21 10:30	51 GAC Effluent			0.00		0.009					
6/9/21 12:00	01 RAW			0.05	0.04	0.156	0.151	6.37	6.35	12.9	
6/9/21 12:00	11 POX	0.88	1.12		0.00		0.130	7.43	7.36	13.0	
6/9/21 12:00	21 GSP FILTER 21-1	0.98	1.07	0.00		0.016		7.34	7.28		
6/9/21 12:00	22 GSP FILTER 21-2	0.76	0.95	0.00		0.014		7.32	7.28		
6/9/21 12:00	41 UV Effluent	0.00	0.29	0.00		0.004		7.34	7.29		
6/9/21 12:00	51 GAC Effluent			0.00		0.002		7.21	7.20		
6/10/21 7:50	01 RAW			0.04	0.04	0.146	0.135	6.36	6.50	12.5	
6/10/21 7:50	11 POX	1.15	1.57		0.00		0.124	7.27	7.25	12.6	

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
6/10/21 7:50	21 GSP FILTER 21-1	1.12	1.17	0.00		0.000		7.35	7.31		
6/10/21 7:50	22 GSP FILTER 21-2	0.85	1.02	0.00		0.000		7.33	7.30		
6/10/21 7:50	41 UV Effluent	0.00	0.22	0.00		0.000		7.31	7.30		
6/10/21 7:50	51 GAC Effluent			0.00		0.000		7.24	7.23		
6/10/21 12:30	01 RAW			0.06	0.06	0.147	0.143	6.36	6.36	12.3	
6/10/21 12:30	11 POX	1.54	1.71		0.00		0.124	7.03	7.07		
6/10/21 12:30	21 GSP FILTER 21-1	1.09	1.17	0.00		0.006		7.12	7.11		
6/10/21 12:30	22 GSP FILTER 21-2	0.90	1.02	0.00		0.008		7.14	7.13		
6/10/21 12:30	41 UV Effluent	0.00	0.15	0.00		0.008		7.12	7.13		
6/10/21 12:30	51 GAC Effluent			0.00		0.005					
6/11/21 7:50	01 RAW			0.01	0.01	0.143	0.146	6.34	6.34	12.2	
6/11/21 7:50	11 POX	1.21	1.51		0.00		0.130				
6/11/21 7:50	21 GSP FILTER 21-1	0.98	1.11	0.00		0.004					
6/11/21 7:50	22 GSP FILTER 21-2	0.60	0.88	0.00		0.009					
6/11/21 7:50	41 UV Effluent	0.00	0.30	0.00		0.010					
6/11/21 7:50	51 GAC Effluent			0.00		0.011					
6/11/21 8:45	Shut down GAC filters, turn off UV, shut down GSP filters										
6/11/21 8:55	Backwash F1										
6/11/21 9:05	Backwash F2										
6/11/21 9:20	Start Filters 1 and 2										
6/11/21 9:55	Power on UV										
6/11/21 10:00	Start GAC filters										
6/11/21 11:00	01 RAW			0.08	0.02	0.189	0.143	6.36	6.34	12.3	
6/11/21 11:00	11 POX	1.45	1.60		0.00		0.117	7.09	7.05		
6/11/21 11:00	21 GSP FILTER 21-1	0.98	1.08	0.00		0.006		7.09	7.06		
6/11/21 11:00	22 GSP FILTER 21-2	0.82	0.91	0.00		0.012		7.18	7.09		
6/11/21 11:00	41 UV Effluent	0.00	0.29	0.00		0.009		7.17	7.12		
6/11/21 11:00	51 GAC Effluent			0.00		0.003		7.13	7.11		
6/14/21 8:00	Start High/Low H2O2 Trial										
6/14/21 9:15	01 RAW			0.04	0.04	0.144	0.142				
6/14/21 9:15	11 POX	0.90	1.34		0.02		0.129				
6/14/21 9:15	21 GSP FILTER 21-1	1.10	1.10	0.00		0.009					
6/14/21 9:15	22 GSP FILTER 21-2	0.79	0.78	0.00		0.004					
6/14/21 9:15	41 UV Effluent	0.00	0.07	0.00		0.003					

Date and Time	SAMPLE LOCATION	Cl2(f) (mg/L)	Cl2(t) (mg/L)	Fe(t) (mg/L)	Fe(d) (mg/L)	Mn(t) (mg/L)	Mn(d) (mg/L)	pH (su) #57212	pH (su) #55478	Temp (Ce)	CO2
6/14/21 9:15	51 GAC Effluent			0.00		0.009					
6/14/21 14:15	01 RAW			0.04	0.04	0.147	0.136	6.33	6.33	12.2	
6/14/21 14:15	11 POX	0.57	0.78		0.02		0.129	6.95	6.94		
6/14/21 14:15	21 GSP FILTER 21-1	0.98	1.17	0.00		0.007		7.05	7.02		
6/14/21 14:15	22 GSP FILTER 21-2	0.97	1.04	0.00		0.004		7.05	7.03		
6/14/21 14:15	41 UV Effluent	0.00	0.12	0.00		0.002		7.03	7.02		
6/14/21 14:15	51 GAC Effluent			0.00		0.007		6.96	6.95		
6/14/21 14:45	Switch to UV Ballast Power of 60%, run on Low/Low H2O2 conditions										
6/15/21 7:45	01 RAW			0.05	0.05	0.148	0.150	6.32	6.34	12.2	
6/15/21 7:45	11 POX	0.57	0.96		0.03		0.120	7.10	7.10	12.3	
6/15/21 7:45	21 GSP FILTER 21-1	1.16	1.28	0.00		0.011		7.05	7.03		
6/15/21 7:45	22 GSP FILTER 21-2	0.97	1.14	0.00		0.003		7.01	7.00		
6/15/21 7:45	41 UV Effluent	0.00	0.10	0.00		0.001		6.99	6.99		
6/15/21 7:45	51 GAC Effluent			0.00		0.004		6.88	6.90		
6/15/21 13:20	Shut down, End of Study										

Appendix C – Absolute Resource Associates Laboratory Reports

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56226
Date Received: 3/17/21

Project: BW-STRAIGHTWAY 07202

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 3/29/2021
Total number of pages: 23

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	3/17/2021 10:00	56226-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Field Specified Laboratory Duplicate Field Specified Matrix Spike Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FILTER B	Water	3/17/2021 10:00	56226-002	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FIELD BLANK	Water	3/17/2021 10:00	56226-003	PFAS in Water by EPA 537.1

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW-DISS	Water	3/17/2021 10:00	56226-004	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
FILTER B-DISS	Water	3/17/2021 10:00	56226-005	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-001

Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM		2100638	3/18/21	7:22	SW8260Dmod

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-001

Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	9.3	0.50	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Magnesium	4.0	0.10	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Manganese	0.096	0.010	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Sodium	53	0.10	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Zinc	0.013	0.010	mg/L	1	AGN	3/18/21	13702	3/18/21	19:47	E200.8
Hardness (as CaCO3)	40	3	mg/L	1	AGN	3/18/21	13702	3/19/21		SM2340B

Sample#: 56226-002

Sample ID: FILTER B

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	9.2	0.50	mg/L	1	AGN	3/18/21	13702	3/18/21	20:08	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	3/18/21	13702	3/19/21	15:23	E200.8
Magnesium	4.0	0.10	mg/L	1	AGN	3/18/21	13702	3/18/21	20:08	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	3/18/21	13702	3/19/21	15:23	E200.8
Sodium	78	0.10	mg/L	1	AGN	3/18/21	13702	3/18/21	20:08	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	3/18/21	13702	3/19/21	15:23	E200.8
Hardness (as CaCO3)	39	3	mg/L	1	AGN	3/18/21	13702	3/19/21		SM2340B

Sample#: 56226-004

Sample ID: RAW-DISS

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	AGN	3/18/21	13702	3/25/21	16:18	E200.8
Manganese	0.097	0.010	mg/L	1	AGN	3/18/21	13702	3/18/21	20:15	E200.8

Sample#: 56226-005

Sample ID: FILTER B-DISS

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	AGN	3/18/21	13702	3/19/21	15:38	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	3/18/21	13702	3/19/21	15:38	E200.8

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-001

Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			
		Limit	Units	Factor	Analyst		Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	< 5	5	mg/L	1	SFM	2100700	3/24/21	5:45	SM2320B	
Apparent Color	< 5.0	5.0	CU	1	SFM	2100642	3/18/21	14:29	SM2120B	
Bromide	< 0.1	0.1	mg/L	1	DBV	2100632	3/17/21	17:25	E300.0A	
Chloride	81	0.5	mg/L	1	DBV	2100632	3/17/21	17:25	E300.0A	
Sulfate	15	0.5	mg/L	1	DBV	2100632	3/17/21	17:25	E300.0A	
Total Dissolved Solids (TDS)	200	20	mg/L	1	SFM	2100666	3/19/21	12:45	SM2540C	
True Color	< 5.0	5.0	CU	1		2100643	3/18/21	14:19	SM2120B	
Total Coliform Bacteria	absent			1	DBV	2100641	3/17/21	15:00	SM9223BColilert	
E. coli Bacteria	absent			1	DBV	2100641	3/17/21	15:00	SM9223BColilert	
Conductivity	380	5	umhos/cm	1	SFM	2100705	3/25/21	11:25	SM2510B	
pH	5.5H		pH	1	WAS	2100631	3/17/21	16:12	SM4500H+B	
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	AGN	2100637	3/17/21	15:43	SM2130B	

Sample#: 56226-002

Sample ID: FILTER B

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			
		Limit	Units	Factor	Analyst		Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	54	5	mg/L	1	SFM	2100652	3/19/21	10:30	SM2320B	
Apparent Color	< 5.0	5.0	CU	1	SFM	2100642	3/18/21	14:30	SM2120B	
Chloride	82	0.5	mg/L	1	DBV	2100632	3/17/21	17:41	E300.0A	
Sulfate	13	0.5	mg/L	1	DBV	2100632	3/17/21	17:41	E300.0A	
Total Dissolved Solids (TDS)	230	20	mg/L	1	SFM	2100666	3/19/21	12:45	SM2540C	
True Color	< 5.0	5.0	CU	1		2100643	3/18/21	14:21	SM2120B	
Total Coliform Bacteria	absent			1	DBV	2100641	3/17/21	15:00	SM9223BColilert	
E. coli Bacteria	absent			1	DBV	2100641	3/17/21	15:00	SM9223BColilert	
Conductivity	460	5	umhos/cm	1	SFM	2100705	3/25/21	11:25	SM2510B	
pH	6.4H		pH	1	WAS	2100631	3/17/21	16:18	SM4500H+B	
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	AGN	2100637	3/17/21	15:44	SM2130B	

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-001

Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2100673	3/22/21	14:50	SM5310C

Sample#: 56226-002

Sample ID: FILTER B

Matrix: Water

Sampled: 3/17/21 10:00

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2100673	3/22/21	15:26	SM5310C

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-001

Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorobutane sulfonic acid (PFBS)	6.1	1.8	0.46	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluoroheptanoic acid (PFHPA)	4.9	1.8	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorohexane sulfonic acid (PFHXS)	13	1.8	0.36	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorohexanoic acid (PFHXA)	13	1.8	0.32	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorononanoic acid (PFNA)	2.1	1.8	0.41	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorooctane sulfonic acid (PFOS)	12	1.8	0.36	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorooctanoic acid (PFOA)	12	1.8	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	3/24/21	13719	3/24/21	14:28
Surrogate Recovery		Limits								
13C2-PFHxA SUR	110	70-130		%	1	ACA	3/24/21	13719	3/24/21	14:28
13C2-PFDA SUR	125	70-130		%	1	ACA	3/24/21	13719	3/24/21	14:28
D5-NEtFOSAA SUR	112	70-130		%	1	ACA	3/24/21	13719	3/24/21	14:28
13C3-HFPO-DA SUR	107	70-130		%	1	ACA	3/24/21	13719	3/24/21	14:28

Project ID: BW-STRAIGHTWAY 07202

Job ID: 56226

Sample#: 56226-003

Sample ID: FIELD BLANK

Matrix: Water

Sampled: 3/17/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.27	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.44	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.29	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.35	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.29	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	3/24/21	13719	3/24/21	15:16
Surrogate Recovery		Limits								
13C2-PFHxA SUR	116	70-130		%	1	ACA	3/24/21	13719	3/24/21	15:16
13C2-PFDA SUR	123	70-130		%	1	ACA	3/24/21	13719	3/24/21	15:16
D5-NEtFOSAA SUR	124	70-130		%	1	ACA	3/24/21	13719	3/24/21	15:16
13C3-HFPO-DA SUR	113	70-130		%	1	ACA	3/24/21	13719	3/24/21	15:16

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56226

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

PFAS: Due to a laboratory spiking error, the matrix spike and matrix spike duplicate are missing the results for four PFAS compounds. The recoveries were acceptable in the laboratory control sample.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2100638	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2100638	1,4-dioxane		9.9	ug/L	8	124	70	130	
SW8260Dmod	LCSD2100638	1,4-dioxane		9.2	ug/L	8	115	70	130	7 20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13702	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13702	Calcium	56128-001	17	mg/L				0	20	
		Iron	56128-001	< 0.050	mg/L					20	
		Magnesium	56128-001	4.6	mg/L				0	20	
		Manganese	56128-001	< 0.010	mg/L					20	
		Sodium	56128-001	34	mg/L				0	20	
E200.8	LCS13702	Calcium		2.7	mg/L	2.5	107	85	115		
		Iron		0.55	mg/L	0.5	110	85	115		
		Magnesium		0.50	mg/L	0.5	100	85	115		
		Manganese		0.52	mg/L	0.5	103	85	115		
		Sodium		5.0	mg/L	5	101	85	115		
		Zinc		0.51	mg/L	0.5	102	85	115		
E200.8	LCSD13702	Calcium		2.7	mg/L	2.5	108	85	115	1	20
		Iron		0.54	mg/L	0.5	109	85	115	1	20
		Magnesium		0.51	mg/L	0.5	103	85	115	2	20
		Manganese		0.51	mg/L	0.5	102	85	115	2	20
		Sodium		5.2	mg/L	5	103	85	115	2	20
		Zinc		0.50	mg/L	0.5	101	85	115	2	20
E200.8	MS13702	Calcium	56128-001	13	mg/L	2.5	-132	70	130		
		Iron	56128-001	0.59	mg/L	0.5	117	70	130		
		Magnesium	56128-001	7.6	mg/L	0.5	595	70	130		
		Manganese	56128-001	0.55	mg/L	0.5	110	70	130		
		Sodium	56128-001	39	mg/L	5	80	70	130		
E200.8	MS13702	Calcium	56209-001	19	mg/L	2.5	325	70	130		
		Iron	56209-001	0.52	mg/L	0.5	92	70	130		
		Magnesium	56209-001	5.2	mg/L	0.5	-367	70	130		
		Manganese	56209-001	0.54	mg/L	0.5	102	70	130		
		Sodium	56209-001	39	mg/L	5	109	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2100632	Bromide		<	0.1	mg/L				
		Chloride		<	0.5	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2100632	Chloride	56206-001	46	mg/L				0	10
E300.0A	LCS2100632	Bromide		11	mg/L	10	107	90	110	
		Chloride		97	mg/L	100	97	90	110	
		Sulfate		100	mg/L	100	102	90	110	
E300.0A	LCSD2100632	Bromide		10	mg/L	10	104	90	110	3
		Chloride		97	mg/L	100	97	90	110	0
		Sulfate		100	mg/L	100	103	90	110	1
E300.0A	MS2100632	Chloride	56206-001	56	mg/L	16	54 *	90	110	
SM2120B	DUP2100642	Apparent Color	56210-002	20	CU				0	20
SM2120B	DUP2100642	Apparent Color	56226-002	<	5	CU				20
SM2120B	LCS2100642	Apparent Color		50	CU	50		45	55	
SM2120B	PB2100642	Apparent Color		<	5	CU		5		
SM2130B	DUP2100637	Turbidity	56226-002	<	1.0	NTU				20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	CCVB2100652	Alkalinity, Total (as CaCO3)		6.05	pH			5.94 6.06		
SM2320B	CCVE2100652	Alkalinity, Total (as CaCO3)		4.04	pH			4.94 4.06		
SM2320B	DUP2100652	Alkalinity, Total (as CaCO3)	56229-001	110	mg/L				2	10
SM2320B	LCS2100652	Alkalinity, Total (as CaCO3)		27	mg/L	25	107	90 110		
SM2320B	LCSD2100652	Alkalinity, Total (as CaCO3)		26	mg/L	25	105	90 110	2	10
SM2320B	PB2100652	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2320B	CCVB2100700	Alkalinity, Total (as CaCO3)		6.05	pH			5.94 6.06		
SM2320B	CCVE2100700	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	CCVM2100700	Alkalinity, Total (as CaCO3)		4.04	pH			3.94 4.06		
SM2320B	DUP2100700	Alkalinity, Total (as CaCO3)	56121-008	22	mg/L				1	10
SM2320B	DUP2100700	Alkalinity, Total (as CaCO3)	56228-002	8	mg/L				32	10
SM2320B	LCS2100700	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110		
SM2320B	LCSD2100700	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90 110	0	10
SM2320B	PB2100700	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2100705	Conductivity		<	5	uS/cm				
SM2510B	DUP2100705	Conductivity	56226-002	460	uS/cm				1	20
SM2510B	LCS2100705	Conductivity		1400	uS/cm	1409	101	90 110		
SM2510B	LCSD2100705	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2100666	Total Dissolved Solids (TDS)	56239-001	710	mg/L				2	5
SM2540C	LCS2100666	Total Dissolved Solids (TDS)		86.0	mg/L	99.2	87	75 125		
SM2540C	PB2100666	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2100631	pH	56190-010	7.6	pH					
SM4500H+B	DUP2100631	pH	56190-016	7.5	pH					
SM4500H+B	DUP2100631	pH	56218-001	8.1	pH					
SM4500H+B	DUP2100631	pH	56226-001	5.5	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2100673	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2100673	Total Organic Carbon (TOC)	56226-001	<	1	mg/L				20
SM5310C	LCS2100673	Total Organic Carbon (TOC)		9	mg/L	10	90	85	115	
SM5310C	LCSD2100673	Total Organic Carbon (TOC)		10	mg/L	10	101	85	115	12
SM5310C	MS2100673	Total Organic Carbon (TOC)	56226-002	10	mg/L	10	102	75	125	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		121			%			70 130		
		13C2-PFDA SUR		117			%			70 130		
		D5-NEIFOSAA SUR		125			%			70 130		
		13C3-HFPO-DA SUR		109			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		31	2.0	0.30	ng/L	40	77	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		41	2.0	0.39	ng/L	40	102	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		46	2.0	0.33	ng/L	40	114	70 130		
		perfluorobutane sulfonic acid (PFBS)		31	2.0	0.50	ng/L	35	87	70 130		
		perfluorodecanoic acid (PFDA)		33	2.0	0.34	ng/L	40	81	70 130		
		perfluorododecanoic acid (PFDOA)		35	2.0	0.43	ng/L	40	89	70 130		
		perfluoroheptanoic acid (PFHPA)		33	2.0	0.33	ng/L	40	82	70 130		
		perfluorohexane sulfonic acid (PFHXS)		32	2.0	0.40	ng/L	38	85	70 130		
		perfluorohexanoic acid (PFHXA)		33	2.0	0.35	ng/L	40	82	70 130		
		perfluorononanoic acid (PFNA)		33	2.0	0.45	ng/L	40	82	70 130		
		perfluorooctane sulfonic acid (PFOS)		29	2.0	0.40	ng/L	38	76	70 130		
		perfluorooctanoic acid (PFOA)		32	2.0	0.33	ng/L	40	80	70 130		
		perfluorotetradecanoic acid (PFTEA)		32	2.0	0.50	ng/L	40	80	70 130		
		perfluorotridecanoic acid (PFTRIA)		33	2.0	0.13	ng/L	40	83	70 130		
		perfluoroundecanoic acid (PFUNA)		31	2.0	0.32	ng/L	40	78	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		33	2.0	0.39	ng/L	37	86	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		32	2.0	0.40	ng/L	37	85	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		30	2.0	0.18	ng/L	37	80	70 130		
		13C2-PFHxA SUR		101			%			70 130		
		13C2-PFDA SUR		117			%			70 130		
		D5-NEIFOSAA SUR		111			%			70 130		
		13C3-HFPO-DA SUR		100			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56226-001	3.3	1.8	0.27	ng/L	3.57	92	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56226-001	1.8 U	1.8	0.35	ng/L			50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56226-001	1.8 U	1.8	0.29	ng/L			50 150		
		perfluorobutane sulfonic acid (PFBS)	56226-001	9.0	1.8	0.45	ng/L	3.17	89	50 150		
		perfluorodecanoic acid (PFDA)	56226-001	3.4	1.8	0.30	ng/L	3.57	96	50 150		
		perfluorododecanoic acid (PFDOA)	56226-001	3.1	1.8	0.38	ng/L	3.57	86	50 150		
		perfluoroheptanoic acid (PFHPA)	56226-001	8.5	1.8	0.30	ng/L	3.57	103	50 150		
		perfluorohexane sulfonic acid (PFHXS)	56226-001	16	1.8	0.35	ng/L	3.2	94	50 150		
		perfluorohexanoic acid (PFHXA)	56226-001	17	1.8	0.31	ng/L	3.5	125	50 150		
		perfluorononanoic acid (PFNA)	56226-001	4.8	1.8	0.40	ng/L	3.57	76	50 150		
		perfluorooctane sulfonic acid (PFOS)	56226-001	15	1.8	0.36	ng/L	3.3	83	50 150		
		perfluorooctanoic acid (PFOA)	56226-001	15	1.8	0.30	ng/L	3.5	94	50 150		
		perfluorotetradecanoic acid (PFTEA)	56226-001	1.8 U	1.8	0.44	ng/L			50 150		
		perfluorotridecanoic acid (PFTRIA)	56226-001	1.8 U	1.8	0.12	ng/L			50 150		
		perfluoroundecanoic acid (PFUNA)	56226-001	2.6	1.8	0.29	ng/L	3.57	74	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56226-001	2.6	1.8	0.35	ng/L	3.37	76	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56226-001	2.6	1.8	0.36	ng/L	3.33	79	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56226-001	2.9	1.8	0.16	ng/L	3.37	85	50 150		
		13C2-PFHxA SUR	56226-001	118			%			70 130		
		13C2-PFDA SUR	56226-001	126			%			70 130		
		D5-NEIFOSAA SUR	56226-001	112			%			70 130		
		13C3-HFPO-DA SUR	56226-001	116			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MSD13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56226-001	3.0	1.8	0.27	ng/L	3.59	84	50 150	8	50
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56226-001	U	1.8	0.35	ng/L			50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56226-001	U	1.8	0.29	ng/L			50 150		
		perfluorobutane sulfonic acid (PFBS)	56226-001	8.9	1.8	0.45	ng/L	3.19	86	50 150	1	50
		perfluorodecanoic acid (PFDA)	56226-001	3.3	1.8	0.31	ng/L	3.59	92	50 150	4	50
		perfluorododecanoic acid (PFDOA)	56226-001	3.5	1.8	0.39	ng/L	3.59	97	50 150	12	50
		perfluoroheptanoic acid (PFHPA)	56226-001	8.3	1.8	0.30	ng/L	3.59	96	50 150	3	50
		perfluorohexane sulfonic acid (PFHXS)	56226-001	16	1.8	0.36	ng/L	3.2	93	50 150	0	50
		perfluorohexanoic acid (PFHXA)	56226-001	17	1.8	0.31	ng/L	3.5	119	50 150	1	50
		perfluorononanoic acid (PFNA)	56226-001	5.1	1.8	0.40	ng/L	3.59	86	50 150	8	50
		perfluorooctane sulfonic acid (PFOS)	56226-001	15	1.8	0.36	ng/L	3.3	77	50 150	1	50
		perfluorooctanoic acid (PFOA)	56226-001	15	1.8	0.30	ng/L	3.5	95	50 150	0	50
		perfluorotetradecanoic acid (PFTEA)	56226-001	U	1.8	0.45	ng/L			50 150		
		perfluorotridecanoic acid (PFTRIA)	56226-001	U	1.8	0.12	ng/L			50 150		
		perfluoroundecanoic acid (PFUNA)	56226-001	2.9	1.8	0.29	ng/L	3.59	81	50 150	9	50
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56226-001	2.7	1.8	0.35	ng/L	3.39	80	50 150	5	50
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56226-001	2.7	1.8	0.36	ng/L	3.36	79	50 150	1	50
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56226-001	2.9	1.8	0.16	ng/L	3.39	86	50 150	2	50
		13C2-PFHxA SUR	56226-001	117			%			70 130		
		13C2-PFDA SUR	56226-001	124			%			70 130		
		D5-NEIFOSAA SUR	56226-001	112			%			70 130		
		13C3-HFPO-DA SUR	56226-001	107			%			70 130		

Sample Receipt Condition Report

56226

Absolute Resource Associates

Job Number: _____

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 1 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments: JD HE 3/17/21

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)			
HNO ₃	125mL(P)		250mL(P)	<u>4</u>	500mL(P)					
H ₂ SO ₄	40mL(G)	<u>4</u>	60mL(P)		125mL(P)		250mL(P)		500mL(P)	<u>PH 2.50</u>
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	<u>5</u>						
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	<u>2</u>						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)	<u>2</u>	60mL(P)	<u>4</u>	125mL(P)	<u>6</u>	250mL(P)	<u>2</u>	500mL(P)	<u>2</u>
									1L(G)	1L(P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 _____ Pest608 _____
 Bacteria ResCl ✓ by analyst
 PC Dry applicable? Y (N)

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			Bact. bottles rec but not marked on CoC JD
Analyses marked on COC match bottles received?		✓		
VOC & TOC Water-no headspace?		✓		Raw TOC vials - A has 2 pea sized bubble B has > pea sized bubble filter B - one vial has pea sized bubble
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , o-PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			DOB
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?				
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JD Date/Time: 3/17/21 15:41

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56580
Date Received: 4/14/21

Project: BW-STRAIGHTWAY 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 4/27/2021
Total number of pages: 23

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	4/14/2021 10:00	56580-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FILTER B	Water	4/14/2021 11:00	56580-002	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FILTER B CBW	Water	4/14/2021 9:30	56580-004	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1 Total Suspended Solids by SM2540D

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
FILTER D CBW	Water	4/14/2021 9:30	56580-005	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1
RAW-DISS	Water	4/14/2021 10:00	56580-006	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
FILTER B-DISS	Water	4/14/2021 11:00	56580-007	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-001

Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
1,4-dioxane	0.98	0.25	ug/L	1	LMM		2101049	4/23/21	4:06	SW8260Dmod

Sample#: 56580-004

Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
1,4-dioxane	0.82	0.25	ug/L	1	LMM		2101069	4/23/21	13:58	SW8260Dmod

Sample#: 56580-005

Sample ID: FILTER D CBW

Matrix: Water

Sampled: 4/14/21 9:30

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
1,4-dioxane	0.77	0.25	ug/L	1	LMM		2101069	4/23/21	14:29	SW8260Dmod

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-001

Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	17	0.50	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Iron	0.56	0.050	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Magnesium	4.8	0.10	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Manganese	1.2	0.010	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Sodium	25	0.10	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	4/15/21	13793	4/15/21	17:51	E200.8
Hardness (as CaCO3)	63	3	mg/L	1	AGN	4/15/21	13793	4/16/21		SM2340B

Sample#: 56580-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/14/21 11:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	18	0.50	mg/L	1	AGN	4/15/21	13793	4/15/21	18:05	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	4/15/21	13793	4/15/21	18:05	E200.8
Magnesium	4.8	0.10	mg/L	1	AGN	4/15/21	13793	4/15/21	18:05	E200.8
Manganese	0.062	0.010	mg/L	1	AGN	4/15/21	13793	4/16/21	16:07	E200.8
Sodium	27	0.10	mg/L	1	AGN	4/15/21	13793	4/15/21	18:05	E200.8
Zinc	0.012	0.010	mg/L	1	AGN	4/15/21	13793	4/16/21	16:07	E200.8
Hardness (as CaCO3)	64	3	mg/L	1	AGN	4/15/21	13793	4/16/21		SM2340B

Sample#: 56580-006

Sample ID: RAW-DISS

Matrix: Water

Sampled: 4/14/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	0.49	0.050	mg/L	1	AGN	4/15/21	13793	4/15/21	18:26	E200.8
Manganese	1.2	0.010	mg/L	1	AGN	4/15/21	13793	4/15/21	18:26	E200.8

Sample#: 56580-007

Sample ID: FILTER B-DISS

Matrix: Water

Sampled: 4/14/21 11:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	AGN	4/15/21	13793	4/15/21	18:33	E200.8
Manganese	0.065	0.010	mg/L	1	AGN	4/15/21	13793	4/15/21	18:33	E200.8

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-001

Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			
		Limit	Units	Factor	Analyst		Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	42	5	mg/L	1	SFM	2100957	4/15/21	15:45	SM2320B	
Apparent Color	< 5.0	5.0	CU	1	SFM	2100951	4/15/21	15:44	SM2120B	
Chloride	47	0.5	mg/L	1	DBV	2100984	4/16/21	13:35	E300.0A	
Sulfate	21	0.5	mg/L	1	DBV	2100984	4/16/21	13:35	E300.0A	
Total Dissolved Solids (TDS)	170	20	mg/L	1	SFM	2100969	4/15/21	13:45	SM2540C	
True Color	< 5.0	5.0	CU	1	SFM	2100952	4/15/21	15:44	SM2120B	
Total Coliform Bacteria	absent			1	DBV	2100955	4/14/21	16:40	SM9223BColilert	
E. coli Bacteria	absent			1	DBV	2100955	4/14/21	16:40	SM9223BColilert	
Conductivity	280	5	umhos/cm	1	SFM	2101000	4/20/21	13:40	SM2510B	
pH	6.8H		pH	1	SFM	2100982	4/14/21	16:51	SM4500H+B	
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB	2100947	4/15/21	11:54	SM2130B	

Sample#: 56580-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/14/21 11:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis			
		Limit	Units	Factor	Analyst		Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	42	5	mg/L	1	SFM	2100957	4/15/21	15:45	SM2320B	
Apparent Color	< 5.0	5.0	CU	1	SFM	2100951	4/15/21	15:45	SM2120B	
Chloride	49	0.5	mg/L	1	DBV	2100984	4/16/21	13:52	E300.0A	
Sulfate	21	0.5	mg/L	1	DBV	2100984	4/16/21	13:52	E300.0A	
Total Dissolved Solids (TDS)	170	20	mg/L	1	SFM	2100969	4/15/21	13:45	SM2540C	
True Color	< 5.0	5.0	CU	1	SFM	2100952	4/15/21	15:45	SM2120B	
Total Coliform Bacteria	absent			1	DBV	2100955	4/14/21	16:40	SM9223BColilert	
E. coli Bacteria	absent			1	DBV	2100955	4/14/21	16:40	SM9223BColilert	
Conductivity	290	5	umhos/cm	1	SFM	2101000	4/20/21	13:40	SM2510B	
pH	6.9H		pH	1	SFM	2100982	4/14/21	16:53	SM4500H+B	
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB	2100947	4/15/21	11:56	SM2130B	

Sample#: 56580-004

Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Total Suspended Solids (TSS)	180	89	mg/L	1	SFM	2100988	4/16/21	15:15	SM2540D

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-001

Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			
		Limit	Units	Factor		Date	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2100960	4/15/21	16:08	SM5310C

Sample#: 56580-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/14/21 11:00

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			
		Limit	Units	Factor		Date	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2100960	4/15/21	16:45	SM5310C

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-001

Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	4/15/21	13792	4/15/21	10:33
Surrogate Recovery		Limits								
13C2-PFHxA SUR	102	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:33
13C2-PFDA SUR	102	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:33
D5-NEtFOSAA SUR	86	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:33
13C3-HFPO-DA SUR	113	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:33

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-004

Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.9 U	1.9	0.29	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	0.63 J	1.9	0.37	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	0.56 J	1.9	0.31	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorobutane sulfonic acid (PFBS)	4.4	1.9	0.48	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorodecanoic acid (PFDA)	0.53 J	1.9	0.33	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorododecanoic acid (PFDOA)	0.55 J	1.9	0.41	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluoroheptanoic acid (PFHPA)	5.4	1.9	0.32	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorohexane sulfonic acid (PFHXS)	30	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorohexanoic acid (PFHXA)	11	1.9	0.33	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorononanoic acid (PFNA)	1.8 J	1.9	0.43	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorooctane sulfonic acid (PFOS)	31	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorooctanoic acid (PFOA)	17	1.9	0.32	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorotetradecanoic acid (PFTEA)	1.1 J	1.9	0.47	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluorotridecanoic acid (PFTRIA)	0.83 J	1.9	0.12	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
perfluoroundecanoic acid (PFUNA)	0.33 J	1.9	0.31	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.9 U	1.9	0.37	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.9 U	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.9 U	1.9	0.17	ng/L	1	ACA	4/15/21	13792	4/15/21	10:49
Surrogate Recovery		Limits								
13C2-PFHxA SUR	94	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:49
13C2-PFDA SUR	112	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:49
D5-NEtFOSAA SUR	83	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:49
13C3-HFPO-DA SUR	81	70-130		%	1	ACA	4/15/21	13792	4/15/21	10:49

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56580

Sample#: 56580-005

Sample ID: FILTER D CBW

Matrix: Water

Sampled: 4/14/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.9 U	1.9	0.29	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.9 U	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.9 U	1.9	0.31	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorobutane sulfonic acid (PFBS)	4.0	1.9	0.48	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorodecanoic acid (PFDA)	1.9 U	1.9	0.33	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorododecanoic acid (PFDOA)	1.9 U	1.9	0.41	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluoroheptanoic acid (PFHPA)	5.5	1.9	0.32	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorohexane sulfonic acid (PFHXS)	30	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorohexanoic acid (PFHXA)	12	1.9	0.33	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorononanoic acid (PFNA)	1.9	1.9	0.43	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorooctane sulfonic acid (PFOS)	30	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorooctanoic acid (PFOA)	17	1.9	0.32	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorotetradecanoic acid (PFTEA)	1.9 U	1.9	0.48	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluorotridecanoic acid (PFTRIA)	1.9 U	1.9	0.13	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
perfluoroundecanoic acid (PFUNA)	1.9 U	1.9	0.31	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.9 U	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.9 U	1.9	0.38	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.9 U	1.9	0.18	ng/L	1	ACA	4/15/21	13792	4/15/21	11:05
Surrogate Recovery		Limits								
13C2-PFHxA SUR	104	70-130		%	1	ACA	4/15/21	13792	4/15/21	11:05
13C2-PFDA SUR	117	70-130		%	1	ACA	4/15/21	13792	4/15/21	11:05
D5-NEtFOSAA SUR	87	70-130		%	1	ACA	4/15/21	13792	4/15/21	11:05
13C3-HFPO-DA SUR	106	70-130		%	1	ACA	4/15/21	13792	4/15/21	11:05

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56580

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: Due to a laboratory error, the sample volume for "FIELD BLANK" was spilled prior to extraction. No additional sample volume remains. Minimal impact to the sample results suspected as the results for the sample identified as "RAW" were all below the reporting limit.

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101049	1,4-dioxane		<	0.25	ug/L				
SW8260Dmod	LCS2101049	1,4-dioxane			9.4	ug/L	8	118	70	130
SW8260Dmod	LCSD2101049	1,4-dioxane			9.3	ug/L	8	116	70	130
									1	20
SW8260Dmod	BLK2101069	1,4-dioxane		<	0.25	ug/L				
SW8260Dmod	LCS2101069	1,4-dioxane			7.8	ug/L	8	98	70	130
SW8260Dmod	LCSD2101069	1,4-dioxane			9.2	ug/L	8	115	70	130
									16	20
SW8260Dmod	MS2101069	1,4-dioxane	56665-006		9.7	ug/L	8	107	70	130
SW8260Dmod	MSD2101069	1,4-dioxane	56665-006		9.7	ug/L	8	107	70	130
									0	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13793	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13793	Calcium	56488-001	< 0.50	mg/L					20	
		Iron	56488-001	< 0.050	mg/L					20	
		Magnesium	56488-001	< 0.10	mg/L					20	
		Manganese	56488-001	< 0.010	mg/L					20	
		Sodium	56488-001	42	mg/L				2	20	
E200.8	LCS13793	Calcium		2.6	mg/L	2.5	105	85	115		
		Iron		0.53	mg/L	0.5	105	85	115		
		Magnesium		0.47	mg/L	0.5	95	85	115		
		Manganese		0.51	mg/L	0.5	102	85	115		
		Sodium		4.9	mg/L	5	98	85	115		
		Zinc		0.51	mg/L	0.5	102	85	115		
E200.8	LCSD13793	Calcium		2.7	mg/L	2.5	107	85	115	2	20
		Iron		0.52	mg/L	0.5	104	85	115	1	20
		Magnesium		0.48	mg/L	0.5	96	85	115	2	20
		Manganese		0.50	mg/L	0.5	100	85	115	1	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.50	mg/L	0.5	100	85	115	2	20
E200.8	MS13793	Calcium	56488-001	2.6	mg/L	2.5	102	70	130		
		Iron	56488-001	0.55	mg/L	0.5	110	70	130		
		Magnesium	56488-001	0.47	mg/L	0.5	95	70	130		
		Manganese	56488-001	0.50	mg/L	0.5	99	70	130		
		Sodium	56488-001	47	mg/L	5	98	70	130		
E200.8	MS13793	Calcium	56580-001	20	mg/L	2.5	120	70	130		
		Iron	56580-001	1.1	mg/L	0.5	101	70	130		
		Magnesium	56580-001	5.3	mg/L	0.5	108	70	130		
		Manganese	56580-001	1.7	mg/L	0.5	103	70	130		
		Sodium	56580-001	30	mg/L	5	101	70	130		
		Zinc	56580-001	0.55	mg/L	0.5	110	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2100984	Chloride		<	0.5	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	LCS2100984	Chloride		95	mg/L	100	95	90	110	
		Sulfate		100	mg/L	100	101	90	110	
E300.0A	LCSD2100984	Chloride		92	mg/L	100	92	90	110	3
		Sulfate		98	mg/L	100	98	90	110	4
E300.0A	MS2100984	Sulfate	56604-006	40	mg/L	16	74 *	90	110	
SM2120B	DUP2100951	Apparent Color	56580-002	<	5	CU				20
SM2120B	LCS2100951	Apparent Color		20	CU	20		15	25	
SM2120B	PB2100951	Apparent Color		<	5	CU		5		
SM2120B	BLK2100952	True Color		<	5	CU		5		
SM2120B	DUP2100952	True Color	56580-002	<	5	CU				20
SM2120B	LCS2100952	True Color		20	CU	20		15	25	
SM2130B	DUP2100947	Turbidity	56580-002			NTU				
SM2320B	DUP2100957	Alkalinity, Total (as CaCO3)	56556-002	17	mg/L				3	10
SM2320B	LCS2100957	Alkalinity, Total (as CaCO3)		25	mg/L	25	100	90	110	
SM2320B	PB2100957	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101000	Conductivity		<	5	uS/cm				
SM2510B	DUP2101000	Conductivity	56580-002	300	uS/cm				2	20
SM2510B	LCS2101000	Conductivity		1400	uS/cm	1409	101	90	110	
SM2510B	LCSD2101000	Conductivity		1400	umhos	1409	101	90	110	
SM2540C	DUP2100969	Total Dissolved Solids (TDS)	56580-002	180	mg/L				4	5
SM2540C	LCS2100969	Total Dissolved Solids (TDS)		110	mg/L	99.2	106	75	125	
SM2540C	PB2100969	Total Dissolved Solids (TDS)		<	20	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2540D	DUP2100988	Total Suspended Solids (TSS)	56546-001	30	mg/L				2	5
SM2540D	DUP2100988	Total Suspended Solids (TSS)	56580-004	160	mg/L				11	5
SM2540D	LCS2100988	Total Suspended Solids (TSS)		320	mg/L	323	101	75 125		
SM2540D	PB2100988	Total Suspended Solids (TSS)		< 2.5	mg/L					
SM4500H+B	DUP2100982	pH	56534-001	8.0	pH					
SM4500H+B	DUP2100982	pH	56580-001	6.8	pH					
SM4500H+B	DUP2100982	pH	56582-001	7.9	pH					
SM5310C	BLK2100960	Total Organic Carbon (TOC)		< 1	mg/L					
SM5310C	DUP2100960	Total Organic Carbon (TOC)	56580-001	< 1	mg/L					20
SM5310C	LCS2100960	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2100960	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115	1	20
SM5310C	MS2100960	Total Organic Carbon (TOC)	56580-002	10	mg/L	10	99	75 125		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		96			%			70 130		
		13C2-PFDA SUR		94			%			70 130		
		D5-NEIFOSAA SUR		82			%			70 130		
		13C3-HFPO-DA SUR		103			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56561-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56561-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56561-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56561-001	1.8 U	1.8	0.45	ng/L					30
		perfluorodecanoic acid (PFDA)	56561-001	1.8 U	1.8	0.31	ng/L					30
		perfluorododecanoic acid (PFDOA)	56561-001	1.8 U	1.8	0.39	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56561-001	1.8 U	1.8	0.30	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	56561-001	1.8 U	1.8	0.36	ng/L					30
		perfluorohexanoic acid (PFHXA)	56561-001	1.8 U	1.8	0.31	ng/L					30
		perfluorononanoic acid (PFNA)	56561-001	1.8 U	1.8	0.41	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56561-001	1.8 U	1.8	0.36	ng/L					30
		perfluorooctanoic acid (PFOA)	56561-001	1.8 U	1.8	0.30	ng/L					30
		perfluorotetradecanoic acid (PFTEA)	56561-001	1.8 U	1.8	0.45	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56561-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56561-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56561-001	1.8 U	1.8	0.36	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56561-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56561-001	1.8 U	1.8	0.17	ng/L					30
		13C2-PFHxA SUR	56561-001	96			%			70 130		
		13C2-PFDA SUR	56561-001	99			%			70 130		
		D5-NEIFOSAA SUR	56561-001	77			%			70 130		
		13C3-HFPO-DA SUR	56561-001	111			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		41	2.0	0.30	ng/L	40	103	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		41	2.0	0.39	ng/L	40	102	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		38	2.0	0.33	ng/L	40	96	70 130		
		perfluorobutane sulfonic acid (PFBS)		35	2.0	0.50	ng/L	35	100	70 130		
		perfluorodecanoic acid (PFDA)		40	2.0	0.34	ng/L	40	99	70 130		
		perfluorododecanoic acid (PFDOA)		37	2.0	0.43	ng/L	40	93	70 130		
		perfluoroheptanoic acid (PFHPA)		41	2.0	0.33	ng/L	40	103	70 130		
		perfluorohexane sulfonic acid (PFHXS)		38	2.0	0.40	ng/L	38	99	70 130		
		perfluorohexanoic acid (PFHXA)		38	2.0	0.35	ng/L	40	96	70 130		
		perfluorononanoic acid (PFNA)		37	2.0	0.45	ng/L	40	94	70 130		
		perfluorooctane sulfonic acid (PFOS)		33	2.0	0.40	ng/L	38	87	70 130		
		perfluorooctanoic acid (PFOA)		36	2.0	0.33	ng/L	40	90	70 130		
		perfluorotetradecanoic acid (PFTEA)		34	2.0	0.50	ng/L	40	86	70 130		
		perfluorotridecanoic acid (PFTRIA)		35	2.0	0.13	ng/L	40	88	70 130		
		perfluoroundecanoic acid (PFUNA)		35	2.0	0.32	ng/L	40	86	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		30	2.0	0.39	ng/L	37	80	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		34	2.0	0.40	ng/L	37	90	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		38	2.0	0.18	ng/L	37	101	70 130		
		13C2-PFHxA SUR		92			%			70 130		
		13C2-PFDA SUR		96			%			70 130		
		D5-NEIFOSAA SUR		84			%			70 130		
		13C3-HFPO-DA SUR		97			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56562-001	3.1	1.8	0.27	ng/L	3.54	88	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56562-001	2.9	1.8	0.35	ng/L	3.54	81	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56562-001	3.0	1.8	0.29	ng/L	3.54	84	50 150		
		perfluorobutane sulfonic acid (PFBS)	56562-001	3.2	1.8	0.44	ng/L	3.13	101	50 150		
		perfluorodecanoic acid (PFDA)	56562-001	3.5	1.8	0.30	ng/L	3.54	98	50 150		
		perfluorododecanoic acid (PFDOA)	56562-001	3.0	1.8	0.38	ng/L	3.54	85	50 150		
		perfluoroheptanoic acid (PFHPA)	56562-001	4.3	1.8	0.29	ng/L	3.54	122	50 150		
		perfluorohexane sulfonic acid (PFHXS)	56562-001	3.4	1.8	0.35	ng/L	3.36	99	50 150		
		perfluorohexanoic acid (PFHXA)	56562-001	3.3	1.8	0.31	ng/L	3.54	93	50 150		
		perfluorononanoic acid (PFNA)	56562-001	4.0	1.8	0.40	ng/L	3.54	112	50 150		
		perfluorooctane sulfonic acid (PFOS)	56562-001	3.6	1.8	0.35	ng/L	3.40	106	50 150		
		perfluorooctanoic acid (PFOA)	56562-001	4.5	1.8	0.29	ng/L	3.54	128	50 150		
		perfluorotetradecanoic acid (PFTEA)	56562-001	2.8	1.8	0.44	ng/L	3.54	79	50 150		
		perfluorotridecanoic acid (PFTRIA)	56562-001	2.8	1.8	0.12	ng/L	3.54	78	50 150		
		perfluoroundecanoic acid (PFUNA)	56562-001	2.8	1.8	0.29	ng/L	3.54	80	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56562-001	2.4	1.8	0.35	ng/L	3.35	73	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56562-001	2.8	1.8	0.35	ng/L	3.31	85	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56562-001	3.2	1.8	0.16	ng/L	3.35	97	50 150		
		13C2-PFHxA SUR	56562-001	82			%			70 130		
		13C2-PFDA SUR	56562-001	99			%			70 130		
		D5-NEIFOSAA SUR	56562-001	73			%			70 130		
		13C3-HFPO-DA SUR	56562-001	88			%			70 130		

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CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

56580

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
 Project Name: BW-STRAIGHTWAY
 Company Address: 57 Dresser Hill Rd.
 Project #: 11204
Charlton, MA 01507
 Project Location: NH (MA) ME VT
 Report To: Aaron Davis
 Accreditation Required? N/A
 Phone #: 774 200 8029
 Protocol: RCRA SDWA NPDES
 MCP NHDES DOD
 Reporting QAPP GW-1 S-1
 Invoice to: Erik Grotton
 Limits: EPA DW Other
 Email: egrotton@blueleafwater.com
 PO #: _____
 NH Reimbursement Pricing

Lab Sample ID	Field ID	# CONTAINERS	Matrix	Preservation Method	Sampling	Analysis Request
(Lab Use Only)			WATER SOLID OTHER	HCl HNO ₃ H ₂ SO ₄ NaOH MeOH	DATE TIME SAMPLER	<input type="checkbox"/> VOC 8260 <input type="checkbox"/> VOC 8260 NHDES <input type="checkbox"/> VOC 8260 MADEP <input type="checkbox"/> VOC 624.1 <input type="checkbox"/> VOC BTEX MIBE, only <input type="checkbox"/> VOC 8021VT <input type="checkbox"/> VPH MADEP <input type="checkbox"/> GRO 8015 <input type="checkbox"/> 1,4-Dioxane <input type="checkbox"/> VOC 524.2 <input type="checkbox"/> VOC 524.2 NH List <input type="checkbox"/> Gases-List: <input type="checkbox"/> TPH <input type="checkbox"/> DRO 8015 <input type="checkbox"/> EPH MADEP <input type="checkbox"/> TPH Fingerprint <input type="checkbox"/> 8270PAH <input type="checkbox"/> 8270ABN <input type="checkbox"/> 625.1 <input type="checkbox"/> EDB <input type="checkbox"/> 8082 PCB <input type="checkbox"/> 8081 Pesticides <input type="checkbox"/> 608.3 Pest/PCB <input checked="" type="checkbox"/> PFAS 537.1 <input type="checkbox"/> O&G 1664 <input type="checkbox"/> Mineral O&G 1664 <input checked="" type="checkbox"/> pH <input type="checkbox"/> BOD <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input type="checkbox"/> Alkalinity <input type="checkbox"/> Acidity <input type="checkbox"/> RCRA Metals <input type="checkbox"/> Priority Pollutant Metals <input type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input type="checkbox"/> Ammonia <input type="checkbox"/> COD <input type="checkbox"/> TKN <input type="checkbox"/> TN <input type="checkbox"/> TOC <input type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input type="checkbox"/> Bacteria MPN <input type="checkbox"/> Enterococci <input type="checkbox"/> Cyanide <input type="checkbox"/> Sulfide <input type="checkbox"/> Nitrate + Nitrite <input type="checkbox"/> Ortho P <input type="checkbox"/> Phenols <input type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input type="checkbox"/> Bromide <input type="checkbox"/> Fluoride <input type="checkbox"/> Corrosivity <input type="checkbox"/> Ignitibility/FP <input type="checkbox"/> TCLP Metals <input type="checkbox"/> TCLP VOC <input type="checkbox"/> TCLP SVOC <input type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos
<u>5658001</u>	<u>RAW</u>	<u>16</u>	<u>X</u>		<u>4/14/21</u> <u>10:00</u> <u>AAD</u>	<input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input checked="" type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input checked="" type="checkbox"/> Acidity <input checked="" type="checkbox"/> RCRA Metals <input checked="" type="checkbox"/> Priority Pollutant Metals <input checked="" type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input checked="" type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input checked="" type="checkbox"/> Ammonia <input checked="" type="checkbox"/> COD <input checked="" type="checkbox"/> TKN <input checked="" type="checkbox"/> TN <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input checked="" type="checkbox"/> Bacteria MPN <input checked="" type="checkbox"/> Enterococci <input checked="" type="checkbox"/> Cyanide <input checked="" type="checkbox"/> Sulfide <input checked="" type="checkbox"/> Nitrate + Nitrite <input checked="" type="checkbox"/> Ortho P <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Corrosivity <input checked="" type="checkbox"/> Ignitibility/FP <input checked="" type="checkbox"/> TCLP Metals <input checked="" type="checkbox"/> TCLP VOC <input checked="" type="checkbox"/> TCLP SVOC <input checked="" type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos
<u>02</u>	<u>FILTER B</u>	<u>12</u>	<u>X</u>		<u>11:00</u>	<input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input checked="" type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input checked="" type="checkbox"/> Acidity <input checked="" type="checkbox"/> RCRA Metals <input checked="" type="checkbox"/> Priority Pollutant Metals <input checked="" type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input checked="" type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input checked="" type="checkbox"/> Ammonia <input checked="" type="checkbox"/> COD <input checked="" type="checkbox"/> TKN <input checked="" type="checkbox"/> TN <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input checked="" type="checkbox"/> Bacteria MPN <input checked="" type="checkbox"/> Enterococci <input checked="" type="checkbox"/> Cyanide <input checked="" type="checkbox"/> Sulfide <input checked="" type="checkbox"/> Nitrate + Nitrite <input checked="" type="checkbox"/> Ortho P <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Corrosivity <input checked="" type="checkbox"/> Ignitibility/FP <input checked="" type="checkbox"/> TCLP Metals <input checked="" type="checkbox"/> TCLP VOC <input checked="" type="checkbox"/> TCLP SVOC <input checked="" type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos
<u>03</u>	<u>FIELD BLANK</u>	<u>2</u>	<u>X</u>		<u>11:20</u>	<input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input checked="" type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input checked="" type="checkbox"/> Acidity <input checked="" type="checkbox"/> RCRA Metals <input checked="" type="checkbox"/> Priority Pollutant Metals <input checked="" type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input checked="" type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input checked="" type="checkbox"/> Ammonia <input checked="" type="checkbox"/> COD <input checked="" type="checkbox"/> TKN <input checked="" type="checkbox"/> TN <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input checked="" type="checkbox"/> Bacteria MPN <input checked="" type="checkbox"/> Enterococci <input checked="" type="checkbox"/> Cyanide <input checked="" type="checkbox"/> Sulfide <input checked="" type="checkbox"/> Nitrate + Nitrite <input checked="" type="checkbox"/> Ortho P <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Corrosivity <input checked="" type="checkbox"/> Ignitibility/FP <input checked="" type="checkbox"/> TCLP Metals <input checked="" type="checkbox"/> TCLP VOC <input checked="" type="checkbox"/> TCLP SVOC <input checked="" type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos
<u>04</u>	<u>FILTER B CBW</u>	<u>5</u>	<u>X</u>		<u>9:30</u>	<input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input checked="" type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input checked="" type="checkbox"/> Acidity <input checked="" type="checkbox"/> RCRA Metals <input checked="" type="checkbox"/> Priority Pollutant Metals <input checked="" type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input checked="" type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input checked="" type="checkbox"/> Ammonia <input checked="" type="checkbox"/> COD <input checked="" type="checkbox"/> TKN <input checked="" type="checkbox"/> TN <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input checked="" type="checkbox"/> Bacteria MPN <input checked="" type="checkbox"/> Enterococci <input checked="" type="checkbox"/> Cyanide <input checked="" type="checkbox"/> Sulfide <input checked="" type="checkbox"/> Nitrate + Nitrite <input checked="" type="checkbox"/> Ortho P <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Corrosivity <input checked="" type="checkbox"/> Ignitibility/FP <input checked="" type="checkbox"/> TCLP Metals <input checked="" type="checkbox"/> TCLP VOC <input checked="" type="checkbox"/> TCLP SVOC <input checked="" type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos
<u>05</u>	<u>FILTER D CBW</u>	<u>4</u>	<u>X</u>		<u>9:30</u>	<input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> Conductivity <input checked="" type="checkbox"/> Turbidity <input checked="" type="checkbox"/> Apparent Color <input checked="" type="checkbox"/> True Color <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> TDS <input checked="" type="checkbox"/> TS <input checked="" type="checkbox"/> TVS <input checked="" type="checkbox"/> Alkalinity <input checked="" type="checkbox"/> Acidity <input checked="" type="checkbox"/> RCRA Metals <input checked="" type="checkbox"/> Priority Pollutant Metals <input checked="" type="checkbox"/> TAL Metals <input checked="" type="checkbox"/> Hardness <input checked="" type="checkbox"/> Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u> <input checked="" type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u> <input checked="" type="checkbox"/> Ammonia <input checked="" type="checkbox"/> COD <input checked="" type="checkbox"/> TKN <input checked="" type="checkbox"/> TN <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Ferrous Iron <input checked="" type="checkbox"/> Bacteria P/A <input checked="" type="checkbox"/> Bacteria MPN <input checked="" type="checkbox"/> Enterococci <input checked="" type="checkbox"/> Cyanide <input checked="" type="checkbox"/> Sulfide <input checked="" type="checkbox"/> Nitrate + Nitrite <input checked="" type="checkbox"/> Ortho P <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> Nitrate <input checked="" type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Chloride <input checked="" type="checkbox"/> Sulfate <input checked="" type="checkbox"/> Bromide <input checked="" type="checkbox"/> Fluoride <input checked="" type="checkbox"/> Corrosivity <input checked="" type="checkbox"/> Ignitibility/FP <input checked="" type="checkbox"/> TCLP Metals <input checked="" type="checkbox"/> TCLP VOC <input checked="" type="checkbox"/> TCLP SVOC <input checked="" type="checkbox"/> TCLP Pesticide Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos

diss
06
07

TSS

Upper bottles
80 order & AAD

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
 TEMPERATURE 1.2 °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler:		Date	Time	Received by:	Date	Time
	<u>[Signature]</u>		<u>4/14/21</u>	<u>14:15</u>	<u>[Signature]</u>	<u>4/14/21</u>	<u>14:15</u>
	Relinquished by:		Date	Time	Received by:	Date	Time
<u>[Signature]</u>		<u>4/14/21</u>	<u>15:40</u>	<u>[Signature]</u>			
Relinquished by:		Date	Time	Received by Laboratory:	Date	Time	
<u>[Signature]</u>				<u>[Signature]</u>	<u>4-14-21</u>	<u>15:46</u>	

Sample Receipt Condition Report

56580

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 1 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:						
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)						
HNO ₃	125mL(P)		250mL(P)	4	500mL(P)								
H ₂ SO ₄	40mL(G)	4	60mL(P)		125mL(P)		250mL(P)		500mL(P)				
NaOH	125mL(P)		250mL(P)										
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)								
ZnAc-NaOH	125mL(P)		250mL(P)										
Trizma	125mL(P)		250mL(P)	7									
NH ₄ Ac	125mL(P)		250mL(P)										
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	2									
MeOH	20mL(G)		40mL(G)										
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe						
None (water)	40ml (G)	64	60mL(P)	4	125mL(P)	G	250mL(P)	2	500mL(P)	2	1L(G)	1L(P)	1
JOHE 4/14/21													
Mold	Cassette		Bulk		Plate		Tape Lift						
Asbestos	Cassette		Bulk										
Lead	Cassette		Bulk		Wipe								

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 Pest608
 Bacteria ResCl ✓ by analyst

PC Dry applicable? Y N

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , NH ₄ , BOD, Coliform/E. coli (P) or MPN, Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			SFM, EB, AN, DBV
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?				
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	(Or must be rejected)
Log-in Supervisor notified immediately of following items:	✓			Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JO

Date/Time: 4/14/21 16:40

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56700
Date Received: 4/22/21

Project: BW-STRAIGHTWAY 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 4/28/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Filter D CBW	Water	4/19/2021 9:30	56700-001	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56700

Sample#: 56700-001

Sample ID: Filter D CBW

Matrix: Water

Sampled: 4/19/21 9:30

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.74	0.25	ug/L	1	LMM		2101069	4/23/21	15:01	SW8260Dmod

Project ID: BW-STRAIGHTWAY 11204

Job ID: 56700

Sample#: 56700-001

Sample ID: Filter D CBW

Matrix: Water

Sampled: 4/19/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	2.0 U	2.0	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	2.0 U	2.0	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	2.0 U	2.0	0.32	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorobutane sulfonic acid (PFBS)	4.1	2.0	0.49	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorodecanoic acid (PFDA)	0.36 J	2.0	0.34	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorododecanoic acid (PFDOA)	2.0 U	2.0	0.42	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluoroheptanoic acid (PFHPA)	5.0	2.0	0.33	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorohexane sulfonic acid (PFHXS)	30	2.0	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorohexanoic acid (PFHXA)	10.0	2.0	0.34	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorononanoic acid (PFNA)	1.4 J	2.0	0.44	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorooctane sulfonic acid (PFOS)	26	2.0	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorooctanoic acid (PFOA)	17	2.0	0.33	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorotetradecanoic acid (PFTEA)	2.0 U	2.0	0.49	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluorotridecanoic acid (PFTRIA)	2.0 U	2.0	0.13	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
perfluoroundecanoic acid (PFUNA)	2.0 U	2.0	0.32	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	2.0 U	2.0	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	2.0 U	2.0	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	2.0 U	2.0	0.18	ng/L	1	WAS	4/26/21	13816	4/26/21	14:52
Surrogate Recovery		Limits								
13C2-PFHxA SUR	89	70-130	%	1	WAS	4/26/21	13816	4/26/21	14:52	
13C2-PFDA SUR	116	70-130	%	1	WAS	4/26/21	13816	4/26/21	14:52	
D5-NEtFOSAA SUR	77	70-130	%	1	WAS	4/26/21	13816	4/26/21	14:52	
13C3-HFPO-DA SUR	92	70-130	%	1	WAS	4/26/21	13816	4/26/21	14:52	

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56700

Sample Receiving and Chain of Custody Discrepancies

Samples were received at 10 degrees C, sample analysis continued at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101069	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101069	1,4-dioxane		7.8	ug/L	8	98	70 130		
SW8260Dmod	LCSD2101069	1,4-dioxane		9.2	ug/L	8	115	70 130	16	20
SW8260Dmod	MS2101069	1,4-dioxane	56665-006	9.7	ug/L	8	107	70 130		
SW8260Dmod	MSD2101069	1,4-dioxane	56665-006	9.7	ug/L	8	107	70 130	0	20

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		85			%			70 130		
		13C2-PFDA SUR		91			%			70 130		
		D5-NEIFOSAA SUR		88			%			70 130		
		13C3-HFPO-DA SUR		97			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56659-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56659-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56659-001	0.38 J	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56659-001	1.8 U	1.8	0.44	ng/L					30
		perfluorodecanoic acid (PFDA)	56659-001	0.38 J	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	56659-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56659-001	1.8 U	1.8	0.29	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		perfluorohexanoic acid (PFHXA)	56659-001	1.8 U	1.8	0.31	ng/L					30
		perfluorononanoic acid (PFNA)	56659-001	1.8 U	1.8	0.40	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		perfluorooctanoic acid (PFOA)	56659-001	1.8 U	1.8	0.29	ng/L					30
		perfluorotetradecanoic acid (PFTEA)	56659-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56659-001	0.26 J	1.8	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56659-001	0.46 J	1.8	0.29	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56659-001	0.23 J	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	56659-001	102			%			70 130		
		13C2-PFDA SUR	56659-001	103			%			70 130		
		D5-NEIFOSAA SUR	56659-001	82			%			70 130		
		13C3-HFPO-DA SUR	56659-001	97			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		230	2.0	0.30	ng/L	200	115	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		200	2.0	0.39	ng/L	200	101	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	109	70 130		
		perfluorobutane sulfonic acid (PFBS)		180	2.0	0.50	ng/L	177	103	70 130		
		perfluorodecanoic acid (PFDA)		210	2.0	0.34	ng/L	200	103	70 130		
		perfluorododecanoic acid (PFDOA)		240	2.0	0.43	ng/L	200	118	70 130		
		perfluoroheptanoic acid (PFHPA)		200	2.0	0.33	ng/L	200	100	70 130		
		perfluorohexane sulfonic acid (PFHXS)		190	2.0	0.40	ng/L	190	99	70 130		
		perfluorohexanoic acid (PFHXA)		210	2.0	0.35	ng/L	200	103	70 130		
		perfluorononanoic acid (PFNA)		210	2.0	0.45	ng/L	200	105	70 130		
		perfluorooctane sulfonic acid (PFOS)		170	2.0	0.40	ng/L	192	91	70 130		
		perfluorooctanoic acid (PFOA)		210	2.0	0.33	ng/L	200	107	70 130		
		perfluorotetradecanoic acid (PFTEA)		210	2.0	0.50	ng/L	200	103	70 130		
		perfluorotridecanoic acid (PFTRIA)		210	2.0	0.13	ng/L	200	107	70 130		
		perfluoroundecanoic acid (PFUNA)		210	2.0	0.32	ng/L	200	104	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	93	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	98	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		190	2.0	0.18	ng/L	189	98	70 130		
		13C2-PFHxA SUR		97			%			70 130		
		13C2-PFDA SUR		100			%			70 130		
		D5-NEIFOSAA SUR		78			%			70 130		
		13C3-HFPO-DA SUR		107			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56563-001	31	1.7	0.26	ng/L	34	90	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56563-001	33	1.7	0.34	ng/L	34	95	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56563-001	34	1.7	0.28	ng/L	34	98	70 130		
		perfluorobutane sulfonic acid (PFBS)	56563-001	27	1.7	0.43	ng/L	30	88	70 130		
		perfluorodecanoic acid (PFDA)	56563-001	34	1.7	0.30	ng/L	34	97	70 130		
		perfluorododecanoic acid (PFDOA)	56563-001	28	1.7	0.37	ng/L	34	82	70 130		
		perfluoroheptanoic acid (PFHPA)	56563-001	39	1.7	0.29	ng/L	34	113	70 130		
		perfluorohexane sulfonic acid (PFHXS)	56563-001	32	1.7	0.34	ng/L	34	93	70 130		
		perfluorohexanoic acid (PFHXA)	56563-001	31	1.7	0.30	ng/L	34	89	70 130		
		perfluorononanoic acid (PFNA)	56563-001	34	1.7	0.39	ng/L	34	97	70 130		
		perfluorooctane sulfonic acid (PFOS)	56563-001	29	1.7	0.35	ng/L	34	85	70 130		
		perfluorooctanoic acid (PFOA)	56563-001	37	1.7	0.29	ng/L	34	106	70 130		
		perfluorotetradecanoic acid (PFTEA)	56563-001	27	1.7	0.43	ng/L	34	78	70 130		
		perfluorotridecanoic acid (PFTRIA)	56563-001	29	1.7	0.11	ng/L	34	84	70 130		
		perfluoroundecanoic acid (PFUNA)	56563-001	31	1.7	0.28	ng/L	34	89	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56563-001	27	1.7	0.34	ng/L	32	81	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56563-001	29	1.7	0.35	ng/L	32	90	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56563-001	33	1.7	0.16	ng/L	32	100	70 130		
		13C2-PFHxA SUR	56563-001	86			%			70 130		
		13C2-PFDA SUR	56563-001	93			%			70 130		
		D5-NEIFOSAA SUR	56563-001	78			%			70 130		
		13C3-HFPO-DA SUR	56563-001	87			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

56700

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
Company Address: 57 Dresser Hill Rd.
Charlton, MA 01507
Report To: Aaron Davis
Phone #: 774 200 8029
Invoice to: Erik Grotton
Email: egrotton@blueleafwater.com
PO #:

Project Name: 13th STRAIGHTWAY
Project #: 11204
Project Location: NH (MA) ME VT _____
Accreditation Required? NY
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting Limits: QAPP GW-1 S-1
EPA DW Other
Quote # _____
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input checked="" type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT <u>1,4-Diox</u>
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> pH
<input type="checkbox"/> BOD	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals
<input type="checkbox"/> Total Metals-list:	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia
<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP VOC
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide
<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides
<input type="checkbox"/> Asbestos		

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME
56700	Filter D CBW4	4	X							4/19	9:30	AD

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 10 °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler: <u>[Signature]</u>	Date: <u>4/22</u> Time: <u>1405</u>	Received by: <u>[Signature]</u>	Date: <u>4/22/21</u> Time: <u>1405</u>
	Relinquished by: <u>[Signature]</u>	Date: <u>4/22/21</u> Time: <u>1551</u>	Received by:	Date: _____ Time: _____
	Relinquished by: _____	Date: _____ Time: _____	Received by Laboratory: <u>[Signature]</u>	Date: <u>4/22/21</u> Time: <u>1551</u>

Sample Receipt Condition Report

56700

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 10 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	Z 250mL(P)	500mL(P)	1L(G)			
HNO ₃	125mL(P)	250mL(P)	500mL(P)				
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)				
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL (P) 2					*pH ✓ by analyst: VOC, PFAS, TOC, O&G
NH ₄ Ac	125mL(P)	250mL (P)					Residual Cl not present:
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					ABN625 _____ Pest608 _____
MeOH	20mL(G)	40mL(G)					Bacteria ResCl ✓ by analyst
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe			PC Dry applicable? Y N
None (water)	40ml (G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)	1L(G)	1L (P)
Mold	Cassette	Bulk	Plate	Tape Lift			
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk	Wipe				

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?			X	
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?			X	
PFAS: Lab specific bottles? QC received, if required?	X			
Bacteria bottles provided by ARA?			X	
Samples within holding time?	X			
Immediate tests communicated in writing: NO ₃ , NO ₂ , O-PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624			X	
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?			X	
Pesticides EPA 608 pH5-9?			X	
Compliance samples have no discrepancies/require no flags?			X	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			X	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests. <i>received above</i>

 Inspected and Received By: SPM

 Date/Time: 4/23/21 10:27 °C

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56696
Date Received: 4/22/21

Project: BW-Simmons 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/6/2021
Total number of pages: 22

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	4/22/2021 9:30	56696-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FILTER B	Water	4/22/2021 10:00	56696-002	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
FIELD BLANK	Water	4/22/2021 10:00	56696-003	PFAS in Water by EPA 537.1
RAW-DISS	Water	4/22/2021 9:30	56696-004	Dissolved Prep for ICPMS Analysis Iron in water by 200.8 Manganese in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
FILTER B-DISS	Water	4/22/2021 10:00	56696-005	Dissolved Prep for ICPMS Analysis Iron in water by 200.8 Manganese in water by 200.8

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-001

Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.40	0.25	ug/L	1	LMM		2101069	4/23/21	13:26	SW8260Dmod

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-001

Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	21	0.50	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Magnesium	5.8	0.10	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Manganese	0.14	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Sodium	47	0.10	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	19:47	E200.8
Hardness (as CaCO3)	75	3	mg/L	1	AGN	4/27/21	13825	4/28/21		SM2340B

Sample#: 56696-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/22/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	21	0.50	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Magnesium	5.6	0.10	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Sodium	51	0.10	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	19:55	E200.8
Hardness (as CaCO3)	74	3	mg/L	1	AGN	4/27/21	13825	4/28/21		SM2340B

Sample#: 56696-004

Sample ID: RAW-DISS

Matrix: Water

Sampled: 4/22/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	AGN	4/27/21	13825	4/27/21	18:58	E200.8
Manganese	0.14	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	18:58	E200.8

Sample#: 56696-005

Sample ID: FILTER B-DISS

Matrix: Water

Sampled: 4/22/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	AGN	4/27/21	13825	4/27/21	19:19	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN	4/27/21	13825	4/27/21	19:19	E200.8

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-001

Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Alkalinity, Total (as CaCO3)	42	5	mg/L	1	SFM	2101073	4/26/21	12:45	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101053	4/23/21	14:20	SM2120B
Chloride	83	0.5	mg/L	1	DBV	2101048	4/22/21	18:48	E300.0A
Sulfate	22M	0.5	mg/L	1	DBV	2101048	4/22/21	18:48	E300.0A
M = The recovery for the matrix spike was 78%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.									
Total Dissolved Solids (TDS)	250	20	mg/L	1	SFM	2101087	4/26/21	15:45	SM2540C
True Color	< 5.0	5.0	CU	1	SFM	2101054	4/23/21	14:20	SM2120B
Total Coliform Bacteria	absent			1	DBV	2101061	4/22/21	16:15	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101061	4/22/21	16:15	SM9223BColilert
Conductivity	420	5	umhos/cm	1	SFM	2101051	4/23/21	12:20	SM2510B
pH	6.6H		pH	1	SFM	2101060	4/22/21	16:49	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	DJM	2101052	4/23/21	13:04	SM2130B

Sample#: 56696-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/22/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Alkalinity, Total (as CaCO3)	50	5	mg/L	1	SFM	2101073	4/26/21	12:45	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM	2101053	4/23/21	14:21	SM2120B
Chloride	83	0.5	mg/L	1	DBV	2101048	4/22/21	19:21	E300.0A
Sulfate	22	0.5	mg/L	1	DBV	2101048	4/22/21	19:21	E300.0A
Total Dissolved Solids (TDS)	260	20	mg/L	1	SFM	2101087	4/26/21	15:45	SM2540C
True Color	< 5.0	5.0	CU	1	SFM	2101054	4/23/21	14:21	SM2120B
Total Coliform Bacteria	absent			1	DBV	2101061	4/22/21	16:15	SM9223BColilert
E. coli Bacteria	absent			1	DBV	2101061	4/22/21	16:15	SM9223BColilert
Conductivity	450	5	umhos/cm	1	SFM	2101051	4/23/21	12:20	SM2510B
pH	7.1H		pH	1	SFM	2101060	4/22/21	17:01	SM4500H+B
H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	DJM	2101052	4/23/21	13:06	SM2130B

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-001

Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101189	5/4/21	14:33	SM5310C

Note: The results were obtained from a vial with headspace.

Sample#: 56696-002

Sample ID: FILTER B

Matrix: Water

Sampled: 4/22/21 10:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101110	4/28/21	16:05	SM5310C

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-001

Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorobutane sulfonic acid (PFBS)	5.0	1.8	0.45	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorodecanoic acid (PFDA)	0.40 J	1.8	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluoroheptanoic acid (PFHPA)	5.1	1.8	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorohexane sulfonic acid (PFHXS)	30	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorohexanoic acid (PFHXA)	11	1.8	0.31	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorononanoic acid (PFNA)	1.8	1.8	0.40	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorooctane sulfonic acid (PFOS)	30	1.8	0.36	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorooctanoic acid (PFOA)	13	1.8	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	WAS	4/26/21	13816	4/26/21	14:20
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:20
13C2-PFDA SUR	97	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:20
D5-NEtFOSAA SUR	83	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:20
13C3-HFPO-DA SUR	92	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:20

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-Simmons 11204

Job ID: 56696

Sample#: 56696-003

Sample ID: FIELD BLANK

Matrix: Water

Sampled: 4/22/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.34	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.44	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.29	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.30	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.39	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.29	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.11	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.28	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.34	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.35	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	WAS	4/26/21	13816	4/26/21	14:36
Surrogate Recovery		Limits								
13C2-PFHxA SUR	99	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:36
13C2-PFDA SUR	98	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:36
D5-NEtFOSAA SUR	84	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:36
13C3-HFPO-DA SUR	97	70-130		%	1	WAS	4/26/21	13816	4/26/21	14:36

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56696

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

TDS: Total Dissolved Solids were detected in the PB2101087 at 25mg/L. There is no impact to the data as the concentrations detected in the associated field samples were greater than ten times the blank contamination.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 56696-001 did not meet the acceptance criteria for Sulfate. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101069	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101069	1,4-dioxane		7.8	ug/L	8	98	70 130		
SW8260Dmod	LCSD2101069	1,4-dioxane		9.2	ug/L	8	115	70 130	16	20
SW8260Dmod	MS2101069	1,4-dioxane	56665-006	9.7	ug/L	8	107	70 130		
SW8260Dmod	MSD2101069	1,4-dioxane	56665-006	9.7	ug/L	8	107	70 130	0	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13825	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13825	Iron	56696-004	< 0.050	mg/L					20	
		Manganese	56696-004	0.14	mg/L				0	20	
E200.8	LCS13825	Calcium		2.7	mg/L	2.5	107	85	115		
		Iron		0.53	mg/L	0.5	106	85	115		
		Magnesium		0.48	mg/L	0.5	97	85	115		
		Manganese		0.50	mg/L	0.5	101	85	115		
		Sodium		4.9	mg/L	5	98	85	115		
		Zinc		0.50	mg/L	0.5	99	85	115		
E200.8	LCSD13825	Calcium		2.7	mg/L	2.5	110	85	115	3	20
		Iron		0.54	mg/L	0.5	109	85	115	2	20
		Magnesium		0.49	mg/L	0.5	98	85	115	1	20
		Manganese		0.52	mg/L	0.5	104	85	115	3	20
		Sodium		4.9	mg/L	5	98	85	115	1	20
		Zinc		0.51	mg/L	0.5	103	85	115	4	20
E200.8	MS13825	Iron	56696-004	0.53	mg/L	0.5	106	70	130		
		Manganese	56696-004	0.65	mg/L	0.5	102	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101048	Chloride		<	0.5	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101048	Chloride	56621-001	100	mg/L				1	10
E300.0A	LCS2101048	Chloride		95	mg/L	100	95	90	110	
		Sulfate		100	mg/L	100	100	90	110	
E300.0A	LCSD2101048	Chloride		93	mg/L	100	93	90	110	2
		Sulfate		99	mg/L	100	99	90	110	2
E300.0A	MS2101048	Chloride	56621-001	170	mg/L	83.3	79 *	90	110	
E300.0A	MS2101048	Chloride	56696-001	85	mg/L	16	12	90	110	
		Sulfate	56696-001	35	mg/L	16	78 *	90	110	
SM2120B	DUP2101053	Apparent Color	56696-002	<	5	CU				20
SM2120B	LCS2101053	Apparent Color		35	CU	35		30	40	
SM2120B	PB2101053	Apparent Color		<	5	CU		5		
SM2120B	DUP2101054	True Color	56696-002	<	5	CU				20
SM2130B	DUP2101052	Turbidity	56696-001	<	1.0	NTU				
SM2320B	DUP2101073	Alkalinity, Total (as CaCO3)	56716-002	<	5	mg/L				10
SM2320B	LCS2101073	Alkalinity, Total (as CaCO3)		26	mg/L	25	104	90	110	
SM2320B	LCSD2101073	Alkalinity, Total (as CaCO3)		27	mg/L	25	106	90	110	2
SM2320B	PB2101073	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101051	Conductivity		<	5	uS/cm				
SM2510B	DUP2101051	Conductivity	56696-002	450	uS/cm				1	20
SM2510B	LCS2101051	Conductivity		1400	uS/cm	1409	100	90	110	
SM2510B	LCSD2101051	Conductivity		1400	uS/cm	1409	100	90	110	20
SM2540C	DUP2101087	Total Dissolved Solids (TDS)	56696-002	260	mg/L				2	5
SM2540C	LCS2101087	Total Dissolved Solids (TDS)		110	mg/L	99.2	116	75	125	
SM2540C	PB2101087	Total Dissolved Solids (TDS)		25	mg/L				*	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM4500H+B	DUP2101060	pH	56621-001	8.2	pH					
SM4500H+B	DUP2101060	pH	56666-001	6.8	pH					
SM4500H+B	DUP2101060	pH	56683-001	7.5	pH					
SM5310C	BLK2101110	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	LCS2101110	Total Organic Carbon (TOC)		10	mg/L	10	102	85	115	
SM5310C	LCSD2101110	Total Organic Carbon (TOC)		11	mg/L	10	106	85	115	4
SM5310C	MS2101110	Total Organic Carbon (TOC)	56696-002	10	mg/L	10	103	75	125	
SM5310C	BLK2101189	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	<	1	mg/L				20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85	115	
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85	115	2
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75	125	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		85			%			70 130		
		13C2-PFDA SUR		91			%			70 130		
		D5-NEIFOSAA SUR		88			%			70 130		
		13C3-HFPO-DA SUR		97			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56659-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56659-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56659-001	0.38 J	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56659-001	1.8 U	1.8	0.44	ng/L					30
		perfluorodecanoic acid (PFDA)	56659-001	0.38 J	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	56659-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56659-001	1.8 U	1.8	0.29	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		perfluorohexanoic acid (PFHXA)	56659-001	1.8 U	1.8	0.31	ng/L					30
		perfluorononanoic acid (PFNA)	56659-001	1.8 U	1.8	0.40	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		perfluorooctanoic acid (PFOA)	56659-001	1.8 U	1.8	0.29	ng/L					30
		perfluorotetradecanoic acid (PFTEA)	56659-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56659-001	0.26 J	1.8	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56659-001	0.46 J	1.8	0.29	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56659-001	1.8 U	1.8	0.35	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56659-001	0.23 J	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	56659-001	102			%			70 130		
		13C2-PFDA SUR	56659-001	103			%			70 130		
		D5-NEIFOSAA SUR	56659-001	82			%			70 130		
		13C3-HFPO-DA SUR	56659-001	97			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		230	2.0	0.30	ng/L	200	115	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		200	2.0	0.39	ng/L	200	101	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	109	70 130		
		perfluorobutane sulfonic acid (PFBS)		180	2.0	0.50	ng/L	177	103	70 130		
		perfluorodecanoic acid (PFDA)		210	2.0	0.34	ng/L	200	103	70 130		
		perfluorododecanoic acid (PFDOA)		240	2.0	0.43	ng/L	200	118	70 130		
		perfluoroheptanoic acid (PFHPA)		200	2.0	0.33	ng/L	200	100	70 130		
		perfluorohexane sulfonic acid (PFHXS)		190	2.0	0.40	ng/L	190	99	70 130		
		perfluorohexanoic acid (PFHXA)		210	2.0	0.35	ng/L	200	103	70 130		
		perfluorononanoic acid (PFNA)		210	2.0	0.45	ng/L	200	105	70 130		
		perfluorooctane sulfonic acid (PFOS)		170	2.0	0.40	ng/L	192	91	70 130		
		perfluorooctanoic acid (PFOA)		210	2.0	0.33	ng/L	200	107	70 130		
		perfluorotetradecanoic acid (PFTEA)		210	2.0	0.50	ng/L	200	103	70 130		
		perfluorotridecanoic acid (PFTRIA)		210	2.0	0.13	ng/L	200	107	70 130		
		perfluoroundecanoic acid (PFUNA)		210	2.0	0.32	ng/L	200	104	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	93	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	98	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		190	2.0	0.18	ng/L	189	98	70 130		
		13C2-PFHxA SUR		97			%			70 130		
		13C2-PFDA SUR		100			%			70 130		
		D5-NEIFOSAA SUR		78			%			70 130		
		13C3-HFPO-DA SUR		107			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56563-001	31	1.7	0.26	ng/L	34	90	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56563-001	33	1.7	0.34	ng/L	34	95	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56563-001	34	1.7	0.28	ng/L	34	98	70 130		
		perfluorobutane sulfonic acid (PFBS)	56563-001	27	1.7	0.43	ng/L	30	88	70 130		
		perfluorodecanoic acid (PFDA)	56563-001	34	1.7	0.30	ng/L	34	97	70 130		
		perfluorododecanoic acid (PFDOA)	56563-001	28	1.7	0.37	ng/L	34	82	70 130		
		perfluoroheptanoic acid (PFHPA)	56563-001	39	1.7	0.29	ng/L	34	113	70 130		
		perfluorohexane sulfonic acid (PFHXS)	56563-001	32	1.7	0.34	ng/L	34	93	70 130		
		perfluorohexanoic acid (PFHXA)	56563-001	31	1.7	0.30	ng/L	34	89	70 130		
		perfluorononanoic acid (PFNA)	56563-001	34	1.7	0.39	ng/L	34	97	70 130		
		perfluorooctane sulfonic acid (PFOS)	56563-001	29	1.7	0.35	ng/L	34	85	70 130		
		perfluorooctanoic acid (PFOA)	56563-001	37	1.7	0.29	ng/L	34	106	70 130		
		perfluorotetradecanoic acid (PFTEA)	56563-001	27	1.7	0.43	ng/L	34	78	70 130		
		perfluorotridecanoic acid (PFTRIA)	56563-001	29	1.7	0.11	ng/L	34	84	70 130		
		perfluoroundecanoic acid (PFUNA)	56563-001	31	1.7	0.28	ng/L	34	89	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56563-001	27	1.7	0.34	ng/L	32	81	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56563-001	29	1.7	0.35	ng/L	32	90	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56563-001	33	1.7	0.16	ng/L	32	100	70 130		
		13C2-PFHxA SUR	56563-001	86			%			70 130		
		13C2-PFDA SUR	56563-001	93			%			70 130		
		D5-NEIFOSAA SUR	56563-001	78			%			70 130		
		13C3-HFPO-DA SUR	56563-001	87			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

56696

ANALYSIS REQUEST

Company Name: **BLUELEAF INC**

Company Address: **STRESSER HILL RD
CHARLTON MA 01507**

Report To: **Aaron DAVIS**

Phone #: **(774) 200-8029**

Invoice to: **ERIK GROTTON**

Email: **egrotton@blueleafwater.com**

PO #: **11204**

Project Name: **B&S - Summers**

Project #: **11204**

Project Location: NH **(MA)** ME VT

Accreditation Required? **NO**

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
EPA DW Other

Quote #

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 624.1
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VPH MADEP
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<input type="checkbox"/> VOC 524.2
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> 8082 PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> pH	<input type="checkbox"/> Conductivity
<input type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input checked="" type="checkbox"/> Turbidity	<input type="checkbox"/> Alkalinity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness
Total Metals-list: Fe, Mn, Zn, Ni, Cu, Mg			
Dissolved Metals-list: Fe, Mn			
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TON
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC
<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides
<input type="checkbox"/> Asbestos	+55 Not needed per customer		
<input type="checkbox"/> Fluoride	sd 4/25/21		
<input type="checkbox"/> Asbestos	sd 4/25/21		
<input type="checkbox"/> Asbestos	sd 4/25/21		
<input type="checkbox"/> Asbestos	sd 4/25/21		

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5/6/21-01	RAW		<input checked="" type="checkbox"/>								4/22	930	
02	FILTERS		<input checked="" type="checkbox"/>								"	1000	
03	FIELD BLANK		<input checked="" type="checkbox"/>								"	1000	

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard
(10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) _____
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 5 °C

CUSTODY RECORD OSD-01 Revision 03/09/2020	Relinquished by Sampler: ERIK J. GROTTON	Date: 4/22	Time: 1405	Received by: EJ Balch	Date: 4/22/21	Time: 1405
	Relinquished by: EJ Balch	Date: 4/22/21	Time: 1551	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by Laboratory: [Signature]	Date: 4/22/21	Time: 1551

Sample Receipt Condition Report

56696

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 5 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)			*pH ✓ by analyst: VOC, PEAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y N
HNO ₃	125mL(P)		250mL(P)	4	500mL(P)					
H ₂ SO ₄	40mL(G)	4	60mL(P)		125mL(P)		250mL(P)	500mL(P)		
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL (P)	3						
NH ₄ Ac	125mL(P)		250mL (P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	2						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml (G)		60mL(P)	4	125mL(P)	6	250mL(P)	2	500mL(P)	2
									1L(G)	1L (P)
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/ <i>E. coli</i> (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624				
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?			✓	
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?	✓			(Or must be rejected)
Log-in Supervisor notified immediately of following items:			✓	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: gd Date/Time: 4/22/21 16:30

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HT's communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

	Initials	Date	What was sent?
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56792
Date Received: 4/29/21

Project: None

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/11/2021
Total number of pages: 29

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Filter A CBW	Water	4/26/2021 14:00	56792-001	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1
Filter B CBW	Water	4/26/2021 14:00	56792-002	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1 Total Suspended Solids by SM2540D
Filter D CBW	Water	4/26/2021 14:00	56792-003	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1
GAC	Water	4/28/2021 12:00	56792-004	PFAS in Water by EPA 537.1
Field Blank	Water	4/28/2021 12:00	56792-005	PFAS in Water by EPA 537.1
Raw	Water	4/29/2021 9:30	56792-006	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Filter B	Water	4/29/2021 9:30	56792-007	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
GAC	Water	4/29/2021 9:30	56792-008	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Blank	Water	4/29/2021 9:30	56792-009	PFAS in Water by EPA 537.1
Raw-DISS	Water	4/29/2021 9:30	56792-010	Dissolved Prep for ICPMS Analysis Iron in water by 200.8 Manganese in water by 200.8
Filter B-DISS	Water	4/29/2021 9:30	56792-011	Dissolved Prep for ICPMS Analysis Iron in water by 200.8 Manganese in water by 200.8

Project ID: None

Job ID: 56792

Sample#: 56792-001

Sample ID: Filter A CBW

Matrix: Water

Sampled: 4/26/21 14:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM		2101197	5/5/21	7:57	SW8260Dmod

Sample#: 56792-002

Sample ID: Filter B CBW

Matrix: Water

Sampled: 4/26/21 14:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
1,4-dioxane	0.37	0.25	ug/L	1	LMM		2101197	5/5/21	8:28	SW8260Dmod

Sample#: 56792-003

Sample ID: Filter D CBW

Matrix: Water

Sampled: 4/26/21 14:00

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
1,4-dioxane	0.34	0.25	ug/L	1	LMM		2101197	5/5/21	8:59	SW8260Dmod

Sample#: 56792-006

Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Batch	Analysis		Reference
		Limit	Units	Factor	Analyst			Date	Time	
1,4-dioxane	< 0.25	0.25	ug/L	1	LMM		2101197	5/5/21	9:30	SW8260Dmod

Project ID: None

Job ID: 56792

Sample#: 56792-006

Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	8.8	0.50	mg/L	1	AGN	5/3/21	13839	5/5/21	16:18	E200.8
Iron	< 0.050	0.050	mg/L	1	EEB	5/3/21	13839	5/3/21	20:08	E200.8
Magnesium	3.3	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:08	E200.8
Manganese	0.12	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:08	E200.8
Sodium	68	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:08	E200.8
Zinc	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:08	E200.8
Hardness (as CaCO3)	36	3	mg/L	1	AGN	5/3/21	13839	5/6/21		SM2340B

Sample#: 56792-007

Sample ID: Filter B

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	8.6	0.50	mg/L	1	AGN	5/3/21	13839	5/5/21	16:52	E200.8
Iron	< 0.050	0.050	mg/L	1	EEB	5/3/21	13839	5/3/21	20:29	E200.8
Magnesium	3.4	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:29	E200.8
Manganese	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:29	E200.8
Sodium	93	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:29	E200.8
Zinc	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:29	E200.8
Hardness (as CaCO3)	35	3	mg/L	1	AGN	5/3/21	13839	5/6/21		SM2340B

Sample#: 56792-008

Sample ID: GAC

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Calcium	8.8	0.50	mg/L	1	AGN	5/3/21	13839	5/5/21	16:59	E200.8
Iron	< 0.050	0.050	mg/L	1	EEB	5/3/21	13839	5/3/21	20:36	E200.8
Magnesium	3.4	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:36	E200.8
Manganese	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:36	E200.8
Sodium	99	0.10	mg/L	1	EEB	5/3/21	13839	5/3/21	20:36	E200.8
Zinc	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:36	E200.8
Hardness (as CaCO3)	36	3	mg/L	1	AGN	5/3/21	13839	5/6/21		SM2340B

Sample#: 56792-010

Sample ID: Raw-DISS

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep		Analysis		
		Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Iron	< 0.050	0.050	mg/L	1	EEB	5/3/21	13839	5/3/21	20:42	E200.8
Manganese	0.12	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:42	E200.8

Project ID: None

Job ID: 56792

Sample#: 56792-011

Sample ID: Filter B-DISS

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Reporting		Instr Dil'n		Prep		Analysis			Reference
	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	
Iron	< 0.050	0.050	mg/L	1	EEB	5/3/21	13839	5/3/21	20:49	E200.8
Manganese	< 0.010	0.010	mg/L	1	EEB	5/3/21	13839	5/3/21	20:49	E200.8

Project ID: None

Job ID: 56792

Sample#: 56792-002

Sample ID: Filter B CBW

Matrix: Water

Sampled: 4/26/21 14:00

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Total Suspended Solids (TSS)	< 50	50	mg/L	1	SFM		2101166	4/30/21	17:15	SM2540D

Sample#: 56792-006

Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Alkalinity, Total (as CaCO3)	6	5	mg/L	1	SFM		2101167	5/3/21	14:30	SM2320B
Apparent Color	< 5.0	5.0	CU	1	DJM		2101150	4/30/21	16:36	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV		2101210	5/5/21	14:30	E300.0A
Chloride	98	2.5	mg/L	5	DBV		2101192	5/4/21	14:45	E300.0A
Sulfate	15	0.5	mg/L	1	DBV		2101156	4/30/21	15:07	E300.0A
Total Dissolved Solids (TDS)	230	20	mg/L	1	SFM		2101164	4/30/21	18:00	SM2540C
True Color	< 5.0	5.0	CU	1	SFM		2101151	4/30/21	16:36	SM2120B
Total Coliform Bacteria	absent			1	DBV		2101144	4/29/21	17:05	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101144	4/29/21	17:05	SM9223BColilert
Conductivity	420	5	umhos/cm	1	SFM		2101137	4/30/21	12:30	SM2510B
pH	6.1H		pH	1	SFM		2101180	4/29/21	18:39	SM4500H+B
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB		2101143	4/30/21	11:46	SM2130B

Sample#: 56792-007

Sample ID: Filter B

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Alkalinity, Total (as CaCO3)	56	5	mg/L	1	SFM		2101167	5/3/21	14:30	SM2320B
Apparent Color	< 5.0	5.0	CU	1	DJM		2101150	4/30/21	16:37	SM2120B
Chloride	100M	2.5	mg/L	5	DBV		2101192	5/4/21	15:51	E300.0A
M = The recovery for the matrix spike was 83%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.										
Sulfate	15	0.5	mg/L	1	DBV		2101156	4/30/21	15:24	E300.0A
Total Dissolved Solids (TDS)	270	20	mg/L	1	SFM		2101164	4/30/21	18:00	SM2540C
True Color	< 5.0	5.0	CU	1	SFM		2101151	4/30/21	16:37	SM2120B
Total Coliform Bacteria	absent			1	DBV		2101144	4/29/21	17:05	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101144	4/29/21	17:05	SM9223BColilert
Conductivity	510	5	umhos/cm	1	SFM		2101137	4/30/21	12:30	SM2510B
pH	7.4H		pH	1	SFM		2101180	4/29/21	18:49	SM4500H+B
H = Sample was received beyond method holding time.										
Turbidity	< 1.0	1.0	NTU	1	EB		2101143	4/30/21	11:48	SM2130B

Project ID: None

Job ID: 56792

Sample#: 56792-008

Sample ID: GAC

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Alkalinity, Total (as CaCO3)	58	5	mg/L	1	SFM	2101167	5/3/21	14:30	SM2320B
Chloride	100	2.5	mg/L	5	DBV	2101192	5/4/21	16:24	E300.0A
Sulfate	18	0.5	mg/L	1	DBV	2101156	4/30/21	15:40	E300.0A
Total Dissolved Solids (TDS)	270	20	mg/L	1	SFM	2101164	4/30/21	18:00	SM2540C
Conductivity	540	5	umhos/cm	1	SFM	2101137	4/30/21	12:30	SM2510B
pH	7.3H		pH	1	SFM	2101180	4/29/21	18:57	SM4500H+B

H = Sample was received beyond method holding time.

Sample#: 56792-006

Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	15:28	SM5310C

Sample#: 56792-007

Sample ID: Filter B

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	15:47	SM5310C

Sample#: 56792-008

Sample ID: GAC

Matrix: Water

Sampled: 4/29/21 9:30

Parameter	Result	Reporting		Instr Dil'n		Prep Date	Analysis		
		Limit	Units	Factor	Analyst		Batch	Date	Time
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV	2101189	5/4/21	16:05	SM5310C

Project ID: None

Job ID: 56792

Sample#: 56792-001

Sample ID: Filter A CBW

Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorobutane sulfonic acid (PFBS)	5.0	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluoroheptanoic acid (PFHPA)	5.9	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorohexane sulfonic acid (PFHXS)	30	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorohexanoic acid (PFHXA)	12	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorononanoic acid (PFNA)	1.7 J	1.8	0.41	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorooctane sulfonic acid (PFOS)	26	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorooctanoic acid (PFOA)	14	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13842	5/5/21	13:20
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:20
13C2-PFDA SUR	108	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:20
D5-NEtFOSAA SUR	80	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:20
13C3-HFPO-DA SUR	112	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:20

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-002

Sample ID: Filter B CBW

Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorobutane sulfonic acid (PFBS)	5.1	1.8	0.46	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluoroheptanoic acid (PFHPA)	5.7	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorohexane sulfonic acid (PFHXS)	31	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorohexanoic acid (PFHXA)	12	1.8	0.32	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorononanoic acid (PFNA)	1.9	1.8	0.41	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorooctane sulfonic acid (PFOS)	26	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorooctanoic acid (PFOA)	14	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13842	5/5/21	13:36
Surrogate Recovery		Limits								
13C2-PFHxA SUR	96	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:36
13C2-PFDA SUR	99	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:36
D5-NEtFOSAA SUR	81	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:36
13C3-HFPO-DA SUR	112	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:36

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-003

Sample ID: Filter D CBW

Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.9 U	1.9	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.9 U	1.9	0.37	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.9 U	1.9	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorobutane sulfonic acid (PFBS)	5.0	1.9	0.48	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorodecanoic acid (PFDA)	1.9 U	1.9	0.32	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorododecanoic acid (PFDOA)	1.9 U	1.9	0.41	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluoroheptanoic acid (PFHPA)	5.6	1.9	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorohexane sulfonic acid (PFHXS)	31	1.9	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorohexanoic acid (PFHXA)	12	1.9	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorononanoic acid (PFNA)	1.7 J	1.9	0.43	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorooctane sulfonic acid (PFOS)	26	1.9	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorooctanoic acid (PFOA)	13	1.9	0.32	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorotetradecanoic acid (PFTEA)	1.9 U	1.9	0.47	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluorotridecanoic acid (PFTRIA)	1.9 U	1.9	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
perfluoroundecanoic acid (PFUNA)	1.9 U	1.9	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.9 U	1.9	0.37	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.9 U	1.9	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.9 U	1.9	0.17	ng/L	1	ACA	5/5/21	13842	5/5/21	13:52
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:52
13C2-PFDA SUR	98	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:52
D5-NEtFOSAA SUR	75	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:52
13C3-HFPO-DA SUR	104	70-130		%	1	ACA	5/5/21	13842	5/5/21	13:52

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-004

Sample ID: GAC

Matrix: Water

Sampled: 4/28/21 12:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13842	5/5/21	14:08
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:08
13C2-PFDA SUR	105	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:08
D5-NEtFOSAA SUR	82	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:08
13C3-HFPO-DA SUR	106	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:08

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-005

Sample ID: Field Blank

Matrix: Water

Sampled: 4/28/21 12:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	5/5/21	13842	5/5/21	14:24
Surrogate Recovery		Limits								
13C2-PFHxA SUR	94	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:24
13C2-PFDA SUR	99	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:24
D5-NEtFOSAA SUR	85	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:24
13C3-HFPO-DA SUR	104	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:24

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-006

Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorobutane sulfonic acid (PFBS)	5.8	1.8	0.44	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluoroheptanoic acid (PFHPA)	3.5	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorohexane sulfonic acid (PFHXS)	19	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorohexanoic acid (PFHXA)	7.2	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorononanoic acid (PFNA)	1.0 J	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorooctane sulfonic acid (PFOS)	16	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorooctanoic acid (PFOA)	6.9	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.11	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	ACA	5/5/21	13842	5/5/21	14:40
Surrogate Recovery		Limits								
13C2-PFHxA SUR	104	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:40
13C2-PFDA SUR	106	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:40
D5-NEtFOSAA SUR	80	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:40
13C3-HFPO-DA SUR	105	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:40

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-008

Sample ID: GAC

Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	5/5/21	13842	5/5/21	14:56
Surrogate Recovery		Limits								
13C2-PFHxA SUR	90	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:56
13C2-PFDA SUR	98	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:56
D5-NEtFOSAA SUR	80	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:56
13C3-HFPO-DA SUR	99	70-130		%	1	ACA	5/5/21	13842	5/5/21	14:56

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: None

Job ID: 56792

Sample#: 56792-009

Sample ID: Field Blank

Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.40	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	ACA	5/5/21	13842	5/5/21	15:12
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	5/5/21	13842	5/5/21	15:12
13C2-PFDA SUR	99	70-130		%	1	ACA	5/5/21	13842	5/5/21	15:12
D5-NEtFOSAA SUR	83	70-130		%	1	ACA	5/5/21	13842	5/5/21	15:12
13C3-HFPO-DA SUR	110	70-130		%	1	ACA	5/5/21	13842	5/5/21	15:12

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56792

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 56792-007 did not meet the acceptance criteria for chloride. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101197	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101197	1,4-dioxane		9.8	ug/L	8	122	70 130		
SW8260Dmod	LCSD2101197	1,4-dioxane		9.5	ug/L	8	119	70 130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E200.8	BLK13839	Calcium		< 0.50	mg/L						
		Iron		< 0.050	mg/L						
		Magnesium		< 0.10	mg/L						
		Manganese		< 0.010	mg/L						
		Sodium		< 0.10	mg/L						
		Zinc		< 0.010	mg/L						
E200.8	DUP13839	Calcium	56792-006	8.7	mg/L				0	20	
		Iron	56792-006	< 0.050	mg/L					20	
		Magnesium	56792-006	3.3	mg/L				1	20	
		Manganese	56792-006	0.12	mg/L				1	20	
		Sodium	56792-006	68	mg/L				0	20	
		Zinc	56792-006	< 0.010	mg/L					20	
E200.8	LCS13839	Calcium		2.7	mg/L	2.5	109	85	115		
		Iron		0.52	mg/L	0.5	105	85	115		
		Magnesium		0.48	mg/L	0.5	97	85	115		
		Manganese		0.51	mg/L	0.5	101	85	115		
		Sodium		5.0	mg/L	5	100	85	115		
		Zinc		0.50	mg/L	0.5	100	85	115		
E200.8	LCSD13839	Calcium		2.7	mg/L	2.5	110	85	115	0	20
		Iron		0.53	mg/L	0.5	106	85	115	1	20
		Magnesium		0.49	mg/L	0.5	97	85	115	1	20
		Manganese		0.52	mg/L	0.5	104	85	115	3	20
		Sodium		5.0	mg/L	5	101	85	115	1	20
		Zinc		0.51	mg/L	0.5	102	85	115	2	20
E200.8	MS13839	Manganese	56560-096	0.51	mg/L	0.5	102	70	130		
E200.8	MS13839	Calcium	56792-006	11	mg/L	2.5	98	70	130		
		Iron	56792-006	0.42	mg/L	0.5	83	70	130		
		Magnesium	56792-006	3.8	mg/L	0.5	101	70	130		
		Manganese	56792-006	0.55	mg/L	0.5	86	70	130		
		Sodium	56792-006	73	mg/L	5	109	70	130		
		Zinc	56792-006	0.46	mg/L	0.5	91	70	130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101156	Sulfate		<	0.5	mg/L				
E300.0A	LCS2101156	Sulfate			100	mg/L	100	90	110	
E300.0A	LCSD2101156	Sulfate			100	mg/L	100	90	110	0
E300.0A	BLK2101192	Chloride		<	0.5	mg/L				
E300.0A	LCS2101192	Chloride			96	mg/L	100	90	110	
E300.0A	LCSD2101192	Chloride			95	mg/L	100	90	110	1
E300.0A	MS2101192	Chloride	56792-007		170	mg/L	83.3	90	110	
							83	*		
E300.0A	BLK2101210	Bromide		<	0.1	mg/L				
E300.0A	LCS2101210	Bromide			10	mg/L	10	90	110	
E300.0A	LCSD2101210	Bromide			10.0	mg/L	10	90	110	1
E300.0A	MS2101210	Bromide	56813-002		85	mg/L	100	90	110	
							85	*		
SM2120B	DUP2101150	Apparent Color	56792-007	<	5	CU				20
SM2120B	LCS2101150	Apparent Color			35	CU	35	30	40	
SM2120B	PB2101150	Apparent Color		<	5	CU		5		
SM2120B	DUP2101151	True Color	56792-007	<	5	CU				20
SM2320B	DUP2101167	Alkalinity, Total (as CaCO3)	56792-008		59	mg/L			2	10
SM2320B	LCS2101167	Alkalinity, Total (as CaCO3)			25	mg/L	25	90	110	
SM2320B	LCSD2101167	Alkalinity, Total (as CaCO3)			26	mg/L	25	90	110	1
SM2320B	PB2101167	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101137	Conductivity		<	5	uS/cm				
SM2510B	DUP2101137	Conductivity	56792-008		530	uS/cm			0	20
SM2510B	LCS2101137	Conductivity			1400	uS/cm	1409	90	110	
SM2510B	LCSD2101137	Conductivity			1400	uS/cm	1409	90	110	20
SM2540C	DUP2101164	Total Dissolved Solids (TDS)	56752-001		1000	mg/L			2	5
SM2540C	LCS2101164	Total Dissolved Solids (TDS)			110	mg/L	99.2	75	125	
SM2540C	PB2101164	Total Dissolved Solids (TDS)		<	20	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2540D	DUP2101166	Total Suspended Solids (TSS)	56792-002	< 50	mg/L					5
SM2540D	DUP2101166	Total Suspended Solids (TSS)	56804-001	67	mg/L				2	5
SM2540D	LCS2101166	Total Suspended Solids (TSS)		310	mg/L	323	95	75 125		
SM2540D	PB2101166	Total Suspended Solids (TSS)		< 2.5	mg/L					
SM4500H+B	DUP2101180	pH	56796-002	5.4	pH					
SM4500H+B	DUP2101180	pH	56823-001	5.5	pH					
SM5310C	BLK2101189	Total Organic Carbon (TOC)		< 1	mg/L					
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	< 1	mg/L					20
SM5310C	LCS2101189	Total Organic Carbon (TOC)		10	mg/L	10	103	85 115		
SM5310C	LCSD2101189	Total Organic Carbon (TOC)		10	mg/L	10	104	85 115	2	20
SM5310C	MS2101189	Total Organic Carbon (TOC)	56823-001	11	mg/L	10	108	75 125		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		95			%			70 130		
		D5-NEIFOSAA SUR		81			%			70 130		
		13C3-HFPO-DA SUR		94			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56773-009	0.76 J	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56773-009	1.7 U	1.7	0.33	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56773-009	1.7 U	1.7	0.27	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56773-009	2.6	1.7	0.42	ng/L				2	30
		perfluorodecanoic acid (PFDA)	56773-009	1.5 J	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDOA)	56773-009	1.7 U	1.7	0.36	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56773-009	12	1.7	0.28	ng/L				3	30
		perfluorohexane sulfonic acid (PFHXS)	56773-009	29	1.7	0.33	ng/L				1	30
		perfluorohexanoic acid (PFHXA)	56773-009	7.1	1.7	0.29	ng/L				5	30
		perfluorononanoic acid (PFNA)	56773-009	4.1	1.7	0.38	ng/L				17	30
		perfluorooctane sulfonic acid (PFOS)	56773-009	58	1.7	0.34	ng/L				5	30
		perfluorooctanoic acid (PFOA)	56773-009	56	1.7	0.28	ng/L				4	30
		perfluorotetradecanoic acid (PFTEA)	56773-009	1.7 U	1.7	0.42	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56773-009	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56773-009	1.7 U	1.7	0.27	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56773-009	1.7 U	1.7	0.33	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56773-009	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56773-009	1.7 U	1.7	0.15	ng/L					30
		13C2-PFHxA SUR	56773-009	42			%			70 130	*	
		13C2-PFDA SUR	56773-009	145			%			70 130	*	
		D5-NEIFOSAA SUR	56773-009	74			%			70 130		
		13C3-HFPO-DA SUR	56773-009	38			%			70 130	*	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		4.5	2.0	0.30	ng/L	4	112	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		3.8	2.0	0.39	ng/L	4	96	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		4.2	2.0	0.33	ng/L	4	104	50 150		
		perfluorobutane sulfonic acid (PFBS)		3.3	2.0	0.50	ng/L	3.54	94	50 150		
		perfluorodecanoic acid (PFDA)		4.0	2.0	0.34	ng/L	4	101	50 150		
		perfluorododecanoic acid (PFDOA)		4.0	2.0	0.43	ng/L	4	100	50 150		
		perfluoroheptanoic acid (PFHPA)		4.5	2.0	0.33	ng/L	4	113	50 150		
		perfluorohexane sulfonic acid (PFHXS)		3.7	2.0	0.40	ng/L	3.8	97	50 150		
		perfluorohexanoic acid (PFHXA)		4.0	2.0	0.35	ng/L	4	101	50 150		
		perfluorononanoic acid (PFNA)		4.0	2.0	0.45	ng/L	4	101	50 150		
		perfluorooctane sulfonic acid (PFOS)		3.3	2.0	0.40	ng/L	3.84	86	50 150		
		perfluorooctanoic acid (PFOA)		4.2	2.0	0.33	ng/L	4	105	50 150		
		perfluorotetradecanoic acid (PFTEA)		3.4	2.0	0.50	ng/L	4	86	50 150		
		perfluorotridecanoic acid (PFTRIA)		4.1	2.0	0.13	ng/L	4	102	50 150		
		perfluoroundecanoic acid (PFUNA)		3.6	2.0	0.32	ng/L	4	90	50 150		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.8	2.0	0.39	ng/L	3.78	74	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		3.1	2.0	0.40	ng/L	3.74	83	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		4.2	2.0	0.18	ng/L	3.78	110	50 150		
		13C2-PFHxA SUR		97			%			70 130		
		13C2-PFDA SUR		103			%			70 130		
		D5-NEIFOSAA SUR		85			%			70 130		
		13C3-HFPO-DA SUR		110			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56787-001	180	1.7	0.25	ng/L	167	106	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56787-001	150	1.7	0.33	ng/L	167	89	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56787-001	170	1.7	0.27	ng/L	167	100	70 130		
		perfluorobutane sulfonic acid (PFBS)	56787-001	150	1.7	0.42	ng/L	147	97	70 130		
		perfluorodecanoic acid (PFDA)	56787-001	150	1.7	0.29	ng/L	167	89	70 130		
		perfluorododecanoic acid (PFDOA)	56787-001	150	1.7	0.36	ng/L	167	89	70 130		
		perfluoroheptanoic acid (PFHPA)	56787-001	160	1.7	0.28	ng/L	167	95	70 130		
		perfluorohexane sulfonic acid (PFHXS)	56787-001	170	1.7	0.33	ng/L	158	94	70 130		
		perfluorohexanoic acid (PFHXA)	56787-001	160	1.7	0.29	ng/L	167	92	70 130		
		perfluorononanoic acid (PFNA)	56787-001	160	1.7	0.38	ng/L	167	93	70 130		
		perfluorooctane sulfonic acid (PFOS)	56787-001	150	1.7	0.33	ng/L	160	85	70 130		
		perfluorooctanoic acid (PFOA)	56787-001	170	1.7	0.28	ng/L	167	95	70 130		
		perfluorotetradecanoic acid (PFTEA)	56787-001	140	1.7	0.41	ng/L	167	83	70 130		
		perfluorotridecanoic acid (PFTRIA)	56787-001	150	1.7	0.11	ng/L	167	91	70 130		
		perfluoroundecanoic acid (PFUNA)	56787-001	150	1.7	0.27	ng/L	167	87	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56787-001	130	1.7	0.33	ng/L	158	84	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56787-001	140	1.7	0.33	ng/L	156	90	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56787-001	140	1.7	0.15	ng/L	158	88	70 130		
		13C2-PFHxA SUR	56787-001	94			%			70 130		
		13C2-PFDA SUR	56787-001	95			%			70 130		
		D5-NEIFOSAA SUR	56787-001	80			%			70 130		
		13C3-HFPO-DA SUR	56787-001	104			%			70 130		



ANALYSIS REQUEST

Company Name: Blueleaf, Inc

Company Address: 57 Dresser Hill Rd. Charlton, MA

Report To: Aaron Davis

Phone #: 774 200 4029

Invoice to: Erik Grotton

Email: egrotton@blueleafwater.com

PO #:

Project Name:

Project #:

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: _____

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting QAPP GW-1 S-1

Limits: EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Cases-List:	<input type="checkbox"/> TPH	<input type="checkbox"/> DRG 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pesti/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input checked="" type="checkbox"/> Turbidity	<input checked="" type="checkbox"/> Apparent Color	<input type="checkbox"/> True Color	<input checked="" type="checkbox"/> TSS	<input checked="" type="checkbox"/> TDS	<input type="checkbox"/> TS	<input checked="" type="checkbox"/> TVS	<input checked="" type="checkbox"/> Alkalinity	<input type="checkbox"/> Acidity	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness	Total Metals-list: <u>Fe, Mn, Zn, Na, Ca, Mg</u>		Dissolved Metals-list: <u>Fe, Mn</u>		<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input checked="" type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input type="checkbox"/> T-Phosphorus	<input checked="" type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Nitrite	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos	Grab (G) or Composite (C)
-----------------------------------	---	---	------------------------------------	--	-------------------------------------	------------------------------------	-----------------------------------	---	------------------------------------	--	--------------------------------------	------------------------------	-----------------------------------	------------------------------------	--	----------------------------------	----------------------------------	--------------------------------	------------------------------	-----------------------------------	--	--	--	-----------------------------------	---	--	------------------------------	--	---	--	-------------------------------------	---	---	-----------------------------	---	--	----------------------------------	--------------------------------------	--	-------------------------------------	--	--	--	--------------------------------------	--	----------------------------------	------------------------------	------------------------------	-----------------------------	---	---------------------------------------	---------------------------------------	--	---------------------------------------	--------------------------------------	----------------------------------	----------------------------------	--	----------------------------------	----------------------------------	----------------------------------	---	--	---	----------------------------------	-----------------------------------	--------------------------------------	--	--------------------------------------	-----------------------------------	------------------------------------	---	--	---------------------------

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling			
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
<u>5792</u>	<u>Filter A CBW</u>	<u>4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<u>4/26/21</u>	<u>14:00</u>	<u>AGD</u>
<u>02</u>	<u>Filter B CBW</u>	<u>5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<u>03</u>	<u>Filter D CBW</u>	<u>4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<u>04</u>	<u>GAC</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<u>4/29/21</u>	<u>12:00</u>	<u>NCF</u>
<u>05</u>	<u>Field Blank</u>	<u>2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<u>06</u>	<u>Raw</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<u>4/29/21</u>	<u>9:30</u>	<u>AGD</u>
<u>07</u>	<u>Filter B</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<u>08</u>	<u>GAC</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<u>09</u>	<u>Field Blank</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

Do Not Run True + Apparent Color on GAC Sample.

TSS Only on Filter B CBW + Bromide on Raw only

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 2 °C

CUSTODY RECORD

QSD-01 Revision 03/09/2020

Relinquished by Sampler: <u>[Signature]</u>	Date <u>4/29/21</u>	Time <u>13:57</u>	Received by: <u>[Signature]</u>	Date <u>4/29/21</u>	Time <u>13:57</u>
Relinquished by: <u>[Signature]</u>	Date <u>4/29/21</u>	Time <u>1600</u>	Received by:	Date	Time
Relinquished by:	Date	Time	Received by Laboratory:	Date <u>4/29/21</u>	Time <u>16:00</u>

Sample Receipt Condition Report

56792

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 2 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
	40mL(G)	250mL(P)	500mL(P)	1L(G)						
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)						
HNO ₃	125mL(P)	250mL(P)	500mL(P)							
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)					
NaOH	125mL(P)	250mL(P)								
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)							
ZnAc-NaOH	125mL(P)	250mL(P)								
Trizma	125mL(P)	250mL(P)								
NH ₄ Ac	125mL(P)	250mL(P)								
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)								
MeOH	20mL(G)	40mL(G)								
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe						
None (water)	40ml (G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)	1L(G)	1L(P)			

Mold	Cassette	Bulk	Plate	Tape Lift
Asbestos	Cassette	Bulk		
Lead	Cassette	Bulk	Wipe	

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 Pest608
 Bacteria ResCl ✓ by analyst
 PC Dry applicable? Y N

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?		X		-06 TOC significant headspace
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?				7pc sized bubbles in -07, 08, 10 TOC
PFAS: Lab specific bottles? QC received, if required?	X			
Bacteria bottles provided by ARA?	X			
Samples within holding time?	X			
Immediate tests communicated in writing: NO ₃ , NO ₂ , o-PO ₄ (P), BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	X			SPM, DBV, EB
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests. TOC headspace

Inspected and Received By: SPM Date/Time: 4/30/21 8:21

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS

Reviewed By: _____ Date: _____

Notes: (continue on back as needed)

Uploaded / PDF _____	Initials _____	Date _____	What was sent?
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 56824
Date Received: 5/3/21

Project: BW-Hyannisport 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 5/11/2021
Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GAC	Water	5/3/2021 10:00	56824-001	PFAS in Water by EPA 537.1
Field Blank	Water	5/3/2021 10:00	56824-002	PFAS in Water by EPA 537.1
Filter B CBW	Water	5/3/2021 10:35	56824-003	Total Suspended Solids by SM2540D

Project ID: BW-Hyannisport 11204

Job ID: 56824

Sample#: 56824-003

Sample ID: Filter B CBW

Matrix: Water

Sampled: 5/3/21 10:35

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Time	Reference
Total Suspended Solids (TSS)	70	50	mg/L	1	SFM		2101244	5/7/21	13:40	SM2540D

Project ID: BW-Hyannisport 11204

Job ID: 56824

Sample#: 56824-001

Sample ID: GAC

Matrix: Water

Sampled: 5/3/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorooctanoic acid (PFOA)	0.31 J	1.7	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	5/5/21	13843	5/5/21	19:45
Surrogate Recovery		Limits								
13C2-PFHxA SUR	90	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:45
13C2-PFDA SUR	99	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:45
D5-NEtFOSAA SUR	80	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:45
13C3-HFPO-DA SUR	98	70-130		%	1	ACA	5/5/21	13843	5/5/21	19:45

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-Hyannisport 11204

Job ID: 56824

Sample#: 56824-002

Sample ID: Field Blank

Matrix: Water

Sampled: 5/3/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.46	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.32	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.40	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.32	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.37	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.31	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.46	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.30	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.37	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	ACA	5/5/21	13843	5/5/21	20:01
Surrogate Recovery		Limits								
13C2-PFHxA SUR	95	70-130		%	1	ACA	5/5/21	13843	5/5/21	20:01
13C2-PFDA SUR	92	70-130		%	1	ACA	5/5/21	13843	5/5/21	20:01
D5-NEtFOSAA SUR	79	70-130		%	1	ACA	5/5/21	13843	5/5/21	20:01
13C3-HFPO-DA SUR	94	70-130		%	1	ACA	5/5/21	13843	5/5/21	20:01

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 56824

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		93			%			70	130	
		13C2-PFDA SUR		99			%			70	130	
		D5-NEIFOSAA SUR		79			%			70	130	
		13C3-HFPO-DA SUR		101			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56817-002	1.7 U	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56817-002	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	56817-002	1.9	1.7	0.43	ng/L				11	30
		perfluorodecanoic acid (PFDA)	56817-002	1.7 U	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDOA)	56817-002	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	56817-002	2.9	1.7	0.29	ng/L				13	30
		perfluorohexane sulfonic acid (PFHXS)	56817-002	1.6 J	1.7	0.34	ng/L					30
		perfluorohexanoic acid (PFHXA)	56817-002	3.7	1.7	0.30	ng/L				12	30
		perfluorononanoic acid (PFNA)	56817-002	0.42 J	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	56817-002	3.2	1.7	0.34	ng/L				12	30
		perfluorooctanoic acid (PFOA)	56817-002	2.9	1.7	0.29	ng/L				16	30
		perfluorotetradecanoic acid (PFTEA)	56817-002	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	56817-002	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	56817-002	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56817-002	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56817-002	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	56817-002	93			%			70 130		
		13C2-PFDA SUR	56817-002	93			%			70 130		
		D5-NEIFOSAA SUR	56817-002	76			%			70 130		
		13C3-HFPO-DA SUR	56817-002	99			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		39	2.0	0.30	ng/L	40	98	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		37	2.0	0.39	ng/L	40	92	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		38	2.0	0.33	ng/L	40	95	70 130		
		perfluorobutane sulfonic acid (PFBS)		33	2.0	0.50	ng/L	35	92	70 130		
		perfluorodecanoic acid (PFDA)		37	2.0	0.34	ng/L	40	93	70 130		
		perfluorododecanoic acid (PFDOA)		36	2.0	0.43	ng/L	40	89	70 130		
		perfluoroheptanoic acid (PFHPA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorohexane sulfonic acid (PFHXS)		36	2.0	0.40	ng/L	38	94	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	96	70 130		
		perfluorooctane sulfonic acid (PFOS)		31	2.0	0.40	ng/L	38	80	70 130		
		perfluorooctanoic acid (PFOA)		39	2.0	0.33	ng/L	40	98	70 130		
		perfluorotetradecanoic acid (PFTEA)		32	2.0	0.50	ng/L	40	81	70 130		
		perfluorotridecanoic acid (PFTRIA)		36	2.0	0.13	ng/L	40	90	70 130		
		perfluoroundecanoic acid (PFUNA)		34	2.0	0.32	ng/L	40	86	70 130		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		28	2.0	0.39	ng/L	37	75	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		31	2.0	0.40	ng/L	37	83	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		36	2.0	0.18	ng/L	37	95	70 130		
		13C2-PFHxA SUR		93			%			70 130		
		13C2-PFDA SUR		104			%			70 130		
		D5-NEIFOSAA SUR		78			%			70 130		
		13C3-HFPO-DA SUR		101			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	56821-001	3.0	1.7	0.25	ng/L	3.35	90	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56821-001	2.8	1.7	0.33	ng/L	3.35	85	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56821-001	2.8	1.7	0.27	ng/L	3.35	83	50 150		
		perfluorobutane sulfonic acid (PFBS)	56821-001	2.3	1.7	0.42	ng/L	2.97	76	50 150		
		perfluorodecanoic acid (PFDA)	56821-001	2.4	1.7	0.29	ng/L	3.35	72	50 150		
		perfluorododecanoic acid (PFDOA)	56821-001	2.3	1.7	0.36	ng/L	3.35	69	50 150		
		perfluoroheptanoic acid (PFHPA)	56821-001	2.9	1.7	0.28	ng/L	3.35	86	50 150		
		perfluorohexane sulfonic acid (PFHXS)	56821-001	2.5	1.7	0.33	ng/L	3.18	78	50 150		
		perfluorohexanoic acid (PFHXA)	56821-001	2.6	1.7	0.29	ng/L	3.35	79	50 150		
		perfluorononanoic acid (PFNA)	56821-001	2.7	1.7	0.38	ng/L	3.35	81	50 150		
		perfluorooctane sulfonic acid (PFOS)	56821-001	2.3	1.7	0.34	ng/L	3.22	70	50 150		
		perfluorooctanoic acid (PFOA)	56821-001	2.6	1.7	0.28	ng/L	3.35	79	50 150		
		perfluorotetradecanoic acid (PFTEA)	56821-001	2.2	1.7	0.42	ng/L	3.35	67	50 150		
		perfluorotridecanoic acid (PFTRIA)	56821-001	2.4	1.7	0.11	ng/L	3.35	71	50 150		
		perfluoroundecanoic acid (PFUNA)	56821-001	2.3	1.7	0.27	ng/L	3.35	67	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56821-001	2.0	1.7	0.33	ng/L	3.17	63	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56821-001	2.1	1.7	0.34	ng/L	3.13	67	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56821-001	2.6	1.7	0.15	ng/L	3.17	83	50 150		
		13C2-PFHxA SUR	56821-001	93			%			70 130		
		13C2-PFDA SUR	56821-001	96			%			70 130		
		D5-NEIFOSAA SUR	56821-001	80			%			70 130		
		13C3-HFPO-DA SUR	56821-001	91			%			70 130		
SM2540	DUP2101244	Total Suspended Solids (TSS) (SS)	56893-001	43	25	12	mg/L				13	5
SM2540	LCS2101244	Total Suspended Solids (TSS) (SS)		320	50	24	mg/L	323	101	75 125		
SM2540	PB2101244	Total Suspended Solids (TSS) (SS)		2.5 U	2.5	1.2	mg/L					

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Portsmouth, NH 03801
603-436-2001
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CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

56824

LAB ID HERE

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
 Company Address: 57 Dresser Hill Rd. Chariton, MA 01507
 Report To: Aaron Davis
 Phone #: 774 200 8029
 Invoice to: Erik Grotton
 Email: egrotton@blueleafwater.com
 PO #:

Project Name: BW-Hyannisport
 Project #: 11204
 Project Location: NH MA ME VT
 Accreditation Required? NY
 Protocol: RCRA SDWA NPDES
 MCP NHDES DOD
 Reporting QAPP GW-1 S-1
 Limits: EPA DW Other
 Quote # _____
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 624.1
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VPH MADEP
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:	<input type="checkbox"/> VOC 524.2
<input type="checkbox"/> TPH	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH
<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 8270PAH
<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8082 PCB
<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> O&G 1664
<input type="checkbox"/> Mineral O&G 1664	<input type="checkbox"/> pH	<input type="checkbox"/> BOD	<input type="checkbox"/> pH
<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> Apparent Color	<input type="checkbox"/> Conductivity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS	<input type="checkbox"/> TSS
<input type="checkbox"/> TVS	<input type="checkbox"/> Alkalinity	<input type="checkbox"/> Acidity	<input type="checkbox"/> TVS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> RCRA Metals
<input type="checkbox"/> Hardness	<input type="checkbox"/> Total Metals-list:	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Hardness
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> Ammonia
<input type="checkbox"/> TN	<input type="checkbox"/> TON	<input type="checkbox"/> TOC	<input type="checkbox"/> TN
<input type="checkbox"/> Ferrrous Iron	<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Ferrrous Iron
<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P
<input type="checkbox"/> Fluoride	<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Fluoride
<input type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> Corrosivity
<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> TCLP VOC
<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides
<input type="checkbox"/> Grab (G) or Composite (C)			<input type="checkbox"/> Asbestos

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling			
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER	
5682401	GAC	2	X								4/3	10:00	AD	
-02	Field Blank	2	X									10:00		
-03	Filter IS CBW	1	X								↓	10:35	↓	

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

SPECIAL INSTRUCTIONS

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO
TEMPERATURE 6 °C

CUSTODY RECORD

QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>4/3/21</u> Time: <u>11:30</u>	Received by:	Date: <u>4/3/21</u> Time: <u>11:30</u>
Relinquished by:	Date: <u>4/3/21</u> Time: <u>14:00</u>	Received by:	Date: <u>5/3/21</u> Time: <u>14:00</u>
Relinquished by:	Date: <u>4/5/21</u> Time: <u>15:31</u>	Received by Laboratory:	Date: <u>5/3/21</u> Time: <u>15:31</u>

Sample Receipt Condition Report

56824

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 6 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y N 1L(G) <u>+</u> 1L(P) <u>1</u> SUB 5-3-21 4R
HNO ₃	125mL(P)	250mL(P)	500mL(P)				
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)				
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL(P)					
NH ₄ Ac	125mL(P)	250mL(P)	3				
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe			
None (water)	40ml (G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
Mold	Cassette	Bulk	Plate	Tape Lift			
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk	Wipe				

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	<input checked="" type="checkbox"/>			
Analyses marked on COC match bottles received?	<input checked="" type="checkbox"/>			
VOC & TOC Water-no headspace?			<input checked="" type="checkbox"/>	
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?			<input checked="" type="checkbox"/>	
PFAS: Lab specific bottles? QC received, if required?	<input checked="" type="checkbox"/>			
Bacteria bottles provided by ARA?			<input checked="" type="checkbox"/>	
Samples within holding time?	<input checked="" type="checkbox"/>			
Immediate tests communicated in writing: NO ₃ , NO ₂ , O-PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624			<input checked="" type="checkbox"/>	
Date, time & ID on samples match CoC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		chan says sampled 4/3
Rushes communicated to analyst in writing?			<input checked="" type="checkbox"/>	
Subcontract note on login board?			<input checked="" type="checkbox"/>	
Pesticides EPA 608 pH5-9?			<input checked="" type="checkbox"/>	
Compliance samples have no discrepancies/require no flags?			<input checked="" type="checkbox"/>	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			<input checked="" type="checkbox"/>	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: SUB

 Date/Time: 5-3-21 15:59

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

<u>Initials</u>	<u>Date</u>	<u>What was sent?</u>
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/08/2021
Work Order #: 2106-00283
Client Job #:
Date Received: 06/02/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00283-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: GSP Filter
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/25/2021 12:15PM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 03:34AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 03:34AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 03:34AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 03:34AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 03:34AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 03:34AM
2,3-Dibromopropionic Acid	91	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 03:34AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00283-002
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: UV Effluent
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/25/2021 12:15PM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:14AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:14AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:14AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 04:14AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 04:14AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:14AM
2,3-Dibromopropionic Acid	82	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 04:14AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57189
Date Received: 5/27/21

Project: BW-Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.
Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/9/2021
Total number of pages: 12

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	5/25/2021 12:15	57189-001	Bromide in water by 300.0A Low level 1,4-dioxane in water by 8260 SIM Prep for transfer to Subcontract Lab
GSP FILTER	Water	5/25/2021 12:15	57189-002	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM VOCs Trihalomethanes in water by 524.2
UV EFFLUENT	Water	5/25/2021 12:15	57189-003	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A VOCs Trihalomethanes in water by 524.2

Project ID: BW-Straightway 11204

Job ID: 57189

Sample#: 57189-002

Sample ID: GSP FILTER

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	15:24	E524.2
bromodichloromethane	0.26 J	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	15:24	E524.2
dibromochloromethane	0.53	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	15:24	E524.2
bromoform	0.26 J	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	15:24	E524.2
Total Trihalomethanes (THMs)	0.53	0.50		ug/L	1	LMM			2101571	6/3/21	15:24	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	97	70-130		%	1	LMM			2101571	6/3/21	15:24	E524.2
1,4-dichlorobenzene-D4 SUR	98	70-130		%	1	LMM			2101571	6/3/21	15:24	E524.2

Sample#: 57189-003

Sample ID: UV EFFLUENT

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	15:56	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	15:56	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	15:56	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	15:56	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	15:56	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	96	70-130		%	1	LMM			2101571	6/3/21	15:56	E524.2
1,4-dichlorobenzene-D4 SUR	90	70-130		%	1	LMM			2101571	6/3/21	15:56	E524.2

Project ID: BW-Straightway 11204

Job ID: 57189

Sample#: 57189-001

Sample ID: RAW

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.81	0.25	0.12	ug/L	1	LMM			2101602	6/4/21	13:19	SW8260Dmod

Sample#: 57189-002

Sample ID: GSP FILTER

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.59	0.25	0.12	ug/L	1	LMM			2101602	6/4/21	13:50	SW8260Dmod

Sample#: 57189-003

Sample ID: UV EFFLUENT

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101602	6/4/21	14:22	SW8260Dmod

Project ID: BW-Straightway 11204

Job ID: 57189

Sample#: 57189-001

Sample ID: RAW

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Bromide	U	0.1	0.021	mg/L	1	DBV			2101520	5/28/21	21:19	E300.0A

Sample#: 57189-003

Sample ID: UV EFFLUENT

Matrix: Water

Sampled: 5/25/21 12:15

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Nitrate-N	0.5 H	0.1	0.038	mg/L	1	DBV			2101519	5/28/21	10:34	E300.0A
	H = Sample was received beyond method holding time and analyzed at customer's request.											
Nitrite-N	U H	0.1	0.019	mg/L	1	DBV			2101519	5/28/21	10:34	E300.0A
	H = Sample was received beyond method holding time and analyzed at customer's request.											

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57189

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101571	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			93	%			70	130	
		1,4-dichlorobenzene-D4 SUR			95	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101571	chloroform	57188-001	<	0.50	ug/L				20	
		bromodichloromethane	57188-001	<	0.50	ug/L				20	
		dibromochloromethane	57188-001	<	0.50	ug/L				20	
		bromoform	57188-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57188-001		96	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57188-001		95	%			70	130	
		Total Trihalomethanes (THMs)	57188-001							95.8	
E524.2	LCS2101571	chloroform			10	ug/L	10	104	70	130	
		bromodichloromethane			10	ug/L	10	103	70	130	
		dibromochloromethane			10	ug/L	10	104	70	130	
		bromoform			11	ug/L	10	110	70	130	
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			122	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101571	chloroform			10	ug/L	10	100	70	130	4
		bromodichloromethane			9.9	ug/L	10	99	70	130	4
		dibromochloromethane			10	ug/L	10	101	70	130	2
		bromoform			10	ug/L	10	105	70	130	4
		4-bromofluorobenzene SUR			106	%			70	130	
		1,4-dichlorobenzene-D4 SUR			114	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101602	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101602	1,4-dioxane			9.2	ug/L	8	115	70	130	
SW8260Dmod	LCSD2101602	1,4-dioxane			9.4	ug/L	8	118	70	130	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101519	Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
E300.0A	DUP2101519	Nitrate-N	57189-003		0.5	mg/L			0	10
		Nitrite-N	57189-003	<	0.1	mg/L				10
E300.0A	LCS2101519	Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
E300.0A	LCSD2101519	Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
									0	10
									0	10
E300.0A	MS2101519	Nitrate-N	57189-003		2.0	mg/L	1.66	92	90	110
		Nitrite-N	57189-003		2.4	mg/L	2.53	96	90	110
E300.0A	MS2101519	Nitrate-N	57190-008		2.2	mg/L	1.66	95	90	110
		Nitrite-N	57190-008		2.5	mg/L	2.53	100	90	110
E300.0A	BLK2101520	Bromide		<	0.1	mg/L				
E300.0A	LCS2101520	Bromide			9.4	mg/L	10	94	90	110
E300.0A	LCSD2101520	Bromide			9.4	mg/L	10	94	90	110
									0	10
E300.0A	MS2101520	Bromide	57065-002		95	mg/L	100	95	90	110

Sample Receipt Condition Report

57189

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	<u>4</u> 250mL(P)		500mL(P)	1L(G)		*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>(N)</u> 1L(G) _____ 1L(P) _____
HNO ₃	125mL(P)	250mL(P)		500mL(P)			
H ₂ SO ₄	40mL(G)	60mL(P)		125mL(P)	250mL(P)	500mL(P)	
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)		250mL(P)			
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL(P)					
NH ₄ Ac	125mL(P)	250mL(P)					
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)		8oz(G)	Syringe		
None (water)	40ml (G)	60mL(P)	<u>2</u>	125mL(P)	250mL(P)	500mL(P)	
<u>NH₄Cl</u>	<u>60mL(G)</u>	<u>6</u>					
Mold	Cassette	Bulk		Plate	Tape Lift		
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk		Wipe			

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			<u>Less than pea-sized bubbles in 02B</u>
PFAS: Lab specific bottles? QC received, if required?	✓			<u>+ -02C HAA + -03BC HAA</u>
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			<u>-03 NO₂, NO₃ expired 5/27/21 @ 12:15</u>
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			<u>DBV</u>
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			-	
Compliance samples have no discrepancies/require no flags?			-	(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: JD

 Date/Time: 5/27/21 20:50

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/08/2021
Work Order #: 2106-00285
Client Job #:
Date Received: 06/02/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00285-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: GSP Filter
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 10:00AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:55AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:55AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:55AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 04:55AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 04:55AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 04:55AM
2,3-Dibromopropionic Acid	86	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 04:55AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00285-002
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: UV Effluent
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 10:00AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 05:36AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 05:36AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 05:36AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 05:36AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 05:36AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 05:36AM
2,3-Dibromopropionic Acid	90	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 05:36AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00285-003
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: GAC
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 10:00AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:16AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:16AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:16AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 06:16AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 06:16AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:16AM
2,3-Dibromopropionic Acid	92	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 06:16AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00285-004
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: Maher GSP
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 09:00AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:57AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:57AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:57AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 06:57AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 06:57AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 06:57AM
2,3-Dibromopropionic Acid	94	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 06:57AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/08/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00285-005
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: Maher UV
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 05/27/2021 09:00AM
DATE AND TIME RECEIVED: 06/02/2021 09:00AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 07:38AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 07:38AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 07:38AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/05/2021 07:38AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/05/2021 07:38AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/05/2021 07:38AM
2,3-Dibromopropionic Acid	80	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 07:38AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57190
Date Received: 5/27/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.
Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/10/2021
Total number of pages: 44

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GSP CBW	Water	5/26/2021 12:30	57190-001	Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1 Total Dissolved Solids by SM2540C Total Suspended Solids by SM2540D
Raw	Water	5/27/2021 10:00	57190-002	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GSP Filter	Water	5/27/2021 10:00	57190-003	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
UV Effluent	Water	5/27/2021 10:00	57190-004	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GAC	Water	5/27/2021 10:00	57190-005	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Magnesium in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Maher Raw	Water	5/27/2021 9:00	57190-006	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher GSP	Water	5/27/2021 9:00	57190-007	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher UV	Water	5/27/2021 9:00	57190-008	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Maher GAC	Water	5/27/2021 9:00	57190-009	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Zinc in water by 200.8
Raw-DISS	Water	5/27/2021 10:00	57190-010	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
GSP Filter-DISS	Water	5/27/2021 10:00	57190-011	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Field Blank	Water	5/27/2021 0:00	57190-012	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-003

Sample ID: GSP Filter

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	16:28	E524.2
bromodichloromethane	0.15 J	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	16:28	E524.2
dibromochloromethane	0.39 J	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	16:28	E524.2
bromoform	0.22 J	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	16:28	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	16:28	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	89	70-130		%	1	LMM			2101571	6/3/21	16:28	E524.2
1,4-dichlorobenzene-D4 SUR	91	70-130		%	1	LMM			2101571	6/3/21	16:28	E524.2

Sample#: 57190-004

Sample ID: UV Effluent

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	17:00	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	17:00	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	17:00	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	17:00	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	17:00	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	89	70-130		%	1	LMM			2101571	6/3/21	17:00	E524.2
1,4-dichlorobenzene-D4 SUR	89	70-130		%	1	LMM			2101571	6/3/21	17:00	E524.2

Sample#: 57190-005

Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	17:31	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	17:31	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	17:31	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	17:31	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	17:31	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	94	70-130		%	1	LMM			2101571	6/3/21	17:31	E524.2
1,4-dichlorobenzene-D4 SUR	93	70-130		%	1	LMM			2101571	6/3/21	17:31	E524.2

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	18:03	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	18:03	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	18:03	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	18:03	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	18:03	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	96	70-130		%	1	LMM			2101571	6/3/21	18:03	E524.2
1,4-dichlorobenzene-D4 SUR	95	70-130		%	1	LMM			2101571	6/3/21	18:03	E524.2

Sample#: 57190-008

Sample ID: Maher UV

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	18:35	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101571	6/3/21	18:35	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101571	6/3/21	18:35	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101571	6/3/21	18:35	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101571	6/3/21	18:35	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	95	70-130		%	1	LMM			2101571	6/3/21	18:35	E524.2
1,4-dichlorobenzene-D4 SUR	97	70-130		%	1	LMM			2101571	6/3/21	18:35	E524.2

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 5/26/21 12:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.53	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	8:35	SW8260Dmod

Sample#: 57190-002

Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.66	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	9:07	SW8260Dmod

Sample#: 57190-003

Sample ID: GSP Filter

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.91	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	9:38	SW8260Dmod

Sample#: 57190-004

Sample ID: UV Effluent

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	10:10	SW8260Dmod

Sample#: 57190-006

Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	10:41	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	11:13	SW8260Dmod

Sample#: 57190-008

Sample ID: Maher UV

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	11:45	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-002

Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Iron	0.68	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Magnesium	5.5	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Manganese	1.0	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Sodium	26	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Zinc	0.0097 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:04	E200.8
Hardness (as CaCO3)	70	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-003

Sample ID: GSP Filter

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	18	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Magnesium	5.3	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Manganese	0.0010 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Sodium	42	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:11	E200.8
Hardness (as CaCO3)	68	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-004

Sample ID: UV Effluent

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:37	E200.8
Magnesium	5.3	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:37	E200.8
Sodium	43	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:37	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:37	E200.8
Hardness (as CaCO3)	68	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-005

Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	18	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:44	E200.8
Magnesium	5.4	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:44	E200.8
Sodium	43	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:44	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:44	E200.8
Hardness (as CaCO3)	68	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-006

Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	5.9	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Iron	0.044 J	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Magnesium	2.7	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Manganese	0.065	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Sodium	16	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Zinc	0.0052 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:50	E200.8
Hardness (as CaCO3)	26	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	5.9	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Magnesium	2.6	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Manganese	0.035	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Sodium	17	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Zinc	0.0030 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	20:57	E200.8
Hardness (as CaCO3)	25	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-008

Sample ID: Maher UV

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	6.0	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Magnesium	2.6	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Manganese	0.035	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Sodium	17	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Zinc	0.0033 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:04	E200.8
Hardness (as CaCO3)	26	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-009

Sample ID: Maher GAC

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	5.2	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Magnesium	2.4	0.10	0.00066	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Manganese	0.0039 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Sodium	18	0.10	0.021	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Zinc	0.16	0.010	0.0028	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:10	E200.8
Hardness (as CaCO3)	23	3	0.4	mg/L	1	AGN	6/7/21	16:37	13945	6/8/21		SM2340B

Sample#: 57190-010

Sample ID: Raw-DISS

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	0.41	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:17	E200.8
Manganese	1.0	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:17	E200.8

Sample#: 57190-011

Sample ID: GSP Filter-DISS

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:24	E200.8
Manganese	0.0046 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:37	13945	6/7/21	21:24	E200.8

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 5/26/21 12:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Dissolved Solids (TDS)	95	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
Total Suspended Solids (TSS)	220	110	52	mg/L	1	SFM			2101504	5/28/21	12:15	SM2540D

Sample#: 57190-002

Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	48	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101509	5/28/21	12:46	SM2120B
Chloride	47	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	12:13	E300.0A
Nitrate-N	0.5	0.1	0.038	mg/L	1	DBV			2101519	5/28/21	12:13	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101519	5/28/21	12:13	E300.0A
Sulfate	19	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	12:13	E300.0A
Total Dissolved Solids (TDS)	170	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101510	5/28/21	12:46	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
Conductivity	280	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	6.8 H			pH	1	SFM			2101511	5/28/21	10:33	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101503	5/28/21	11:44	SM2130B

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-003

Sample ID: GSP Filter

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	74	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101509	5/28/21	12:48	SM2120B
Chloride	50	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	12:29	E300.0A
Nitrate-N	0.5	0.1	0.038	mg/L	1	DBV			2101519	5/28/21	12:29	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101519	5/28/21	12:29	E300.0A
Sulfate	19	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	12:29	E300.0A
Total Dissolved Solids (TDS)	190	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101510	5/28/21	12:48	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
Conductivity	340	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	7.5 H			pH	1	SFM			2101511	5/28/21	10:38	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101503	5/28/21	11:45	SM2130B

Sample#: 57190-004

Sample ID: UV Effluent

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	73	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Chloride	50	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	12:46	E300.0A
Sulfate	21	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	12:46	E300.0A
Total Dissolved Solids (TDS)	190	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
Conductivity	340	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	7.6 H			pH	1	SFM			2101511	5/28/21	10:45	SM4500H+B

H = Sample was received beyond method holding time.

Sample#: 57190-005

Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	71	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Chloride	51	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	13:02	E300.0A
Sulfate	22	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	13:02	E300.0A
Total Dissolved Solids (TDS)	190	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
Conductivity	350	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	7.9 H			pH	1	SFM			2101511	5/28/21	11:03	SM4500H+B

H = Sample was received beyond method holding time.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-006

Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	12	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101509	5/28/21	12:49	SM2120B
Bromide	0.045 J	0.1	0.021	mg/L	1	DBV			2101519	5/28/21	13:18	E300.0A
Chloride	29	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	13:18	E300.0A
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101519	5/28/21	13:18	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101519	5/28/21	13:18	E300.0A
Sulfate	7.3	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	13:18	E300.0A
Total Dissolved Solids (TDS)	83	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101510	5/28/21	12:49	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
Conductivity	140	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	6.1 H			pH	1	SFM			2101511	5/28/21	11:13	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101503	5/28/21	11:45	SM2130B

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	15	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101509	5/28/21	12:50	SM2120B
Chloride	28	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	13:35	E300.0A
Sulfate	7.5	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	13:35	E300.0A
Total Dissolved Solids (TDS)	80	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101510	5/28/21	12:50	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
Conductivity	150	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	6.4 H			pH	1	SFM			2101511	5/28/21	11:24	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101503	5/28/21	11:46	SM2130B

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-008

Sample ID: Maher UV

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	14	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101509	5/28/21	12:51	SM2120B
Chloride	29 M	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	14:41	E300.0A
M = The recovery for the matrix spike was 77%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101519	5/28/21	14:41	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101519	5/28/21	14:41	E300.0A
Sulfate	7.4	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	14:41	E300.0A
Total Dissolved Solids (TDS)	86	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101510	5/28/21	12:51	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101516	5/27/21	17:40	SM9223BColilert
Conductivity	150	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	7.3 H			pH	1	SFM			2101511	5/28/21	11:32	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101503	5/28/21	11:47	SM2130B

Sample#: 57190-009

Sample ID: Maher GAC

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	15	5	0.47	mg/L	1	DJM			2101535	6/2/21	9:21	SM2320B
Chloride	28	0.5	0.36	mg/L	1	DBV			2101519	5/28/21	15:14	E300.0A
Sulfate	7.1	0.5	0.21	mg/L	1	DBV			2101519	5/28/21	15:14	E300.0A
Total Dissolved Solids (TDS)	87	20	7.5	mg/L	1	SFM			2101566	6/2/21	14:25	SM2540C
Conductivity	140	5		umhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
pH	7.5 H			pH	1	SFM			2101511	5/28/21	11:44	SM4500H+B
H = Sample was received beyond method holding time.												

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-002

Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	0.63 J	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	14:57	SM5310C

Sample#: 57190-003

Sample ID: GSP Filter

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	1.1	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	15:15	SM5310C

Sample#: 57190-004

Sample ID: UV Effluent

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	1.0	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	15:33	SM5310C

Sample#: 57190-005

Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	15:52	SM5310C

Sample#: 57190-006

Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	1.0	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	16:10	SM5310C

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	0.62 J	1.0	0.59	mg/L	1	DBV			2101548	6/2/21	16:29	SM5310C

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 5/26/21 12:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.9 U	1.9	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.9 U	1.9	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.9 U	1.9	0.32	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorobutane sulfonic acid (PFBS)	3.6	1.9	0.49	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorodecanoic acid (PFDA)	0.44 J	1.9	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorododecanoic acid (PFDOA)	1.9 U	1.9	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluoroheptanoic acid (PFHPA)	5.2	1.9	0.32	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorohexane sulfonic acid (PFHXS)	26	1.9	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorohexanoic acid (PFHXA)	12	1.9	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorononanoic acid (PFNA)	2.1	1.9	0.44	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorooctane sulfonic acid (PFOS)	36	1.9	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorooctanoic acid (PFOA)	19	1.9	0.32	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorotetradecanoic acid (PFTEA)	1.9 U	1.9	0.48	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluorotridecanoic acid (PFTRIA)	1.9 U	1.9	0.13	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
perfluoroundecanoic acid (PFUNA)	1.9 U	1.9	0.31	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.9 U	1.9	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.9 U	1.9	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.9 U	1.9	0.18	ng/L	1	ACA	6/8/21	13948	6/9/21	14:08
Surrogate Recovery		Limits								
13C2-PFHxA SUR	95	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:08
13C2-PFDA SUR	111	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:08
D5-NEtFOSAA SUR	100	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:08
13C3-HFPO-DA SUR	91	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:08
Sum of MA PFAS6 Analytes (MAPFAS6)	88	1.9		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-002

Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorobutane sulfonic acid (PFBS)	3.8	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorodecanoic acid (PFDA)	0.70 J	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluoroheptanoic acid (PFHPA)	6.8	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorohexane sulfonic acid (PFHXS)	29	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorohexanoic acid (PFHXA)	11	1.7	0.30	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorononanoic acid (PFNA)	2.2	1.7	0.39	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorooctane sulfonic acid (PFOS)	36	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorooctanoic acid (PFOA)	19	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
perfluoroundecanoic acid (PFUNA)	0.66 J	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/1/21	13921	6/1/21	18:44
Surrogate Recovery		Limits								
13C2-PFHxA SUR	109	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:44
13C2-PFDA SUR	114	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:44
D5-NEtFOSAA SUR	96	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:44
13C3-HFPO-DA SUR	109	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:44
Sum of MA PFAS6 Analytes (MAPFAS6)	92	1.7		ng/L	1			2101532		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-005

Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.1 J	1.7	0.26	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorodecanoic acid (PFDA)	2.0	1.7	0.30	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorododecanoic acid (PFDOA)	0.95 J	1.7	0.37	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluoroheptanoic acid (PFHPA)	1.6 J	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorohexanoic acid (PFHXA)	0.84 J	1.7	0.30	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorononanoic acid (PFNA)	2.2	1.7	0.39	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorooctanoic acid (PFOA)	1.9	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
perfluoroundecanoic acid (PFUNA)	1.4 J	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 J	1.7	0.16	ng/L	1	WAS	6/1/21	13921	6/1/21	18:59
Surrogate Recovery		Limits								
13C2-PFHxA SUR	102	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:59
13C2-PFDA SUR	119	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:59
D5-NEtFOSAA SUR	96	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:59
13C3-HFPO-DA SUR	108	70-130		%	1	WAS	6/1/21	13921	6/1/21	18:59
Sum of MA PFAS6 Analytes (MAPFAS6)	6.1	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-006

Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	0.81 J	1.7	0.26	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorobutane sulfonic acid (PFBS)	2.2	1.7	0.42	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorodecanoic acid (PFDA)	1.1 J	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluoroheptanoic acid (PFHPA)	13	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorohexane sulfonic acid (PFHXS)	40	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorohexanoic acid (PFHXA)	24	1.7	0.29	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorononanoic acid (PFNA)	7.0	1.7	0.38	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorooctane sulfonic acid (PFOS)	78	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorooctanoic acid (PFOA)	15	1.7	0.28	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
perfluoroundecanoic acid (PFUNA)	0.58 J	1.7	0.27	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.4 J	1.7	0.15	ng/L	1	WAS	6/1/21	13921	6/1/21	19:15
Surrogate Recovery		Limits								
13C2-PFHxA SUR	110	70-130		%	1	WAS	6/1/21	13921	6/1/21	19:15
13C2-PFDA SUR	123	70-130		%	1	WAS	6/1/21	13921	6/1/21	19:15
D5-NEtFOSAA SUR	99	70-130		%	1	WAS	6/1/21	13921	6/1/21	19:15
13C3-HFPO-DA SUR	124	70-130		%	1	WAS	6/1/21	13921	6/1/21	19:15
Sum of MA PFAS6 Analytes (MAPFAS6)	150	1.7		ng/L	1			2101532		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-007

Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorobutane sulfonic acid (PFBS)	1.9	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorodecanoic acid (PFDA)	0.41 J	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluoroheptanoic acid (PFHPA)	12	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorohexane sulfonic acid (PFHXS)	33	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorohexanoic acid (PFHXA)	27	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorononanoic acid (PFNA)	7.5	1.7	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorooctane sulfonic acid (PFOS)	75	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorooctanoic acid (PFOA)	15	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	6/8/21	13948	6/9/21	14:24
Surrogate Recovery		Limits								
13C2-PFHxA SUR	94	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:24
13C2-PFDA SUR	98	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:24
D5-NEtFOSAA SUR	97	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:24
13C3-HFPO-DA SUR	89	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:24
Sum of MA PFAS6 Analytes (MAPFAS6)	140	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-008

Sample ID: Maher UV

Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.34	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorobutane sulfonic acid (PFBS)	2.0	1.8	0.44	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorodecanoic acid (PFDA)	0.39 J	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluoroheptanoic acid (PFHPA)	13	1.8	0.29	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorohexane sulfonic acid (PFHXS)	36	1.8	0.35	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorohexanoic acid (PFHXA)	27	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorononanoic acid (PFNA)	7.3	1.8	0.40	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorooctane sulfonic acid (PFOS)	75	1.8	0.35	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorooctanoic acid (PFOA)	14	1.8	0.29	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.11	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	WAS	6/1/21	13921	6/2/21	6:20
Surrogate Recovery		Limits								
13C2-PFHxA SUR	104	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:20
13C2-PFDA SUR	125	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:20
D5-NEtFOSAA SUR	96	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:20
13C3-HFPO-DA SUR	112	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:20
Sum of MA PFAS6 Analytes (MAPFAS6)	140	1.8		ng/L	1			2101532		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57190

Sample#: 57190-012

Sample ID: Field Blank

Matrix: Water

Sampled: 5/27/21 0:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.46	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.32	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.37	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.46	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.37	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	WAS	6/1/21	13921	6/2/21	6:36
Surrogate Recovery										
		Limits								
13C2-PFHxA SUR	115	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:36
13C2-PFDA SUR	127	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:36
D5-NEtFOSAA SUR	104	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:36
13C3-HFPO-DA SUR	121	70-130		%	1	WAS	6/1/21	13921	6/2/21	6:36
Sum of MA PFAS6 Analytes (MAPFAS6)	1.8 U	1.8		ng/L	1			2101532		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57190

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 57190-008 did not meet the acceptance criteria for chloride. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101571	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			93	%			70	130	
		1,4-dichlorobenzene-D4 SUR			95	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101571	chloroform	57188-001	<	0.50	ug/L				20	
		bromodichloromethane	57188-001	<	0.50	ug/L				20	
		dibromochloromethane	57188-001	<	0.50	ug/L				20	
		bromoform	57188-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57188-001		96	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57188-001		95	%			70	130	
		Total Trihalomethanes (THMs)	57188-001							95.8	
E524.2	LCS2101571	chloroform			10	ug/L	10	104	70	130	
		bromodichloromethane			10	ug/L	10	103	70	130	
		dibromochloromethane			10	ug/L	10	104	70	130	
		bromoform			11	ug/L	10	110	70	130	
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			122	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101571	chloroform			10	ug/L	10	100	70	130	4
		bromodichloromethane			9.9	ug/L	10	99	70	130	4
		dibromochloromethane			10	ug/L	10	101	70	130	2
		bromoform			10	ug/L	10	105	70	130	4
		4-bromofluorobenzene SUR			106	%			70	130	
		1,4-dichlorobenzene-D4 SUR			114	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101601	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101601	1,4-dioxane			8.4	ug/L	8	105	70	130	
SW8260Dmod	LCSD2101601	1,4-dioxane			8.4	ug/L	8	105	70	130	0

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13945	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13945	Calcium	57136-001	0.69	mg/L				9	20
		Iron	57136-001	< 0.050	mg/L					20
		Magnesium	57136-001	0.48	mg/L				2	20
		Manganese	57136-001	0.030	mg/L				0	20
E200.8	LCS13945	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13945	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13945	Calcium	57136-001	3.0	mg/L	2.5	121	70 130		
		Iron	57136-001	0.49	mg/L	0.5	98	70 130		
		Magnesium	57136-001	0.96	mg/L	0.5	96	70 130		
		Manganese	57136-001	0.54	mg/L	0.5	101	70 130		
E200.8	MS13945	Calcium	57190-003	21	mg/L	2.5	104	70 130		
		Iron	57190-003	0.49	mg/L	0.5	97	70 130		
		Magnesium	57190-003	5.9	mg/L	0.5	108	70 130		
		Manganese	57190-003	0.50	mg/L	0.5	100	70 130		
		Sodium	57190-003	47	mg/L	5	103	70 130		
		Zinc	57190-003	0.51	mg/L	0.5	102	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101519	Bromide		<	0.1	mg/L				
		Chloride		<	0.5	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101519	Nitrate-N	57189-003		0.5	mg/L			0	10
		Nitrite-N	57189-003	<	0.1	mg/L				10
E300.0A	LCS2101519	Bromide			9.5	mg/L	10	95	90	110
		Chloride			97	mg/L	100	97	90	110
		Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
		Sulfate			97	mg/L	100	97	90	110
E300.0A	LCS2101519	Bromide			9.5	mg/L	10	95	90	110
		Chloride			98	mg/L	100	98	90	110
		Nitrate-N			9.9	mg/L	10	99	90	110
		Nitrite-N			15	mg/L	15	97	90	110
		Sulfate			97	mg/L	100	97	90	110
E300.0A	MS2101519	Chloride	57078-006		17	mg/L	16	104	90	110
E300.0A	MS2101519	Nitrate-N	57189-003		2.0	mg/L	1.66	92	90	110
		Nitrite-N	57189-003		2.4	mg/L	2.53	96	90	110
E300.0A	MS2101519	Chloride	57190-008		42	mg/L	16	77 *	90	110
		Nitrate-N	57190-008		2.2	mg/L	1.66	95	90	110
		Nitrite-N	57190-008		2.5	mg/L	2.53	100	90	110
		Sulfate	57190-008		23	mg/L	16	93	90	110
E300.0A	MSD2101519	Chloride	57078-006		18	mg/L	16	107	90	110
									3	10
SM2120B	DUP2101509	Apparent Color	57139-001		8	CU			0	20
SM2120B	DUP2101509	Apparent Color	57139-005		8	CU			0	20
SM2120B	LCS2101509	Apparent Color			35	CU	35		30	40
SM2120B	PB2101509	Apparent Color		<	5	CU			5	
SM2120B	BLK2101510	True Color		<	5	CU			5	
SM2120B	DUP2101510	True Color	57187-001	<	5	CU				20
SM2120B	LCS2101510	True Color			35	CU	35		30	40

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	CCVB2101535	Alkalinity, Total (as CaCO3)		6.04	pH			5.94 6.06		
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)		4.06	pH			3.94 4.06		
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-004	75	mg/L				3	10
SM2320B	DUP2101535	Alkalinity, Total (as CaCO3)	57190-007	15	mg/L				2	10
SM2320B	LCS2101535	Alkalinity, Total (as CaCO3)		24	mg/L	25	97	90 110		
SM2320B	LCSD2101535	Alkalinity, Total (as CaCO3)		25	mg/L	25	98	90 110	1	10
SM2320B	PB2101535	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101528	Conductivity		<	5	uS/cm				
SM2510B	DUP2101528	Conductivity	57190-008	150	uS/cm				0	20
SM2510B	DUP2101528	Conductivity	57190-009	150	uS/cm				2	20
SM2510B	LCS2101528	Conductivity		1400	uS/cm	1409	99	90 110		
SM2510B	LCSD2101528	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101566	Total Dissolved Solids (TDS)	57190-007	76	mg/L				5	5
SM2540C	LCS2101566	Total Dissolved Solids (TDS)		110	mg/L	99.2	106	75 125		
SM2540C	PB2101566	Total Dissolved Solids (TDS)		<	20	mg/L				
SM2540D	DUP2101504	Total Suspended Solids (TSS)	57127-001	36	mg/L				4	5
SM2540D	LCS2101504	Total Suspended Solids (TSS)		300	mg/L	323	93	75 125		
SM2540D	LCSD2101504	Total Suspended Solids (TSS)		310	mg/L	323	97	75 125	4	20
SM2540D	PB2101504	Total Suspended Solids (TSS)		<	2.5	mg/L				
SM4500H+B	DUP2101511	pH	57136-001	8.3	pH					
SM4500H+B	DUP2101511	pH	57179-001	8.1	pH					
SM4500H+B	DUP2101511	pH	57186-001	7.3	pH					
SM4500H+B	DUP2101511	pH	57190-009	7.4	pH					

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM5310C	BLK2101548	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101548	Total Organic Carbon (TOC)	57219-001	9	mg/L				1	20
SM5310C	LCS2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115		
SM5310C	LCSD2101548	Total Organic Carbon (TOC)		10	mg/L	10	102	85 115	0	20
SM5310C	MS2101548	Total Organic Carbon (TOC)	57219-002	13	mg/L	10	97	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30 ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39 ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33 ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50 ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34 ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43 ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33 ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40 ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35 ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45 ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40 ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33 ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50 ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13 ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32 ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39 ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40 ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18 ng/L					
		13C2-PFHxA SUR		109		%			70 130		
		13C2-PFDA SUR		117		%			70 130		
		D5-NETFOSAA SUR		104		%			70 130		
		13C3-HFPO-DA SUR		110		%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57136-001	1.7 U	1.7	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57136-001	1.7 U	1.7	0.34	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57136-001	1.8	1.7	0.44	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57136-001	1.7 U	1.7	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57136-001	1.7 U	1.7	0.37	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57136-001	0.76 J	1.7	0.29	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57136-001	0.44 J	1.7	0.35	ng/L					30
		perfluorohexanoic acid (PFHXA)	57136-001	1.4 J	1.7	0.30	ng/L					30
		perfluorononanoic acid (PFNA)	57136-001	1.7 U	1.7	0.39	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57136-001	0.88 J	1.7	0.35	ng/L					30
		perfluorooctanoic acid (PFOA)	57136-001	2.6	1.7	0.29	ng/L				2	30
		perfluorotetradecanoic acid (PFTEA)	57136-001	1.7 U	1.7	0.43	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57136-001	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57136-001	1.7 U	1.7	0.28	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57136-001	1.7 U	1.7	0.34	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57136-001	1.7 U	1.7	0.35	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57136-001	1.7 U	1.7	0.16	ng/L					30
		13C2-PFHxA SUR	57136-001	111			%			70 130		
		13C2-PFDA SUR	57136-001	111			%			70 130		
		D5-NETFOSAA SUR	57136-001	104			%			70 130		
		13C3-HFPO-DA SUR	57136-001	121			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		42	2.0	0.30	ng/L	40	106	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		42	2.0	0.39	ng/L	40	105	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		40	2.0	0.33	ng/L	40	99	70 130		
		perfluorobutane sulfonic acid (PFBS)		35	2.0	0.50	ng/L	35	99	70 130		
		perfluorodecanoic acid (PFDA)		38	2.0	0.34	ng/L	40	95	70 130		
		perfluorododecanoic acid (PFDOA)		45	2.0	0.43	ng/L	40	112	70 130		
		perfluoroheptanoic acid (PFHPA)		45	2.0	0.33	ng/L	40	113	70 130		
		perfluorohexane sulfonic acid (PFHXS)		39	2.0	0.40	ng/L	38	103	70 130		
		perfluorohexanoic acid (PFHXA)		40	2.0	0.35	ng/L	40	101	70 130		
		perfluorononanoic acid (PFNA)		43	2.0	0.45	ng/L	40	108	70 130		
		perfluorooctane sulfonic acid (PFOS)		35	2.0	0.40	ng/L	38	90	70 130		
		perfluorooctanoic acid (PFOA)		42	2.0	0.33	ng/L	40	105	70 130		
		perfluorotetradecanoic acid (PFTEA)		40	2.0	0.50	ng/L	40	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		41	2.0	0.13	ng/L	40	103	70 130		
		perfluoroundecanoic acid (PFUNA)		40	2.0	0.32	ng/L	40	101	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		32	2.0	0.39	ng/L	37	85	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		34	2.0	0.40	ng/L	37	92	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		43	2.0	0.18	ng/L	37	113	70 130		
		13C2-PFHxA SUR		113			%			70 130		
		13C2-PFDA SUR		126			%			70 130		
		D5-NEtFOSAA SUR		102			%			70 130		
		13C3-HFPO-DA SUR		120			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57178-001	3.9	1.7	0.26	ng/L	3.41	114	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57178-001	3.8	1.7	0.33	ng/L	3.41	111	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57178-001	3.9	1.7	0.28	ng/L	3.41	115	50 150		
		perfluorobutane sulfonic acid (PFBS)	57178-001	3.7	1.7	0.43	ng/L	3.02	122	50 150		
		perfluorodecanoic acid (PFDA)	57178-001	3.5	1.7	0.29	ng/L	3.41	102	50 150		
		perfluorododecanoic acid (PFDOA)	57178-001	3.9	1.7	0.37	ng/L	3.41	114	50 150		
		perfluoroheptanoic acid (PFHPA)	57178-001	4.9	1.7	0.28	ng/L	3.41	144	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57178-001	3.8	1.7	0.34	ng/L	3.24	117	50 150		
		perfluorohexanoic acid (PFHXA)	57178-001	4.8	1.7	0.29	ng/L	3.41	140	50 150		
		perfluorononanoic acid (PFNA)	57178-001	4.1	1.7	0.38	ng/L	3.41	119	50 150		
		perfluorooctane sulfonic acid (PFOS)	57178-001	3.4	1.7	0.34	ng/L	3.27	102	50 150		
		perfluorooctanoic acid (PFOA)	57178-001	6.1	1.7	0.28	ng/L	3.41	116	50 150		
		perfluorotetradecanoic acid (PFTEA)	57178-001	3.3	1.7	0.42	ng/L	3.41	96	50 150		
		perfluorotridecanoic acid (PFTRIA)	57178-001	3.5	1.7	0.11	ng/L	3.41	103	50 150		
		perfluoroundecanoic acid (PFUNA)	57178-001	3.7	1.7	0.28	ng/L	3.41	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57178-001	2.8	1.7	0.34	ng/L	3.22	86	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57178-001	3.0	1.7	0.34	ng/L	3.19	94	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57178-001	4.0	1.7	0.16	ng/L	3.22	125	50 150		
		13C2-PFHxA SUR	57178-001	113			%			70 130		
		13C2-PFDA SUR	57178-001	119			%			70 130		
		D5-NETFOSAA SUR	57178-001	106			%			70 130		
		13C3-HFPO-DA SUR	57178-001	110			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		100			%			70 130		
		13C2-PFDA SUR		112			%			70 130		
		D5-NETFOSAA SUR		97			%			70 130		
		13C3-HFPO-DA SUR		95			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	1.9 U	1.9	0.29	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57290-002	1.9 U	1.9	0.38	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57290-002	2.3	1.9	0.48	ng/L				1	30
		perfluorodecanoic acid (PFDA)	57290-002	1.9 U	1.9	0.33	ng/L					30
		perfluorododecanoic acid (PFDOA)	57290-002	1.9 U	1.9	0.41	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57290-002	1.8 J	1.9	0.32	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57290-002	1.4 J	1.9	0.38	ng/L					30
		perfluorohexanoic acid (PFHXA)	57290-002	3.4	1.9	0.33	ng/L				8	30
		perfluorononanoic acid (PFNA)	57290-002	0.54 J	1.9	0.43	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57290-002	3.6	1.9	0.38	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57290-002	5.9	1.9	0.32	ng/L				7	30
		perfluorotetradecanoic acid (PFTEA)	57290-002	1.9 U	1.9	0.48	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57290-002	1.9 U	1.9	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57290-002	1.9 U	1.9	0.18	ng/L					30
		13C2-PFHxA SUR	57290-002	102			%			70 130		
		13C2-PFDA SUR	57290-002	103			%			70 130		
		D5-NETFOSAA SUR	57290-002	95			%			70 130		
		13C3-HFPO-DA SUR	57290-002	99			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		170	2.0	0.30	ng/L	200	87	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		210	2.0	0.39	ng/L	200	103	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	108	70 130		
		perfluorobutane sulfonic acid (PFBS)		160	2.0	0.50	ng/L	177	91	70 130		
		perfluorodecanoic acid (PFDA)		200	2.0	0.34	ng/L	200	102	70 130		
		perfluorododecanoic acid (PFDOA)		210	2.0	0.43	ng/L	200	104	70 130		
		perfluoroheptanoic acid (PFHPA)		180	2.0	0.33	ng/L	200	90	70 130		
		perfluorohexane sulfonic acid (PFHXS)		160	2.0	0.40	ng/L	190	85	70 130		
		perfluorohexanoic acid (PFHXA)		180	2.0	0.35	ng/L	200	90	70 130		
		perfluorononanoic acid (PFNA)		190	2.0	0.45	ng/L	200	93	70 130		
		perfluorooctane sulfonic acid (PFOS)		160	2.0	0.40	ng/L	192	85	70 130		
		perfluorooctanoic acid (PFOA)		180	2.0	0.33	ng/L	200	89	70 130		
		perfluorotetradecanoic acid (PFTEA)		200	2.0	0.50	ng/L	200	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		200	2.0	0.13	ng/L	200	99	70 130		
		perfluoroundecanoic acid (PFUNA)		200	2.0	0.32	ng/L	200	102	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	97	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		170	2.0	0.18	ng/L	189	89	70 130		
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NETFOSAA SUR		84			%			70 130		
		13C3-HFPO-DA SUR		85			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	1.8	0.28	ng/L	36	95	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57286-001	43	1.8	0.36	ng/L	36	116	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57286-001	40	1.8	0.30	ng/L	36	108	70 130		
		perfluorobutane sulfonic acid (PFBS)	57286-001	30	1.8	0.46	ng/L	32	94	70 130		
		perfluorodecanoic acid (PFDA)	57286-001	39	1.8	0.31	ng/L	36	106	70 130		
		perfluorododecanoic acid (PFDOA)	57286-001	41	1.8	0.39	ng/L	36	112	70 130		
		perfluoroheptanoic acid (PFHPA)	57286-001	37	1.8	0.30	ng/L	36	101	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57286-001	32	1.8	0.36	ng/L	34	92	70 130		
		perfluorohexanoic acid (PFHXA)	57286-001	37	1.8	0.32	ng/L	36	102	70 130		
		perfluorononanoic acid (PFNA)	57286-001	37	1.8	0.41	ng/L	36	102	70 130		
		perfluorooctane sulfonic acid (PFOS)	57286-001	33	1.8	0.37	ng/L	35	94	70 130		
		perfluorooctanoic acid (PFOA)	57286-001	39	1.8	0.30	ng/L	36	107	70 130		
		perfluorotetradecanoic acid (PFTEA)	57286-001	41	1.8	0.46	ng/L	36	111	70 130		
		perfluorotridecanoic acid (PFTRIA)	57286-001	40	1.8	0.12	ng/L	36	110	70 130		
		perfluoroundecanoic acid (PFUNA)	57286-001	43	1.8	0.30	ng/L	36	117	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57286-001	33	1.8	0.36	ng/L	34	96	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57286-001	33	1.8	0.37	ng/L	34	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57286-001	33	1.8	0.17	ng/L	34	95	70 130		
		13C2-PFHxA SUR	57286-001	97			%			70 130		
		13C2-PFDA SUR	57286-001	100			%			70 130		
		D5-NETFOSAA SUR	57286-001	101			%			70 130		
		13C3-HFPO-DA SUR	57286-001	91			%			70 130		

Absolute Resource associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57190

ANALYSIS REQUEST

Company Name: Bluelect, Inc.

Company Address: 57 Dresser Hill Rd.

Report To: Charlton, MA 01507

Phone #: 774 200 8029

Invoice to: Eric Grotton

Email: egrotton@bluelectwater.com

PO #: _____

Project Name: BW Straightway

Project #: 11204

Project Location: NH MA ME VT

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting QAPP GW-1 S-1

Limits: EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015
<input type="checkbox"/> VPH MADEP	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input type="checkbox"/> Gases-List:
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRP 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PAH
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> EDB	<input type="checkbox"/> 8082 PCB
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pests/PCB	<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533
<input type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664
<input type="checkbox"/> pH	<input checked="" type="checkbox"/> BOD	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> Apparent Color
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TVS	<input type="checkbox"/> Alkalinity	<input type="checkbox"/> Acidity
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness	<input type="checkbox"/> Total Metals-list:
<input type="checkbox"/> Total Metals-list:	<input type="checkbox"/> Dissolved Metals-list:	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN
<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide
<input checked="" type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Chloride	<input checked="" type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> Pesticide
<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Conductivity

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57190-01	GSP CBW		X							5/26	12:30	AD	
-02	Rcw		X							5/27	10:00		
-03	GSP Filter												
-04	UV Effluent												
-05	GAC												
-06	Maier Raw										9:00		
-07	Maier GSP												
-08	Maier UV												
-09	Maier GAC												
-12	Field Blank												

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed: _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

Report 1,4 D Down to MCL = 0.150 ug/L

Bromide on Maier Raw Only

REPORTING INSTRUCTIONS PDF (e-mail address) _____

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 0.2 °C

CUSTODY RECORD QSD-01 Revision 03/09/2020	Relinquished by Sampler:	Date	Time	Received by:	Date	Time
		5/27/21	14:20		5-27	14:20
	Relinquished by:	Date	Time	Received by:	Date	Time
	5-27	17:16				
Relinquished by:	Date	Time	Received by Laboratory:	Date	Time	
				5/27/21	17:16	

Sample Receipt Condition Report

57190

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 0.2 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	8	250mL(P)		500mL(P)	1L(G)	*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <input checked="" type="checkbox"/> N <input type="checkbox"/> 2 1L(G) _____ 1L(P) _____
HNO ₃	125mL(P)		250mL(P)	10	500mL(P)		
H ₂ SO ₄	40mL(G)	12	60mL(P)		125mL(P)	250mL(P) 500mL(P)	
NaOH	125mL(P)		250mL(P)				
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)		
ZnAc-NaOH	125mL(P)		250mL(P)				
Trizma	125mL(P)		250mL(P)	13			
NH ₄ Ac	125mL(P)		250mL(P)				
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	5			
MeOH	20mL(G)		40mL(G)				
None (solid)	2oz(G)		4oz(G)		8oz(G)	Syringe	
None (water)	40ml(G)	12	60mL(P)	16	125mL(P)	21 250mL(P) 8 500mL(P) 5	
NH ₄ Cl	60mL(G)	12	40mL	4			
Mold	Cassette		Bulk		Plate	Tape Lift	
Asbestos	Cassette		Bulk				
Lead	Cassette		Bulk		Wipe		
Maleic acid/Ascorbic acid			40ml	2			

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?		✓		-05 VOCs are pres. w/ maleic acid and ascorbic acid
Analyses marked on COC match bottles received?		✓		
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			TSS bottles rec for -01 + 05 only
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?	✓			confirm if Fe, Mn is required on any of the total metals
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624				AN true report SFM, DBV No PFAS rec on -09
Date, time & ID on samples match CoC?	✓			No color rec on -04, 05, or -09
Rushes communicated to analyst in writing?				Alkalinity rec on -02 through -09, not on -09
Subcontract note on login board?	✓			No turbidity rec on -04, 05, or -09 CoC
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: JD

 Date/Time: 5/27/21 20:35

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HT's communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/17/2021
Work Order #: 2106-00933
Client Job #:
Date Received: 06/04/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/17/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-00933-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57224
GSP Filter
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✗
Attention	⚠

DATE AND TIME COLLECTED: 06/01/2021 11:00AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:05PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:05PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:05PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 12:05PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 12:05PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:05PM
2,3-Dibromopropionic Acid	90	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 12:05PM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/17/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00933-002
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57224
UV Effluent
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/01/2021 11:00AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:46PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:46PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:46PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 12:46PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 12:46PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 12:46PM
2,3-Dibromopropionic Acid	82	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 12:46PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57224

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
 Company Address: 57 Dresser Hill Rd. Charlton, MA
 Report To: Aaron Davis
 Phone #: 774 200 8025
 Invoice to: Erik Grotton
 Email: egrotton@blueleafwater.com
 PO #:

Project Name: BW STRAIGHTWAY
 Project #: 11204
 Project Location: NH MA ME VT _____
 Accreditation Required? N/A
 Protocol: RCRA SDWA NPDES
 MCP NHDES DOD
 Reporting QAPP GW-1 S-1
 Limits: EPA DW Other _____
 Quote # _____
 NH Reimbursement Pricing

VOC 8260 MADEP
 VOC 8260 NHDES VOC 8260 MADEP
 VOC 824.1 VOC BTEX MIBE, only VOC 8021VT
 VPH MADEP GRO 8015 1,4-Dioxane
 VOC 524.2 VOC 524.2 NH List Gases-List:
 TPH 8100 DRP 8015 EPH MADEP TPH Fingerprint
 8270PAH 8270ABN 625.1 EDB
 8082 PCB 8081 Pesticides 608.3 Pest/PCB
 PFAS 537.1 PFAS 533 PFAS isotopes dilution
 O&G 1664 Mineral O&G 1664
 pH BOD Conductivity Turbidity Apparent Color
 TSS TDS TS TVS Alkalinity Acidity
 RCRA Metals Priority Pollutant Metals TAL Metals Hardness
 Total Metals-list:
 Dissolved Metals-list:
 Ammonia COD TKN TN TOC Ferrous Iron
 T-Phosphorus Bacteria P/A Bacteria MPN Enterococci
 Cyanide Sulfide Nitrate-Nitrite Ortho P Phenols
 Nitrate Nitrite Chloride Sulfate Bromide Fluoride
 Corrosivity Ignitibility/FP
 TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide
 Subcontract: Grain Size Herbicides Asbestos

Lab Sample ID <small>(Lab Use Only)</small>	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5722401	Raw	2	X							6/1/21	11:00	AD	
02	GSP F. lter	7	X							30 per bottles			
03	UV Effluent	8	X										
04	GSP CBW	4	X								9:00		

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS Reps 1,4 Dioxane Down To Detection Limit < 0.15ug/L

REPORTING INSTRUCTIONS PDF (e-mail address) _____

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
 TEMPERATURE 3 °C

CUSTODY RECORD
 QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>6/1/21</u>	Time: <u>14:50</u>	Received by:	Date: <u>6-1</u>	Time: <u>12:50</u>
Relinquished by:	Date: <u>07</u>	Time: <u>16:41</u>	Received by:	Date: _____	Time: _____
Relinquished by:	Date: _____	Time: _____	Received by Laboratory:	Date: <u>6/1/21</u>	Time: <u>16:41</u>

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57224
Date Received: 6/1/21

Project: BW STRAIGHTWAY 11204

Attached please find results for the analysis of the samples received on the date referenced above.
Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/11/2021
Total number of pages: 7

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw	Water	6/1/2021 11:00	57224-001	Low level 1,4-dioxane in water by 8260 SIM
GSP Filter	Water	6/1/2021 11:00	57224-002	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM VOCs Trihalomethanes in water by 524.2
UV Effluent	Water	6/1/2021 11:00	57224-003	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A VOCs Trihalomethanes in water by 524.2
GSP CBW	Water	6/1/2021 9:00	57224-004	Low level 1,4-dioxane in water by 8260 SIM PFAS in Water by EPA 537.1

Project ID: BW STRAIGHTWAY 11204

Job ID: 57224

Sample#: 57224-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101572	6/4/21	1:35	E524.2
bromodichloromethane	0.064 J	0.50	0.060	ug/L	1	LMM			2101572	6/4/21	1:35	E524.2
dibromochloromethane	0.30 J	0.50	0.050	ug/L	1	LMM			2101572	6/4/21	1:35	E524.2
bromoform	0.15 J	0.50	0.10	ug/L	1	LMM			2101572	6/4/21	1:35	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101572	6/4/21	1:35	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	94	70-130		%	1	LMM			2101572	6/4/21	1:35	E524.2
1,4-dichlorobenzene-D4 SUR	98	70-130		%	1	LMM			2101572	6/4/21	1:35	E524.2

Sample#: 57224-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101572	6/4/21	2:06	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101572	6/4/21	2:06	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101572	6/4/21	2:06	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101572	6/4/21	2:06	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101572	6/4/21	2:06	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	93	70-130		%	1	LMM			2101572	6/4/21	2:06	E524.2
1,4-dichlorobenzene-D4 SUR	97	70-130		%	1	LMM			2101572	6/4/21	2:06	E524.2

Project ID: BW STRAIGHTWAY 11204

Job ID: 57224

Sample#: 57224-001

Sample ID: Raw

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.92	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	12:16	SW8260Dmod

Sample#: 57224-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.83	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	12:47	SW8260Dmod

Sample#: 57224-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.19 J	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	13:19	SW8260Dmod

Sample#: 57224-004

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/1/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.46	0.25	0.12	ug/L	1	LMM			2101601	6/5/21	13:50	SW8260Dmod

Project ID: BW STRAIGHTWAY 11204

Job ID: 57224

Sample#: 57224-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/1/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Nitrate-N	0.5	0.1	0.038	mg/L	1	DBV			2101549	6/2/21	13:01	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101549	6/2/21	13:01	E300.0A

Project ID: BW STRAIGHTWAY 11204

Job ID: 57224

Sample#: 57224-004

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/1/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	2.0 U	2.0	0.31	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	2.0 U	2.0	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	2.0 U	2.0	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorobutane sulfonic acid (PFBS)	3.6	2.0	0.51	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorodecanoic acid (PFDA)	0.43 J	2.0	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorododecanoic acid (PFDOA)	2.0 U	2.0	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluoroheptanoic acid (PFHPA)	4.9	2.0	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorohexane sulfonic acid (PFHXS)	26	2.0	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorohexanoic acid (PFHXA)	12	2.0	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorononanoic acid (PFNA)	2.1	2.0	0.45	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorooctane sulfonic acid (PFOS)	39	2.0	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorooctanoic acid (PFOA)	18	2.0	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorotetradecanoic acid (PFTEA)	2.0 U	2.0	0.50	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluorotridecanoic acid (PFTRIA)	2.0 U	2.0	0.13	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
perfluoroundecanoic acid (PFUNA)	2.0 U	2.0	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	2.0 U	2.0	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	2.0 U	2.0	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	2.0 U	2.0	0.19	ng/L	1	ACA	6/8/21	13948	6/9/21	14:40
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:40
13C2-PFDA SUR	104	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:40
D5-NEtFOSAA SUR	109	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:40
13C3-HFPO-DA SUR	88	70-130		%	1	ACA	6/8/21	13948	6/9/21	14:40
Sum of MA PFAS6 Analytes (MAPFAS6)	91	2		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57224

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

Method Blank

VOC: The compound, chloroform, was detected in the BLK2101572 at 0.57ug/L. There is no impact to the data as this analyte was not detected in the associated field samples.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101572	chloroform		0.57	ug/L		*				
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			93	%			70	130	
		1,4-dichlorobenzene-D4 SUR			92	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101572	chloroform	57203-007	<	0.50	ug/L				20	
		bromodichloromethane	57203-007	<	0.50	ug/L				20	
		dibromochloromethane	57203-007	<	0.50	ug/L				20	
		bromoform	57203-007	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57203-007		92	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57203-007		94	%			70	130	
		Total Trihalomethanes (THMs)	57203-007								92.4
E524.2	LCS2101572	chloroform		11	ug/L	10	106	70	130		
		bromodichloromethane		10.0	ug/L	10	100	70	130		
		dibromochloromethane		10.0	ug/L	10	100	70	130		
		bromoform		10	ug/L	10	103	70	130		
		4-bromofluorobenzene SUR		103	%			70	130		
		1,4-dichlorobenzene-D4 SUR		116	%			70	130		
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101572	chloroform		10	ug/L	10	102	70	130	3	20
		bromodichloromethane		9.9	ug/L	10	99	70	130	1	20
		dibromochloromethane		10	ug/L	10	101	70	130	2	20
		bromoform		10	ug/L	10	103	70	130	0	20
		4-bromofluorobenzene SUR		109	%			70	130		
		1,4-dichlorobenzene-D4 SUR		120	%			70	130		
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101601	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101601	1,4-dioxane		8.4	ug/L	8	105	70	130		
SW8260Dmod	LCSD2101601	1,4-dioxane		8.4	ug/L	8	105	70	130	0	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101549	Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
E300.0A	LCS2101549	Nitrate-N		9.9	mg/L	10	99	90	110	
		Nitrite-N		15	mg/L	15	96	90	110	
E300.0A	LCSD2101549	Nitrate-N		9.9	mg/L	10	99	90	110	0
		Nitrite-N		15	mg/L	15	97	90	110	0

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30 ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39 ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33 ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50 ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34 ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43 ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33 ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40 ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35 ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45 ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40 ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33 ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50 ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13 ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32 ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39 ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40 ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18 ng/L					
		13C2-PFHxA SUR		100		%			70 130		
		13C2-PFDA SUR		112		%			70 130		
		D5-NETFOSAA SUR		97		%			70 130		
		13C3-HFPO-DA SUR		95		%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	1.9 U	1.9	0.29	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57290-002	1.9 U	1.9	0.38	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57290-002	2.3	1.9	0.48	ng/L				1	30
		perfluorodecanoic acid (PFDA)	57290-002	1.9 U	1.9	0.33	ng/L					30
		perfluorododecanoic acid (PFDOA)	57290-002	1.9 U	1.9	0.41	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57290-002	1.8 J	1.9	0.32	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57290-002	1.4 J	1.9	0.38	ng/L					30
		perfluorohexanoic acid (PFHXA)	57290-002	3.4	1.9	0.33	ng/L				8	30
		perfluorononanoic acid (PFNA)	57290-002	0.54 J	1.9	0.43	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57290-002	3.6	1.9	0.38	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57290-002	5.9	1.9	0.32	ng/L				7	30
		perfluorotetradecanoic acid (PFTEA)	57290-002	1.9 U	1.9	0.48	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57290-002	1.9 U	1.9	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57290-002	1.9 U	1.9	0.18	ng/L					30
		13C2-PFHxA SUR	57290-002	102			%			70 130		
		13C2-PFDA SUR	57290-002	103			%			70 130		
		D5-NETFOSAA SUR	57290-002	95			%			70 130		
		13C3-HFPO-DA SUR	57290-002	99			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		170	2.0	0.30	ng/L	200	87	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		210	2.0	0.39	ng/L	200	103	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	108	70 130		
		perfluorobutane sulfonic acid (PFBS)		160	2.0	0.50	ng/L	177	91	70 130		
		perfluorodecanoic acid (PFDA)		200	2.0	0.34	ng/L	200	102	70 130		
		perfluorododecanoic acid (PFDOA)		210	2.0	0.43	ng/L	200	104	70 130		
		perfluoroheptanoic acid (PFHPA)		180	2.0	0.33	ng/L	200	90	70 130		
		perfluorohexane sulfonic acid (PFHXS)		160	2.0	0.40	ng/L	190	85	70 130		
		perfluorohexanoic acid (PFHXA)		180	2.0	0.35	ng/L	200	90	70 130		
		perfluorononanoic acid (PFNA)		190	2.0	0.45	ng/L	200	93	70 130		
		perfluorooctane sulfonic acid (PFOS)		160	2.0	0.40	ng/L	192	85	70 130		
		perfluorooctanoic acid (PFOA)		180	2.0	0.33	ng/L	200	89	70 130		
		perfluorotetradecanoic acid (PFTEA)		200	2.0	0.50	ng/L	200	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		200	2.0	0.13	ng/L	200	99	70 130		
		perfluoroundecanoic acid (PFUNA)		200	2.0	0.32	ng/L	200	102	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	97	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		170	2.0	0.18	ng/L	189	89	70 130		
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NETFOSAA SUR		84			%			70 130		
		13C3-HFPO-DA SUR		85			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	1.8	0.28	ng/L	36	95	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57286-001	43	1.8	0.36	ng/L	36	116	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57286-001	40	1.8	0.30	ng/L	36	108	70 130		
		perfluorobutane sulfonic acid (PFBS)	57286-001	30	1.8	0.46	ng/L	32	94	70 130		
		perfluorodecanoic acid (PFDA)	57286-001	39	1.8	0.31	ng/L	36	106	70 130		
		perfluorododecanoic acid (PFDOA)	57286-001	41	1.8	0.39	ng/L	36	112	70 130		
		perfluoroheptanoic acid (PFHPA)	57286-001	37	1.8	0.30	ng/L	36	101	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57286-001	32	1.8	0.36	ng/L	34	92	70 130		
		perfluorohexanoic acid (PFHXA)	57286-001	37	1.8	0.32	ng/L	36	102	70 130		
		perfluorononanoic acid (PFNA)	57286-001	37	1.8	0.41	ng/L	36	102	70 130		
		perfluorooctane sulfonic acid (PFOS)	57286-001	33	1.8	0.37	ng/L	35	94	70 130		
		perfluorooctanoic acid (PFOA)	57286-001	39	1.8	0.30	ng/L	36	107	70 130		
		perfluorotetradecanoic acid (PFTEA)	57286-001	41	1.8	0.46	ng/L	36	111	70 130		
		perfluorotridecanoic acid (PFTRIA)	57286-001	40	1.8	0.12	ng/L	36	110	70 130		
		perfluoroundecanoic acid (PFUNA)	57286-001	43	1.8	0.30	ng/L	36	117	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57286-001	33	1.8	0.36	ng/L	34	96	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57286-001	33	1.8	0.37	ng/L	34	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57286-001	33	1.8	0.17	ng/L	34	95	70 130		
		13C2-PFHxA SUR	57286-001	97			%			70 130		
		13C2-PFDA SUR	57286-001	100			%			70 130		
		D5-NETFOSAA SUR	57286-001	101			%			70 130		
		13C3-HFPO-DA SUR	57286-001	91			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57224

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
Company Address: 57 Dresser Hill Rd. Charlton, MA
Report To: Aaron Davis
Phone #: 774 200 8029
Invoice to: Erik Grotton
Email: egrotton@blueleafwater.com
PO #:

Project Name: BW STRAIGHTWAY
Project #: 11204
Project Location: NH MA ME VT _____
Accreditation Required? N/A
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting QAPP GW-1 S-1
Limits: EPA DW Other _____
Quote # _____
 NH Reimbursement Pricing

- VOC 8260 MADEP VOC 8260 NHDES VOC 8260 MADEP
- VOC 824.1 VOC BTEX MIBE, only VOC 8021VT
- VPH MADEP GRO 8015 1,4-Dioxane
- VOC 524.2 VOC 524.2 NH List Gases-List:
- TPH 8100 DRO 8015 EPH MADEP TPH Fingerprint
- 8270PAH 8270ABN 625.1 EDB
- 8082 PCB 8081 Pesticides 608.3 Pest/PCB
- PFAS 537.1 PFAS 533 PFAS isotope dilution
- O&G 1664 Mineral O&G 1664
- pH BOD Conductivity Turbidity Apparent Color
- TSS TDS TS TVS Alkalinity Acidity
- RCRA Metals Priority Pollutant Metals TAL Metals Hardness
- Total Metals-list:
- Dissolved Metals-list:
- Ammonia COD TKN TN TOC Ferrous Iron
- T-Phosphorus Bacteria P/A Bacteria MPN Enterococci
- Cyanide Sulfide Nitrate-Nitrite Ortho P Phenols
- Nitrate Nitrite Chloride Sulfate Bromide Fluoride
- Corrosivity Ignitibility/FP
- TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide
- Subcontract: Grain Size Herbicides Asbestos

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling					
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER			
5722401	Raw	2	X													
02	GSP F. lter	7	X							6/1/21	11:00	AD				
03	UV Effluent	8	X													
04	GSP CBW	4	X								9:00					

TAT REQUESTED
 Priority (24 hr)*
 Expedited (48 hr)*
 Standard (10 Business Days)
 *Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS Reps 1,4 Dioxane Down To Detection Limit ≈ 0.15ug/L

REPORTING INSTRUCTIONS PDF (e-mail address) _____
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
 TEMPERATURE 3 °C

CUSTODY RECORD
QSD-01 Revision 03/09/2020

Relinquished by Sampler: <u>[Signature]</u>	Date: <u>6/1/21</u> Time: <u>14:50</u>	Received by: <u>[Signature]</u>	Date: <u>6-1</u> Time: <u>2:50</u>
Relinquished by: <u>[Signature]</u>	Date: <u>6-1</u> Time: <u>16:41</u>	Received by: <u>[Signature]</u>	Date: _____ Time: _____
Relinquished by: _____	Date: _____ Time: _____	Received by Laboratory: <u>[Signature]</u>	Date: <u>6/1/21</u> Time: <u>16:41</u>

Sample Receipt Condition Report

57224

Absolute Resource Associates
Job Number:

Samples Received from: UPS FedEx USPS Lab Courier Client Drop-off _____
 Custody Seals - present & intact: Yes No N/A CoC signed: Yes No
 Receipt Temp: 3 °C Samples on ice? Yes No N/A Sampled < 24 hrs ago? Yes No
 PFAS-only real ice? Yes No N/A Any signs of freezing? Yes No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	<u>4</u> 250mL(P)		500mL(P)	1L(G)		*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y (N)
HNO ₃	125mL(P)	250mL(P)		500mL(P)			
H ₂ SO ₄	40mL(G)	60mL(P)		125mL(P)	250mL(P)	500mL(P)	
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)		250mL(P)			
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL (P)	<u>2</u>				
NH ₄ Ac	125mL(P)	250mL (P)					
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)		8oz(G)	Syringe		
None (water)	40ml (G)	60mL(P)	<u>8</u>	125mL(P)	250mL(P)	500mL(P)	
NH ₄ Cl	<u>60mL(G)</u>	<u>6</u>					
Mold	Cassette	Bulk		Plate	Tape Lift		
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk		Wipe			

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			on-02, 1, 4 dioxane vial in GSP Filter bag says "GSP Filter" other 1, 4 vial, both VOC and all HAA vials says "CBW Filter" NO HE 6/1/21 DBV EM's Aaron Davis (Or must be rejected)
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?			✓	
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?			✓	
PFAS: Lab specific bottles? QC received, if required?	✓			
Bacteria bottles provided by ARA?			✓	
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			✓	
Compliance samples have no discrepancies/require no flags?			✓	
Log-in Supervisor notified immediately of following items:	(JD)			

 Inspected and Received By: JD

 Date/Time: 6/1/21 17:53

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

	Initials	Date	What was sent?
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice
Uploaded / PDF _____			Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/23/2021
Work Order #: 2106-00937
Client Job #:
Date Received: 06/04/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/23/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-00937-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57271
Maher GSP
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/03/2021 09:00AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:09PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:09PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:09PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 04:09PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 04:09PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:09PM
2,3-Dibromopropionic Acid	103	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 04:09PM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/23/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-00937-002
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: Maher UV
MA

MORE LOC INFO:

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/03/2021 09:00AM
DATE AND TIME RECEIVED: 06/04/2021 12:14PM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:50PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:50PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:50PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/15/2021 04:50PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/15/2021 04:50PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/15/2021 04:50PM
2,3-Dibromopropionic Acid	102	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 04:50PM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57271
Date Received: 6/3/21

Project: BW STRAIGHTWAY 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink that reads "Alexander Alterisio". The signature is written in a cursive, flowing style.

Alex Alterisio
Authorized Signature

Date of Approval: 6/15/2021
Total number of pages: 35

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw	Water	6/2/2021 10:00	57271-001	Low level 1,4-dioxane in water by 8260 SIM
UV Effluent	Water	6/2/2021 10:00	57271-002	Low level 1,4-dioxane in water by 8260 SIM
Raw	Water	6/3/2021 10:00	57271-003	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis
GSP Filter	Water	6/3/2021 10:00	57271-004	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A pH in water by SM4500H+B True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis
UV Effluent	Water	6/3/2021 10:00	57271-005	Low level 1,4-dioxane in water by 8260 SIM Total Organic Carbon by 5310C
GAC	Water	6/3/2021 10:00	57271-006	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher Raw	Water	6/3/2021 9:00	57271-007	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Maher GSP	Water	6/3/2021 9:00	57271-008	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher UV	Water	6/3/2021 9:00	57271-009	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Maher GAC	Water	6/3/2021 9:00	57271-010	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Raw-DISS	Water	6/3/2021 10:00	57271-011	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
GSP Filter-DISS	Water	6/3/2021 10:00	57271-012	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher GAC	Water	6/3/2021 9:00	57271-013	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
Field Reagent Blank	Water	6/3/2021 10:00	57271-014	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	19:28	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	19:28	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	19:28	E524.2
bromoform	0.17 J	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	19:28	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	19:28	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	97	70-130		%	1	LMM			2101699	6/11/21	19:28	E524.2
1,4-dichlorobenzene-D4 SUR	90	70-130		%	1	LMM			2101699	6/11/21	19:28	E524.2

Sample#: 57271-009

Sample ID: Maher UV

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	20:00	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	20:00	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	20:00	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	20:00	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	20:00	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	97	70-130		%	1	LMM			2101699	6/11/21	20:00	E524.2
1,4-dichlorobenzene-D4 SUR	92	70-130		%	1	LMM			2101699	6/11/21	20:00	E524.2

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-001

Sample ID: Raw

Matrix: Water

Sampled: 6/2/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.89	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	12:16	SW8260Dmod

Sample#: 57271-002

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/2/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	12:48	SW8260Dmod

Sample#: 57271-003

Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	1.0	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	13:20	SW8260Dmod

Sample#: 57271-004

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.85	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	13:52	SW8260Dmod

Sample#: 57271-005

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	14:24	SW8260Dmod

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-007

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.43	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	14:56	SW8260Dmod

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	0.37	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	15:28	SW8260Dmod

Sample#: 57271-009

Sample ID: Maher UV

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101643	6/8/21	16:00	SW8260Dmod

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-003

Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Iron	0.81	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:50	E200.8	
Manganese	0.97	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:50	E200.8	

Sample#: 57271-004

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:57	E200.8	
Manganese	U	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	22:57	E200.8	

Sample#: 57271-007

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Calcium	7.9	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Iron	0.081	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Magnesium	3.2	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Manganese	0.080	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Sodium	21	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Zinc	0.0049 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:16	E200.8	
Hardness (as CaCO3)	33	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B	

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Calcium	8.1	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:23	E200.8	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/10/21	14:35	E200.8	
Magnesium	3.2	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:23	E200.8	
Manganese	0.026	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/10/21	14:35	E200.8	
Sodium	19	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:23	E200.8	
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/10/21	14:35	E200.8	
Hardness (as CaCO3)	33	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B	

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-009

Sample ID: Maher UV

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Calcium	8.0	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Magnesium	3.1	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Manganese	0.024	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Sodium	20	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Zinc	0.0028 J	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:36	E200.8	
Hardness (as CaCO3)	33	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B	

Sample#: 57271-010

Sample ID: Maher GAC

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Calcium	7.6	0.50	0.013	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Magnesium	3.0	0.10	0.00066	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Manganese	0.0023 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Sodium	22	0.10	0.021	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Zinc	0.17	0.010	0.0028	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:43	E200.8	
Hardness (as CaCO3)	31	3	0.4	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21		SM2340B	

Sample#: 57271-011

Sample ID: Raw-DISS

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Iron	0.43	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:50	E200.8	
Manganese	0.98	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:50	E200.8	

Sample#: 57271-012

Sample ID: GSP Filter-DISS

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n			Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Date		Time	Reference	
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:56	E200.8	
Manganese	0.0016 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:56	E200.8	

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-013

Sample ID: Maher GAC

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	U	0.050	0.0032	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21	0:03	E200.8
Manganese	0.0026 J	0.010	0.0010	mg/L	1	AGN	6/7/21	16:47	13946	6/8/21	0:03	E200.8

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-003

Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	47	5	0.47	mg/L	1	DJM			2101588	6/4/21	10:30	SM2320B
Apparent Color	5.0	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:46	SM2120B
Bromide	0.1	0.1	0.021	mg/L	1	DBV			2101666	6/9/21	10:17	E300.0A
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	12:28	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
pH	6.8 H			pH	1	SFM			2101579	6/4/21	7:25	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	2.8	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:20	SM2130B

Sample#: 57271-004

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	70	5	0.47	mg/L	1	DJM			2101588	6/4/21	10:30	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:47	SM2120B
Nitrate-N	0.5	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	14:23	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101597	6/4/21	14:23	E300.0A
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:47	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
pH	7.4 H			pH	1	SFM			2101579	6/4/21	7:28	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:21	SM2130B

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-007

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	21	5	0.47	mg/L	1	SFM			2101594	6/4/21	14:12	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:48	SM2120B
Chloride	35	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	14:40	E300.0A
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	14:40	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101597	6/4/21	14:40	E300.0A
Sulfate	8.9	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	14:40	E300.0A
Total Dissolved Solids (TDS)	110	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:48	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
Conductivity	180	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	6.5 H			pH	1	WAS			2101645	6/4/21	7:31	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:21	SM2130B

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	20	5	0.47	mg/L	1	SFM			2101594	6/4/21	14:12	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:50	SM2120B
Chloride	35	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	15:29	E300.0A
Sulfate	8.2	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	15:29	E300.0A
Total Dissolved Solids (TDS)	110	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:50	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
Conductivity	170	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	6.4 H			pH	1	WAS			2101645	6/4/21	7:33	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:22	SM2130B

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-009

Sample ID: Maher UV

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	20	5	0.47	mg/L	1	SFM			2101594	6/4/21	14:12	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101582	6/4/21	11:51	SM2120B
Chloride	36	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	14:56	E300.0A
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	14:56	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101597	6/4/21	14:56	E300.0A
Sulfate	8.2	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	14:56	E300.0A
Total Dissolved Solids (TDS)	110	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101583	6/4/21	11:51	SM2120B
Total Coliform Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
E. coli Bacteria	absent				1	AJD			2101593	6/3/21	17:45	SM9223BColilert
Conductivity	180	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	7.2 H			pH	1	WAS			2101645	6/4/21	7:37	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:23	SM2130B

Sample#: 57271-010

Sample ID: Maher GAC

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Alkalinity, Total (as CaCO3)	21	5	0.47	mg/L	1	SFM			2101594	6/4/21	14:12	SM2320B
Chloride	35	0.5	0.36	mg/L	1	DBV			2101597	6/4/21	15:45	E300.0A
Sulfate	9.0	0.5	0.21	mg/L	1	DBV			2101597	6/4/21	15:45	E300.0A
Total Dissolved Solids (TDS)	95 D	20	7.5	mg/L	1	SFM			2101631	6/7/21	19:00	SM2540C
D = The RPD for the sample duplicate, run as internal QC, was outside the 5% acceptance range. The duplicate result is 120 mg/L.												
Conductivity	180	5		umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	7.4 H			pH	1	WAS			2101645	6/4/21	7:39	SM4500H+B
H = Sample was received beyond method holding time.												

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-003

Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	0.84 J	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	14:07	SM5310C

Sample#: 57271-005

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/3/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	1.3	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	14:26	SM5310C

Sample#: 57271-007

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	0.82 J	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	14:44	SM5310C

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	1.2	1.0	0.59	mg/L	1	DBV			2101615	6/7/21	15:03	SM5310C

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-003

Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorobutane sulfonic acid (PFBS)	3.6	1.8	0.45	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorodecanoic acid (PFDA)	0.36 J	1.8	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluoroheptanoic acid (PFHPA)	4.8	1.8	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorohexane sulfonic acid (PFHXS)	25	1.8	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorohexanoic acid (PFHXA)	11	1.8	0.31	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorononanoic acid (PFNA)	1.8	1.8	0.40	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorooctane sulfonic acid (PFOS)	35	1.8	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorooctanoic acid (PFOA)	18	1.8	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.44	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.16	ng/L	1	ACA	6/8/21	13948	6/9/21	16:32
Surrogate Recovery		Limits								
13C2-PFHxA SUR	97	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:32
13C2-PFDA SUR	96	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:32
D5-NEtFOSAA SUR	103	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:32
13C3-HFPO-DA SUR	93	70-130		%	1	ACA	6/8/21	13948	6/9/21	16:32
Sum of MA PFAS6 Analytes (MAPFAS6)	85	1.8		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-006

Sample ID: GAC

Matrix: Water

Sampled: 6/3/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	6/8/21	13948	6/9/21	17:19
Surrogate Recovery		Limits								
13C2-PFHxA SUR	98	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:19
13C2-PFDA SUR	97	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:19
D5-NEtFOSAA SUR	103	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:19
13C3-HFPO-DA SUR	97	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:19
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-007

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/3/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorobutane sulfonic acid (PFBS)	2.0	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorodecanoic acid (PFDA)	0.51 J	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluoroheptanoic acid (PFHPA)	15	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorohexane sulfonic acid (PFHXS)	34	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorohexanoic acid (PFHXA)	33	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorononanoic acid (PFNA)	9.2	1.7	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorooctane sulfonic acid (PFOS)	79	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorooctanoic acid (PFOA)	17	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	6/8/21	13948	6/9/21	17:35
Surrogate Recovery		Limits								
13C2-PFHxA SUR	101	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:35
13C2-PFDA SUR	96	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:35
D5-NEtFOSAA SUR	103	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:35
13C3-HFPO-DA SUR	106	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:35
Sum of MA PFAS6 Analytes (MAPFAS6)	150	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-008

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorobutane sulfonic acid (PFBS)	2.3	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorodecanoic acid (PFDA)	0.42 J	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluoroheptanoic acid (PFHPA)	12	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorohexane sulfonic acid (PFHXS)	32	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorohexanoic acid (PFHXA)	28	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorononanoic acid (PFNA)	6.3	1.7	0.38	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorooctane sulfonic acid (PFOS)	67	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorooctanoic acid (PFOA)	14	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	ACA	6/8/21	13948	6/9/21	17:51
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:51
13C2-PFDA SUR	100	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:51
D5-NEtFOSAA SUR	108	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:51
13C3-HFPO-DA SUR	90	70-130		%	1	ACA	6/8/21	13948	6/9/21	17:51
Sum of MA PFAS6 Analytes (MAPFAS6)	130	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-009

Sample ID: Maher UV

Matrix: Water

Sampled: 6/3/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorobutane sulfonic acid (PFBS)	2.3	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorodecanoic acid (PFDA)	0.41 J	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluoroheptanoic acid (PFHPA)	13	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorohexane sulfonic acid (PFHXS)	32	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorohexanoic acid (PFHXA)	31	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorononanoic acid (PFNA)	6.4	1.7	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorooctane sulfonic acid (PFOS)	69	1.7	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorooctanoic acid (PFOA)	13	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	6/8/21	13948	6/9/21	18:07
Surrogate Recovery		Limits								
13C2-PFHxA SUR	91	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:07
13C2-PFDA SUR	106	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:07
D5-NEtFOSAA SUR	102	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:07
13C3-HFPO-DA SUR	87	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:07
Sum of MA PFAS6 Analytes (MAPFAS6)	130	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW STRAIGHTWAY 11204

Job ID: 57271

Sample#: 57271-014

Sample ID: Field Reagent Blank

Matrix: Water

Sampled: 6/3/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.29	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	ACA	6/8/21	13948	6/9/21	18:23
Surrogate Recovery		Limits								
13C2-PFHxA SUR	107	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:23
13C2-PFDA SUR	107	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:23
D5-NEtFOSAA SUR	92	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:23
13C3-HFPO-DA SUR	99	70-130		%	1	ACA	6/8/21	13948	6/9/21	18:23
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101663		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57271

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

TDS: DUP2101631 for 57271-010 did not meet the acceptance criteria for RPD. The associated result has been qualified accordingly.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101699	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			98	%			70	130		
		1,4-dichlorobenzene-D4 SUR			96	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20		
		bromodichloromethane	57363-001	<	0.50	ug/L				20		
		dibromochloromethane	57363-001	<	0.50	ug/L				20		
		bromoform	57363-001	<	0.50	ug/L				20		
		4-bromofluorobenzene SUR	57363-001		99	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130		
		Total Trihalomethanes (THMs)	57363-001							99.3		
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130		
		bromodichloromethane			10	ug/L	10	104	70	130		
		dibromochloromethane			10	ug/L	10	100	70	130		
		bromoform			10	ug/L	10	104	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7	20
		bromodichloromethane			11	ug/L	10	111	70	130	6	20
		dibromochloromethane			11	ug/L	10	107	70	130	7	20
		bromoform			11	ug/L	10	110	70	130	5	20
		4-bromofluorobenzene SUR			112	%			70	130		
		1,4-dichlorobenzene-D4 SUR			113	%			70	130		
		Total Trihalomethanes (THMs)										
SW8260Dmod	BLK2101643	1,4-dioxane		<	0.25	ug/L						
SW8260Dmod	LCS2101643	1,4-dioxane			9.3	ug/L	8	116	70	130		
SW8260Dmod	LCSD2101643	1,4-dioxane			9.5	ug/L	8	118	70	130	2	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13946	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13946	Calcium	57226-001	20	mg/L				6	20
		Iron	57226-001	< 0.050	mg/L					20
		Magnesium	57226-001	5.3	mg/L				2	20
		Manganese	57226-001	< 0.010	mg/L					20
		Sodium	57226-001	27	mg/L				4	20
E200.8	LCS13946	Calcium		2.6	mg/L	2.5	102	85 115		
		Iron		0.51	mg/L	0.5	102	85 115		
		Magnesium		0.47	mg/L	0.5	95	85 115		
		Manganese		0.49	mg/L	0.5	98	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.49	mg/L	0.5	98	85 115		
E200.8	LCSD13946	Calcium		2.6	mg/L	2.5	106	85 115	3	20
		Iron		0.51	mg/L	0.5	102	85 115	0	20
		Magnesium		0.48	mg/L	0.5	96	85 115	1	20
		Manganese		0.50	mg/L	0.5	99	85 115	1	20
		Sodium		5.0	mg/L	5	100	85 115	2	20
		Zinc		0.50	mg/L	0.5	99	85 115	1	20
E200.8	MS13946	Calcium	57226-001	24	mg/L	2.5	173	70 130		
		Iron	57226-001	0.49	mg/L	0.5	97	70 130		
		Magnesium	57226-001	5.9	mg/L	0.5	136	70 130		
		Manganese	57226-001	0.52	mg/L	0.5	104	70 130		
		Sodium	57226-001	32	mg/L	5	118	70 130		
E200.8	MS13946	Calcium	57271-008	11	mg/L	2.5	116	70 130		
		Iron	57271-008	0.52	mg/L	0.5	104	70 130		
		Magnesium	57271-008	3.7	mg/L	0.5	114	70 130		
		Manganese	57271-008	0.51	mg/L	0.5	103	70 130		
		Sodium	57271-008	25	mg/L	5	105	70 130		
		Zinc	57271-008	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101597	Chloride		<	0.5	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101597	Chloride	57269-001	54	mg/L				0	10
		Nitrate-N	57269-001	3.3	mg/L				1	10
		Nitrite-N	57269-001	<	0.1	mg/L				10
		Sulfate	57269-001	13	mg/L				0	10
E300.0A	LCS2101597	Chloride		99	mg/L	100	99	90	110	
		Nitrate-N		10.0	mg/L	10	100	90	110	
		Nitrite-N		15	mg/L	15	99	90	110	
		Sulfate		98	mg/L	100	98	90	110	
E300.0A	LCSD2101597	Chloride		99	mg/L	100	99	90	110	0
		Nitrate-N		9.9	mg/L	10	99	90	110	1
		Nitrite-N		15	mg/L	15	99	90	110	0
		Sulfate		98	mg/L	100	98	90	110	0
E300.0A	MS2101597	Chloride	57269-001	61	mg/L	16	44 *	90	110	
		Nitrate-N	57269-001	4.4	mg/L	1.66	70 *	90	110	
		Nitrite-N	57269-001	2.4	mg/L	2.53	96	90	110	
		Sulfate	57269-001	28	mg/L	16	89 *	90	110	
E300.0A	MS2101597	Nitrate-N	57280-003	11	mg/L	8.3	90	90	110	
E300.0A	BLK2101666	Bromide		<	0.1	mg/L				
E300.0A	DUP2101666	Bromide	57271-003	0.1	mg/L				6	10
E300.0A	LCS2101666	Bromide		9.8	mg/L	10	98	90	110	
E300.0A	LCSD2101666	Bromide		9.8	mg/L	10	98	90	110	0
E300.0A	MS2101666	Bromide	57271-003	1.7	mg/L	1.66	96	90	110	
E300.0A	MS2101666	Bromide	57278-002	100	mg/L	100	103	90	110	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2120B	DUP2101582	Apparent Color	57268-001	<	5	CU				20
SM2120B	DUP2101582	Apparent Color	57271-009	<	5	CU				20
SM2120B	LCS2101582	Apparent Color			50	CU	50	45	55	
SM2120B	PB2101582	Apparent Color		<	5	CU		5		
SM2120B	DUP2101583	True Color	57271-003	<	5.0	CU				
SM2120B	LCS2101583	True Color			20	CU	20	15	25	
SM2120B	PB2101583	True Color		<	5.0	CU				
SM2130B	DUP2101590	Turbidity	57271-009	<	1.0	NTU				20
SM2320B	CCVB2101588	Alkalinity, Total (as CaCO3)			6.01	pH		5.94	6.06	
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	pH		3.94	4.06	
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	pH		3.94	4.06	
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57227-007		53	mg/L			3	10
SM2320B	DUP2101588	Alkalinity, Total (as CaCO3)	57271-004		72	mg/L			3	10
SM2320B	LCS2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110
SM2320B	LCSD2101588	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110
SM2320B	PB2101588	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2320B	CCVB2101594	Alkalinity, Total (as CaCO3)			4.01	pH		3.94	4.06	
SM2320B	CCVE2101594	Alkalinity, Total (as CaCO3)			3.98	pH		3.94	4.06	
SM2320B	CCVM2101594	Alkalinity, Total (as CaCO3)			3.97	pH		3.94	4.06	
SM2320B	DUP2101594	Alkalinity, Total (as CaCO3)	57229-003		36	mg/L			2	10
SM2320B	LCS2101594	Alkalinity, Total (as CaCO3)			27	mg/L	25	109	90	110
SM2320B	LCSD2101594	Alkalinity, Total (as CaCO3)			27	mg/L	25	108	90	110
SM2320B	PB2101594	Alkalinity, Total (as CaCO3)		<	5	mg/L				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101638	Conductivity		<	5	uS/cm				
SM2510B	DUP2101638	Conductivity	57280-003	560	uS/cm				2	20
SM2510B	DUP2101638	Conductivity	57280-004	510	uS/cm				3	20
SM2510B	LCS2101638	Conductivity		1400	uS/cm	1409	100	90 110		
SM2510B	LCSD2101638	Conductivity		1400	uS/cm	1409	102	90 110		20
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57268-001	180	mg/L				3	5
SM2540C	DUP2101631	Total Dissolved Solids (TDS)	57271-010	120	mg/L				20 *	5
SM2540C	LCS2101631	Total Dissolved Solids (TDS)		99.0	mg/L	99.2	100	75 125		
SM2540C	PB2101631	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101579	pH	57205-002	9.4	pH					
SM4500H+B	DUP2101579	pH	57226-001	8.0	pH					
SM4500H+B	DUP2101579	pH	57249-001	7.8	pH					
SM4500H+B	DUP2101579	pH	57268-001	6.6	pH					
SM4500H+B	DUP2101645	pH	57280-001	6.3	pH					
SM5310C	BLK2101615	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101615	Total Organic Carbon (TOC)	57268-001	<	1	mg/L				20
SM5310C	LCS2101615	Total Organic Carbon (TOC)		10	mg/L	10	100	85 115		
SM5310C	LCSD2101615	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	0	20
SM5310C	MS2101615	Total Organic Carbon (TOC)	57269-001	10	mg/L	10	99	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		100			%			70	130	
		13C2-PFDA SUR		112			%			70	130	
		D5-NETFOSAA SUR		97			%			70	130	
		13C3-HFPO-DA SUR		95			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	1.9 U	1.9	0.29	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57290-002	1.9 U	1.9	0.38	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57290-002	2.3	1.9	0.48	ng/L				1	30
		perfluorodecanoic acid (PFDA)	57290-002	1.9 U	1.9	0.33	ng/L					30
		perfluorododecanoic acid (PFDOA)	57290-002	1.9 U	1.9	0.41	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57290-002	1.8 J	1.9	0.32	ng/L					30
		perfluorohexane sulfonic acid (PFHXS)	57290-002	1.4 J	1.9	0.38	ng/L					30
		perfluorohexanoic acid (PFHXA)	57290-002	3.4	1.9	0.33	ng/L				8	30
		perfluorononanoic acid (PFNA)	57290-002	0.54 J	1.9	0.43	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57290-002	3.6	1.9	0.38	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57290-002	5.9	1.9	0.32	ng/L				7	30
		perfluorotetradecanoic acid (PFTEA)	57290-002	1.9 U	1.9	0.48	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57290-002	1.9 U	1.9	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57290-002	1.9 U	1.9	0.31	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57290-002	1.9 U	1.9	0.38	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57290-002	1.9 U	1.9	0.18	ng/L					30
		13C2-PFHxA SUR	57290-002	102			%			70	130	
		13C2-PFDA SUR	57290-002	103			%			70	130	
		D5-NETFOSAA SUR	57290-002	95			%			70	130	
		13C3-HFPO-DA SUR	57290-002	99			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		170	2.0	0.30	ng/L	200	87	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		210	2.0	0.39	ng/L	200	103	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		220	2.0	0.33	ng/L	200	108	70 130		
		perfluorobutane sulfonic acid (PFBS)		160	2.0	0.50	ng/L	177	91	70 130		
		perfluorodecanoic acid (PFDA)		200	2.0	0.34	ng/L	200	102	70 130		
		perfluorododecanoic acid (PFDOA)		210	2.0	0.43	ng/L	200	104	70 130		
		perfluoroheptanoic acid (PFHPA)		180	2.0	0.33	ng/L	200	90	70 130		
		perfluorohexane sulfonic acid (PFHXS)		160	2.0	0.40	ng/L	190	85	70 130		
		perfluorohexanoic acid (PFHXA)		180	2.0	0.35	ng/L	200	90	70 130		
		perfluorononanoic acid (PFNA)		190	2.0	0.45	ng/L	200	93	70 130		
		perfluorooctane sulfonic acid (PFOS)		160	2.0	0.40	ng/L	192	85	70 130		
		perfluorooctanoic acid (PFOA)		180	2.0	0.33	ng/L	200	89	70 130		
		perfluorotetradecanoic acid (PFTEA)		200	2.0	0.50	ng/L	200	100	70 130		
		perfluorotridecanoic acid (PFTRIA)		200	2.0	0.13	ng/L	200	99	70 130		
		perfluoroundecanoic acid (PFUNA)		200	2.0	0.32	ng/L	200	102	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		180	2.0	0.39	ng/L	189	97	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		180	2.0	0.40	ng/L	187	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		170	2.0	0.18	ng/L	189	89	70 130		
		13C2-PFHxA SUR		90			%			70 130		
		13C2-PFDA SUR		99			%			70 130		
		D5-NETFOSAA SUR		84			%			70 130		
		13C3-HFPO-DA SUR		85			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	1.8	0.28	ng/L	36	95	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57286-001	43	1.8	0.36	ng/L	36	116	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57286-001	40	1.8	0.30	ng/L	36	108	70 130		
		perfluorobutane sulfonic acid (PFBS)	57286-001	30	1.8	0.46	ng/L	32	94	70 130		
		perfluorodecanoic acid (PFDA)	57286-001	39	1.8	0.31	ng/L	36	106	70 130		
		perfluorododecanoic acid (PFDOA)	57286-001	41	1.8	0.39	ng/L	36	112	70 130		
		perfluoroheptanoic acid (PFHPA)	57286-001	37	1.8	0.30	ng/L	36	101	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57286-001	32	1.8	0.36	ng/L	34	92	70 130		
		perfluorohexanoic acid (PFHXA)	57286-001	37	1.8	0.32	ng/L	36	102	70 130		
		perfluorononanoic acid (PFNA)	57286-001	37	1.8	0.41	ng/L	36	102	70 130		
		perfluorooctane sulfonic acid (PFOS)	57286-001	33	1.8	0.37	ng/L	35	94	70 130		
		perfluorooctanoic acid (PFOA)	57286-001	39	1.8	0.30	ng/L	36	107	70 130		
		perfluorotetradecanoic acid (PFTEA)	57286-001	41	1.8	0.46	ng/L	36	111	70 130		
		perfluorotridecanoic acid (PFTRIA)	57286-001	40	1.8	0.12	ng/L	36	110	70 130		
		perfluoroundecanoic acid (PFUNA)	57286-001	43	1.8	0.30	ng/L	36	117	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57286-001	33	1.8	0.36	ng/L	34	96	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57286-001	33	1.8	0.37	ng/L	34	95	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57286-001	33	1.8	0.17	ng/L	34	95	70 130		
		13C2-PFHxA SUR	57286-001	97			%			70 130		
		13C2-PFDA SUR	57286-001	100			%			70 130		
		D5-NETFOSAA SUR	57286-001	101			%			70 130		
		13C3-HFPO-DA SUR	57286-001	91			%			70 130		

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001

absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57271

ANALYSIS REQUEST

Company Name: Blueleaf, Inc.
Company Address: 57 Dresser Hill Rd., Charlton, MA
Report To: Aaron Davis
Phone #: 774 200 8029
Invoice to: Erik Gratton
Email: egratton@blueleafwater.com
PO #:

Project Name: BW STRAIGHTWAY
Project #: 11204
Project Location: NH MA ME VT
Accreditation Required? N/A
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting QAPP GW-1 S-1
Limits: EPA DW Other
Quote #
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 824.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VOC 824.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane
<input type="checkbox"/> VOC 624.2	<input type="checkbox"/> VOC 594.2 NH List	<input type="checkbox"/> Grease-List: TTHM, HAAS	<input type="checkbox"/> VOC 624.2	<input type="checkbox"/> VOC 594.2 NH List	<input type="checkbox"/> Grease-List: TTHM, HAAS
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DR0 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1	<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution
<input checked="" type="checkbox"/> 6066-1664	<input type="checkbox"/> Mineral-O&C-1664	<input type="checkbox"/> Na, Ca, Mg, Zn	<input checked="" type="checkbox"/> 6066-1664	<input type="checkbox"/> Mineral-O&C-1664	<input type="checkbox"/> Na, Ca, Mg, Zn
<input type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity	<input type="checkbox"/> pH	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> Conductivity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TSS	<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TSS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals
<input type="checkbox"/> Total Metals-list: Fe, Mn	<input type="checkbox"/> Dissolved Metals-list: Fe, Mn	<input type="checkbox"/> Ammonia	<input type="checkbox"/> Total Metals-list: Fe, Mn	<input type="checkbox"/> Dissolved Metals-list: Fe, Mn	<input type="checkbox"/> Ammonia
<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci
<input type="checkbox"/> Cyanide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P	<input type="checkbox"/> Cyanide	<input checked="" type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P
<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate	<input type="checkbox"/> Nitrate	<input checked="" type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP VOC
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> Herbicides	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> Herbicides
<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Subcontract	<input type="checkbox"/> Grain Size	<input type="checkbox"/> Asbestos
Conductivity pH + Alkalinity Grab (G) or Composite (C)					

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57271-01	Raw	2	X								6/2	10:00	
-02	UV Effluent	2											
-03	Raw										6/3	10:00	
-04	GSP Filter												
-05	UV Effluent												
-06	GAC												
-07	Maher Raw											9:00	
-08	Maher GSP												
-09	Maher UV												
-10	Maher GAC												
-14	Field Reagent Blank										6/3/21	10:00	

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard
(10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS per bottle
Report 14 Dioxane Down to lowest Detection Limit ≈ 0.13 my/L

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com
 HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 2 °C

CUSTODY RECORD
QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>6/3/21</u> Time: <u>15:00</u>	Received by:	Date: <u>6-3</u> Time: <u>3pm</u>
Relinquished by:	Date: <u>6-3</u> Time: <u>17:15</u>	Received by:	Date: _____ Time: _____
Relinquished by:	Date: _____ Time: _____	Received by Laboratory:	Date: <u>6/3/21</u> Time: <u>17:15</u>

Sample Receipt Condition Report

57271

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: _____ °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	4	250mL(P)		500mL(P)		1L(G)		
HNO ₃	125mL(P)		250mL(P)	9	500mL(P)				
H ₂ SO ₄	40mL(G)	6	60mL(P)		125mL(P)		250mL(P)	500mL(P)	pH=2
NaOH	125mL(P)		250mL(P)						
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)				
ZnAc-NaOH	125mL(P)		250mL(P)						
Trizma	125mL(P)		250mL (P)	11					
NH ₄ Ac	125mL(P)		250mL (P)						
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	5					
MeOH NH₄Cl	20mL(G)		40mL(G)		60mL(G)	6			
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe		
None (water)	40ml (G)	16	60mL(P)	11	125mL(P)	15	250mL(P)	4	500mL(P)
phosphoric acid	40mL(G)	2							
Mold	Cassette		Bulk		Plate		Tape Lift		
Asbestos	Cassette		Bulk						
Lead	Cassette		Bulk		Wipe				

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
 Residual Cl not present:
 ABN625 ___ Pest608 ___
 Bacteria ResCl ✓ by analyst

PC Dry applicable? Y N

OK per ASD

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✗	✓		ITB 10/6/21
VOC & TOC Water-no headspace?	✓			-05 TOC rec. pres w/ phosphoric acid
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			PFAS checked off on -05, but no
PFAS: Lab specific bottles? QC received, if required?	✓			-05 PFAS rec. PFAS rec on -06 but
Bacteria bottles provided by ARA?	✓			is not checked & off on Col 30
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			AN DBV AN SFM
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			✓	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By:

Date/Time:

6/13/21 20:46

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice
_____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57365
Date Received: 6/10/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/23/2021
Total number of pages: 30

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	6/10/2021 9:00	57365-001	Handling to Subcontract Lab Low level 1,4-dioxane in water by 8260 SIM
GSP Filter	Water	6/10/2021 9:00	57365-002	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM VOCs Trihalomethanes in water by 524.2
UV Effluent	Water	6/10/2021 9:00	57365-003	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A VOCs Trihalomethanes in water by 524.2
Maher Raw	Water	6/10/2021 10:00	57365-004	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher GSP	Water	6/10/2021 10:00	57365-005	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher UV	Water	6/10/2021 10:00	57365-006	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
Maher GAC	Water	6/10/2021 10:00	57365-007	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Magnesium in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Field Reagent Blank	Water	6/10/2021 0:00	57365-008	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1
Maher GAC-DISS	Water	6/10/2021 10:00	57365-009	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	22:07	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	22:07	E524.2
dibromochloromethane	0.11 J	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	22:07	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	22:07	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	22:07	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	93	70-130		%	1	LMM			2101699	6/11/21	22:07	E524.2
1,4-dichlorobenzene-D4 SUR	84	70-130		%	1	LMM			2101699	6/11/21	22:07	E524.2

Sample#: 57365-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	22:39	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	22:39	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	22:39	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	22:39	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	22:39	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	93	70-130		%	1	LMM			2101699	6/11/21	22:39	E524.2
1,4-dichlorobenzene-D4 SUR	86	70-130		%	1	LMM			2101699	6/11/21	22:39	E524.2

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	23:11	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	23:11	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	23:11	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	23:11	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	23:11	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	98	70-130		%	1	LMM			2101699	6/11/21	23:11	E524.2
1,4-dichlorobenzene-D4 SUR	92	70-130		%	1	LMM			2101699	6/11/21	23:11	E524.2

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-006

Sample ID: Maher UV

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	23:44	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/11/21	23:44	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/11/21	23:44	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/11/21	23:44	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/11/21	23:44	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	95	70-130		%	1	LMM			2101699	6/11/21	23:44	E524.2
1,4-dichlorobenzene-D4 SUR	90	70-130		%	1	LMM			2101699	6/11/21	23:44	E524.2

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-001

Sample ID: RAW

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.23 J	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	15:42	SW8260Dmod

Sample#: 57365-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	16:14	SW8260Dmod

Sample#: 57365-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	16:45	SW8260Dmod

Sample#: 57365-004

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.23 J	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	17:16	SW8260Dmod

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	0.25	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	17:47	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-006

Sample ID: Maher UV

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	18:18	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-004

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	6.1	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Iron	0.056	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Magnesium	2.7	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Manganese	0.075	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Sodium	20	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Zinc	0.0081 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:38	E200.8
Hardness (as CaCO3)	26	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	7.0	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Magnesium	3.0	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Manganese	0.062	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Sodium	24	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Zinc	0.0037 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:44	E200.8
Hardness (as CaCO3)	30	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Sample#: 57365-006

Sample ID: Maher UV

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	6.7	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Magnesium	2.8	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Manganese	0.059	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Sodium	22	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Zinc	0.0029 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:04	E200.8
Hardness (as CaCO3)	29	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-007

Sample ID: Maher GAC

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	7.1	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:11	E200.8
Magnesium	2.9	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:11	E200.8
Sodium	23	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:11	E200.8
Zinc	0.17	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:11	E200.8
Hardness (as CaCO3)	30	3	0.4	mg/L	1	AGN	6/18/21	12:39	13977	6/21/21		SM2340B

Sample#: 57365-009

Sample ID: Maher GAC-DISS

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:18	E200.8
Manganese	0.0025 J	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	17:18	E200.8

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/10/21 9:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Nitrate-N	4.3	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	13:58	E300.0A
Nitrite-N	0.022 J	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	13:58	E300.0A

Sample#: 57365-004

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	12	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:54	SM2120B
Bromide	0.044 J	0.1	0.021	mg/L	1	DBV			2101707	6/11/21	14:15	E300.0A
Chloride	38	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	14:15	E300.0A
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	14:15	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	14:15	E300.0A
Sulfate	7.5	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	14:15	E300.0A
Total Dissolved Solids (TDS)	91	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:54	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	170	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	6.2 H			pH	1	DJM			2101692	6/11/21	6:17	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:28	SM2130B

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	15	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:55	SM2120B
Chloride	42	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	14:31	E300.0A
Sulfate	7.8	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	14:31	E300.0A
Total Dissolved Solids (TDS)	100	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:55	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	180	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	6.1 H			pH	1	DJM			2101692	6/11/21	6:19	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:30	SM2130B

Sample#: 57365-006

Sample ID: Maher UV

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	15	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Apparent Color	U	5.0	2.5	CU	1	DJM			2101689	6/11/21	15:56	SM2120B
Chloride	40	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	14:48	E300.0A
Nitrate-N	0.6	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	14:48	E300.0A
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	14:48	E300.0A
Sulfate	7.7	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	14:48	E300.0A
Total Dissolved Solids (TDS)	97	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
True Color	U	5.0	2.5	CU	1	DJM			2101703	6/11/21	15:56	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101693	6/10/21	16:40	SM9223BColilert
Conductivity	180	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	6.8 H			pH	1	DJM			2101692	6/11/21	6:26	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101695	6/12/21	17:31	SM2130B

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-007

Sample ID: Maher GAC

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	20	5	0.47	mg/L	1	DJM			2101727	6/15/21	14:08	SM2320B
Chloride	40	0.5	0.36	mg/L	1	DBV			2101707	6/11/21	15:04	E300.0A
Sulfate	7.9	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	15:04	E300.0A
Total Dissolved Solids (TDS)	110	20	7.5	mg/L	1	WAS			2101708	6/11/21	9:55	SM2540C
Conductivity	190	5		umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
pH	7.2 H			pH	1	DJM			2101692	6/11/21	6:29	SM4500H+B

H = Sample was received beyond method holding time.

Sample#: 57365-004

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	12:14	SM5310C

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	12:32	SM5310C

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-004

Sample ID: Maher Raw

Matrix: Water

Sampled: 6/10/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorobutane sulfonic acid (PFBS)	1.9	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorodecanoic acid (PFDA)	0.49 J	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluoroheptanoic acid (PFHPA)	13	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorohexane sulfonic acid (PFHXS)	32	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorohexanoic acid (PFHXA)	28	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorononanoic acid (PFNA)	7.8	1.7	0.38	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorooctane sulfonic acid (PFOS)	75	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorooctanoic acid (PFOA)	15	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/16/21	13970	6/16/21	22:45
Surrogate Recovery		Limits								
13C2-PFHxA SUR	94	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:45	
13C2-PFDA SUR	92	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:45	
D5-NEtFOSAA SUR	90	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:45	
13C3-HFPO-DA SUR	89	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:45	
Sum of MA PFAS6 Analytes (MAPFAS6)	140	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-005

Sample ID: Maher GSP

Matrix: Water

Sampled: 6/10/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorobutane sulfonic acid (PFBS)	1.9	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorodecanoic acid (PFDA)	0.54 J	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluoroheptanoic acid (PFHPA)	14	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorohexane sulfonic acid (PFHXS)	32	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorohexanoic acid (PFHXA)	30	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorononanoic acid (PFNA)	7.8	1.7	0.38	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorooctane sulfonic acid (PFOS)	76	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorooctanoic acid (PFOA)	16	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13970	6/16/21	23:01
Surrogate Recovery		Limits								
13C2-PFHxA SUR	99	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:01
13C2-PFDA SUR	102	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:01
D5-NEtFOSAA SUR	92	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:01
13C3-HFPO-DA SUR	99	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:01
Sum of MA PFAS6 Analytes (MAPFAS6)	150	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-006

Sample ID: Maher UV

Matrix: Water

Sampled: 6/10/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorobutane sulfonic acid (PFBS)	2.0	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorodecanoic acid (PFDA)	0.54 J	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluoroheptanoic acid (PFHPA)	14	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorohexane sulfonic acid (PFHXS)	31	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorohexanoic acid (PFHXA)	33	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorononanoic acid (PFNA)	8.2	1.7	0.39	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorooctane sulfonic acid (PFOS)	74	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorooctanoic acid (PFOA)	16	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/16/21	13970	6/16/21	23:17
Surrogate Recovery		Limits								
13C2-PFHxA SUR	98	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:17
13C2-PFDA SUR	100	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:17
D5-NEtFOSAA SUR	95	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:17
13C3-HFPO-DA SUR	98	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:17
Sum of MA PFAS6 Analytes (MAPFAS6)	140	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57365

Sample#: 57365-008

Sample ID: Field Reagent Blank

Matrix: Water

Sampled: 6/10/21 0:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13970	6/16/21	23:33
Surrogate Recovery		Limits								
13C2-PFHxA SUR	93	70-130	%	1	WAS	6/16/21	13970	6/16/21	23:33	
13C2-PFDA SUR	96	70-130	%	1	WAS	6/16/21	13970	6/16/21	23:33	
D5-NEtFOSAA SUR	94	70-130	%	1	WAS	6/16/21	13970	6/16/21	23:33	
13C3-HFPO-DA SUR	91	70-130	%	1	WAS	6/16/21	13970	6/16/21	23:33	
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57365

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101699	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			98	%			70	130	
		1,4-dichlorobenzene-D4 SUR			96	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20	
		bromodichloromethane	57363-001	<	0.50	ug/L				20	
		dibromochloromethane	57363-001	<	0.50	ug/L				20	
		bromoform	57363-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57363-001		99	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130	
		Total Trihalomethanes (THMs)	57363-001							99.3	
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130	
		bromodichloromethane			10	ug/L	10	104	70	130	
		dibromochloromethane			10	ug/L	10	100	70	130	
		bromoform			10	ug/L	10	104	70	130	
		4-bromofluorobenzene SUR			104	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7
		bromodichloromethane			11	ug/L	10	111	70	130	6
		dibromochloromethane			11	ug/L	10	107	70	130	7
		bromoform			11	ug/L	10	110	70	130	5
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101731	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101731	1,4-dioxane			8.4	ug/L	8	106	70	130	
SW8260Dmod	LCSD2101731	1,4-dioxane			9.7	ug/L	8	121	70	130	14

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13977	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13977	Calcium	57362-001	20	mg/L				2	20
		Iron	57362-001	< 0.050	mg/L					20
		Magnesium	57362-001	5.6	mg/L				2	20
		Manganese	57362-001	0.16	mg/L				2	20
		Sodium	57362-001	50	mg/L				2	20
		Zinc	57362-001	< 0.010	mg/L					20
E200.8	LCS13977	Calcium		2.7	mg/L	2.5	108	85 115		
		Iron		0.54	mg/L	0.5	108	85 115		
		Magnesium		0.50	mg/L	0.5	99	85 115		
		Manganese		0.50	mg/L	0.5	100	85 115		
		Sodium		4.9	mg/L	5	98	85 115		
		Zinc		0.50	mg/L	0.5	99	85 115		
E200.8	LCSD13977	Calcium		2.6	mg/L	2.5	105	85 115	2	20
		Iron		0.55	mg/L	0.5	110	85 115	1	20
		Magnesium		0.50	mg/L	0.5	100	85 115	1	20
		Manganese		0.51	mg/L	0.5	102	85 115	2	20
		Sodium		5.0	mg/L	5	99	85 115	1	20
		Zinc		0.51	mg/L	0.5	102	85 115	3	20
E200.8	MS13977	Calcium	57362-001	23	mg/L	2.5	100	70 130		
		Iron	57362-001	0.56	mg/L	0.5	113	70 130		
		Magnesium	57362-001	6.2	mg/L	0.5	88	70 130		
		Manganese	57362-001	0.67	mg/L	0.5	101	70 130		
		Sodium	57362-001	56	mg/L	5	92	70 130		
		Zinc	57362-001	0.53	mg/L	0.5	106	70 130		
E200.8	MS13977	Manganese	57375-010	0.52	mg/L	0.5	105	70 130		

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E300.0A	BLK2101707	Bromide		<	0.1	mg/L						
		Chloride		<	0.5	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1	mg/L						
		Sulfate		<	0.5	mg/L						
E300.0A	DUP2101707	Bromide	57363-001	<	0.1	mg/L				10		
		Chloride	57363-001		84	mg/L			0	10		
		Nitrate-N	57363-001		4.2	mg/L			0	10		
		Nitrite-N	57363-001	<	0.1	mg/L					10	
		Sulfate	57363-001		19	mg/L			1		10	
E300.0A	LCS2101707	Bromide			9.9	mg/L	10	99	90	110		
		Chloride			100	mg/L	100	100	90	110		
		Nitrate-N			10	mg/L	10	100	90	110		
		Nitrite-N			15	mg/L	15	98	90	110		
		Sulfate			99	mg/L	100	99	90	110		
E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99	90	110	0	10
		Chloride			100	mg/L	100	100	90	110	0	10
		Nitrate-N			10	mg/L	10	100	90	110	0	10
		Nitrite-N			15	mg/L	15	99	90	110	0	10
		Sulfate			99	mg/L	100	99	90	110	0	10
E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96	90	110		
		Chloride	57363-001		85	mg/L	16	11	90	110		
		Nitrate-N	57363-001		5.2	mg/L	1.66	63 *	90	110		
		Nitrite-N	57363-001		2.3	mg/L	2.53	92	90	110		
		Sulfate	57363-001		33	mg/L	16	83 *	90	110		
SM2120B	DUP2101689	Apparent Color	57326-010		45	CU			0	20		
SM2120B	DUP2101689	Apparent Color	57365-006	<	5	CU				20		
SM2120B	LCS2101689	Apparent Color			10	CU	10	5	15			
SM2120B	PB2101689	Apparent Color		<	5	CU		5				

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)		6.01	pH			5.94 6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)		4.01	pH			3.94 4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)		4.03	pH			3.94 4.06		
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57365-007	21	mg/L				3	10
SM2320B	DUP2101727	Alkalinity, Total (as CaCO3)	57399-001	45	mg/L				2	10
SM2320B	LCS2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	106	90 110		
SM2320B	LCSD2101727	Alkalinity, Total (as CaCO3)		26	mg/L	25	104	90 110	1	10
SM2320B	PB2101727	Alkalinity, Total (as CaCO3)		<	5	mg/L				
SM2510B	BLK2101702	Conductivity		<	5	uS/cm				
SM2510B	DUP2101702	Conductivity	57365-007	200	uS/cm				0	20
SM2510B	LCS2101702	Conductivity		1400	uS/cm	1409	101	90 110		
SM2510B	LCSD2101702	Conductivity		1400	uS/cm	1409	101	90 110		20
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57330-001	910	mg/L				3	5
SM2540C	DUP2101708	Total Dissolved Solids (TDS)	57365-007	98	mg/L				8	5
SM2540C	LCS2101708	Total Dissolved Solids (TDS)		81.0	mg/L	99.2	82	75 125		
SM2540C	PB2101708	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101692	pH	57362-001	6.5	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		98			%			70	130	
		13C2-PFDA SUR		106			%			70	130	
		D5-NETFOSAA SUR		98			%			70	130	
		13C3-HFPO-DA SUR		93			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57407-001	5.5	1.8	0.45	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57407-001	0.32 J	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57407-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57407-001	5.4	1.8	0.30	ng/L				4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001	27	1.8	0.35	ng/L				2	30
		perfluorohexanoic acid (PFHXA)	57407-001	12	1.8	0.31	ng/L				4	30
		perfluorononanoic acid (PFNA)	57407-001	1.8	1.8	0.40	ng/L				7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001	34	1.8	0.36	ng/L				2	30
		perfluorooctanoic acid (PFOA)	57407-001	14	1.8	0.30	ng/L				9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57407-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57407-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57407-001	99			%			70	130	
		13C2-PFDA SUR	57407-001	99			%			70	130	
		D5-NEtFOSAA SUR	57407-001	98			%			70	130	
		13C3-HFPO-DA SUR	57407-001	95			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	2.0	0.30	ng/L	40	89	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	2.0	0.39	ng/L	40	100	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	2.0	0.33	ng/L	40	97	70 130		
		perfluorobutane sulfonic acid (PFBS)		31	2.0	0.50	ng/L	35	88	70 130		
		perfluorodecanoic acid (PFDA)		42	2.0	0.34	ng/L	40	104	70 130		
		perfluorododecanoic acid (PFDOA)		40	2.0	0.43	ng/L	40	101	70 130		
		perfluoroheptanoic acid (PFHPA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorohexane sulfonic acid (PFHXS)		32	2.0	0.40	ng/L	38	85	70 130		
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 130		
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	98	70 130		
		perfluorooctane sulfonic acid (PFOS)		33	2.0	0.40	ng/L	38	87	70 130		
		perfluorooctanoic acid (PFOA)		37	2.0	0.33	ng/L	40	93	70 130		
		perfluorotetradecanoic acid (PFTEA)		45	2.0	0.50	ng/L	40	113	70 130		
		perfluorotridecanoic acid (PFTRIA)		44	2.0	0.13	ng/L	40	111	70 130		
		perfluoroundecanoic acid (PFUNA)		39	2.0	0.32	ng/L	40	98	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	2.0	0.39	ng/L	37	93	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	2.0	0.40	ng/L	37	94	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	2.0	0.18	ng/L	37	91	70 130		
		13C2-PFHxA SUR		92			%			70 130		
		13C2-PFDA SUR		103			%			70 130		
		D5-NETFOSAA SUR		90			%			70 130		
		13C3-HFPO-DA SUR		90			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	1.7	0.26	ng/L	3.48	95	50 150		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	1.7	0.34	ng/L	3.48	100	50 150		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	1.7	0.28	ng/L	3.48	101	50 150		
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	1.7	0.44	ng/L	3.08	89	50 150		
		perfluorodecanoic acid (PFDA)	57432-001	3.7	1.7	0.30	ng/L	3.48	107	50 150		
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	1.7	0.37	ng/L	3.48	111	50 150		
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	1.7	0.29	ng/L	3.48	102	50 150		
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	1.7	0.34	ng/L	3.31	89	50 150		
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	1.7	0.30	ng/L	3.48	97	50 150		
		perfluorononanoic acid (PFNA)	57432-001	3.6	1.7	0.39	ng/L	3.48	103	50 150		
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	1.7	0.35	ng/L	3.34	92	50 150		
		perfluorooctanoic acid (PFOA)	57432-001	3.3	1.7	0.29	ng/L	3.48	96	50 150		
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	1.7	0.43	ng/L	3.48	117	50 150		
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	1.7	0.11	ng/L	3.48	107	50 150		
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	1.7	0.28	ng/L	3.48	109	50 150		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	1.7	0.34	ng/L	3.29	90	50 150		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	1.7	0.35	ng/L	3.25	90	50 150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	1.7	0.16	ng/L	3.29	102	50 150		
		13C2-PFHxA SUR	57432-001	94			%			70 130		
		13C2-PFDA SUR	57432-001	100			%			70 130		
		D5-NETFOSAA SUR	57432-001	95			%			70 130		
		13C3-HFPO-DA SUR	57432-001	92			%			70 130		

Absolute Resource

associates



124 Heritage Avenue #16
 Portsmouth, NH 03801
 603-436-2001
 absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57365

ANALYSIS REQUEST

Company Name: Blueleaf Inc.

Company Address: 57 Dresser Hill Rd

Report To: Aaron Davis

Phone #: 774-200-8029

Invoice to: Eric Gistow

Email: adavis@blueleafwater.com

PO #:

Project Name: Bw Straightway

Project #: 11204

Project Location: NH (MA) ME VT

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES
 MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
 EPA DW Other

Quote #

NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP	<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MIBE, only	<input type="checkbox"/> VOC 8021VT	<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane	<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input checked="" type="checkbox"/> Gases-List: <u>THM's HAN's</u>	<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DFO 8015	<input type="checkbox"/> EPH MADEP	<input type="checkbox"/> TPH Fingerprint	<input type="checkbox"/> 8270PBT	<input type="checkbox"/> 8270PBT	<input type="checkbox"/> 625-1	<input type="checkbox"/> EDB	<input type="checkbox"/> Bromide	<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pesti/PCB	<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution	<input type="checkbox"/> pH	<input type="checkbox"/> BOD	<input type="checkbox"/> Conductivity	<input type="checkbox"/> Turbidity	<input type="checkbox"/> Apparent Color	<input type="checkbox"/> True Color	<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS	<input type="checkbox"/> TVS	<input type="checkbox"/> Alkalinity	<input type="checkbox"/> Acidity	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals	<input checked="" type="checkbox"/> Hardness	<input type="checkbox"/> Total Metals-list: <u>Fe, Mn</u>	<input type="checkbox"/> Dissolved Metals-list: <u>Fe, Mn</u>	<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN	<input type="checkbox"/> TN	<input type="checkbox"/> TOC	<input type="checkbox"/> Ferrous Iron	<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN	<input type="checkbox"/> Enterococci	<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite	<input type="checkbox"/> Ortho P	<input type="checkbox"/> Phenols	<input type="checkbox"/> Chloride	<input type="checkbox"/> Sulfate	<input type="checkbox"/> Bromide	<input type="checkbox"/> Fluoride	<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC	<input type="checkbox"/> TCLP Pesticide	<input type="checkbox"/> Subcontract: Grain Size	<input type="checkbox"/> Herbicides	<input type="checkbox"/> Asbestos	<u>Conductivity</u>	<u>pH + Alkalinity</u>	<input type="checkbox"/> Grab (S) or Composite (C)
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Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME
<u>5736501</u>	<u>RAW</u>		<u>X</u>							<u>6/10</u>	<u>900</u>	<u>NCF</u>
<u>-02</u>	<u>GSP Filter</u>									<u>6/10</u>	<u>900</u>	<u>NCF</u>
<u>-03</u>	<u>UV Effluent</u>									<u>6/10</u>	<u>900</u>	<u>NCF</u>
<u>-04</u>	<u>Maier Raw</u>										<u>10:00</u>	<u>AD</u>
<u>-05</u>	<u>Maier GSP</u>											
<u>-06</u>	<u>Maier UV</u>											
<u>-07</u>	<u>Maier GAC</u>											
<u>-08</u>	<u>Field Reagent Blank</u>											

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

Estimate 1,4D Below Reporting Limit

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 0 °C

CUSTODY RECORD

QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>6/10/21</u> Time: <u>14:10</u>	Received by:	Date: <u>6/10</u> Time: <u>2pm</u>
Relinquished by:	Date: <u>6-10</u> Time:	Received by:	Date: Time:
Relinquished by:	Date: Time:	Received by Laboratory:	Date: <u>6/10/21</u> Time: <u>6:15</u>

Sample Receipt Condition Report

57365

Absolute Resource Associates

Job Number:

Samples Received from: UPS FedEx USPS Lab Courier Client Drop-off _____
 Custody Seals - present & intact: Yes No N/A CoC signed: Yes No
 Receipt Temp: 0 °C Samples on ice? Yes No N/A Sampled < 24 hrs ago? Yes No
 PFAS-only real ice? Yes No N/A Any signs of freezing? Yes No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity							Check pH for ALL applicable* samples and document:
HCl	40mL(G)	8	250mL(P)	5	500mL(P)	1L(G)		pH = 2 *pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <input checked="" type="checkbox"/> N
HNO ₃	125mL(P)		250mL(P)		500mL(P)			
H ₂ SO ₄	40mL(G)	4	60mL(P)		125mL(P)	250mL(P)	500mL(P)	
NaOH	125mL(P)		250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)			
ZnAc-NaOH	125mL(P)		250mL(P)					
Trizma	125mL(P)		250mL(P)	7				
NH ₄ Ac	125mL(P)		250mL(P)					
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	3				
MeOH	20mL(G)		40mL(G)					
None (solid)	2oz(G)		4oz(G)		8oz(G)	Syringe		
None (water)	40ml(G)	12	60mL(P)	9	125mL(P)	11	250mL(P) 4	500mL(P) 3
NH ₄ Cl	60mL(G)	12						
Mold	Cassette		Bulk		Plate		Tape Lift	
Asbestos	Cassette		Bulk					
Lead	Cassette		Bulk		Wipe			

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	✓			Lot ID#: <u>PB-05</u>
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A) or MPN, Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			DBU, WS, AD, EB
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			-	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			-	
Compliance samples have no discrepancies/require no flags?			-	(Or must be rejected)
Log-in Supervisor notified immediately of following items:	✓			Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: JS

Date/Time: 2/10/21 18:00

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/22/2021
Work Order #: 2106-02507
Client Job #:
Date Received: 06/15/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-02507-001
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57365
GSP Filter
MA

DATE AND TIME COLLECTED: 06/10/2021 09:00AM
DATE AND TIME RECEIVED: 06/15/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

MORE LOC INFO:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	CLIENT JOB #:		Method	Analyst	Date - Time Analyzed
					RL	Limit			
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/16/2021 09:05AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 05:47PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 05:47PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 05:47PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/17/2021 05:47PM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/17/2021 05:47PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/17/2021 05:47PM
2,3-Dibromopropionic Acid	98	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/17/2021 05:47PM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
 Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
 Portsmouth, NH 03801
SAMPLE ID #: 2106-02507-002
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57365
 UV Effluent
 MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/10/2021 09:00AM
DATE AND TIME RECEIVED: 06/15/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 03:31AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 03:31AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 03:31AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/19/2021 03:31AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/19/2021 03:31AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 03:31AM
2,3-Dibromopropionic Acid	79	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/19/2021 03:31AM

Donald A. D'Anjou, Ph. D.
 Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-02507-003
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57365
Maher GSP
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/10/2021 10:00AM
DATE AND TIME RECEIVED: 06/15/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:12AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:12AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:12AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/19/2021 04:12AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/19/2021 04:12AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:12AM
2,3-Dibromopropionic Acid	92	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/19/2021 04:12AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



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CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-02507-004
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57365
Maher UV
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/10/2021 10:00AM
DATE AND TIME RECEIVED: 06/15/2021 11:20AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:52AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:52AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:52AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/19/2021 04:52AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/19/2021 04:52AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 04:52AM
2,3-Dibromopropionic Acid	81	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/19/2021 04:52AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource

associates



124 Heritage Avenue #16
 Portsmouth, NH 03801
 603-436-2001
 absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57365

ANALYSIS REQUEST

Company Name: Blueleaf Inc.

Company Address: 57 Dresser Hill Rd

Report To: Aaron Davis

Phone #: 774-200-8029

Invoice to: Eric Gistow

Email: adavis@blueleafwater.com

PO #:

Project Name: Bw Straightway

Project #: 11204

Project Location: NH (MA) ME VT

Accreditation Required? N/A

Protocol: RCRA SDWA NPDES
 MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
 EPA DW Other

Quote #

NH Reimbursement Pricing

VOC 8260 VOC 8260 NHDES VOC 8260 MADEP

VOC 624.1 VOC BTEX MIBE, only VOC 8021VT

VPH MADEP GRO 8015 1,4-Dioxane

VOC 524.2 VOC 524.2 NH List Gases-List: TTHM, HAMS

TPH 8100 DFO 8015 EPH MADEP TPH Fingerprint

~~8270P4H~~ ~~8270P4BN~~ ~~625.1~~ ~~EDB~~ Bromide

8082 PCB 8081 Pesticides 608.3 Pesti/PCB

PFAS 537.1 PFAS 533 PFAS isotope dilution

~~8088 T004~~ ~~Mineral O&G-1664~~ Ni, Cu, Mg, Zn

pH BOD Conductivity Turbidity Apparent Color TSS

TDS TS TVS Alkalinity Acidity

RCRA Metals Priority Pollutant Metals TAL Metals Hardness

Total Metals-list: Fe, Mn

Dissolved Metals-list: Fe, Mn

Ammonia COD TKN TN TOC Ferrous Iron

T-Phosphorus Bacteria P/A Bacteria MPN Enterococci

Cyanide Sulfide Nitrate + Nitrite Ortho P Phenols

~~Sulfate~~ Chloride Sulfate Bromide Fluoride

Corrosivity Ignitibility/FP

TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide

Subcontract: Grain Size Herbicides Asbestos

Conductivity
 pH + Alkalinity
 Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method				Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME
diss 5736501	RAW		X							6/10	900	NCF
-02	GSP Filter									6/10	900	NCF
-03	UV Effluent									6/10	900	NCF
-04	Mahe Raw										10:00	AD
-05	Mahe GSP											
-06	Mahe UV											
-07	Mahe GAC											
-08	Field Reagent Blank											

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
Estimate 1,4D Below Reporting Limit

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@blueleafwater.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 0 °C

CUSTODY RECORD
 QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date: <u>6/10/21</u> Time: <u>14:10</u>	Received by:	Date: <u>6/10</u> Time: <u>2pm</u>
Relinquished by:	Date: <u>6-10</u> Time:	Received by:	Date: Time:
Relinquished by:	Date: Time:	Received by Laboratory:	Date: <u>6/10/21</u> Time: <u>6:15</u>

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57382
Date Received: 6/11/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.
Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 6/18/2021
Total number of pages: 23

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
RAW	Water	6/11/2021 8:30	57382-001	Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A
GSP Filter	Water	6/11/2021 8:30	57382-002	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM VOCs Trihalomethanes in water by 524.2
UV Effluent	Water	6/11/2021 8:30	57382-003	Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A Total Organic Carbon by 5310C VOCs Trihalomethanes in water by 524.2
GAC	Water	6/11/2021 8:30	57382-004	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1
GSP CBW	Water	6/11/2021 9:00	57382-005	Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1
Field Blank	Water	6/11/2021	57382-006	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/12/21	0:48 E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/12/21	0:48 E524.2
dibromochloromethane	0.11 J	0.50	0.050	ug/L	1	LMM			2101699	6/12/21	0:48 E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/12/21	0:48 E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/12/21	0:48 E524.2
Surrogate Recovery		Limits									
4-bromofluorobenzene SUR	96	70-130		%	1	LMM			2101699	6/12/21	0:48 E524.2
1,4-dichlorobenzene-D4 SUR	91	70-130		%	1	LMM			2101699	6/12/21	0:48 E524.2

Sample#: 57382-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101699	6/12/21	1:20 E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101699	6/12/21	1:20 E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101699	6/12/21	1:20 E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101699	6/12/21	1:20 E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101699	6/12/21	1:20 E524.2
Surrogate Recovery		Limits									
4-bromofluorobenzene SUR	93	70-130		%	1	LMM			2101699	6/12/21	1:20 E524.2
1,4-dichlorobenzene-D4 SUR	90	70-130		%	1	LMM			2101699	6/12/21	1:20 E524.2

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-001

Sample ID: RAW

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.31	0.25	0.13	ug/L	1	LMM			2101731	6/15/21	18:50	SW8260Dmod

Sample#: 57382-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.13	ug/L	1	LMM			2101731	6/15/21	19:21	SW8260Dmod

Sample#: 57382-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.13	ug/L	1	LMM			2101731	6/15/21	19:53	SW8260Dmod

Sample#: 57382-005

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/11/21 9:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.13	ug/L	1	LMM			2101731	6/15/21	20:24	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-001

Sample ID: RAW

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting		Units	Instr Dil'n		Prep		Analysis			
		Limit	DL		Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Nitrate-N	4.3	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	19:25	E300.0A
Nitrite-N	0.019 J	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	19:25	E300.0A

Sample#: 57382-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting		Units	Instr Dil'n		Prep		Analysis			
		Limit	DL		Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Nitrate-N	4.3	0.1	0.038	mg/L	1	DBV			2101707	6/11/21	19:42	E300.0A
Nitrite-N	0.019 J	0.1	0.019	mg/L	1	DBV			2101707	6/11/21	19:42	E300.0A

Sample#: 57382-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/11/21 8:30

Parameter	Result	Reporting		Units	Instr Dil'n		Prep		Analysis			
		Limit	DL		Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	0.65 J	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	15:37	SM5310C

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-004

Sample ID: GAC

Matrix: Water

Sampled: 6/11/21 8:30

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.25	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorooctane sulfonic acid (PFOS)	0.47 J	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.41	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13970	6/16/21	22:29
Surrogate Recovery			Limits							
13C2-PFHxA SUR	99	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:29	
13C2-PFDA SUR	107	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:29	
D5-NEtFOSAA SUR	106	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:29	
13C3-HFPO-DA SUR	97	70-130	%	1	WAS	6/16/21	13970	6/16/21	22:29	
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-005

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/11/21 9:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	2.0 U	2.0	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	2.0 U	2.0	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	2.0 U	2.0	0.32	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorobutane sulfonic acid (PFBS)	4.0	2.0	0.49	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorodecanoic acid (PFDA)	2.0 U	2.0	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorododecanoic acid (PFDOA)	2.0 U	2.0	0.42	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluoroheptanoic acid (PFHPA)	4.1	2.0	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorohexane sulfonic acid (PFHXS)	22	2.0	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorohexanoic acid (PFHXA)	8.3	2.0	0.34	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorononanoic acid (PFNA)	1.3 J	2.0	0.44	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorooctane sulfonic acid (PFOS)	27	2.0	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorooctanoic acid (PFOA)	9.9	2.0	0.33	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorotetradecanoic acid (PFTEA)	2.0 U	2.0	0.49	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluorotridecanoic acid (PFTRIA)	2.0 U	2.0	0.13	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
perfluoroundecanoic acid (PFUNA)	2.0 U	2.0	0.32	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	2.0 U	2.0	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	2.0 U	2.0	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	2.0 U	2.0	0.18	ng/L	1	WAS	6/16/21	13969	6/16/21	20:21
Surrogate Recovery		Limits								
13C2-PFHxA SUR	83	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:21
13C2-PFDA SUR	102	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:21
D5-NEtFOSAA SUR	85	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:21
13C3-HFPO-DA SUR	79	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:21
Sum of MA PFAS6 Analytes (MAPFAS6)	63	2		ng/L	1			2101748		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57382

Sample#: 57382-006

Sample ID: Field Blank

Matrix: Water

Sampled: 6/11/21

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.46	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.31	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	WAS	6/16/21	13969	6/16/21	20:37
Surrogate Recovery										
		Limits								
13C2-PFHxA SUR	81	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:37
13C2-PFDA SUR	87	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:37
D5-NEtFOSAA SUR	77	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:37
13C3-HFPO-DA SUR	85	70-130		%	1	WAS	6/16/21	13969	6/16/21	20:37
Sum of MA PFAS6 Analytes (MAPFAS6)	1.8 U	1.8		ng/L	1			2101748		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57382

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

PFAS: No exceptions noted regarding the Internal Standards or Calibration/Calibration Verifications associated with sample analysis.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit	
E524.2	BLK2101699	chloroform		<	0.50	ug/L					
		bromodichloromethane		<	0.50	ug/L					
		dibromochloromethane		<	0.50	ug/L					
		bromoform		<	0.50	ug/L					
		4-bromofluorobenzene SUR			98	%			70	130	
		1,4-dichlorobenzene-D4 SUR			96	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	DUP2101699	chloroform	57363-001	<	0.50	ug/L				20	
		bromodichloromethane	57363-001	<	0.50	ug/L				20	
		dibromochloromethane	57363-001	<	0.50	ug/L				20	
		bromoform	57363-001	<	0.50	ug/L				20	
		4-bromofluorobenzene SUR	57363-001		99	%			70	130	
		1,4-dichlorobenzene-D4 SUR	57363-001		97	%			70	130	
		Total Trihalomethanes (THMs)	57363-001							99.3	
E524.2	LCS2101699	chloroform			9.6	ug/L	10	96	70	130	
		bromodichloromethane			10	ug/L	10	104	70	130	
		dibromochloromethane			10	ug/L	10	100	70	130	
		bromoform			10	ug/L	10	104	70	130	
		4-bromofluorobenzene SUR			104	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
E524.2	LCSD2101699	chloroform			10	ug/L	10	103	70	130	7
		bromodichloromethane			11	ug/L	10	111	70	130	6
		dibromochloromethane			11	ug/L	10	107	70	130	7
		bromoform			11	ug/L	10	110	70	130	5
		4-bromofluorobenzene SUR			112	%			70	130	
		1,4-dichlorobenzene-D4 SUR			113	%			70	130	
		Total Trihalomethanes (THMs)									
SW8260Dmod	BLK2101731	1,4-dioxane		<	0.25	ug/L					
SW8260Dmod	LCS2101731	1,4-dioxane			8.4	ug/L	8	106	70	130	
SW8260Dmod	LCSD2101731	1,4-dioxane			9.7	ug/L	8	121	70	130	14

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101707	Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
E300.0A	DUP2101707	Nitrate-N	57363-001		4.2	mg/L			0	10
		Nitrite-N	57363-001	<	0.1	mg/L				10
E300.0A	LCS2101707	Nitrate-N			10	mg/L	10	100	90	110
		Nitrite-N			15	mg/L	15	98	90	110
E300.0A	LCSD2101707	Nitrate-N			10	mg/L	10	100	90	110
		Nitrite-N			15	mg/L	15	99	90	110
									0	10
									0	10
E300.0A	MS2101707	Nitrate-N	57363-001		5.2	mg/L	1.66	63 *	90	110
		Nitrite-N	57363-001		2.3	mg/L	2.53	92	90	110
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)			10	mg/L	10	99	85	115
SM5310C	LCSD2101750	Total Organic Carbon (TOC)			10	mg/L	10	101	85	115
									1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001		10	mg/L	10	98	75	125

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR		96	%			70	130	
		13C2-PFDA SUR		110	%			70	130	
		D5ETFOSAA SUR		101	%			70	130	
		HFPODA13C3 SUR		103	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57299-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57299-001	<	1.8	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57299-001	<	1.8	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57299-001	<	1.8	ng/L				30
		perfluorodecanoic acid (PFDA)	57299-001	<	1.8	ng/L				30
		perfluorododecanoic acid (PFDOA)	57299-001	<	1.8	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57299-001	<	1.8	ng/L				30
		perfluorohexane sulfonic acid (PFHXS)	57299-001	<	1.8	ng/L				30
		perfluorohexanoic acid (PFHXA)	57299-001	<	1.8	ng/L				30
		perfluorononanoic acid (PFNA)	57299-001	<	1.8	ng/L				30
		perfluorooctane sulfonic acid (PFOS)	57299-001		1.8	ng/L			1	30
		perfluorooctanoic acid (PFOA)	57299-001	<	1.8	ng/L				30
		perfluorotetradecanoic acid (PFTEA)	57299-001	<	1.8	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57299-001	<	1.8	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57299-001	<	1.8	ng/L				30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57299-001	<	1.8	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57299-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57299-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57299-001		76	%		70	130	
		13C2-PFDA SUR	57299-001		95	%		70	130	
		D5ETFOSAA SUR	57299-001		91	%		70	130	
		HFPODA13C3 SUR	57299-001		76	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		4.5	ng/L	4	113	50	150	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		4.3	ng/L	4	107	50	150	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		4.1	ng/L	4	103	50	150	
		perfluorobutane sulfonic acid (PFBS)		3.2	ng/L	3.54	91	50	150	
		perfluorodecanoic acid (PFDA)		4.5	ng/L	4	113	50	150	
		perfluorododecanoic acid (PFDOA)		4.2	ng/L	4	104	50	150	
		perfluoroheptanoic acid (PFHPA)		4.2	ng/L	4	104	50	150	
		perfluorohexane sulfonic acid (PFHXS)		3.4	ng/L	3.8	89	50	150	
		perfluorohexanoic acid (PFHXA)		4.0	ng/L	4	99	50	150	
		perfluorononanoic acid (PFNA)		4.7	ng/L	4	117	50	150	
		perfluorooctane sulfonic acid (PFOS)		3.6	ng/L	3.84	93	50	150	
		perfluorooctanoic acid (PFOA)		4.1	ng/L	4	102	50	150	
		perfluorotetradecanoic acid (PFTEA)		4.4	ng/L	4	110	50	150	
		perfluorotridecanoic acid (PFTRIA)		4.2	ng/L	4	104	50	150	
		perfluoroundecanoic acid (PFUNA)		4.3	ng/L	4	108	50	150	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		3.6	ng/L	3.78	95	50	150	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		3.5	ng/L	3.74	93	50	150	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		3.7	ng/L	3.78	97	50	150	
		13C2-PFHxA SUR		98	%			70	130	
		13C2-PFDA SUR		111	%			70	130	
		D5ETFOSAA SUR		95	%			70	130	
		HFPODA13C3 SUR		108	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57361-001	130	ng/L	178	70	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57361-001	170	ng/L	178	93	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57361-001	170	ng/L	178	97	70	130	
		perfluorobutane sulfonic acid (PFBS)	57361-001	120	ng/L	158	77	70	130	
		perfluorodecanoic acid (PFDA)	57361-001	170	ng/L	178	96	70	130	
		perfluorododecanoic acid (PFDOA)	57361-001	150	ng/L	178	83	70	130	
		perfluoroheptanoic acid (PFHPA)	57361-001	140	ng/L	178	80	70	130	
		perfluorohexane sulfonic acid (PFHXS)	57361-001	130	ng/L	169	78	70	130	
		perfluorohexanoic acid (PFHXA)	57361-001	140	ng/L	178	76	70	130	
		perfluorononanoic acid (PFNA)	57361-001	150	ng/L	178	86	70	130	
		perfluorooctane sulfonic acid (PFOS)	57361-001	140	ng/L	171	80	70	130	
		perfluorooctanoic acid (PFOA)	57361-001	160	ng/L	178	91	70	130	
		perfluorotetradecanoic acid (PFTEA)	57361-001	130	ng/L	178	70	70	130	
		perfluorotridecanoic acid (PFTRIA)	57361-001	140	ng/L	178	76	70	130	
		perfluoroundecanoic acid (PFUNA)	57361-001	160	ng/L	178	87	70	130	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57361-001	150	ng/L	168	88	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57361-001	150	ng/L	166	89	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57361-001	120	ng/L	168	73	70	130	
		13C2-PFHxA SUR	57361-001	87	%			70	130	
		13C2-PFDA SUR	57361-001	109	%			70	130	
		D5ETFOSAA SUR	57361-001	84	%			70	130	
		HFPODA13C3 SUR	57361-001	87	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR			98	%		70	130	
		13C2-PFDA SUR			106	%		70	130	
		D5ETFOSAA SUR			98	%		70	130	
		HFPODA13C3 SUR			93	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	<	1.8	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	<	1.8	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57407-001		5.5	ng/L			2	30
		perfluorodecanoic acid (PFDA)	57407-001	<	1.8	ng/L				30
		perfluorododecanoic acid (PFDOA)	57407-001	<	1.8	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57407-001		5.4	ng/L			4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001		27	ng/L			2	30
		perfluorohexanoic acid (PFHXA)	57407-001		12	ng/L			4	30
		perfluorononanoic acid (PFNA)	57407-001		1.8	ng/L			7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001		34	ng/L			2	30
		perfluorooctanoic acid (PFOA)	57407-001		14	ng/L			9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	<	1.8	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57407-001	<	1.8	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57407-001	<	1.8	ng/L				30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	<	1.8	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57407-001		99	%		70	130	
		13C2-PFDA SUR	57407-001		99	%		70	130	
		D5ETFOSAA SUR	57407-001		98	%		70	130	
		HFPODA13C3 SUR	57407-001		95	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	ng/L	40	89	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	ng/L	40	100	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	ng/L	40	97	70	130	
		perfluorobutane sulfonic acid (PFBS)		31	ng/L	35	88	70	130	
		perfluorodecanoic acid (PFDA)		42	ng/L	40	104	70	130	
		perfluorododecanoic acid (PFDOA)		40	ng/L	40	101	70	130	
		perfluoroheptanoic acid (PFHPA)		37	ng/L	40	93	70	130	
		perfluorohexane sulfonic acid (PFHXS)		32	ng/L	38	85	70	130	
		perfluorohexanoic acid (PFHXA)		36	ng/L	40	90	70	130	
		perfluorononanoic acid (PFNA)		39	ng/L	40	98	70	130	
		perfluorooctane sulfonic acid (PFOS)		33	ng/L	38	87	70	130	
		perfluorooctanoic acid (PFOA)		37	ng/L	40	93	70	130	
		perfluorotetradecanoic acid (PFTEA)		45	ng/L	40	113	70	130	
		perfluorotridecanoic acid (PFTRIA)		44	ng/L	40	111	70	130	
		perfluoroundecanoic acid (PFUNA)		39	ng/L	40	98	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	ng/L	37	93	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	ng/L	37	94	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	ng/L	37	91	70	130	
		13C2-PFHxA SUR		92	%			70	130	
		13C2-PFDA SUR		103	%			70	130	
		D5ETFOSAA SUR		90	%			70	130	
		HFPODA13C3 SUR		90	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	ng/L	3.48	95	50	150	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	ng/L	3.48	100	50	150	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	ng/L	3.48	101	50	150	
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	ng/L	3.08	89	50	150	
		perfluorodecanoic acid (PFDA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	ng/L	3.48	111	50	150	
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	ng/L	3.48	102	50	150	
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	ng/L	3.31	89	50	150	
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	ng/L	3.48	97	50	150	
		perfluorononanoic acid (PFNA)	57432-001	3.6	ng/L	3.48	103	50	150	
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	ng/L	3.34	92	50	150	
		perfluorooctanoic acid (PFOA)	57432-001	3.3	ng/L	3.48	96	50	150	
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	ng/L	3.48	117	50	150	
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	ng/L	3.48	109	50	150	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	ng/L	3.29	90	50	150	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	ng/L	3.25	90	50	150	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	ng/L	3.29	102	50	150	
		13C2-PFHxA SUR	57432-001	94	%			70	130	
		13C2-PFDA SUR	57432-001	100	%			70	130	
		D5ETFOSAA SUR	57432-001	95	%			70	130	
		HFPODA13C3 SUR	57432-001	92	%			70	130	



Absolute Resource
associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

PAGE **57382** OF

ANALYSIS REQUEST

Company Name: Blueleaf Inc

Company Address: 57 Dresser Hill Rd Charlton MA

Report To: Aaron Davis

Phone #: 774-200-8029

Invoice to: _____

Email: a.davis@blueleafwater.com

PO #: _____

Project Name: BW Straightway

Project #: 11204

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: _____

Protocol:	RCRA	SDWA	NPDES
	MCP	NHDES	DOD
Reporting Limits:	QAPP	GW-1	S-1
	EPA DW	Other	

Quote # _____

NH Reimbursement Pricing

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
573201	RAW										6/11	830	
02	GSP Filter												X
03	UV Effluent												X
04	GAC												X
05	GSP CBW											900	X
06	Field Blank NO PER EM 6/11/21												X

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only	<input type="checkbox"/> VOC 8021VT
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015	<input checked="" type="checkbox"/> 1,4-Dioxane
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List	<input checked="" type="checkbox"/> Gases-List: TTHM, HAAS
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRO 8015	<input type="checkbox"/> EPH MADEP
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN	<input type="checkbox"/> 625.1
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides	<input type="checkbox"/> 608.3 Pest/PCB
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533	<input type="checkbox"/> PFAS isotope dilution
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664	
<input type="checkbox"/> pH	<input type="checkbox"/> BOD	<input type="checkbox"/> Conductivity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS	<input type="checkbox"/> TS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals	<input type="checkbox"/> TAL Metals
<input type="checkbox"/> Total Metals-list:		
<input type="checkbox"/> Dissolved Metals-list:		
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD	<input type="checkbox"/> TKN
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A	<input type="checkbox"/> Bacteria MPN
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide	<input type="checkbox"/> Nitrate + Nitrite
<input checked="" type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite	<input type="checkbox"/> Chloride
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP	
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC	<input type="checkbox"/> TCLP SVOC
Subcontract: <input type="checkbox"/> Grain Size <input type="checkbox"/> Herbicides <input type="checkbox"/> Asbestos		
Grab (G) or Composite (C)		

TAT REQUESTED

Priority (24 hr)* Expedited (48 hr)* Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) _____

HARD COPY REQUIRED EDD

RECEIVED ON ICE YES NO

TEMPERATURE 4 °C

CUSTODY RECORD <small>QSD-01 Revision 03/09/2020</small>	Relinquished by Sampler:	Date	Time	Received by:	Date	Time
	<i>[Signature]</i>	6/11	13:50	<i>[Signature]</i>	6-11	13:50
	<i>[Signature]</i>	6-11				
	Relinquished by:	Date	Time	Received by:	Date	Time
	<i>[Signature]</i>			<i>[Signature]</i>		
	Relinquished by:	Date	Time	Received by Laboratory:	Date	Time
	<i>[Signature]</i>			<i>[Signature]</i>	6/11/21	15:51

Sample Receipt Condition Report

57382

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 4 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	<u>4</u>	250mL(P)		500mL(P)	1L(G)	
HNO ₃	125mL(P)		250mL(P)		500mL(P)		
H ₂ SO ₄	40mL(G)	<u>2</u>	60mL(P)		125mL(P)	250mL(P)	500mL(P)
NaOH	125mL(P)		250mL(P)				
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)		
ZnAc-NaOH	125mL(P)		250mL(P)				
Trizma	125mL(P)		250mL(P)				
NH ₄ Ac	125mL(P)		250mL(P)				
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)				
MeOH	20mL(G)		40mL(G)				
None (solid)	2oz(G)		4oz(G)		8oz(G)	Syringe	
None (water)	40ml (G)	<u>6</u>	60mL(P)	<u>2</u>	125mL(P)	250mL(P)	500mL(P)
							1L(G)
							1L (P)
Mold	Cassette		Bulk		Plate		Tape Lift
Asbestos	Cassette		Bulk				
Lead	Cassette		Bulk		Wipe		

*pH ✓ by analyst: VOC, PFAS, TOC, O&G
Residual Cl not present:
ABN625 Pest608
Bacteria ResCl ✓ by analyst

PC Dry applicable? Y N

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?	X			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	X			
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	X			Lot ID#: <u>04</u>
Bacteria bottles provided by ARA?			X	
Samples within holding time?	X			
Immediate tests communicated in writing: NO₃, NO₂, o-PO₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	X			DBV
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?	X			HAA to GSA Courten
Pesticides EPA 608 pH5-9?			X	Add TOC to CoC per email
Compliance samples have no discrepancies/require no flags?			X	(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests. <u>Received TOC for</u>

Inspected and Received By: Sam

Date/Time: 6/11/21 16:30

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 06/22/2021
Work Order #: 2106-02508
Client Job #:
Date Received: 06/15/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **None**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-02508-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57382
GSP Filter
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/11/2021 08:30AM
DATE AND TIME RECEIVED: 06/15/2021 11:19AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 05:33AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 05:33AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 05:33AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/19/2021 05:33AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/19/2021 05:33AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 05:33AM
2,3-Dibromopropionic Acid	91	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/19/2021 05:33AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/22/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-02508-002
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57382
UV Effluent
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/11/2021 08:30AM
DATE AND TIME RECEIVED: 06/15/2021 11:19AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 06:14AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 06:14AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 06:14AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/19/2021 06:14AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/19/2021 06:14AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/19/2021 06:14AM
2,3-Dibromopropionic Acid	80	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/19/2021 06:14AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Absolute Resource

associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57382

ANALYSIS REQUEST

Company Name: Blueleaf Inc

Company Address: 57 Dresser Hill Rd Charlton MA

Report To: Aaron Davis

Phone #: 774-200-8029

Invoice to: _____

Email: adavis@blueleafwater.com

PO #: _____

Project Name: BW Straightway

Project #: 11204

Project Location: NH MA ME VT _____

Accreditation Required? N/Y: _____

Protocol: RCRA SDWA NPDES
MCP NHDES DOD

Reporting Limits: QAPP GW-1 S-1
EPA DW Other _____

Quote # _____

NH Reimbursement Pricing

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
5738201	RAW										6/11	830	
02	GSP Filter												
03	UV Effluent												
04	GAC												
05	GSP CBW											900	
06	Field Blank NO per EM 6/14/21												

VOC 8260 MADEP VOC 8260 NHDES VOC 8260 MADEP

VOC 624.1 VOC BTEX MBE, only VOC 8021VT

VPH MADEP GRO 8015 1,4-Dioxane

VOC 524.2 VOC 524.2 NH List Gases-List: THM, HAA5

TPH 8100 DRO 8015 EPH MADEP TPH Fingerprint

8270PAH 8270ABN 625.1 EDB

8082 PCB 8081 Pesticides 608.3 Pest/PCB

PFAS 537.1 PFAS 533 PFAS isotope dilution

O&G 1664 Mineral O&G 1664

pH BOD Conductivity Turbidity Apparent Color

TSS TDS TS TVS Alkalinity Acidity

RCRA Metals Priority Pollutant Metals TAL Metals Hardness

Total Metals-list:

Dissolved Metals-list:

Ammonia COD TKN TN TON TOC Ferrous Iron

T-Phosphorus Bacteria P/A Bacteria MPN Enterococci

Cyanide Sulfide Nitrate + Nitrite Ortho P Phenols

Nitrate Nitrite Chloride Sulfate Bromide Fluoride

Corrosivity Ignitibility/FP

TCLP Metals TCLP VOC TCLP SVOC TCLP Pesticide

Subcontract: Grain Size Herbicides Asbestos

Grab (G) or Composite (C)

TAT REQUESTED

Priority (24 hr)*

Expedited (48 hr)*

Standard (10 Business Days)

*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) _____

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO

TEMPERATURE 4 °C

CUSTODY RECORD		Date	Time	Received by:	Date	Time
Relinquished by Sampler:		6/11	13:50		6-11	13:50
Relinquished by:		6-11				
Relinquished by:				Received by Laboratory:	6/11/21	11:51

QSD-01 Revision 03/09/2020

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57383
Date Received: 6/11/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'Willie Stone', with a long, sweeping underline.

Willie Stone
Authorized Signature

Date of Approval: 6/18/2021
Total number of pages: 12

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GSP CBW	Water	6/4/2021 9:45	57383-001	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: BW Straightway 11204

Job ID: 57383

Sample#: 57383-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/4/21 9:45

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	2.0 U	2.0	0.30	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	2.0 U	2.0	0.38	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	2.0 U	2.0	0.32	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorobutane sulfonic acid (PFBS)	3.5	2.0	0.49	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorodecanoic acid (PFDA)	0.50 J	2.0	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorododecanoic acid (PFDOA)	2.0 U	2.0	0.42	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluoroheptanoic acid (PFHPA)	4.7	2.0	0.32	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorohexane sulfonic acid (PFHXS)	25	2.0	0.39	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorohexanoic acid (PFHXA)	11	2.0	0.34	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorononanoic acid (PFNA)	1.9 J	2.0	0.44	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorooctane sulfonic acid (PFOS)	33	2.0	0.39	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorooctanoic acid (PFOA)	17	2.0	0.33	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorotetradecanoic acid (PFTEA)	2.0 U	2.0	0.49	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluorotridecanoic acid (PFTRIA)	2.0 U	2.0	0.13	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
perfluoroundecanoic acid (PFUNA)	2.0 U	2.0	0.32	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	2.0 U	2.0	0.38	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	2.0 U	2.0	0.39	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	2.0 U	2.0	0.18	ng/L	1	WAS	6/16/21	13970	6/16/21	23:49
Surrogate Recovery		Limits								
13C2-PFHxA SUR	96	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:49
13C2-PFDA SUR	121	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:49
D5-NEtFOSAA SUR	92	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:49
13C3-HFPO-DA SUR	90	70-130		%	1	WAS	6/16/21	13970	6/16/21	23:49
Sum of MA PFAS6 Analytes (MAPFAS6)	80	2		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57383

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

PFAS: No exceptions noted regarding the Internal Standards or Calibration/Calibration Verifications associated with sample analysis.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR		98	%			70	130	
		13C2-PFDA SUR		106	%			70	130	
		D5ETFOSAA SUR		98	%			70	130	
		HFPODA13C3 SUR		93	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	<	1.8	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	<	1.8	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57407-001		5.5	ng/L			2	30
		perfluorodecanoic acid (PFDA)	57407-001	<	1.8	ng/L				30
		perfluorododecanoic acid (PFDOA)	57407-001	<	1.8	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57407-001		5.4	ng/L			4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001		27	ng/L			2	30
		perfluorohexanoic acid (PFHXA)	57407-001		12	ng/L			4	30
		perfluorononanoic acid (PFNA)	57407-001		1.8	ng/L			7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001		34	ng/L			2	30
		perfluorooctanoic acid (PFOA)	57407-001		14	ng/L			9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	<	1.8	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57407-001	<	1.8	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57407-001	<	1.8	ng/L				30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	<	1.8	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57407-001		99	%		70	130	
		13C2-PFDA SUR	57407-001		99	%		70	130	
		D5ETFOSAA SUR	57407-001		98	%		70	130	
		HFPODA13C3 SUR	57407-001		95	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	ng/L	40	89	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	ng/L	40	100	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	ng/L	40	97	70	130	
		perfluorobutane sulfonic acid (PFBS)		31	ng/L	35	88	70	130	
		perfluorodecanoic acid (PFDA)		42	ng/L	40	104	70	130	
		perfluorododecanoic acid (PFDOA)		40	ng/L	40	101	70	130	
		perfluoroheptanoic acid (PFHPA)		37	ng/L	40	93	70	130	
		perfluorohexane sulfonic acid (PFHXS)		32	ng/L	38	85	70	130	
		perfluorohexanoic acid (PFHXA)		36	ng/L	40	90	70	130	
		perfluorononanoic acid (PFNA)		39	ng/L	40	98	70	130	
		perfluorooctane sulfonic acid (PFOS)		33	ng/L	38	87	70	130	
		perfluorooctanoic acid (PFOA)		37	ng/L	40	93	70	130	
		perfluorotetradecanoic acid (PFTEA)		45	ng/L	40	113	70	130	
		perfluorotridecanoic acid (PFTRIA)		44	ng/L	40	111	70	130	
		perfluoroundecanoic acid (PFUNA)		39	ng/L	40	98	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	ng/L	37	93	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	ng/L	37	94	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	ng/L	37	91	70	130	
		13C2-PFHxA SUR		92	%			70	130	
		13C2-PFDA SUR		103	%			70	130	
		D5ETFOSAA SUR		90	%			70	130	
		HFPODA13C3 SUR		90	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	ng/L	3.48	95	50	150	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	ng/L	3.48	100	50	150	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	ng/L	3.48	101	50	150	
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	ng/L	3.08	89	50	150	
		perfluorodecanoic acid (PFDA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	ng/L	3.48	111	50	150	
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	ng/L	3.48	102	50	150	
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	ng/L	3.31	89	50	150	
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	ng/L	3.48	97	50	150	
		perfluorononanoic acid (PFNA)	57432-001	3.6	ng/L	3.48	103	50	150	
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	ng/L	3.34	92	50	150	
		perfluorooctanoic acid (PFOA)	57432-001	3.3	ng/L	3.48	96	50	150	
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	ng/L	3.48	117	50	150	
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	ng/L	3.48	109	50	150	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	ng/L	3.29	90	50	150	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	ng/L	3.25	90	50	150	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	ng/L	3.29	102	50	150	
		13C2-PFHxA SUR	57432-001	94	%			70	130	
		13C2-PFDA SUR	57432-001	100	%			70	130	
		D5ETFOSAA SUR	57432-001	95	%			70	130	
		HFPODA13C3 SUR	57432-001	92	%			70	130	

Absolute Resource
associates



124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

**CHAIN-OF-CUSTODY RECORD
AND ANALYSIS REQUEST**

57383

ANALYSIS REQUEST

Company Name: Bluelect, Inc.
Company Address: 57 Dresser Hill Rd Chilton NH
Report To: Aaron Davis
Phone #: 774 200 8029
Invoice to: Erik Grotton
Email: egrotton@bluelectwater.com
PO #:

Project Name: BW STRAIGHTWAY
Project #: 11204
Project Location: NH MA ME VT
Accreditation Required? N/A
Protocol: RCRA SDWA NPDES
MCP NHDES DOD
Reporting Limits: QAPP GW-1 S-1
EPA DW Other
Quote #
 NH Reimbursement Pricing

<input type="checkbox"/> VOC 8260	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 8260 NHDES	<input type="checkbox"/> VOC 8260 MADEP
<input type="checkbox"/> VOC 624.1	<input type="checkbox"/> VOC BTEX MBE, only
<input type="checkbox"/> VPH MADEP	<input type="checkbox"/> GRO 8015
<input type="checkbox"/> VOC 524.2	<input type="checkbox"/> VOC 524.2 NH List
<input type="checkbox"/> TPH 8100	<input type="checkbox"/> DRP 8015
<input type="checkbox"/> 8270PAH	<input type="checkbox"/> 8270ABN
<input type="checkbox"/> 8082 PCB	<input type="checkbox"/> 8081 Pesticides
<input checked="" type="checkbox"/> PFAS 537.1	<input type="checkbox"/> PFAS 533
<input type="checkbox"/> O&G 1664	<input type="checkbox"/> Mineral O&G 1664
<input type="checkbox"/> pH	<input type="checkbox"/> Conductivity
<input type="checkbox"/> TSS	<input type="checkbox"/> TDS
<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Priority Pollutant Metals
<input type="checkbox"/> Total Metals-list:	
<input type="checkbox"/> Dissolved Metals-list:	
<input type="checkbox"/> Ammonia	<input type="checkbox"/> COD
<input type="checkbox"/> T-Phosphorus	<input type="checkbox"/> Bacteria P/A
<input type="checkbox"/> Cyanide	<input type="checkbox"/> Sulfide
<input type="checkbox"/> Nitrate	<input type="checkbox"/> Nitrite
<input type="checkbox"/> Corrosivity	<input type="checkbox"/> Ignitibility/FP
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> TCLP VOC
<input type="checkbox"/> Subcontract:	<input type="checkbox"/> Grain Size

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	DATE	TIME	SAMPLER
57383-01	GSP CBW	2	X								6/4/21	9:45	4F

TAT REQUESTED
Priority (24 hr)*
Expedited (48 hr)*
Standard (10 Business Days)
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS PDF (e-mail address) adavis@bluelectwater.com

HARD COPY REQUIRED EDD _____

RECEIVED ON ICE YES NO
TEMPERATURE 4 °C

CUSTODY RECORD
QSD-01 Revision 03/09/2020

Relinquished by Sampler:	Date	Time	Received by:	Date	Time
	6/11/21	13:50		6-11	13:50
Relinquished by:	Date	Time	Received by:	Date	Time
	6-11				
Relinquished by:	Date	Time	Received by Laboratory:	Date	Time
				6/11/21	15:51

Sample Receipt Condition Report

57383

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 4 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
	40mL(G)	250mL(P)	500mL(P)	1L(G)			
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y N 1L(G) 1L(P)
HNO ₃	125mL(P)	250mL(P)	500mL(P)				
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)				
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL (P) <u>2</u>					
NH ₄ Ac	125mL(P)	250mL (P)					
NaS ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe			
None (water)	40ml (G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
Mold	Cassette	Bulk	Plate	Tape Lift			
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk	Wipe				

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?			X	
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?			X	
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	X			Lot ID#: <u>PB04</u>
Bacteria bottles provided by ARA?			X	
Samples within holding time?	X			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624			X	
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?			X	
Pesticides EPA 608 pH5-9?			X	
Compliance samples have no discrepancies/require no flags?			X	(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By:

 Date/Time: 6/11/21 16:22

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 12204
Job ID: 57407
Date Received: 6/14/21

Project: BW-Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'Willie Stone', with a long, sweeping underline.

Willie Stone
Authorized Signature

Date of Approval: 6/18/2021
Total number of pages: 18

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw	Water	6/14/2021 11:00	57407-001	Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1
GSP Filter	Water	6/14/2021 11:00	57407-002	Low level 1,4-dioxane in water by 8260 SIM
UV Effluent	Water	6/14/2021 11:00	57407-003	Low level 1,4-dioxane in water by 8260 SIM Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A
GAC	Water	6/14/2021 11:00	57407-004	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1
Field Blank	Water	6/14/2021 11:00	57407-005	MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1

Project ID: BW-Straightway 11204

Job ID: 57407

Sample#: 57407-001

Sample ID: Raw

Matrix: Water

Sampled: 6/14/21 11:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.20 J	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	20:55	SW8260Dmod

Sample#: 57407-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/14/21 11:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.14 J	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	21:27	SW8260Dmod

Sample#: 57407-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/14/21 11:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101731	6/15/21	21:58	SW8260Dmod

Project ID: BW-Straightway 11204

Job ID: 57407

Sample#: 57407-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/14/21 11:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Nitrate-N	4.3 M	0.1	0.038	mg/L	1	DBV			2101730	6/15/21	13:04	E300.0A
M = The recovery for the matrix spike was 58%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101730	6/15/21	13:04	E300.0A

Project ID: BW-Straightway 11204

Job ID: 57407

Sample#: 57407-001

Sample ID: Raw

Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorobutane sulfonic acid (PFBS)	5.6	1.7	0.44	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluoroheptanoic acid (PFHPA)	5.1	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorohexane sulfonic acid (PFHXS)	28	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorohexanoic acid (PFHXA)	12	1.7	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorononanoic acid (PFNA)	1.7 J	1.7	0.39	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorooctane sulfonic acid (PFOS)	34	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorooctanoic acid (PFOA)	13	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/16/21	13970	6/17/21	0:05
Surrogate Recovery		Limits								
13C2-PFHxA SUR	93	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:05
13C2-PFDA SUR	93	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:05
D5-NEtFOSAA SUR	91	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:05
13C3-HFPO-DA SUR	90	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:05
Sum of MA PFAS6 Analytes (MAPFAS6)	80	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-Straightway 11204

Job ID: 57407

Sample#: 57407-004

Sample ID: GAC

Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.38	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.33	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.15	ng/L	1	WAS	6/16/21	13970	6/17/21	0:36
Surrogate Recovery		Limits								
13C2-PFHxA SUR	95	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:36
13C2-PFDA SUR	93	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:36
D5-NEtFOSAA SUR	96	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:36
13C3-HFPO-DA SUR	87	70-130		%	1	WAS	6/16/21	13970	6/17/21	0:36
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW-Straightway 11204

Job ID: 57407

Sample#: 57407-005

Sample ID: Field Blank

Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.28	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorobutane sulfonic acid (PFBS)	1.8 U	1.8	0.46	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluoroheptanoic acid (PFHPA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorohexane sulfonic acid (PFHXS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorohexanoic acid (PFHXA)	1.8 U	1.8	0.32	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorononanoic acid (PFNA)	1.8 U	1.8	0.41	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorooctane sulfonic acid (PFOS)	1.8 U	1.8	0.37	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorooctanoic acid (PFOA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.30	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.37	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	WAS	6/16/21	13970	6/17/21	1:40
Surrogate Recovery		Limits								
13C2-PFHxA SUR	94	70-130		%	1	WAS	6/16/21	13970	6/17/21	1:40
13C2-PFDA SUR	101	70-130		%	1	WAS	6/16/21	13970	6/17/21	1:40
D5-NEtFOSAA SUR	89	70-130		%	1	WAS	6/16/21	13970	6/17/21	1:40
13C3-HFPO-DA SUR	90	70-130		%	1	WAS	6/16/21	13970	6/17/21	1:40
Sum of MA PFAS6 Analytes (MAPFAS6)	1.8 U	1.8		ng/L	1			2101749		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57407

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

PFAS: No exceptions noted regarding the Internal Standards or Calibration/Calibration Verifications associated with sample analysis.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The MS for 57407-003 did not meet the acceptance criteria for nitrate-N. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR		98	%			70	130	
		13C2-PFDA SUR		106	%			70	130	
		D5ETFOSAA SUR		98	%			70	130	
		HFPODA13C3 SUR		93	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57407-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57407-001	<	1.8	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57407-001	<	1.8	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57407-001		5.5	ng/L			2	30
		perfluorodecanoic acid (PFDA)	57407-001	<	1.8	ng/L				30
		perfluorododecanoic acid (PFDOA)	57407-001	<	1.8	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57407-001		5.4	ng/L			4	30
		perfluorohexane sulfonic acid (PFHXS)	57407-001		27	ng/L			2	30
		perfluorohexanoic acid (PFHXA)	57407-001		12	ng/L			4	30
		perfluorononanoic acid (PFNA)	57407-001		1.8	ng/L			7	30
		perfluorooctane sulfonic acid (PFOS)	57407-001		34	ng/L			2	30
		perfluorooctanoic acid (PFOA)	57407-001		14	ng/L			9	30
		perfluorotetradecanoic acid (PFTEA)	57407-001	<	1.8	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57407-001	<	1.8	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57407-001	<	1.8	ng/L				30
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57407-001	<	1.8	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57407-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57407-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57407-001		99	%		70	130	
		13C2-PFDA SUR	57407-001		99	%		70	130	
		D5ETFOSAA SUR	57407-001		98	%		70	130	
		HFPODA13C3 SUR	57407-001		95	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		35	ng/L	40	89	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		40	ng/L	40	100	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		39	ng/L	40	97	70	130	
		perfluorobutane sulfonic acid (PFBS)		31	ng/L	35	88	70	130	
		perfluorodecanoic acid (PFDA)		42	ng/L	40	104	70	130	
		perfluorododecanoic acid (PFDOA)		40	ng/L	40	101	70	130	
		perfluoroheptanoic acid (PFHPA)		37	ng/L	40	93	70	130	
		perfluorohexane sulfonic acid (PFHXS)		32	ng/L	38	85	70	130	
		perfluorohexanoic acid (PFHXA)		36	ng/L	40	90	70	130	
		perfluorononanoic acid (PFNA)		39	ng/L	40	98	70	130	
		perfluorooctane sulfonic acid (PFOS)		33	ng/L	38	87	70	130	
		perfluorooctanoic acid (PFOA)		37	ng/L	40	93	70	130	
		perfluorotetradecanoic acid (PFTEA)		45	ng/L	40	113	70	130	
		perfluorotridecanoic acid (PFTRIA)		44	ng/L	40	111	70	130	
		perfluoroundecanoic acid (PFUNA)		39	ng/L	40	98	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		35	ng/L	37	93	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		35	ng/L	37	94	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		35	ng/L	37	91	70	130	
		13C2-PFHxA SUR		92	%			70	130	
		13C2-PFDA SUR		103	%			70	130	
		D5ETFOSAA SUR		90	%			70	130	
		HFPODA13C3 SUR		90	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57432-001	3.3	ng/L	3.48	95	50	150	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	ng/L	3.48	100	50	150	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	ng/L	3.48	101	50	150	
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	ng/L	3.08	89	50	150	
		perfluorodecanoic acid (PFDA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	ng/L	3.48	111	50	150	
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	ng/L	3.48	102	50	150	
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	ng/L	3.31	89	50	150	
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	ng/L	3.48	97	50	150	
		perfluorononanoic acid (PFNA)	57432-001	3.6	ng/L	3.48	103	50	150	
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	ng/L	3.34	92	50	150	
		perfluorooctanoic acid (PFOA)	57432-001	3.3	ng/L	3.48	96	50	150	
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	ng/L	3.48	117	50	150	
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	ng/L	3.48	107	50	150	
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	ng/L	3.48	109	50	150	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	ng/L	3.29	90	50	150	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	ng/L	3.25	90	50	150	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57432-001	3.3	ng/L	3.29	102	50	150	
		13C2-PFHxA SUR	57432-001	94	%			70	130	
		13C2-PFDA SUR	57432-001	100	%			70	130	
		D5ETFOSAA SUR	57432-001	95	%			70	130	
		HFPODA13C3 SUR	57432-001	92	%			70	130	

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101731	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101731	1,4-dioxane		8.4	ug/L	8	106	70 130		
SW8260Dmod	LCSD2101731	1,4-dioxane		9.7	ug/L	8	121	70 130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101730	Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
E300.0A	DUP2101730	Nitrate-N	57407-003	4.3	mg/L				1	10
		Nitrite-N	57407-003	<	0.1	mg/L				10
E300.0A	LCS2101730	Nitrate-N		10	mg/L	10	101	90	110	
		Nitrite-N		15	mg/L	15	99	90	110	
E300.0A	LCSD2101730	Nitrate-N		10	mg/L	10	100	90	110	0
		Nitrite-N		15	mg/L	15	98	90	110	0
E300.0A	MS2101730	Nitrate-N	57407-003	5.2	mg/L	1.66	58 *	90	110	
		Nitrite-N	57407-003	2.5	mg/L	2.53	99	90	110	
E300.0A	MS2101730	Nitrate-N	57435-003	5.2	mg/L	1.66	56 *	90	110	
		Nitrite-N	57435-003	2.4	mg/L	2.53	93	90	110	

Sample Receipt Condition Report

57407

Absolute Resource Associates
Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>N</u> 1L(G) 1L(P)
HNO ₃	125mL(P)	250mL(P)	500mL(P)				
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)				
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL(P)	5				
NH ₄ Ac	125mL(P)	250mL(P)					
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe			
None (water)	40ml (G)	6	60mL(P)	1	125mL(P)	500mL(P)	
Mold	Cassette	Bulk	Plate	Tape Lift			
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk	Wipe				

Login Review	Yes	No	NA	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?	✓			
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd?	✓			Lot ID#: <u>PB-04</u>
Bacteria bottles provided by ARA?			✓	
Samples within holding time?	✓			
Immediate tests communicated in writing: (NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624)	✓			DBV
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			/	
Subcontract note on login board?			/	
Pesticides EPA 608 pH5-9?			/	
Compliance samples have no discrepancies/require no flags?			/	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			/	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

 Inspected and Received By: JD

 Date/Time: 6/14/21 16:04

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HT's communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57435
Date Received: 6/15/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.
Subcontracted analyses are provided under separate cover.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'A. DeWees', written in a cursive style.

Aaron DeWees
Chief Operating Officer

Date of Approval: 7/2/2021
Total number of pages: 26

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Raw	Water	6/15/2021 10:00	57435-001	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 Manganese in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
GSP Filter	Water	6/15/2021 10:00	57435-002	Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Iron in water by 200.8 Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Manganese in water by 200.8 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C True Color by SM2120B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
UV Effluent	Water	6/15/2021 10:00	57435-003	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water Haloacetic acids in water by SM6251 (subcontract) Low level 1,4-dioxane in water by 8260 SIM Magnesium in water by 200.8 Nitrate-N in water (NO3) by 300.0A Nitrite-N in water (NO2) by 300.0A pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2 Zinc in water by 200.8
GAC	Water	6/15/2021 10:00	57435-004	Alkalinity in water by SM2320B Calcium in water by 200.8 Chloride in water by 300.0A Direct Analysis Prep for Drinking Water MA PFAS6 analyte summation in Water by EPA 537.1 Magnesium in water by 200.8 PFAS in Water by EPA 537.1 pH in water by SM4500H+B Sodium in water by 200.8 Specific Conductance / Conductivity by SM2510B Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C Total Hardness (includes Ca & Mg) by SM2340B Total Organic Carbon by 5310C Turbidity Check for Direct Metals Analysis Zinc in water by 200.8
Raw-DISS	Water	6/15/2021 10:00	57435-005	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8
GSP Filter-DISS	Water	6/15/2021 10:00	57435-006	Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	15:14	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	15:14	E524.2
dibromochloromethane	0.063 J	0.50	0.050	ug/L	1	LMM			2101774	6/17/21	15:14	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101774	6/17/21	15:14	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101774	6/17/21	15:14	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	93	70-130		%	1	LMM			2101774	6/17/21	15:14	E524.2
1,4-dichlorobenzene-D4 SUR	85	70-130		%	1	LMM			2101774	6/17/21	15:14	E524.2

Sample#: 57435-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
chloroform	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	15:46	E524.2
bromodichloromethane	U	0.50	0.060	ug/L	1	LMM			2101774	6/17/21	15:46	E524.2
dibromochloromethane	U	0.50	0.050	ug/L	1	LMM			2101774	6/17/21	15:46	E524.2
bromoform	U	0.50	0.10	ug/L	1	LMM			2101774	6/17/21	15:46	E524.2
Total Trihalomethanes (THMs)	U	0.50		ug/L	1	LMM			2101774	6/17/21	15:46	E524.2
Surrogate Recovery		Limits										
4-bromofluorobenzene SUR	103	70-130		%	1	LMM			2101774	6/17/21	15:46	E524.2
1,4-dichlorobenzene-D4 SUR	94	70-130		%	1	LMM			2101774	6/17/21	15:46	E524.2

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	0.15 J	0.25	0.12	ug/L	1	LMM			2101754	6/16/21	15:59	SW8260Dmod

Sample#: 57435-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101754	6/16/21	16:31	SW8260Dmod

Sample#: 57435-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101754	6/16/21	17:03	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	19	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:25	E200.8
Iron	0.044 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:01	E200.8
Magnesium	5.3	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:01	E200.8
Manganese	0.15	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:01	E200.8
Sodium	48	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:01	E200.8
Zinc	0.0068 J	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:01	E200.8
Hardness (as CaCO3)	70	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Sample#: 57435-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	20	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:32	E200.8
Iron	0.0100 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:21	E200.8
Magnesium	5.4	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:21	E200.8
Manganese	0.0015 J	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:21	E200.8
Sodium	56	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:21	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:21	E200.8
Hardness (as CaCO3)	71	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Sample#: 57435-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	20	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:38	E200.8
Magnesium	5.4	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:28	E200.8
Sodium	56	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:28	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:28	E200.8
Hardness (as CaCO3)	72	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-004

Sample ID: GAC

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Calcium	21	1.0	0.026	mg/L	2	AGN	6/18/21	12:39	13984	6/30/21	19:58	E200.8
Magnesium	5.4	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:35	E200.8
Sodium	56	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:35	E200.8
Zinc	U	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:35	E200.8
Hardness (as CaCO3)	74	3	0.4	mg/L	1	AGN	6/18/21	12:39	13984	7/1/21		SM2340B

Sample#: 57435-005

Sample ID: Raw-DISS

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	0.023 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:41	E200.8
Manganese	0.14	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:41	E200.8

Sample#: 57435-006

Sample ID: GSP Filter-DISS

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Batch	Analysis		
		Limit	DL	Units	Factor	Analyst	Date	Time		Date	Time	Reference
Iron	0.0077 J	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:48	E200.8
Manganese	0.0023 J	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13984	6/19/21	4:48	E200.8

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	38	5	0.47	mg/L	1	DJM			2101762	6/16/21	11:00	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101741	6/16/21	15:32	SM2120B
Bromide	0.070 J	0.1	0.021	mg/L	1	DBV			2101776	6/17/21	13:53	E300.0A
Chloride	81	0.5	0.36	mg/L	1	DBV			2101824	6/22/21	15:28	E300.0A
Sulfate	20	0.5	0.21	mg/L	1	DBV			2101776	6/17/21	13:53	E300.0A
Total Dissolved Solids (TDS)	230	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101742	6/16/21	15:32	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
Conductivity	430	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	6.7 H			pH	1	SFM			2101813	6/16/21	11:22	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101761	6/16/21	15:53	SM2130B

Sample#: 57435-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	58	5	0.47	mg/L	1	DJM			2101762	6/16/21	11:00	SM2320B
Apparent Color	U	5.0	2.5	CU	1	SFM			2101741	6/16/21	15:34	SM2120B
Chloride	83	0.5	0.36	mg/L	1	DBV			2101776	6/17/21	14:10	E300.0A
Sulfate	20	0.5	0.21	mg/L	1	DBV			2101776	6/17/21	14:10	E300.0A
Total Dissolved Solids (TDS)	250	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
True Color	U	5.0	2.5	CU	1	SFM			2101742	6/16/21	15:34	SM2120B
Total Coliform Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
E. coli Bacteria	absent				1	DBV			2101737	6/15/21	16:20	SM9223BColilert
Conductivity	470	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	7.3 H			pH	1	SFM			2101813	6/16/21	11:36	SM4500H+B
H = Sample was received beyond method holding time.												
Turbidity	U	1.0	0.40	NTU	1	EB			2101761	6/16/21	15:54	SM2130B

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	55	5	0.47	mg/L	1	DJM			2101770	6/17/21	11:45	SM2320B
Chloride	83	0.5	0.36	mg/L	1	DBV			2101730	6/15/21	17:58	E300.0A
Nitrate-N	4.3 M	0.1	0.038	mg/L	1	DBV			2101730	6/15/21	17:58	E300.0A
M = The recovery for the matrix spike was 56%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Nitrite-N	U	0.1	0.019	mg/L	1	DBV			2101730	6/15/21	17:58	E300.0A
Sulfate	20 M	0.5	0.21	mg/L	1	DBV			2101730	6/15/21	17:58	E300.0A
M = The recovery for the matrix spike was 81%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.												
Total Dissolved Solids (TDS)	250	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
Conductivity	470	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	7.0 H			pH	1	SFM			2101813	6/16/21	11:39	SM4500H+B

H = Sample was received beyond method holding time.

Sample#: 57435-004

Sample ID: GAC

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	60	5	0.47	mg/L	1	DJM			2101770	6/17/21	11:45	SM2320B
Chloride	82	0.5	0.36	mg/L	1	DBV			2101776	6/17/21	14:26	E300.0A
Sulfate	20	0.5	0.21	mg/L	1	DBV			2101776	6/17/21	14:26	E300.0A
Total Dissolved Solids (TDS)	250	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16	SM2540C
Conductivity	460	5		umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B
pH	7.1 H			pH	1	SFM			2101813	6/16/21	11:40	SM4500H+B

H = Sample was received beyond method holding time.

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101750	6/16/21	18:04	SM5310C

Sample#: 57435-002

Sample ID: GSP Filter

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101751	6/16/21	20:13	SM5310C

Sample#: 57435-003

Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	0.68 J	1.0	0.59	mg/L	1	DBV			2101751	6/16/21	20:50	SM5310C

Sample#: 57435-004

Sample ID: GAC

Matrix: Water

Sampled: 6/15/21 10:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1	DBV			2101751	6/16/21	21:26	SM5310C

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.8 U	1.8	0.27	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.8 U	1.8	0.35	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorobutane sulfonic acid (PFBS)	5.4	1.8	0.45	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorodecanoic acid (PFDA)	1.8 U	1.8	0.31	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorododecanoic acid (PFDOA)	1.8 U	1.8	0.39	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluoroheptanoic acid (PFHPA)	4.8	1.8	0.30	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorohexane sulfonic acid (PFHXS)	27	1.8	0.36	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorohexanoic acid (PFHXA)	11	1.8	0.31	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorononanoic acid (PFNA)	1.6 J	1.8	0.41	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorooctane sulfonic acid (PFOS)	33	1.8	0.36	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorooctanoic acid (PFOA)	13	1.8	0.30	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorotetradecanoic acid (PFTEA)	1.8 U	1.8	0.45	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluorotridecanoic acid (PFTRIA)	1.8 U	1.8	0.12	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
perfluoroundecanoic acid (PFUNA)	1.8 U	1.8	0.29	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.8 U	1.8	0.35	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.8 U	1.8	0.36	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.8 U	1.8	0.17	ng/L	1	WAS	6/22/21	13990	6/22/21	12:46
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130	%	1	WAS	6/22/21	13990	6/22/21	12:46	
13C2-PFDA SUR	98	70-130	%	1	WAS	6/22/21	13990	6/22/21	12:46	
D5-NEtFOSAA SUR	97	70-130	%	1	WAS	6/22/21	13990	6/22/21	12:46	
13C3-HFPO-DA SUR	96	70-130	%	1	WAS	6/22/21	13990	6/22/21	12:46	
Sum of MA PFAS6 Analytes (MAPFAS6)	78	1.8		ng/L	1			2101835		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Project ID: BW Straightway 11204

Job ID: 57435

Sample#: 57435-004

Sample ID: GAC

Matrix: Water

Sampled: 6/15/21 10:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n Factor	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	1.7 U	1.7	0.26	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.37	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluoroheptanoic acid (PFHPA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorohexanoic acid (PFHXA)	1.7 U	1.7	0.30	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorononanoic acid (PFNA)	1.7 U	1.7	0.39	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorooctanoic acid (PFOA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1.7 U	1.7	0.16	ng/L	1	WAS	6/22/21	13990	6/22/21	13:18
Surrogate Recovery										
		Limits								
13C2-PFHxA SUR	102	70-130	%	1	WAS	6/22/21	13990	6/22/21	13:18	
13C2-PFDA SUR	102	70-130	%	1	WAS	6/22/21	13990	6/22/21	13:18	
D5-NEtFOSAA SUR	108	70-130	%	1	WAS	6/22/21	13990	6/22/21	13:18	
13C3-HFPO-DA SUR	103	70-130	%	1	WAS	6/22/21	13990	6/22/21	13:18	
Sum of MA PFAS6 Analytes (MAPFAS6)	1.7 U	1.7		ng/L	1			2101835		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57435

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Samples qualified with an "H" were received beyond method holding time and analyzed at customer's request.

Calibration

No exceptions noted.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Anions: The matrix spike for 57435-003 did not meet the acceptance criteria for Nitrate-N and Sulfate. The percent recovery was acceptable in the associated LCS/D. Matrix interference suspected.

Other

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

Data Qualifiers

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit		
E524.2	BLK2101774	chloroform		<	0.50	ug/L						
		bromodichloromethane		<	0.50	ug/L						
		dibromochloromethane		<	0.50	ug/L						
		bromoform		<	0.50	ug/L						
		4-bromofluorobenzene SUR			94	%			70	130		
		1,4-dichlorobenzene-D4 SUR			92	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	DUP2101774	chloroform	57420-006		5.0	ug/L			4	20		
		bromodichloromethane	57420-006	<	0.50	ug/L						
		dibromochloromethane	57420-006	<	0.50	ug/L						
		bromoform	57420-006	<	0.50	ug/L						
		4-bromofluorobenzene SUR	57420-006		98	%			70	130		
		1,4-dichlorobenzene-D4 SUR	57420-006		86	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCS2101774	chloroform			9.2	ug/L	10	92	70	130		
		bromodichloromethane			9.7	ug/L	10	97	70	130		
		dibromochloromethane			8.7	ug/L	10	87	70	130		
		bromoform			8.1	ug/L	10	81	70	130		
		4-bromofluorobenzene SUR			104	%			70	130		
		1,4-dichlorobenzene-D4 SUR			95	%			70	130		
		Total Trihalomethanes (THMs)										
E524.2	LCSD2101774	chloroform			8.8	ug/L	10	88	70	130	4	20
		bromodichloromethane			9.7	ug/L	10	97	70	130	0	20
		dibromochloromethane			9.1	ug/L	10	91	70	130	4	20
		bromoform			8.8	ug/L	10	88	70	130	8	20
		4-bromofluorobenzene SUR			110	%			70	130		
		1,4-dichlorobenzene-D4 SUR			104	%			70	130		
		Total Trihalomethanes (THMs)										
SW8260Dmod	BLK2101754	1,4-dioxane		<	0.25	ug/L						
SW8260Dmod	LCS2101754	1,4-dioxane			9.1	ug/L	8	113	70	130		
SW8260Dmod	LCSD2101754	1,4-dioxane			10	ug/L	8	130	70	130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E200.8	BLK13984	Calcium		< 0.50	mg/L					
		Iron		< 0.050	mg/L					
		Magnesium		< 0.10	mg/L					
		Manganese		< 0.010	mg/L					
		Sodium		< 0.10	mg/L					
		Zinc		< 0.010	mg/L					
E200.8	DUP13984	Manganese	57380-048	0.020	mg/L				1	20
E200.8	LCS13984	Calcium		2.7	mg/L	2.5	108	85	115	
		Iron		0.52	mg/L	0.5	103	85	115	
		Magnesium		0.50	mg/L	0.5	100	85	115	
		Manganese		0.50	mg/L	0.5	101	85	115	
		Sodium		4.9	mg/L	5	98	85	115	
		Zinc		0.52	mg/L	0.5	105	85	115	
E200.8	LCSD13984	Calcium		2.7	mg/L	2.5	108	85	115	1
		Iron		0.53	mg/L	0.5	106	85	115	2
		Magnesium		0.50	mg/L	0.5	101	85	115	1
		Manganese		0.51	mg/L	0.5	102	85	115	1
		Sodium		4.9	mg/L	5	99	85	115	1
		Zinc		0.51	mg/L	0.5	102	85	115	2
E200.8	MS13984	Manganese	57380-048	0.50	mg/L	0.5	97	70	130	
E200.8	MS13984	Manganese	57380-057	0.48	mg/L	0.5	95	70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101730	Chloride		<	0.5	mg/L				
		Nitrate-N		<	0.1	mg/L				
		Nitrite-N		<	0.1	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101730	Nitrate-N	57407-003	4.3	mg/L				1	10
		Nitrite-N	57407-003	<	0.1	mg/L				10
E300.0A	LCS2101730	Chloride		100	mg/L	100	100	90	110	
		Nitrate-N		10	mg/L	10	101	90	110	
		Nitrite-N		15	mg/L	15	99	90	110	
		Sulfate		99	mg/L	100	99	90	110	
E300.0A	LCSD2101730	Chloride		100	mg/L	100	100	90	110	0
		Nitrate-N		10	mg/L	10	100	90	110	0
		Nitrite-N		15	mg/L	15	98	90	110	0
		Sulfate		99	mg/L	100	99	90	110	0
E300.0A	MS2101730	Nitrate-N	57407-003	5.2	mg/L	1.66	58 *	90	110	
		Nitrite-N	57407-003	2.5	mg/L	2.53	99	90	110	
E300.0A	MS2101730	Chloride	57435-003	85	mg/L	16	12	90	110	
		Nitrate-N	57435-003	5.2	mg/L	1.66	56 *	90	110	
		Nitrite-N	57435-003	2.4	mg/L	2.53	93	90	110	
		Sulfate	57435-003	34	mg/L	16	81 *	90	110	
E300.0A	BLK2101776	Bromide		<	0.1	mg/L				
		Chloride		<	0.5	mg/L				
		Sulfate		<	0.5	mg/L				
E300.0A	DUP2101776	Bromide	57433-001	<	0.1	mg/L				10
		Chloride	57433-001	82	mg/L				0	10
		Sulfate	57433-001	20	mg/L				0	10
E300.0A	LCS2101776	Bromide		10	mg/L	10	102	90	110	
		Chloride		100	mg/L	100	103	90	110	
		Sulfate		100	mg/L	100	102	90	110	
E300.0A	LCSD2101776	Bromide		9.8	mg/L	10	98	90	110	4
		Chloride		98	mg/L	100	98	90	110	5
		Sulfate		98	mg/L	100	98	90	110	4
E300.0A	MS2101776	Bromide	57433-001	1.6	mg/L	1.66	94	90	110	
		Chloride	57433-001	84	mg/L	16	15	90	110	
		Sulfate	57433-001	33	mg/L	16	81 *	90	110	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E300.0A	BLK2101824	Chloride		<	0.5	mg/L				
E300.0A	DUP2101824	Chloride	57492-001		53	mg/L			0	10
E300.0A	LCS2101824	Chloride			100	mg/L	100	101	90	110
E300.0A	LCSD2101824	Chloride			98	mg/L	100	98	90	110
E300.0A	MS2101824	Chloride	57492-001		61	mg/L	16	45 *	90	110
SM2120B	DUP2101741	Apparent Color	57435-002	<	5	CU				20
SM2120B	LCS2101741	Apparent Color			35	CU	35		30	40
SM2120B	PB2101741	Apparent Color		<	5	CU			5	
SM2120B	DUP2101742	True Color	57435-002	<	5	CU				20
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)			6.04	pH			5.94	6.06
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	pH			3.94	4.06
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	pH			3.94	4.06
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57411-001		120	mg/L			0	10
SM2320B	DUP2101762	Alkalinity, Total (as CaCO3)	57435-002		59	mg/L			2	10
SM2320B	LCS2101762	Alkalinity, Total (as CaCO3)			25	mg/L	25	100	90	110
SM2320B	LCSD2101762	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110
SM2320B	PB2101762	Alkalinity, Total (as CaCO3)		<	5	mg/L				1
SM2320B	CCVB2101770	Alkalinity, Total (as CaCO3)			6.05	pH			5.94	6.06
SM2320B	CCVE2101770	Alkalinity, Total (as CaCO3)			4.01	pH			3.94	4.06
SM2320B	CCVM2101770	Alkalinity, Total (as CaCO3)			4.02	pH			3.94	4.06
SM2320B	DUP2101770	Alkalinity, Total (as CaCO3)	57439-001		25	mg/L			2	10
SM2320B	DUP2101770	Alkalinity, Total (as CaCO3)	57439-008		25	mg/L			2	10
SM2320B	LCS2101770	Alkalinity, Total (as CaCO3)			26	mg/L	25	104	90	110
SM2320B	LCSD2101770	Alkalinity, Total (as CaCO3)			27	mg/L	25	106	90	110
SM2320B	PB2101770	Alkalinity, Total (as CaCO3)		<	5	mg/L				2

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2510B	BLK2101781	Conductivity		<	5	uS/cm				
SM2510B	DUP2101781	Conductivity	57435-004	460	uS/cm				0	20
SM2510B	LCS2101781	Conductivity		1500	uS/cm	1409	103	90 110		
SM2510B	LCSD2101781	Conductivity		1400	uS/cm	1409	103	90 110		20
SM2540C	DUP2101745	Total Dissolved Solids (TDS)	57400-002	95	mg/L				1	5
SM2540C	LCS2101745	Total Dissolved Solids (TDS)		79.0	mg/L	99.2	80	75 125		
SM2540C	PB2101745	Total Dissolved Solids (TDS)		<	20	mg/L				
SM4500H+B	DUP2101813	pH	57432-001	7.3	pH					
SM4500H+B	DUP2101813	pH	57476-001	8.0	pH					
SM5310C	BLK2101750	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101750	Total Organic Carbon (TOC)	57362-001	<	1	mg/L				20
SM5310C	LCS2101750	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101750	Total Organic Carbon (TOC)		10	mg/L	10	101	85 115	1	20
SM5310C	MS2101750	Total Organic Carbon (TOC)	57363-001	10	mg/L	10	98	75 125		
SM5310C	BLK2101751	Total Organic Carbon (TOC)		<	1	mg/L				
SM5310C	DUP2101751	Total Organic Carbon (TOC)	57435-002	<	1	mg/L				20
SM5310C	LCS2101751	Total Organic Carbon (TOC)		10	mg/L	10	99	85 115		
SM5310C	LCSD2101751	Total Organic Carbon (TOC)		10	mg/L	10	97	85 115	1	20
SM5310C	MS2101751	Total Organic Carbon (TOC)	57435-003	10	mg/L	10	100	75 125		

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		2.0 U	2.0	0.30	ng/L					
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		2.0 U	2.0	0.39	ng/L					
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		2.0 U	2.0	0.33	ng/L					
		perfluorobutane sulfonic acid (PFBS)		2.0 U	2.0	0.50	ng/L					
		perfluorodecanoic acid (PFDA)		2.0 U	2.0	0.34	ng/L					
		perfluorododecanoic acid (PFDOA)		2.0 U	2.0	0.43	ng/L					
		perfluoroheptanoic acid (PFHPA)		2.0 U	2.0	0.33	ng/L					
		perfluorohexane sulfonic acid (PFHXS)		2.0 U	2.0	0.40	ng/L					
		perfluorohexanoic acid (PFHXA)		2.0 U	2.0	0.35	ng/L					
		perfluorononanoic acid (PFNA)		2.0 U	2.0	0.45	ng/L					
		perfluorooctane sulfonic acid (PFOS)		2.0 U	2.0	0.40	ng/L					
		perfluorooctanoic acid (PFOA)		2.0 U	2.0	0.33	ng/L					
		perfluorotetradecanoic acid (PFTEA)		2.0 U	2.0	0.50	ng/L					
		perfluorotridecanoic acid (PFTRIA)		2.0 U	2.0	0.13	ng/L					
		perfluoroundecanoic acid (PFUNA)		2.0 U	2.0	0.32	ng/L					
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		2.0 U	2.0	0.39	ng/L					
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		89			%			70	130	
		13C2-PFDA SUR		91			%			70	130	
		D5-NETFOSAA SUR		97			%			70	130	
		13C3-HFPO-DA SUR		99			%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57435-001	1.8 U	1.8	0.27	ng/L					30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57435-001	1.8 U	1.8	0.35	ng/L					30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57435-001	1.8 U	1.8	0.29	ng/L					30
		perfluorobutane sulfonic acid (PFBS)	57435-001	5.5	1.8	0.45	ng/L				2	30
		perfluorodecanoic acid (PFDA)	57435-001	1.8 U	1.8	0.30	ng/L					30
		perfluorododecanoic acid (PFDOA)	57435-001	1.8 U	1.8	0.38	ng/L					30
		perfluoroheptanoic acid (PFHPA)	57435-001	4.8	1.8	0.30	ng/L				0	30
		perfluorohexane sulfonic acid (PFHXS)	57435-001	27	1.8	0.35	ng/L				1	30
		perfluorohexanoic acid (PFHXA)	57435-001	12	1.8	0.31	ng/L				10	30
		perfluorononanoic acid (PFNA)	57435-001	1.7 J	1.8	0.40	ng/L					30
		perfluorooctane sulfonic acid (PFOS)	57435-001	33	1.8	0.36	ng/L				0	30
		perfluorooctanoic acid (PFOA)	57435-001	13	1.8	0.30	ng/L				2	30
		perfluorotetradecanoic acid (PFTEA)	57435-001	1.8 U	1.8	0.44	ng/L					30
		perfluorotridecanoic acid (PFTRIA)	57435-001	1.8 U	1.8	0.12	ng/L					30
		perfluoroundecanoic acid (PFUNA)	57435-001	1.8 U	1.8	0.29	ng/L					30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57435-001	1.8 U	1.8	0.35	ng/L					30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57435-001	1.8 U	1.8	0.36	ng/L					30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57435-001	1.8 U	1.8	0.16	ng/L					30
		13C2-PFHxA SUR	57435-001	100			%			70 130		
		13C2-PFDA SUR	57435-001	91			%			70 130		
		D5-NETFOSAA SUR	57435-001	101			%			70 130		
		13C3-HFPO-DA SUR	57435-001	105			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		180	2.0	0.30	ng/L	200	90	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		180	2.0	0.39	ng/L	200	90	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		190	2.0	0.33	ng/L	200	95	70 130		
		perfluorobutane sulfonic acid (PFBS)		150	2.0	0.50	ng/L	177	87	70 130		
		perfluorodecanoic acid (PFDA)		160	2.0	0.34	ng/L	200	82	70 130		
		perfluorododecanoic acid (PFDOA)		180	2.0	0.43	ng/L	200	89	70 130		
		perfluoroheptanoic acid (PFHPA)		150	2.0	0.33	ng/L	200	77	70 130		
		perfluorohexane sulfonic acid (PFHXS)		150	2.0	0.40	ng/L	190	80	70 130		
		perfluorohexanoic acid (PFHXA)		170	2.0	0.35	ng/L	200	83	70 130		
		perfluorononanoic acid (PFNA)		150	2.0	0.45	ng/L	200	77	70 130		
		perfluorooctane sulfonic acid (PFOS)		150	2.0	0.40	ng/L	192	78	70 130		
		perfluorooctanoic acid (PFOA)		170	2.0	0.33	ng/L	200	84	70 130		
		perfluorotetradecanoic acid (PFTEA)		170	2.0	0.50	ng/L	200	85	70 130		
		perfluorotridecanoic acid (PFTRIA)		170	2.0	0.13	ng/L	200	84	70 130		
		perfluoroundecanoic acid (PFUNA)		160	2.0	0.32	ng/L	200	81	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		160	2.0	0.39	ng/L	189	83	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		150	2.0	0.40	ng/L	187	82	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		140	2.0	0.18	ng/L	189	75	70 130		
		13C2-PFHxA SUR		95			%			70 130		
		13C2-PFDA SUR		97			%			70 130		
		D5-NETFOSAA SUR		90			%			70 130		
		13C3-HFPO-DA SUR		104			%			70 130		

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57444-001	34	1.8	0.28	ng/L	36	93	70 130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57444-001	40	1.8	0.36	ng/L	36	111	70 130		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57444-001	41	1.8	0.30	ng/L	36	112	70 130		
		perfluorobutane sulfonic acid (PFBS)	57444-001	34	1.8	0.46	ng/L	32	107	70 130		
		perfluorodecanoic acid (PFDA)	57444-001	35	1.8	0.31	ng/L	36	95	70 130		
		perfluorododecanoic acid (PFDOA)	57444-001	34	1.8	0.39	ng/L	36	94	70 130		
		perfluoroheptanoic acid (PFHPA)	57444-001	34	1.8	0.30	ng/L	36	93	70 130		
		perfluorohexane sulfonic acid (PFHXS)	57444-001	34	1.8	0.36	ng/L	34	97	70 130		
		perfluorohexanoic acid (PFHXA)	57444-001	35	1.8	0.31	ng/L	36	96	70 130		
		perfluorononanoic acid (PFNA)	57444-001	32	1.8	0.41	ng/L	36	89	70 130		
		perfluorooctane sulfonic acid (PFOS)	57444-001	35	1.8	0.36	ng/L	34	100	70 130		
		perfluorooctanoic acid (PFOA)	57444-001	37	1.8	0.30	ng/L	36	102	70 130		
		perfluorotetradecanoic acid (PFTEA)	57444-001	34	1.8	0.45	ng/L	36	94	70 130		
		perfluorotridecanoic acid (PFTRIA)	57444-001	33	1.8	0.12	ng/L	36	90	70 130		
		perfluoroundecanoic acid (PFUNA)	57444-001	35	1.8	0.29	ng/L	36	95	70 130		
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57444-001	33	1.8	0.36	ng/L	34	95	70 130		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57444-001	32	1.8	0.36	ng/L	34	94	70 130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57444-001	32	1.8	0.17	ng/L	34	92	70 130		
		13C2-PFHxA SUR	57444-001	90			%			70 130		
		13C2-PFDA SUR	57444-001	84			%			70 130		
		D5-NETFOSAA SUR	57444-001	99			%			70 130		
		13C3-HFPO-DA SUR	57444-001	95			%			70 130		

Sample Receipt Condition Report

57435

Absolute Resource Associates

Job Number:

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -
 Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No
 Receipt Temp: 0 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No
 PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments:

Preservation / Analysis	Bottle Size/Type & Quantity								Check pH for ALL applicable* samples and document:	
HCl	40mL(G)	4	250mL(P)		500mL(P)		1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 ___ Pest608 ___ Bacteria ResCl ✓ by analyst PC Dry applicable? Y <u>N</u>
HNO ₃	125mL(P)		250mL(P)	6	500mL(P)					
H ₂ SO ₄	40mL(G)	8	60mL(P)		125mL(P)		250mL(P)	500mL(P)		
NaOH	125mL(P)		250mL(P)							
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)					
ZnAc-NaOH	125mL(P)		250mL(P)							
Trizma	125mL(P)		250mL(P)	4						
NH ₄ Ac	125mL(P)		250mL(P)							
Na ₂ S ₂ O ₃	40mL(G)		120mL(P)	2						
MeOH	20mL(G)		40mL(G)							
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe			
None (water)	40ml(G)	6	60mL(P)	8	125mL(P)	10	250mL(P)	4	500mL(P)	2
NH ₄ Cl	60mL	6								
Mold	Cassette		Bulk		Plate		Tape Lift			
Asbestos	Cassette		Bulk							
Lead	Cassette		Bulk		Wipe					

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	✓			
Analyses marked on COC match bottles received?		✓		No HAA/VOC rec on -04
VOC & TOC Water-no headspace?	✓			
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?	✓			
PFAS: Lab specific bottles? QC received, if required?	✓			PB-05
Bacteria bottles provided by ARA?	✓			
Samples within holding time?	✓			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color, Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624	✓			DBV, SFM, AUP
Date, time & ID on samples match CoC?	✓			
Rushes communicated to analyst in writing?			-	
Subcontract note on login board?	✓			
Pesticides EPA 608 pH5-9?			-	
Compliance samples have no discrepancies/require no flags?			-	(Or must be rejected)
Log-in Supervisor notified immediately of following items:			-	Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: [Signature]

Date/Time: 6/15/21 17:35

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

Laboratory Report

Absolute Resource Associates
124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

Date Printed: 07/02/2021
Work Order #: 2106-03288
Client Job #:
Date Received: 06/21/2021
Sample collected in: Massachusetts

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:

Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:

Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- A & L Laboratory / Granite State Analytical Services LLC. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. **None**
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: **Data Qualifier (DQ) Flags: None**

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: **Revision #1- Corrected sample location in -001.**

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 07/02/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801
SAMPLE ID #: 2106-03288-001
SAMPLED BY: Absolute Resource Associates
SAMPLE ADDRESS: 57435
GSP Filter
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	⚠
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/15/2021 10:00AM
DATE AND TIME RECEIVED: 06/21/2021 10:02AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:13AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:13AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:13AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/24/2021 10:13AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/24/2021 10:13AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:13AM
2,3-Dibromopropionic Acid	108	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/24/2021 10:13AM

Donald A. D'Anjou, Ph. D.
Laboratory Director



GRANITE STATE ANALYTICAL SERVICES, LLC.

22 Manchester Road, Unit 2, Derry, NH 03038
Phone (800) 699-9920 | (603) 432-3044 website www.granitestateanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 07/02/2021
CLIENT NAME: Absolute Resource Associates
CLIENT ADDRESS: 124 Heritage Avenue, Suite 10
Portsmouth, NH 03801

SAMPLE ID #: 2106-03288-002
SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57435
UV Effluent
MA

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/15/2021 10:00AM
DATE AND TIME RECEIVED: 06/21/2021 10:02AM
ANALYSIS PACKAGE: HAA GSA
RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

MORE LOC INFO:

CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Date Extracted	-					No Limit	EPA 552.2	GQ-NH	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:53AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:53AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:53AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH	06/24/2021 10:53AM
Total Haloacetic Acids*	<1	ug/L	✓		1	60 ug/L	EPA 552.2	KV-NH	06/24/2021 10:53AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH	06/24/2021 10:53AM
2,3-Dibromopropionic Acid	91	%	✓			70-130%	EPA 552.2 - SS	KV-NH	06/24/2021 10:53AM

Donald A. D'Anjou, Ph. D.
Laboratory Director

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis
Blueleaf, Inc.
57 Dresser Hill Road
Charlton, MA 01507

PO Number: 11204
Job ID: 57465
Date Received: 6/17/21

Project: BW Straightway 11204

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below. The reported results apply to the sample(s) in the condition as received at the time the laboratory took custody. This report shall not be reproduced except in full, without written approval of the laboratory. The liability of ARA is limited to the cost of the requested analyses, unless otherwise agreed upon in writing.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink, appearing to read 'Willie Stone', with a long, sweeping underline.

Willie Stone
Authorized Signature

Date of Approval: 7/1/2021
Total number of pages: 16

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH902

Massachusetts M-NH902

Sample Association Table

Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
GSP CBW	Water	6/15/2021 13:00	57465-001	Low level 1,4-dioxane in water by 8260 SIM MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1 Total Suspended Solids by SM2540D

Project ID: BW Straightway 11204

Job ID: 57465

Sample#: 57465-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/15/21 13:00

Parameter	Result	Reporting			Instr Dil'n		Prep		Analysis			
		Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time	Reference
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM			2101939	6/28/21	20:33	SW8260Dmod

Project ID: BW Straightway 11204

Job ID: 57465

Sample#: 57465-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/15/21 13:00

Parameter	Result	Reporting Limit	DL	Units	Instr Dil'n Factor	Analyst	Date	Prep Time	Batch	Analysis Date	Time	Reference
Total Suspended Solids (TSS)	26	16	7.4	mg/L	1	SFM			2101841	6/21/21	16:15	SM2540D

Project ID: BW Straightway 11204

Job ID: 57465

Sample#: 57465-001

Sample ID: GSP CBW

Matrix: Water

Sampled: 6/15/21 13:00

Method Reference: E537.1

Parameter	Result	Reporting			Dil'n	Analyst	Prep Date	Batch	Analysis	
		Limit	DL	Units					Date	Time
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	2.0 U	2.0	0.31	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	2.0 U	2.0	0.40	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	2.0 U	2.0	0.33	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorobutane sulfonic acid (PFBS)	6.1	2.0	0.51	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorodecanoic acid (PFDA)	2.0 U	2.0	0.35	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorododecanoic acid (PFDOA)	2.0 U	2.0	0.43	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluoroheptanoic acid (PFHPA)	4.7	2.0	0.33	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorohexane sulfonic acid (PFHXS)	31	2.0	0.40	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorohexanoic acid (PFHXA)	11	2.0	0.35	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorononanoic acid (PFNA)	1.2 J	2.0	0.45	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorooctane sulfonic acid (PFOS)	32	2.0	0.40	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorooctanoic acid (PFOA)	13	2.0	0.34	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorotetradecanoic acid (PFTEA)	2.0 U	2.0	0.50	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluorotridecanoic acid (PFTRIA)	2.0 U	2.0	0.13	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
perfluoroundecanoic acid (PFUNA)	2.0 U	2.0	0.33	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	2.0 U	2.0	0.40	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	2.0 U	2.0	0.40	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	2.0 U	2.0	0.19	ng/L	1	WAS	6/22/21	13990	6/22/21	14:06
Surrogate Recovery		Limits								
13C2-PFHxA SUR	93	70-130		%	1	WAS	6/22/21	13990	6/22/21	14:06
13C2-PFDA SUR	91	70-130		%	1	WAS	6/22/21	13990	6/22/21	14:06
D5-NEtFOSAA SUR	99	70-130		%	1	WAS	6/22/21	13990	6/22/21	14:06
13C3-HFPO-DA SUR	95	70-130		%	1	WAS	6/22/21	13990	6/22/21	14:06
Sum of MA PFAS6 Analytes (MAPFAS6)	81	2		ng/L	1			2101835		

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit. The reported concentration is an estimate.

Quality Control Report



124 Heritage Avenue Unit 16
Portsmouth, NH 03801
www.absoluteresourceassociates.com



Case Narrative

Lab # 57465

Sample Receiving and Chain of Custody Discrepancies

Samples were received in acceptable condition, between 0 and 6 degrees C, on ice, and in accordance with sample handling, preservation and integrity guidelines.

Calibration

No exceptions noted.

PFAS: No exceptions noted regarding the Internal Standards or Calibration/Calibration Verifications associated with sample analysis.

Method Blank

No exceptions noted.

Surrogate Recoveries

No exceptions noted.

Laboratory Control Sample Results

No exceptions noted.

Matrix Spike/Matrix Spike Duplicate/Duplicate Results

Not requested for this project.

Other

PFAS: "Sum of MA PFAS6 Analytes (MAPFAS6)" = PFDA + PFHPA + PFHXS + PFNA + PFOS + PFOA

Reporting Limits: Dilutions performed during the analysis are noted on the result pages.

No other exceptions noted.

U = This compound was analyzed for, but not detected above the associated method detection limit.

J = The analytical result was below the instrument calibration range, but above the method detection limit.

The reported concentration is an estimate.

GLOSSARY

%R	Percent Recovery
BLK	Blank (Method Blank, Preparation Blank)
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CRM	Certified Reference Material (associated with solid Metals samples)
CRMD	Certified Reference Material Duplicate (associated with solid Metals samples)
Dil'n	Dilution
DL	Detection Limit
DUP	Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
MB	Methanol Blank (associated with solid VOC samples)
MLCS	Methanol Laboratory Control Sample (associated with solid VOC samples)
MLCSD	Methanol Laboratory Control Sample Duplicate (associated with solid VOC samples)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PB	Preparation Blank
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SUR	Surrogate



124 Heritage Avenue Unit 16
Portsmouth, NH 03801

www.absoluteresourceassociates.com

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SW8260Dmod	BLK2101939	1,4-dioxane		< 0.25	ug/L					
SW8260Dmod	LCS2101939	1,4-dioxane		9.3	ug/L	8	116	70 130		
SW8260Dmod	LCSD2101939	1,4-dioxane		8.0	ug/L	8	101	70 130	14	20

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM2540D	DUP2101841	Total Suspended Solids (TSS)	57476-001	130	mg/L				2	5
SM2540D	LCS2101841	Total Suspended Solids (TSS)		330	mg/L	323	101	75 125		
SM2540D	PB2101841	Total Suspended Solids (TSS)		< 2.5	mg/L					

- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		<	2.0	ng/L				
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		<	2.0	ng/L				
		perfluorobutane sulfonic acid (PFBS)		<	2.0	ng/L				
		perfluorodecanoic acid (PFDA)		<	2.0	ng/L				
		perfluorododecanoic acid (PFDOA)		<	2.0	ng/L				
		perfluoroheptanoic acid (PFHPA)		<	2.0	ng/L				
		perfluorohexane sulfonic acid (PFHXS)		<	2.0	ng/L				
		perfluorohexanoic acid (PFHXA)		<	2.0	ng/L				
		perfluorononanoic acid (PFNA)		<	2.0	ng/L				
		perfluorooctane sulfonic acid (PFOS)		<	2.0	ng/L				
		perfluorooctanoic acid (PFOA)		<	2.0	ng/L				
		perfluorotetradecanoic acid (PFTEA)		<	2.0	ng/L				
		perfluorotridecanoic acid (PFTRIA)		<	2.0	ng/L				
		perfluoroundecanoic acid (PFUNA)		<	2.0	ng/L				
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		<	2.0	ng/L				
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		<	2.0	ng/L				
		13C2-PFHxA SUR		89	%			70	130	
		13C2-PFDA SUR		91	%			70	130	
		D5ETFOSAA SUR		97	%			70	130	
		HFPODA13C3 SUR		99	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57435-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57435-001	<	1.8	ng/L				30
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57435-001	<	1.8	ng/L				30
		perfluorobutane sulfonic acid (PFBS)	57435-001		5.5	ng/L			2	30
		perfluorodecanoic acid (PFDA)	57435-001	<	1.8	ng/L				30
		perfluorododecanoic acid (PFDOA)	57435-001	<	1.8	ng/L				30
		perfluoroheptanoic acid (PFHPA)	57435-001		4.8	ng/L			0	30
		perfluorohexane sulfonic acid (PFHXS)	57435-001		27	ng/L			1	30
		perfluorohexanoic acid (PFHXA)	57435-001		12	ng/L			10	30
		perfluorononanoic acid (PFNA)	57435-001	<	1.8	ng/L				30
		perfluorooctane sulfonic acid (PFOS)	57435-001		33	ng/L			0	30
		perfluorooctanoic acid (PFOA)	57435-001		13	ng/L			2	30
		perfluorotetradecanoic acid (PFTEA)	57435-001	<	1.8	ng/L				30
		perfluorotridecanoic acid (PFTRIA)	57435-001	<	1.8	ng/L				30
		perfluoroundecanoic acid (PFUNA)	57435-001	<	1.8	ng/L				30
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57435-001	<	1.8	ng/L				30
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57435-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57435-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57435-001		100	%		70	130	
		13C2-PFDA SUR	57435-001		91	%		70	130	
		D5ETFOSAA SUR	57435-001		101	%		70	130	
		HFPODA13C3 SUR	57435-001		105	%		70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)		180	ng/L	200	90	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		180	ng/L	200	90	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		190	ng/L	200	95	70	130	
		perfluorobutane sulfonic acid (PFBS)		150	ng/L	177	87	70	130	
		perfluorodecanoic acid (PFDA)		160	ng/L	200	82	70	130	
		perfluorododecanoic acid (PFDOA)		180	ng/L	200	89	70	130	
		perfluoroheptanoic acid (PFHPA)		150	ng/L	200	77	70	130	
		perfluorohexane sulfonic acid (PFHXS)		150	ng/L	190	80	70	130	
		perfluorohexanoic acid (PFHXA)		170	ng/L	200	83	70	130	
		perfluorononanoic acid (PFNA)		150	ng/L	200	77	70	130	
		perfluorooctane sulfonic acid (PFOS)		150	ng/L	192	78	70	130	
		perfluorooctanoic acid (PFOA)		170	ng/L	200	84	70	130	
		perfluorotetradecanoic acid (PFTEA)		170	ng/L	200	85	70	130	
		perfluorotridecanoic acid (PFTRIA)		170	ng/L	200	84	70	130	
		perfluoroundecanoic acid (PFUNA)		160	ng/L	200	81	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		160	ng/L	189	83	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		150	ng/L	187	82	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)		140	ng/L	189	75	70	130	
		13C2-PFHxA SUR		95	%			70	130	
		13C2-PFDA SUR		97	%			70	130	
		D5ETFOSAA SUR		90	%			70	130	
		HFPODA13C3 SUR		104	%			70	130	

Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	MS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57444-001	34	ng/L	36	93	70	130	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57444-001	40	ng/L	36	111	70	130	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57444-001	41	ng/L	36	112	70	130	
		perfluorobutane sulfonic acid (PFBS)	57444-001	34	ng/L	32	97	70	130	
		perfluorodecanoic acid (PFDA)	57444-001	35	ng/L	36	95	70	130	
		perfluorododecanoic acid (PFDOA)	57444-001	34	ng/L	36	94	70	130	
		perfluoroheptanoic acid (PFHPA)	57444-001	34	ng/L	36	93	70	130	
		perfluorohexane sulfonic acid (PFHXS)	57444-001	34	ng/L	34	97	70	130	
		perfluorohexanoic acid (PFHXA)	57444-001	35	ng/L	36	96	70	130	
		perfluorononanoic acid (PFNA)	57444-001	32	ng/L	36	89	70	130	
		perfluorooctane sulfonic acid (PFOS)	57444-001	35	ng/L	34	95	70	130	
		perfluorooctanoic acid (PFOA)	57444-001	37	ng/L	36	102	70	130	
		perfluorotetradecanoic acid (PFTEA)	57444-001	34	ng/L	36	94	70	130	
		perfluorotridecanoic acid (PFTRIA)	57444-001	33	ng/L	36	90	70	130	
		perfluoroundecanoic acid (PFUNA)	57444-001	35	ng/L	36	95	70	130	
		11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57444-001	33	ng/L	34	95	70	130	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57444-001	32	ng/L	34	94	70	130	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	57444-001	32	ng/L	34	92	70	130	
		13C2-PFHxA SUR	57444-001	90	%			70	130	
		13C2-PFDA SUR	57444-001	84	%			70	130	
		D5ETFOSAA SUR	57444-001	99	%			70	130	
		HFPODA13C3 SUR	57444-001	95	%			70	130	

Sample Receipt Condition Report

57465

Absolute Resource Associates

Job Number: _____

Samples Received from: -UPS -FedEx -USPS -Lab Courier -Client Drop-off -_____

Custody Seals - present & intact: -Yes -No -N/A CoC signed: -Yes -No

Receipt Temp: 10 °C Samples on ice? -Yes -No -N/A Sampled < 24 hrs ago? -Yes -No

PFAS-only real ice? -Yes -No -N/A Any signs of freezing? -Yes -No

Comments: _____

Preservation / Analysis	Bottle Size/Type & Quantity						Check pH for ALL applicable* samples and document:
	40mL(G)	250mL(P)	500mL(P)	1L(G)			
HCl	40mL(G)	250mL(P)	500mL(P)	1L(G)			*pH ✓ by analyst: VOC, PFAS, TOC, O&G Residual Cl not present: ABN625 _____ Pest608 _____ Bacteria ResCl ✓ by analyst PC Dry applicable? Y N 1L(G) 1L(P)
HNO ₃	125mL(P)	250mL(P)	500mL(P)				
H ₂ SO ₄	40mL(G)	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
NaOH	125mL(P)	250mL(P)					
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)	250mL(P)				
ZnAc-NaOH	125mL(P)	250mL(P)					
Trizma	125mL(P)	250mL (P) <u>2</u>					
NH ₄ Ac	125mL(P)	250mL (P)					
Na ₂ S ₂ O ₃	40mL(G)	120mL(P)					
MeOH	20mL(G)	40mL(G)					
None (solid)	2oz(G)	4oz(G)	8oz(G)	Syringe			
None (water)	40ml (G) <u>2</u>	60mL(P)	125mL(P)	250mL(P)	500mL(P)		
Mold	Cassette	Bulk	Plate	Tape Lift			
Asbestos	Cassette	Bulk					
Lead	Cassette	Bulk	Wipe				

Login Review	Yes	No	N/A	Comments
Proper lab sample containers/enough volume/correct preservative?	X			
Analyses marked on COC match bottles received?	X			
VOC & TOC Water-no headspace?			X	
VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK?			X	
PFAS: Lab specific bottles? QC received, if required?	X			
Bacteria bottles provided by ARA?			X	
Samples within holding time?	X			
Immediate tests communicated in writing: NO ₃ , NO ₂ , PO ₄ , pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624			X	
Date, time & ID on samples match CoC?	X			
Rushes communicated to analyst in writing?			X	
Subcontract note on login board?				
Pesticides EPA 608 pH5-9?				
Compliance samples have no discrepancies/require no flags?				(Or must be rejected)
Log-in Supervisor notified immediately of following items:				Discrepancies, compliance samples (NHDES, MADEP, DoD etc.) or uncommon requests.

Inspected and Received By: SRM

Date/Time: 6/17/21 15:53

Peer Review Checklist			
<input type="checkbox"/> Client ID/Project Manager	<input type="checkbox"/> On Ice, Temperature OK?	<input type="checkbox"/> Sample IDs	<input type="checkbox"/> Analyses in Correctly
<input type="checkbox"/> Project Name	<input type="checkbox"/> PO# (if provided)	<input type="checkbox"/> Matrix	-references
<input type="checkbox"/> TAT/rushes communicated	<input type="checkbox"/> Sub samples sent? Shipping Charge?	<input type="checkbox"/> Date/Time collected	-wastewater methods
<input type="checkbox"/> Received Date/Time	<input type="checkbox"/> Issues noted above communicated?	<input type="checkbox"/> Short HTs communicated	<input type="checkbox"/> Notes from CoC in LIMS
Reviewed By: _____		Date: _____	

Notes: (continue on back as needed)

Initials	Date	What was sent?
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice
Uploaded / PDF _____	_____	Report / Data / EDD / Invoice

Appendix D – Alpha Analytical Laboratory Reports



ANALYTICAL REPORT

Lab Number:	L2113238
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW-STRAIGHTWAY
Project Number:	07202
Report Date:	03/24/21

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

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



Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2113238-01	RAW	DW	BARNSTABLE, MA	03/17/21 10:00	03/17/21
L2113238-02	FILTER B	DW	BARNSTABLE, MA	03/17/21 10:00	03/17/21

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Case Narrative

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

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

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

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

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

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

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Case Narrative (continued)

Dissolved Oxygen

L2113238-01 and -02: A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

Carbon Dioxide

L2113238-01 and -02: A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

Chlorine, Residual Free

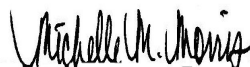
L2113238-02 was analyzed with the method required holding time exceeded.

Chlorine, Total Residual

L2113238-02 was analyzed with the method required holding time exceeded.

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

Authorized Signature:



Michelle M. Morris

Title: Technical Director/Representative

Date: 03/24/21

INORGANICS & MISCELLANEOUS

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

SAMPLE RESULTS

Lab ID: L2113238-01
Client ID: RAW
Sample Location: BARNSTABLE, MA

Date Collected: 03/17/21 10:00
Date Received: 03/17/21
Field Prep: Refer to COC

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	76.		mg/l	2.0	--	1	-	03/18/21 07:59	121,4500CO2-D	MR
Dissolved Oxygen	8.3		mg/l	0.10	--	1	-	03/17/21 15:20	121,4500O-C	JT
Oxidation/Reduction Potential	250		mv	-	NA	1	-	03/17/21 17:24	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

SAMPLE RESULTS

Lab ID: L2113238-02
Client ID: FILTER B
Sample Location: BARNSTABLE, MA

Date Collected: 03/17/21 10:00
Date Received: 03/17/21
Field Prep: Refer to COC

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	170		mg/l	2.0	--	1	-	03/18/21 07:59	121,4500CO2-D	MR
Chlorine, Total Residual	0.68		mg/l	0.04	--	2	-	03/19/21 16:50	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	03/19/21 16:50	121,4500CL-D	AS
Dissolved Oxygen	8.4		mg/l	0.10	--	1	-	03/17/21 15:20	121,4500O-C	JT
Oxidation/Reduction Potential	640		mv	-	NA	1	-	03/17/21 17:24	12,1498	AS



Project Name: BW-STRAIGHTWAY

Lab Number: L2113238

Project Number: 07202

Report Date: 03/24/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1476570-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	03/19/21 16:50	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1476571-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	03/19/21 16:50	121,4500CL-D	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1475582-1								
Oxidation/Reduction Potential	101		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1476570-2								
Chlorine, Total Residual	108		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1476571-2								
Chlorine, Residual Free	108		-			-		

Matrix Spike Analysis Batch Quality Control

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1476570-4 QC Sample: L2113238-02 Client ID: FILTER B												
Chlorine, Total Residual	0.68	1	1.7	103	-	-	-	-	80-120	-	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 07202

Lab Number: L2113238

Report Date: 03/24/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1475582-2 QC Sample: L2113186-01 Client ID: DUP Sample						
Oxidation/Reduction Potential	27	25	mv	8		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1476570-3 QC Sample: L2113238-02 Client ID: FILTER B						
Chlorine, Total Residual	0.68	0.73	mg/l	7		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1476571-3 QC Sample: L2113238-02 Client ID: FILTER B						
Chlorine, Residual Free	ND	ND	mg/l	NC		

Project Name: BW-STRAIGHTWAY**Lab Number:** L2113238**Project Number:** 07202**Report Date:** 03/24/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2113238-01A	BOD bottle Powder Pillow preserved	A	NA		3.4	Y	Absent		DO-4500(.3)
L2113238-01B	Plastic 120ml unpreserved/No Headspace	A	NA		3.4	Y	Absent		CO2(1)
L2113238-01C	Plastic 950ml unpreserved	A	7	7	3.4	Y	Absent		ORP(1)
L2113238-02A	BOD bottle Powder Pillow preserved	A	NA		3.4	Y	Absent		DO-4500(.3)
L2113238-02B	Plastic 120ml unpreserved/No Headspace	A	NA		3.4	Y	Absent		CO2(1)
L2113238-02C	Plastic 950ml unpreserved	A	7	7	3.4	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2113238-02D	Plastic 950ml unpreserved	A	7	7	3.4	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2113238-02X	Plastic 250ml NaOH preserved split	A	7	>12	3.4	N	Absent		-

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BW-STRAIGHTWAY
Project Number: 07202

Lab Number: L2113238
Report Date: 03/24/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Date Rec'd in Lab: 3/17/21

ALPHA Job #: L2113238

Project Information

Project Name: BW-STRAIGHTWAY

Project Location: Barnstable, MA

Project #: 07202

Project Manager: Aaron Davis

ALPHA Quote #:

Report Information - Data Deliverables

ADEx EMAIL

Same as Client info PO #:

Client Information

Client: Blueleaf, Inc

Address: 57 Dresser Hill Rd
Charlton, MA 01507

Phone: 774 200 8029

Email: adavis@blueleafwater.com

Additional Project Information:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due:

Regulatory Requirements & Project Information Requirements

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

ANALYSIS		SAMPLE INFO	TOTAL # BOTTLES
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 824 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH		
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PPI13	Filtration <input type="checkbox"/> Field <input type="checkbox"/> Lab to do	7
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	Preservation <input type="checkbox"/> Lab to do	
<input type="checkbox"/> PCB <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	Sample Comments	
Total + Free Chlorine			
DO			
CO2			
ORP			

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
13238-01	RAW	3/17/21	10:00	BW	ARD
02	FILTER B	↓	↓	↓	↓

- Container Type**
- P= Plastic
 - A= Amber glass
 - V= Vial
 - G= Glass
 - B= Bacteria cup
 - C= Cube
 - O= Other
 - E= Encore
 - D= BOD Bottle
- Preservative**
- A= None
 - B= HCl
 - C= HNO3
 - D= H2SO4
 - E= NaOH
 - F= MeOH
 - G= NaHSO4
 - H= Na2S2O3
 - I= Ascorbic Acid
 - J= NH4Cl
 - K= Zn Acetate
 - O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	3/17/21 13:35	C. Sebean AAE	3/17/21 13:35

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
FORM NO: 01-01 (rev. 12-Mar-2012)



ANALYTICAL REPORT

Lab Number:	L2114524
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW-STRAIGHTWAY
Project Number:	11204
Report Date:	03/29/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

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

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



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2114524-01	FILTER B CBW	DW	BARNSTABLE, MA	03/23/21 09:10	03/23/21

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

Case Narrative

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

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

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

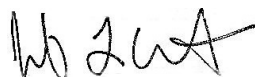
Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

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

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

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

Authorized Signature:



Jennifer L Clements

Title: Technical Director/Representative

Date: 03/29/21

INORGANICS & MISCELLANEOUS

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

SAMPLE RESULTS

Lab ID: L2114524-01
Client ID: FILTER B CBW
Sample Location: BARNSTABLE, MA

Date Collected: 03/23/21 09:10
Date Received: 03/23/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	260		mg/l	50	NA	10	-	03/28/21 13:07	121,2540D	SH



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1479707-1									
Solids, Total Suspended	ND	mg/l	5.0	NA	1	-	03/28/21 13:07	121,2540D	SH

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2114524

Report Date: 03/29/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1479707-2								
Solids, Total Suspended	98		-		80-120	-		

Lab Duplicate Analysis
*Batch Quality Control***Project Name:** BW-STRAIGHTWAY**Project Number:** 11204**Lab Number:** L2114524**Report Date:** 03/29/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1479707-3 QC Sample: L2114366-01 Client ID: DUP Sample						
Solids, Total Suspended	68	61	mg/l	11		29

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Sample Receipt and Container Information

Were project specific reporting limits specified?

YES

Cooler Information

Cooler Custody Seal

A Absent

Container Information

Container ID Container Type

L2114524-01A Plastic 950ml unpreserved

Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
A	7	7	4.3	Y	Absent		TSS-2540(7)

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2114524
Report Date: 03/29/21

REFERENCES

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

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D.

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 3/23/21 ALPHA Job #: L2114524

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: BW-STRAIGHTWAY
Project Location: Barnstable, MA
Project #: 11204
Project Manager: Aaron Davis
ALPHA Quote #:

Report Information - Data Deliverables

ADEx EMAIL Same as Client info PO #:

Client Information

Client: Blueleaf, Inc.
Address: 57 Dresser Hill Rd.
Charlton, MA 01507
Phone: 774 200 8029
Email:

Regulatory Requirements & Project Information Requirements

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

Turn-Around Time

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

Additional Project Information:

ANALYSIS	VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SAMPLE INFO
	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	Filtration	
METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PP13	<input type="checkbox"/> Field	
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Lab to do	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	Preservation	
<input type="checkbox"/> PCB <input type="checkbox"/> PEST	<input type="checkbox"/> Lab to do	
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		
	Sample Comments	

Handwritten notes in analysis section: TSS

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
14524-01	Filter IS CBW	3/23	9:10	DW DJE	DJC

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

Preservative
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₃
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type: P
Preservative: A

Relinquished By: <u>[Signature]</u>	Date/Time: <u>3/23/21 1625</u>	Received By: <u>[Signature]</u>	Date/Time: <u>3/23/21 1625</u>
-------------------------------------	--------------------------------	---------------------------------	--------------------------------

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
FORM NO: 01-01 (rev. 12-Mar-2012)



ANALYTICAL REPORT

Lab Number:	L2118928
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW-STRAIGHTWAY
Project Number:	11204
Report Date:	04/25/21

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

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



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2118928-01	RAW	DW	BARNSTABLE, MA	04/14/21 10:00	04/14/21
L2118928-02	FILTER B	DW	BARNSTABLE, MA	04/14/21 11:00	04/14/21

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

Case Narrative

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

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

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

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

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

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

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

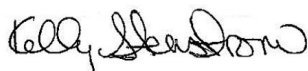
Case Narrative (continued)

Dissolved Oxygen

A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

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

Authorized Signature:

 Kelly Stenstrom

Title: Technical Director/Representative

Date: 04/25/21

INORGANICS & MISCELLANEOUS

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

SAMPLE RESULTS

Lab ID: L2118928-01
Client ID: RAW
Sample Location: BARNSTABLE, MA

Date Collected: 04/14/21 10:00
Date Received: 04/14/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	120		mg/l	2.0	--	1	-	04/15/21 07:16	121,4500CO2-D	MR
Dissolved Oxygen	3.2		mg/l	0.10	--	1	-	04/14/21 16:29	121,4500O-C	SH
Oxidation/Reduction Potential	150		mv	-	NA	1	-	04/14/21 22:20	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

SAMPLE RESULTS

Lab ID: L2118928-02
Client ID: FILTER B
Sample Location: BARNSTABLE, MA

Date Collected: 04/14/21 11:00
Date Received: 04/14/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	120		mg/l	2.0	--	1	-	04/15/21 07:16	121,4500CO2-D	MR
Chlorine, Total Residual	1.7		mg/l	0.20	--	10	-	04/14/21 20:36	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	04/14/21 20:36	121,4500CL-D	AS
Dissolved Oxygen	4.2		mg/l	0.10	--	1	-	04/14/21 16:29	121,4500O-C	SH
Oxidation/Reduction Potential	120		mv	-	NA	1	-	04/14/21 22:20	12,1498	AS



Project Name: BW-STRAIGHTWAY

Lab Number: L2118928

Project Number: 11204

Report Date: 04/25/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1486302-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	04/14/21 20:36	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1486306-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	04/14/21 20:36	121,4500CL-D	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2118928

Report Date: 04/25/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1486302-2								
Chlorine, Total Residual	108		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1486306-2								
Chlorine, Residual Free	96		-			-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1486369-1								
Oxidation/Reduction Potential	101		-		90-110	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1486302-4 QC Sample: L2118928-02 Client ID: FILTER B												
Chlorine, Total Residual	1.7	2.5	4.1	97	-	-	-	-	80-120	-	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2118928

Report Date: 04/25/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1486302-3 QC Sample: L2118928-02 Client ID: FILTER B						
Chlorine, Total Residual	1.7	1.8	mg/l	6		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1486306-3 QC Sample: L2118928-02 Client ID: FILTER B						
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1486369-2 QC Sample: L2118928-01 Client ID: RAW						
Oxidation/Reduction Potential	150	150	mv	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1486467-2 QC Sample: L2118928-02 Client ID: FILTER B						
Carbon Dioxide	120	120	mg/l	0		

Project Name: BW-STRAIGHTWAY**Lab Number:** L2118928**Project Number:** 11204**Report Date:** 04/25/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2118928-01A	Plastic 120ml unpreserved/No Headspace	A	NA		4.5	Y	Absent		CO2(1)
L2118928-01B	BOD bottle unpreserved	A	NA		4.5	Y	Absent		DO-4500(.3)
L2118928-01C	Plastic 950ml unpreserved	A	7	7	4.5	Y	Absent		ORP(1)
L2118928-02A	Plastic 120ml unpreserved/No Headspace	A	NA		4.5	Y	Absent		CO2(1)
L2118928-02B	BOD bottle unpreserved	A	NA		4.5	Y	Absent		DO-4500(.3)
L2118928-02C	Plastic 950ml unpreserved	A	7	7	4.5	Y	Absent		ORP(1)
L2118928-02D	Plastic 950ml unpreserved	A	7	7	4.5	Y	Absent		RFC-4500(1),TRC-4500(1)

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2118928
Report Date: 04/25/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



ANALYTICAL REPORT

Lab Number:	L2120551
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	BARNSTABLE MA
Project Number:	11204
Report Date:	05/04/21

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

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



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2120551-01	RAW	DW	BARNSTABLE MA	04/22/21 11:00	04/22/21
L2120551-02	FILTER B	DW	BARNSTABLE MA	04/22/21 11:00	04/22/21

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Case Narrative

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

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

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

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

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

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

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Case Narrative (continued)

Sample Receipt

L2120551-01 and -02: The collection time was obtained from the container labels.

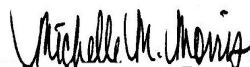
Dissolved Oxygen

L2120551-01 and -02 were analyzed with the method required holding time exceeded, by 15 minutes due to a laboratory oversight.

A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

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

Authorized Signature:



Michelle M. Morris

Title: Technical Director/Representative

Date: 05/04/21

INORGANICS & MISCELLANEOUS

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

SAMPLE RESULTS

Lab ID: L2120551-01
Client ID: RAW
Sample Location: BARNSTABLE MA

Date Collected: 04/22/21 11:00
Date Received: 04/22/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	150		mg/l	2.0	--	1	-	04/23/21 07:42	121,4500CO2-D	MR
Dissolved Oxygen	3.9		mg/l	0.10	--	1	-	04/22/21 19:15	121,4500O-C	CC
Oxidation/Reduction Potential	170		mv	-	NA	1	-	04/22/21 21:45	12,1498	AS



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

SAMPLE RESULTS

Lab ID: L2120551-02
Client ID: FILTER B
Sample Location: BARNSTABLE MA

Date Collected: 04/22/21 11:00
Date Received: 04/22/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	140		mg/l	2.0	--	1	-	04/23/21 07:42	121,4500CO2-D	MR
Chlorine, Total Residual	1.2		mg/l	0.08	--	4	-	04/23/21 08:24	121,4500CL-D	MR
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	04/23/21 09:59	121,4500CL-D	MR
Dissolved Oxygen	5.0		mg/l	0.10	--	1	-	04/22/21 19:15	121,4500O-C	CC
Oxidation/Reduction Potential	690		mv	-	NA	1	-	04/22/21 21:45	12,1498	AS



Project Name: BARNSTABLE MA

Lab Number: L2120551

Project Number: 11204

Report Date: 05/04/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1489700-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	04/23/21 08:24	121,4500CL-D	MR
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1489702-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	04/23/21 09:59	121,4500CL-D	MR

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE MA

Project Number: 11204

Lab Number: L2120551

Report Date: 05/04/21

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1489672-1								
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1489700-2								
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1489702-2								
Chlorine, Residual Free	104		-			-		

Matrix Spike Analysis Batch Quality Control

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1489700-4 QC Sample: L2120325-04 Client ID: MS Sample												
Chlorine, Total Residual	ND	0.25	0.26	104		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BARNSTABLE MA

Project Number: 11204

Lab Number: L2120551

Report Date: 05/04/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1489672-2 QC Sample: L2120551-01 Client ID: RAW						
Oxidation/Reduction Potential	170	170	mv	0		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1489700-3 QC Sample: L2120325-02 Client ID: DUP Sample						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1489702-3 QC Sample: L2120551-02 Client ID: FILTER B						
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1489769-1 QC Sample: L2120672-05 Client ID: DUP Sample						
Carbon Dioxide	560	300	mg/l	60		

Project Name: BARNSTABLE MA

Project Number: 11204

Serial_No:05042115:19

Lab Number: L2120551

Report Date: 05/04/21

Sample Receipt and Container Information

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2120551-01A	BOD bottle unpreserved	A	NA		3.7	Y	Absent		DO-4500(.3)
L2120551-01B	Plastic 950ml unpreserved	A	7	7	3.7	Y	Absent		ORP(1)
L2120551-01C	Plastic 950ml unpreserved	A	NA		3.7	Y	Absent		CO2(1)
L2120551-02A	BOD bottle unpreserved	A	NA		3.7	Y	Absent		DO-4500(.3)
L2120551-02B	Plastic 950ml unpreserved	A	7	7	3.7	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2120551-02C	Plastic 950ml unpreserved	A	NA		3.7	Y	Absent		CO2(1)

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2120551
Report Date: 05/04/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

Project Information

Project Name: Barnstable MA

Project Location: Barnstable MA

Project #: 11204

Project Manager: Aaron Davis

ALPHA Quote #:

Turn-Around Time

Standard Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Westborough, MA TEL: 508-896-9220
 Mansfield, MA TEL: 508-822-9300
 FAX: 508-898-9193 FAX: 508-822-3288

Client Information

Client: Blueleaf, Inc.

Address: 57 Dresser Hill Road

Charlton, MA 01507

Phone: 508-294-3714

Fax:

Email: egrotton@blueleafwater.com

These samples have been Previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

Simmons Pond Well

Date Rec'd in Lab: 4/22/21

ALPHA Job #: 1212558

Report Information Data Deliverables Billing Information

FAX EMAIL
 ADEx Add'l Deliverables

Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program Criteria

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

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

ANALYSIS

TRC, RFC	Dissolved Oxygen	CO2	ORP															
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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SAMPLE HANDLING
Filtration
 Done
 Not Needed
 Lab to do
Preservation
 Lab to do
 (Please specify below)

TOTAL # BOTTLES

Sample Specific Comments

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials
		Date	Time		
20551-01	RAW	4/22/21		DW	EJG
-02	FILTER B	4/22/21		DW	EJG

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

FORM NO: 01-01(3)
 (rev. 5-JAN-12)

Container Type	P	D	P	P	-	-	-	-	-	-	-	-	-
Preservative	A	A	A	A	-	-	-	-	-	-	-	-	-
Relinquished By:	Date/Time		Received By:				Date/Time						
<i>E. McQuinn</i>	4/22/2021 14:15		<i>E. McQuinn</i> AAU				4/22/21 14						

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



ANALYTICAL REPORT

Lab Number:	L2122099
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Erik Grotton
Phone:	(508) 248-7094
Project Name:	BARNSTABLE MA
Project Number:	11204
Report Date:	05/11/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

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

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



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2122099-01	RAW	DW	BARNSTABLE MA	04/29/21 09:30	04/29/21
L2122099-02	FILTER B	DW	BARNSTABLE MA	04/29/21 09:30	04/29/21

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

Case Narrative

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

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

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

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

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

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

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

Case Narrative (continued)

Dissolved Oxygen

L2122099-01: A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

Chlorine, Total Residual

The WG1492625-4 MS recovery, performed on L2122099-02, is outside the acceptance criteria for chlorine, total residual (72%); however, the associated LCS recovery is within criteria. No further action was taken.

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

Authorized Signature:



Sebastian Corbin

Title: Technical Director/Representative

Date: 05/11/21

INORGANICS & MISCELLANEOUS

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

SAMPLE RESULTS

Lab ID: L2122099-01
Client ID: RAW
Sample Location: BARNSTABLE MA

Date Collected: 04/29/21 09:30
Date Received: 04/29/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	79.		mg/l	2.0	--	1	-	04/30/21 06:16	121,4500CO2-D	MR
Dissolved Oxygen	4.9		mg/l	0.10	--	1	-	04/29/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	200		mv	-	NA	1	-	04/29/21 20:10	12,1498	AS



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

SAMPLE RESULTS

Lab ID: L2122099-02
Client ID: FILTER B
Sample Location: BARNSTABLE MA

Date Collected: 04/29/21 09:30
Date Received: 04/29/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	170		mg/l	2.0	--	1	-	04/30/21 06:16	121,4500CO2-D	MR
Chlorine, Total Residual	2.0		mg/l	0.20	--	10	-	04/30/21 03:45	121,4500CL-D	AW
Chlorine, Residual Free	1.1		mg/l	0.25	--	5	-	04/30/21 04:12	121,4500CL-D	AW
Dissolved Oxygen	4.8		mg/l	0.10	--	1	-	04/29/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	600		mv	-	NA	1	-	04/29/21 20:10	12,1498	AS



Project Name: BARNSTABLE MA

Lab Number: L2122099

Project Number: 11204

Report Date: 05/11/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1492624-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	04/30/21 04:12	121,4500CL-D	AW
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG1492625-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	04/30/21 03:45	121,4500CL-D	AW

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE MA

Project Number: 11204

Lab Number: L2122099

Report Date: 05/11/21

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1492531-1								
Oxidation/Reduction Potential	99		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1492624-2								
Chlorine, Residual Free	92		-			-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1492625-2								
Chlorine, Total Residual	100		-		90-110	-		

Matrix Spike Analysis Batch Quality Control

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1492625-4 QC Sample: L2122099-02 Client ID: FILTER B												
Chlorine, Total Residual	2.0	2.5	3.8	72	Q	-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BARNSTABLE MA

Project Number: 11204

Lab Number: L2122099

Report Date: 05/11/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1492531-2 QC Sample: L2122099-01 Client ID: RAW						
Oxidation/Reduction Potential	200	200	mv	0		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1492624-3 QC Sample: L2122099-02 Client ID: FILTER B						
Chlorine, Residual Free	1.1	1.2	mg/l	9		
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1492625-3 QC Sample: L2122099-02 Client ID: FILTER B						
Chlorine, Total Residual	2.0	1.9	mg/l	5		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1492653-2 QC Sample: L2122099-02 Client ID: FILTER B						
Carbon Dioxide	170	160	mg/l	6		

Project Name: BARNSTABLE MA**Lab Number:** L2122099**Project Number:** 11204**Report Date:** 05/11/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2122099-01A	Plastic 120ml unpreserved/No Headspace	A	NA		4.0	Y	Absent		CO2(1)
L2122099-01B	BOD bottle unpreserved	A	NA		4.0	Y	Absent		DO-4500(.3)
L2122099-01C	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		ORP(1)
L2122099-02A	Plastic 120ml unpreserved/No Headspace	A	NA		4.0	Y	Absent		CO2(1)
L2122099-02B	BOD bottle unpreserved	A	NA		4.0	Y	Absent		DO-4500(.3)
L2122099-02C	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		ORP(1)
L2122099-02D	Plastic 950ml unpreserved	A	7	7	4.0	Y	Absent		RFC-4500(1),TRC-4500(1)

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
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Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BARNSTABLE MA
Project Number: 11204

Lab Number: L2122099
Report Date: 05/11/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 519818
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4917426	L2128319/UV Effluent	317.0	05/25/21 12:15	Client	06/02/21 08:30

Report Summary

Note: Sample container was provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.




Authorized Signature

Title

06/10/2021

Date

Client Name: Alpha Analytical

Report #: 519818

Client Name: Alpha Analytical

Report #: 519818

Sampling Point: L2128319/UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 23:27	4917426

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.




Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).


Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

4274HL

519818

		Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617		Alpha Job Number L2128319	
Client Information Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com		Project Information Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/11/21 Deliverables:		Regulatory Requirements/Report Limits State/Federal Program: Regulatory Criteria:	
Project Specific Requirements and/or Report Requirements Reference following Alpha Job Number on final report/deliverables: L2128319 Report to include Method Blank, LCS/LCSD: Additional Comments: Send all results/reports to subreports@alphalab.com					
Lab ID UV EFFLUENT	Client ID	Collection Date/Time 05-25-21 12:15	Sample Matrix DW	Analysis Bromate 4917426 EDA added upon receipt 556222 Client Provided Sample Container	Batch QC
Relinquished By:			Date/Time:		Date/Time:
					6-21-21 0830
Form No: AL_subcoc					

427416

	Subcontract Chain of Custody		Alpha Job Number L2128319
	Eurofins US 110 South Hill St. South Bend, IN 46617		

Client Information		Project Information		Regulatory Requirements/Report Limits	
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com		Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/11/21 Deliverables:		State/Federal Program: Regulatory Criteria:	

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128319 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	JUV EFFLUENT	05-27-21 12:15	DW	Bromate <i>Bottle shows collection date of 5/25/21 ss 6-2-21</i> <i>Bottle shows unpreserved</i> <i>see attached CDC</i> <i>for collection date.</i> <i>6-2-21</i> <i>OK to preserve 6/2/21</i> <i>Full</i> Client Provided Sample Container 0.4°C	
Relinquished By:		Date/Time:	Received By:	Date/Time:	
<i>[Signature]</i>		6/1/21	<i>[Signature]</i>	6-2-21 0830	
Form No: AL_subcoc					



CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 5/27/21

ALPHA Job #: 22128319

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: BW-STRAIGHTWAY

Project Location: BARNSTABLE, MA

Project #: 11204

Project Manager: Aaron Davis

ALPHA Quote #:

Turn-Around Time Standard RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables ADEX EMAIL**Billing Information** Same as Client info PO #:**Client Information**

Client: Blueleaf, Inc.

Address: 57 Dresser Hill Rd.
Charlton, MA 01507

Phone: 774 200 8029

Email: adavis@blueleafwater.com

Additional Project Information:**Regulatory Requirements & Project Information Requirements**

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

ANALYSIS		SAMPLE INFO	
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 824.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	Filtration	<input type="checkbox"/> Field
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8	<input type="checkbox"/> Lab to do	Preservation
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Lab to do	
TPH: <input type="checkbox"/> PCB <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		
BIOLOGICAL			
Sample Comments		TOTAL # BOTTLES	

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials	ANALYSIS	SVOC	METALS	METALS	EPH	VPH	TPH	BIOLOGICAL	SAMPLE INFO	Sample Comments	TOTAL # BOTTLES
		Date	Time													
28319-01	UV EFFLUENT	5/25/21	12:15	DW	NCF											1

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

Preservative
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₃
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time

5/27/21 14:40

5/27/21 1440

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

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



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2128319

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Location: MA Project Manager: Maria Cathcart	State/Federal Program: Regulatory Criteria:
	Turnaround & Deliverables Information Due Date: 06/11/21 Deliverables:	

Project Specific Requirements and/or Report Requirements	
Reference following Alpha Job Number on final report/deliverables: L2128319	Report to include Method Blank, LCS/LCSD:
Additional Comments: Send all results/reports to subreports@alphalab.com	

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT	05-27-21 12:15	DW	Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
	<i>Cry</i>	6/1/21		
Form No: AL_subcoc				



ANALYTICAL REPORT

Lab Number:	L2128315
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW-STRAIGHTWAY
Project Number:	11204
Report Date:	06/15/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

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

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



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2128315-01	RAW	DW	BARNSTABLE, MA	05/27/21 10:00	05/27/21
L2128315-02	GSP FILTER HIGH CAP	DW	BARNSTABLE, MA	05/27/21 10:00	05/27/21
L2128315-03	UV EFFLUENT	DW	BARNSTABLE, MA	05/27/21 10:00	05/27/21
L2128315-04	GAC	DW	BARNSTABLE, MA	05/27/21 10:00	05/27/21
L2128315-05	MAHER RAW	DW	BARNSTABLE, MA	05/27/21 09:00	05/27/21
L2128315-06	MAHER MNGS	DW	BARNSTABLE, MA	05/27/21 09:00	05/27/21
L2128315-07	MAHER UVAOP	DW	BARNSTABLE, MA	05/27/21 09:00	05/27/21
L2128315-08	MAHER GAC	DW	BARNSTABLE, MA	05/27/21 09:00	05/27/21

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

Case Narrative

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

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

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

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

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

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

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

Case Narrative (continued)

Report Submission

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

Chlorine, Residual Free

L2128315-04: The sample has an elevated detection limit due to limited sample volume available for analysis.

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

Authorized Signature:



Sebastian Corbin

Title: Technical Director/Representative

Date: 06/15/21

INORGANICS & MISCELLANEOUS

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-01
Client ID: RAW
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 10:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	200		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Dissolved Oxygen	1.1		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	140		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2128315

Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-02
 Client ID: GSP FILTER HIGH CAP
 Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 10:00
 Date Received: 05/27/21
 Field Prep: Not Specified

Sample Depth:
 Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	180		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Chlorine, Total Residual	1.0		mg/l	0.10	--	5	-	05/27/21 22:47	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	05/27/21 22:47	121,4500CL-D	AS
Dissolved Oxygen	3.5		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	610		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-03
Client ID: UV EFFLUENT
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 10:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	200		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Dissolved Oxygen	6.6		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	300		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-04
Client ID: GAC
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 10:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	200		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/27/21 22:47	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.20	--	4	-	05/27/21 22:47	121,4500CL-D	AS
Dissolved Oxygen	3.4		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	340		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-05
Client ID: MAHER RAW
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 09:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	94.		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Dissolved Oxygen	3.5		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	360		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-06
Client ID: MAHER MNGS
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 09:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	94.		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Dissolved Oxygen	9.6		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	390		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-07
Client ID: MAHER UVAOP
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 09:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	62.		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Dissolved Oxygen	8.0		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	300		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-08
Client ID: MAHER GAC
Sample Location: BARNSTABLE, MA

Date Collected: 05/27/21 09:00
Date Received: 05/27/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	43.		mg/l	2.0	--	1	-	05/27/21 19:55	121,4500CO2-D	JT
Chlorine, Total Residual	1.2		mg/l	0.10	--	5	-	05/27/21 22:47	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	05/27/21 22:47	121,4500CL-D	AS
Dissolved Oxygen	3.7		mg/l	0.10	--	1	-	05/27/21 16:20	121,4500O-C	JT
Oxidation/Reduction Potential	610		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS



Project Name: BW-STRAIGHTWAY

Lab Number: L2128315

Project Number: 11204

Report Date: 06/15/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02,04,08 Batch: WG1504730-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	05/27/21 22:47	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 02,04,08 Batch: WG1504731-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	05/27/21 22:47	121,4500CL-D	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2128315

Report Date: 06/15/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 Batch: WG1504715-1								
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 02,04,08 Batch: WG1504730-2								
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 02,04,08 Batch: WG1504731-2								
Chlorine, Residual Free	92		-			-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02,04,08 QC Batch ID: WG1504730-4 QC Sample: L2128374-02 Client ID: MS Sample											
Chlorine, Total Residual	ND	0.25	0.23	92		-	-		80-120	-	20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2128315

Report Date: 06/15/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1504683-1 QC Sample: L2128315-01 Client ID: RAW						
Dissolved Oxygen	1.1	1.0	mg/l	10		20
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1504715-2 QC Sample: L2128315-01 Client ID: RAW						
Oxidation/Reduction Potential	140	160	mv	13		20
General Chemistry - Westborough Lab Associated sample(s): 02,04,08 QC Batch ID: WG1504730-3 QC Sample: L2128374-01 Client ID: DUP Sample						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 02,04,08 QC Batch ID: WG1504731-3 QC Sample: L2128315-02 Client ID: GSP FILTER HIGH CAP						
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-08 QC Batch ID: WG1504738-1 QC Sample: L2128315-08 Client ID: MAHER GAC						
Carbon Dioxide	43	42	mg/l	2		

Project Name: BW-STRAIGHTWAY**Lab Number:** L2128315**Project Number:** 11204**Report Date:** 06/15/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2128315-01A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-01B	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		ORP(1)
L2128315-01C	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-01D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-02A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-02B	Plastic 950ml unpreserved	A	7	7	4.9	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-02C	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-02D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-03A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-03B	Plastic 120ml unpreserved	A	7	7	4.9	Y	Absent		SUB-BROMATE()
L2128315-03C	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		ORP(1)
L2128315-03D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-03E	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-04A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-04B	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-04C	Plastic 120ml unpreserved	A	7	7	4.9	Y	Absent		SUB-BROMATE()
L2128315-04D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-04E	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-05A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-05B	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		ORP(1)
L2128315-05C	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-05D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-06A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)

Project Name: BW-STRAIGHTWAY**Lab Number:** L2128315**Project Number:** 11204**Report Date:** 06/15/21**Container Information**

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2128315-06B	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		ORP(1)
L2128315-06C	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-06D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-07A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-07B	Plastic 120ml unpreserved	A	7	7	4.9	Y	Absent		SUB-BROMATE()
L2128315-07C	Plastic 60ml unpreserved	A	7	7	4.9	Y	Absent		ORP(1)
L2128315-07D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-07E	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-08A	Plastic 250ml unpreserved/No Headspace	A	NA		4.9	Y	Absent		CO2(1)
L2128315-08B	Plastic 500ml unpreserved	A	7	7	4.9	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-08C	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)
L2128315-08D	BOD bottle Powder Pillow preserved	A	NA		4.9	Y	Absent		DO-4500(.3)

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2128315
Report Date: 06/15/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
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Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



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Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

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REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 5/27/21

ALPHA Job #: 12128 315

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: ISW STRAIGHTWAY

Project Location: Barnstable, MA

Project #: 11204

Project Manager: Aaron Davis

ALPHA Quote #:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables

ADEx EMAIL

Billing Information

Same as Client info PO #:

Client Information

Client: Blueleaf Inc.

Address: 57 Dresser Hill Rd.

Dudley Charlton, MA 01507

Phone: 774 200 8029

Email: a.davis@blueleafwater.com

Additional Project Information:

Regulatory Requirements & Project Information Requirements

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

ANALYSIS	VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	EPH: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	PCB <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	SAMPLE INFO
								Filtration
								<input type="checkbox"/> Field
								<input type="checkbox"/> Lab to do
								Preservation
								<input type="checkbox"/> Lab to do
								Sample Comments


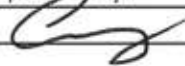
*REC, TRC
Bromate
ORP, DO, CO2*

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
28315-01	Raw	5/27	10:00	DW	ARD
-02	GSP Filter High Cap	5/27			
-03	UV Effluent	5/27			
-04	GAC	5/27			
-05	Maher Raw	5/27	9:00		
-06	Maher MnGS	5/27			
-07	Maher UV/OP	5/27			
-08	Maher GAC	5/27			

- Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle
- Preservative**
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H = Na₂S₂O₃
I= Ascorbic Acid
J = NH₄Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	5/27/21 14:40		5/27/21 1440

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
FORM NO: 01-01 (rev. 12-Mar-2012)

		Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617			Alpha Job Number L2128315	
Client Information		Project Information			Regulatory Requirements/Report Limits	
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com		Project Location: MA Project Manager: Maria Cathcart			State/Federal Program: Regulatory Criteria:	
		Turnaround & Deliverables Information				
		Due Date: 06/13/21 Deliverables:				
Project Specific Requirements and/or Report Requirements						
Reference following Alpha Job Number on final report/deliverables: L2128315				Report to include Method Blank, LCS/LCSD:		
Additional Comments: Send all results/reports to subreports@alphalab.com						
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis		Batch QC
	UV EFFLUENT GAC MAHER UVAOP	05-27-21 10:00 05-27-21 10:00 05-27-21 09:00	DW DW DW	Bromate Bromate Bromate		
		Relinquished By:	Date/Time:	Received By:	Date/Time:	
			6/1/21			
Form No: AL_subcoc						

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies



Eaton Analytical

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 519813
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information

EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4917413	L2128315-03/UV Effluent	317.0	05/27/21 10:00	Client	06/02/21 08:30
4917414	L2128315-04/GAC	317.0	05/27/21 10:00	Client	06/02/21 08:30
4917415	L2128315-07/Maher UVAOP	317.0	05/27/21 09:00	Client	06/02/21 08:30

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.

Authorized Signature

Title

06/10/2021

Date

Client Name: Alpha Analytical

Report #: 519813

Client Name: Alpha Analytical

Report #: 519813

Sampling Point: L2128315-03/UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 20:57	4917413

Sampling Point: L2128315-04/GAC

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 21:22	4917414

Sampling Point: L2128315-07/Maher UVAOP

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/08/21 21:47	4917415

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(\text{MS or MSD value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery \%}$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.


Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

427415
519813


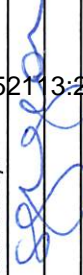
	Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617	Alpha Job Number L2128315
--	--	-------------------------------------

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/13/21 Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128315 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	JV EFFLUENT GAC MAHER UVAOP <i>-03 -04 -07</i> <i>per bottles ss 6-2-21</i>	05-27-21 10:00 05-27-21 10:00 05-27-21 09:00 <i>ss 6-2-21</i>	DW DW DW	Bromate Bromate Bromate <i>4917 413 414 415</i> <i>↓</i> <i>Bottles show unpreserved ss 6-2-21</i> <i>okay to preserve 6/2/21 Aflit</i> <i>Client Provided Sample Container</i> <i>EDA added upon receipt ss 6-2-21</i> <i>0.4°C</i>	
Relinquished By: 				Date/Time: 6/1/21	Date/Time: 6-2-21 0830
Received By: 				Date/Time: 6-2-21 0830	
Form No: AL_subcoc					

Serial_No:06152113:23

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

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STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Nathalie Lewis
 Eight Walkup Drive
 Westborough, MA 01581

Report: 520031
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4919348	L2128998/UV Effluent	317.0	06/01/21 11:00	Client	06/03/21 10:00

Report Summary

Note: Sample container was provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.




Authorized Signature

Title

06/14/2021

Date

Client Name: Alpha Analytical

Report #: 520031

Client Name: Alpha Analytical

Report #: 520031

Sampling Point: L2128998/UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/10/21 19:41	4919348

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

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If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(MS \text{ or } MSD \text{ value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery } \%$

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Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

427555

60031

	Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617	Alpha Job Number L2128998
	Client Information Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Information Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/15/21 Deliverables:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128998 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
4919348	JV EFFLUENT <i>NO EDA listed orig to proceed 6/3/21 AMH EDA added upon receipt 556321</i>	06-01-21 11:00	DW	Bromate <i>Client Provided Sample Container</i> 1.6°C	
Relinquished By: <i>[Signature]</i>				Date/Time: 6/2/21	
Received By: <i>[Signature]</i>				Date/Time: 6-3-21 1000	
Form No: AL_subcoc					



CHAIN OF CUSTODY

PAGE 1 OF 1Date Rec'd In Lab: 6/1/21ALPHA Job #: L21289988 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300**Project Information**Project Name: BW STRAIGHTWAYProject Location: Barnstable, MAProject #: 11204Project Manager: Aaron Davis

ALPHA Quote #:

Turn-Around Time Standard RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables ADEx EMAIL**Billing Information** Same as Client info PO #:**Regulatory Requirements & Project Information Requirements**

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

Client InformationClient: Blueleaf, Inc.Address: 57 Dresser Hill Rd.
Charlton, MA 01571Phone: 774 200 8029Email: adavis@blueleafwater.com

Additional Project Information:

ANALYSIS	SAMPLE INFO
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	Filtration <input type="checkbox"/> Field <input type="checkbox"/> Lab to do
SYOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	Preservation <input type="checkbox"/> Lab to do
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	
METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8	
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	
PCB <input type="checkbox"/> PEST	
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	
<u>Barnstable</u>	
	Sample Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<u>28998-01</u>	<u>UV Effluent</u>	<u>6/1</u>	<u>14:00</u>	<u>DW</u>	<u>AD</u>

- Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle
- Preservative**
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₃
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time

6/1/21 14:346/1/21 14:34

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

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



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2128998

Client Information	Project Information	Regulatory Requirements/Report Limits
--------------------	---------------------	---------------------------------------

Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/15/21 Deliverables:	State/Federal Program: Regulatory Criteria:
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Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2128998 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	JV EFFLUENT	06-01-21 11:00	DW	Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
		6/2/21		



ANALYTICAL REPORT

Lab Number:	L2129637
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW STRAIGHTWAY
Project Number:	11204
Report Date:	06/21/21

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

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



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2129637-01	GSP FILTER HIGH CAP	DW	BARNSTABLE, MA	06/03/21 10:00	06/03/21
L2129637-02	UV EFFLUENT	DW	BARNSTABLE, MA	06/03/21 10:00	06/03/21
L2129637-03	MAHER RAW	DW	BARNSTABLE, MA	06/03/21 09:00	06/03/21
L2129637-04	MAHER MNGS	DW	BARNSTABLE, MA	06/03/21 09:00	06/03/21
L2129637-05	MAHER UVAOP	DW	BARNSTABLE, MA	06/03/21 09:00	06/03/21
L2129637-06	MAHER GAC	DW	BARNSTABLE, MA	06/03/21 09:00	06/03/21

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Case Narrative

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

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

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

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

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

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

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Case Narrative (continued)

Report Submission

The analysis of Bromate was subcontracted. A copy of the laboratory report is included as an addendum.

Please note: This data is only available in PDF format and is not available on Data Merger.

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

Authorized Signature:



Sebastian Corbin

Title: Technical Director/Representative

Date: 06/21/21

INORGANICS & MISCELLANEOUS

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-01
Client ID: GSP FILTER HIGH CAP
Sample Location: BARNSTABLE, MA

Date Collected: 06/03/21 10:00
Date Received: 06/03/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Chlorine, Total Residual	1.1		mg/l	0.10	--	5	-	06/03/21 20:05	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	06/03/21 20:05	121,4500CL-D	AS



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-03
Client ID: MAHER RAW
Sample Location: BARNSTABLE, MA

Date Collected: 06/03/21 09:00
Date Received: 06/03/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	120		mg/l	2.0	--	1	-	06/04/21 06:11	121,4500CO2-D	MR
Dissolved Oxygen	2.0		mg/l	0.10	--	1	-	06/03/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	200		mv	-	NA	1	-	06/03/21 23:12	12,1498	AS



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-04
Client ID: MAHER MNGS
Sample Location: BARNSTABLE, MA

Date Collected: 06/03/21 09:00
Date Received: 06/03/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	110		mg/l	2.0	--	1	-	06/04/21 06:11	121,4500CO2-D	MR
Dissolved Oxygen	4.8		mg/l	0.10	--	1	-	06/03/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	210		mv	-	NA	1	-	06/03/21 23:12	12,1498	AS



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-05
Client ID: MAHER UVAOP
Sample Location: BARNSTABLE, MA

Date Collected: 06/03/21 09:00
Date Received: 06/03/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	76.		mg/l	2.0	--	1	-	06/04/21 06:11	121,4500CO2-D	MR
Dissolved Oxygen	7.6		mg/l	0.10	--	1	-	06/03/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	220		mv	-	NA	1	-	06/03/21 23:12	12,1498	AS



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-06
Client ID: MAHER GAC
Sample Location: BARNSTABLE, MA

Date Collected: 06/03/21 09:00
Date Received: 06/03/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	51.		mg/l	2.0	--	1	-	06/04/21 06:11	121,4500CO2-D	MR
Chlorine, Total Residual	1.3		mg/l	0.10	--	5	-	06/03/21 20:05	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	06/03/21 20:05	121,4500CL-D	AS
Dissolved Oxygen	10		mg/l	0.10	--	1	-	06/03/21 16:25	121,4500O-C	JT
Oxidation/Reduction Potential	580		mv	-	NA	1	-	06/03/21 23:12	12,1498	AS



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01,06 Batch: WG1507297-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	06/03/21 20:05	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 01,06 Batch: WG1507360-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	06/03/21 20:05	121,4500CL-D	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01,06 Batch: WG1507297-2								
Chlorine, Total Residual	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01,06 Batch: WG1507360-2								
Chlorine, Residual Free	104		-			-		
General Chemistry - Westborough Lab Associated sample(s): 03-06 Batch: WG1507399-1								
Oxidation/Reduction Potential	99		-		90-110	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01,06 QC Batch ID: WG1507297-4 QC Sample: L2129453-01 Client ID: MS Sample												
Chlorine, Total Residual	ND	0.25	0.23	92		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01,06 QC Batch ID: WG1507297-3 QC Sample: L2129637-01 Client ID: GSP FILTER HIGH CAP						
Chlorine, Total Residual	1.1	1.1	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 03-06 QC Batch ID: WG1507320-1 QC Sample: L2129637-04 Client ID: MAHER MNGS						
Dissolved Oxygen	4.8	4.6	mg/l	4		20
General Chemistry - Westborough Lab Associated sample(s): 01,06 QC Batch ID: WG1507360-3 QC Sample: L2129637-01 Client ID: GSP FILTER HIGH CAP						
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated sample(s): 03-06 QC Batch ID: WG1507399-2 QC Sample: L2129637-03 Client ID: MAHER RAW						
Oxidation/Reduction Potential	200	200	mv	0		20
General Chemistry - Westborough Lab Associated sample(s): 03-06 QC Batch ID: WG1507489-1 QC Sample: L2129637-06 Client ID: MAHER GAC						
Carbon Dioxide	51	51	mg/l	0		

Project Name: BW STRAIGHTWAY**Lab Number:** L2129637**Project Number:** 11204**Report Date:** 06/21/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2129637-01A	Plastic 950ml unpreserved	A	7	7	2.9	Y	Absent		RFC-4500(1),TRC-4500(1)
L2129637-02A	Plastic 250ml Other preserved (sub-lab)	A	7	7	2.9	Y	Absent		SUB-BROMATE()
L2129637-03A	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-03B	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-03C	Plastic 250ml unpreserved/No Headspace	A	NA		2.9	Y	Absent		CO2(1)
L2129637-03D	Plastic 60ml unpreserved	A	7	7	2.9	Y	Absent		ORP(1)
L2129637-04A	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-04B	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-04C	Plastic 250ml unpreserved/No Headspace	A	NA		2.9	Y	Absent		CO2(1)
L2129637-04D	Plastic 60ml unpreserved	A	7	7	2.9	Y	Absent		ORP(1)
L2129637-05A	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-05B	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-05C	Plastic 250ml unpreserved/No Headspace	A	NA		2.9	Y	Absent		CO2(1)
L2129637-05D	Plastic 60ml unpreserved	A	7	7	2.9	Y	Absent		ORP(1)
L2129637-05E	Plastic 250ml Other preserved (sub-lab)	A	7	7	2.9	Y	Absent		SUB-BROMATE()
L2129637-06A	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-06B	BOD bottle Powder Pillow preserved	A	NA		2.9	Y	Absent		DO-4500(.3)
L2129637-06C	Plastic 250ml unpreserved/No Headspace	A	NA		2.9	Y	Absent		CO2(1)
L2129637-06D	Plastic 60ml unpreserved	A	7	7	2.9	Y	Absent		ORP(1)
L2129637-06E	Plastic 500ml unpreserved	A	7	7	2.9	Y	Absent		RFC-4500(1),TRC-4500(1)

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BW STRAIGHTWAY
Project Number: 11204

Lab Number: L2129637
Report Date: 06/21/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

WESTBORO, MA
 TEL: 508-898-9220
 FAX: 508-898-9193

MANSFIELD, MA
 TEL: 508-822-9300
 FAX: 508-822-3288

Project Information

Project Name: BW STRAIGHTWAY
 Project Location: Barnstable, MA
 Project #: 11204
 Project Manager: Aaron Davis
 ALPHA Quote #:

Date Rec'd in Lab: 6/3/21

ALPHA Job #: L2129637

Report Information - Data Deliverables

FAX EMAIL
 ADEX Add'l Deliverables

Billing Information

Same as Client info PO #:

Client Information

Client: Blueleaf, Inc.
 Address: 57 Dresser Hill Rd.
Charlton, MA 01571
 Phone: 774 200 8029
 Fax:
 Email: adavis@blueleafwater.com

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due: Time:

These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

Regulatory Requirements/Report Limits

State /Fed Program Criteria

ANALYSIS	RFCI TRC	Bromate ORP DO CO ₂	SAMPLE HANDLING			TOTAL # BOTTLES
	Filtration _____					
	<input type="checkbox"/> Done					
	<input type="checkbox"/> Not needed					
	<input type="checkbox"/> Lab to do					
	Preservation					
<input type="checkbox"/> Lab to do						
(Please specify below)			Sample Specific Comments			

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials						Sample Specific Comments	
		Date	Time									
<u>29637 01</u>	<u>GSP Filter High Cap</u>	<u>6/3</u>	<u>10:00</u>	<u>DW</u>	<u>AD</u>	<u>X</u>						
<u>02</u>	<u>UV Effluent</u>		<u>↓</u>				<u>X</u>					
<u>03</u>	<u>Maher Raw</u>		<u>9:00</u>					<u>X</u>	<u>X</u>	<u>X</u>		
<u>04</u>	<u>Maher MnGS</u>		<u>↓</u>					<u>X</u>	<u>X</u>	<u>X</u>		
<u>05</u>	<u>Maher UVAOP</u>		<u>↓</u>				<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>06</u>	<u>Maher GAC</u>	<u>↓</u>	<u>↓</u>	<u>↓</u>	<u>↓</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time


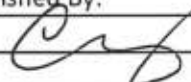
[Signature]

6/3 14:25

[Signature]

6/3/21 14:25

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

		Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Alpha Job Number L2129637 </div>	
Client Information		Project Information		Regulatory Requirements/Report Limits	
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com		Project Location: MA Project Manager: Maria Cathcart		State/Federal Program: Regulatory Criteria:	
		Turnaround & Deliverables Information			
		Due Date: 06/17/21 Deliverables:			
Project Specific Requirements and/or Report Requirements					
Reference following Alpha Job Number on final report/deliverables: L2129637				Report to include Method Blank, LCS/LCSD:	
Additional Comments: Send all results/reports to subreports@alphalab.com					
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT MAHER UVAOP	06-03-21 10:00 06-03-21 09:00	DW DW	Bromate Bromate	
		Relinquished By:	Date/Time:	Received By:	Date/Time:
			6/7/21		
Form No: AL_subcoc					

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies



Eaton Analytical

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Maria Cathcart
 Eight Walkup Drive
 Westborough, MA 01581

Report: 520327
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information

EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4922450	L2129637/UV Effluent	317.0	06/03/21 10:00	Client	06/08/21 08:30
4922451	L2129637/Maher UVAOP	317.0	06/03/21 09:00	Client	06/08/21 08:30

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.

Authorized Signature

Title

06/11/2021

Date

Client Name: Alpha Analytical

Report #: 520327

Client Name: Alpha Analytical

Report #: 520327

Sampling Point: L2129637/UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/10/21 23:50	4922450

Sampling Point: L2129637/Maher UVAOP

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/11/21 00:15	4922451

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(\text{MS or MSD value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery \%}$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

427837
520327

Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 45617



Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019
Phone: 508.439.5150
Email: mcatcart@alphalab.com

Project Information

Project Location: MA
Project Manager: Maria Cathcart

Turnaround & Deliverables Information

Due Date: 06/17/21
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2129637 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT MAHER UVAOP	06-03-21 10:00 06-03-21 09:00	DW DW	Bromate Bromate 4922450 4922451	
Relinquished By: <i>[Signature]</i>		Date/Time: 6/7/21	Received By: <i>[Signature]</i>	Date/Time:	
Form No: AL_subcoc					6/21 0830

Client Provided Sample Container
Serial No: 06212116:01
TEMP D.20C



ANALYTICAL REPORT

Lab Number:	L2131271
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	STRAIGHTWAY
Project Number:	11204
Report Date:	06/28/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

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

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



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2131271-01	UV EFFLUENT	WATER	BARNSTABLE	06/10/21 09:00	06/10/21
L2131271-02	MAHER RAW	DW	BARNSTABLE	06/10/21 10:00	06/10/21
L2131271-03	MAHER MNGS	DW	BARNSTABLE	06/10/21 10:00	06/10/21
L2131271-04	MAHER UVADP	WATER	BARNSTABLE	06/10/21 10:00	06/10/21
L2131271-05	MAHER GAC	DW	BARNSTABLE	06/10/21 10:00	06/10/21

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Case Narrative

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

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

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

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

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

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

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Case Narrative (continued)

Report Submission

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

Chlorine, Residual Free

WG1510711-1: A Laboratory Duplicate could not be performed due to insufficient sample volume available for analysis.

Chlorine, Total Residual

WG1510716-1: A Matrix Spike and Laboratory Duplicate were prepared with the sample batch, however, the native sample was not available for reporting; therefore, the results could not be reported.

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

Authorized Signature:



Sebastian Corbin

Title: Technical Director/Representative

Date: 06/28/21

INORGANICS & MISCELLANEOUS

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-02
Client ID: MAHER RAW
Sample Location: BARNSTABLE

Date Collected: 06/10/21 10:00
Date Received: 06/10/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	89.		mg/l	2.0	--	1	-	06/10/21 20:05	121,4500CO2-D	JT
Dissolved Oxygen	4.6		mg/l	0.10	--	1	-	06/10/21 17:50	121,4500O-C	JT
Oxidation/Reduction Potential	190		mv	-	NA	1	-	06/10/21 21:12	12,1498	AS



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-03
Client ID: MAHER MNGS
Sample Location: BARNSTABLE

Date Collected: 06/10/21 10:00
Date Received: 06/10/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	81.		mg/l	2.0	--	1	-	06/10/21 20:05	121,4500CO2-D	JT
Dissolved Oxygen	5.0		mg/l	0.10	--	1	-	06/10/21 17:50	121,4500O-C	JT
Oxidation/Reduction Potential	210		mv	-	NA	1	-	06/10/21 21:12	12,1498	AS



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-04
Client ID: MAHER UVADP
Sample Location: BARNSTABLE

Date Collected: 06/10/21 10:00
Date Received: 06/10/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	58.		mg/l	2.0	--	1	-	06/10/21 20:05	121,4500CO2-D	JT
Dissolved Oxygen	13		mg/l	0.10	--	1	-	06/10/21 17:50	121,4500O-C	JT
Oxidation/Reduction Potential	220		mv	-	NA	1	-	06/10/21 21:12	12,1498	AS



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-05
Client ID: MAHER GAC
Sample Location: BARNSTABLE

Date Collected: 06/10/21 10:00
Date Received: 06/10/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	46.		mg/l	2.0	--	1	-	06/10/21 20:05	121,4500CO2-D	JT
Chlorine, Total Residual	0.79		mg/l	0.04	--	2	-	06/11/21 05:45	121,4500CL-D	AW
Chlorine, Residual Free	0.68		mg/l	0.05	--	1	-	06/11/21 06:16	121,4500CL-D	AW
Dissolved Oxygen	11		mg/l	0.10	--	1	-	06/10/21 17:50	121,4500O-C	JT
Oxidation/Reduction Potential	540		mv	-	NA	1	-	06/10/21 21:12	12,1498	AS



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 05 Batch: WG1510711-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	06/11/21 06:16	121,4500CL-D	AW
General Chemistry - Westborough Lab for sample(s): 05 Batch: WG1510716-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	06/11/21 05:45	121,4500CL-D	AW

Lab Control Sample Analysis

Batch Quality Control

Project Name: STRAIGHTWAY

Project Number: 11204

Lab Number: L2131271

Report Date: 06/28/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02-05 Batch: WG1510572-1								
Oxidation/Reduction Potential	101		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 05 Batch: WG1510711-2								
Chlorine, Residual Free	100		-			-		
General Chemistry - Westborough Lab Associated sample(s): 05 Batch: WG1510716-2								
Chlorine, Total Residual	96		-		90-110	-		

Lab Duplicate Analysis

Batch Quality Control

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02-05 QC Batch ID: WG1510572-2 QC Sample: L2131271-02 Client ID: MAHER RAW						
Oxidation/Reduction Potential	190	210	mv	10		20
General Chemistry - Westborough Lab Associated sample(s): 02-05 QC Batch ID: WG1510620-1 QC Sample: L2131271-02 Client ID: MAHER RAW						
Dissolved Oxygen	4.6	4.7	mg/l	2		20
General Chemistry - Westborough Lab Associated sample(s): 02-05 QC Batch ID: WG1510621-1 QC Sample: L2131271-04 Client ID: MAHER UVADP						
Carbon Dioxide	58	55	mg/l	5		

Project Name: STRAIGHTWAY**Lab Number:** L2131271**Project Number:** 11204**Report Date:** 06/28/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2131271-01A	Plastic 250ml Other preserved (sub-lab)	A	7	7	2.3	Y	Absent		SUB-BROMATE()
L2131271-02A	Plastic 250ml unpreserved/No Headspace	A	NA		2.3	Y	Absent		CO2(1)
L2131271-02B	Plastic 60ml unpreserved	A	7	7	2.3	Y	Absent		ORP(1)
L2131271-02C	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-02D	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-03A	Plastic 250ml unpreserved/No Headspace	A	NA		2.3	Y	Absent		CO2(1)
L2131271-03B	Plastic 60ml unpreserved	A	7	7	2.3	Y	Absent		ORP(1)
L2131271-03C	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-03D	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-04A	Plastic 120ml unpreserved	A	7	7	2.3	Y	Absent		SUB-BROMATE()
L2131271-04B	Plastic 60ml unpreserved	A	7	7	2.3	Y	Absent		ORP(1)
L2131271-04C	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-04D	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-04E	Plastic 250ml unpreserved/No Headspace	A	NA		2.3	Y	Absent		CO2(1)
L2131271-05A	Plastic 500ml unpreserved	A	7	7	2.3	Y	Absent		RFC-4500(1),TRC-4500(1),CO2(1)
L2131271-05B	Plastic 60ml unpreserved	A	7	7	2.3	Y	Absent		ORP(1)
L2131271-05C	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)
L2131271-05D	BOD bottle Powder Pillow preserved	A	NA		2.3	Y	Absent		DO-4500(.3)

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: STRAIGHTWAY
Project Number: 11204

Lab Number: L2131271
Report Date: 06/28/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: Straightway

Project Location: Barnstable

Project #: 11204

Project Manager: Acron Davis

ALPHA Quote #:

Date Rec'd in Lab: 6/10/21

ALPHA Job #: L213271

Client Information

Client: Blueleaf Inc

Address: 57 Dresser Hill Rd
Charlton MA

Phone: 508-294-3714

Email: adavis@blueleafwater.com

Report Information - Data Deliverables

ADEx EMAIL

Same as Client info PO #:

Additional Project Information:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due:

Regulatory Requirements & Project Information Requirements

Yes No MA MCP Analytical Methods Yes No CT RCP Analytical Methods

Yes No Matrix Spike Required on this SDG? (Required for MCP Inorganics)

Yes No GW1 Standards (Info Required for Metals & EPH with Targets)

Yes No NPDES RGP

Other State /Fed Program _____ Criteria _____

ANALYSIS	VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SAMPLE INFO	TOTAL # BOTTLES
	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH		
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15	PH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	Filtration	
METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PPI3	PH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Field	
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	PCB: <input type="checkbox"/> PEST	<input type="checkbox"/> Lab to do	
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	<u>Bromate</u>	Preservation	
	<u>ORP</u>	<input type="checkbox"/> Lab to do	
	<u>DO</u>	Sample Comments	
	<u>CO2</u>		
	<u>REC, TRC</u>		

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
31271-01	UV Effluent	6/10	9:00	DW	NCF
	02 Macher Raw	↓	10:00	↓	AD
	03 Macher SP MnGS	↓	↓	↓	↓
	04 Macher UVAOP	↓	↓	↓	↓
	05 Macher GAC	↓	↓	↓	↓

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

Preservative
A= None
B= HCl
C= HNO3
D= H2SO4
E= NaOH
F= MeOH
G= NaHSO4
H= Na2S2O3
I= Ascorbic Acid
J= NH4Cl
K= Zn Acetate
O= Other

Container Type	
Preservative	

Relinquished By:	Date/Time: <u>6/10/21 14:20</u>	Received By: <u>Wen Ma</u>	Date/Time: <u>6/10/21 14:20</u>
------------------	---------------------------------	----------------------------	---------------------------------

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

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

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

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STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Maria Cathcart
 Eight Walkup Drive
 Westborough, MA 01581

Report: 520858
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4926633	UV Effluent	317.0	06/10/21 09:00	Client	06/11/21 08:30
4926634	Maher UVADP	317.0	06/10/21 10:00	Client	06/11/21 08:30

Report Summary					
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Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.




Authorized Signature

Title

06/22/2021

Date

Client Name: Alpha Analytical
 Report #: 520858

Client Name: Alpha Analytical

Report #: 520858

Sampling Point: UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/17/21 03:38	4926633

Sampling Point: Maher UVADP

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/17/21 04:02	4926634

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

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If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(\text{MS or MSD value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery \%}$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.


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428139

		<p>Subcontract Chain of Custody</p> <p>Eurofins US 110 South Hill St. South Bend, IN 46617</p>		<p>Alpha Job Number L2131271</p>	
<p>Client Information</p> <p>Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019</p> <p>Phone: 508.439.5150 Email: mcaathcart@alphalab.com</p>		<p>Project Information</p> <p>Project Location: MA Project Manager: Maria Cathcart</p>		<p>Regulatory Requirements/Report Limits</p> <p>State/Federal Program: Regulatory Criteria:</p>	
<p>Turnaround & Deliverables Information</p> <p>Due Date: Deliverables:</p>		<p>Project Specific Requirements and/or Report Requirements</p> <p>Report to include Method Blank, LCS/LCSD:</p>			
<p>Reference following Alpha Job Number on final report/deliverables: L2131271</p>		<p>Report to include Method Blank, LCS/LCSD:</p>			
<p>Additional Comments: Send all results/reports to subreports@alphalab.com</p>					
<p>Lab ID 428139</p>	<p>Client ID JV EFFLUENT MAHER UVADP</p>	<p>Collection Date/Time 06-10-21 09:00 06-10-21 10:00</p>	<p>Sample Matrix WATER WATER</p>	<p>Analysis Bromate Bromate</p>	<p>Batch QC</p>
<p>Relinquished By: C. Tebeau</p>			<p>Received By: <i>[Signature]</i></p>		<p>Date/Time: 6/10/21</p>
<p>Form No: AL_subcoc</p>			<p>Date/Time: 6/10/21</p>		<p>Date/Time: 6/10/21 08:30</p>

Client Provided Sample Container

Temp. 2.0

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

This report may not be reproduced, except in full, without written approval from EEA.

STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Maria Cathcart
 Eight Walkup Drive
 Westborough, MA 01581

Report: 521473
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4932341	L2131616/UV Effluent	317.0	06/11/21 08:30	Client	06/17/21 09:40

Report Summary

Note: Sample container was provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.




06/27/2021

Authorized Signature

Title

Date

Client Name: Alpha Analytical

Report #: 521473

Client Name: Alpha Analytical

Report #: 521473

Sampling Point: L2131616/UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 02:42	4932341

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

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pm 6/17/21 428703



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2131616

521473

Client Information

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

Phone: 508.439.5150
Email: mcathcart@alphalab.com

Project Information

Project Location: MA
Project Manager: Maria Cathcart

Turnaround & Deliverables Information

Due Date: 06/29/21
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2131616 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
4132241	JV EFFLUENT	06-11-21 08:30	WATER	Bromate	
Client Provided Sample Container					
Relinquished By:		Date/Time:	Received By:	Date/Time:	
C. C. C. C.		6/19/21	[Signature]		
Form No: AL_subcoc					6/17/2021 0940

Temp. 1.0°



CHAIN OF CUSTODY

PAGE _____ OF _____

Date Rec'd in Lab: 6/11/21

ALPHA Job #: C2131616

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-622-9300**Project Information**

Project Name: BW Straightway

Project Location: Barnstable

Project #: 11204

Project Manager:

ALPHA Quote #:

Turn-Around Time Standard RUSH (only confirmed if pre-approved)

Date Due:

Report Information - Data Deliverables ADEX EMAIL**Billing Information** Same as Client info PO #:**Client Information**

Client: Blueleaf Inc

Address: 57 Dresse Hill Rd

Charlton MA 01507

Phone: 774-200-8029

Email: adamis@blueleafwater.com

Additional Project Information:

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

ANALYSIS		SAMPLE INFO	
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	Filtration	<input type="checkbox"/> Field <input type="checkbox"/> Lab to do
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PP13	Preservation	<input type="checkbox"/> Lab to do
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	
<i>Brumate</i>		Sample Comments	

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
31616-01	UV Effluent	6/11	830		NCF

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

Preservative
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₃
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type

Preservative

Relinquished By:

Date/Time

Received By:

Date/Time

Walter Fin

6/11/21

C. Jean Att

6/11/21

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

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



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2131616

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/29/21 Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements	
Reference following Alpha Job Number on final report/deliverables: L2131616	Report to include Method Blank, LCS/LCSD:
Additional Comments: Send all results/reports to subreports@alphalab.com	

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT	06-11-21 08:30	WATER	Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
	<i>Seban</i>	<i>6/14/21</i>		
Form No: AL_subcoc				

LABORATORY REPORT

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STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies

110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Maria Cathcart
 Eight Walkup Drive
 Westborough, MA 01581

Report: 521477
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4932364	UV Effluent	317.0	06/14/21 11:00	Client	06/17/21 09:15

Report Summary

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

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Authorized Signature

Title

06/27/2021

Date

Client Name: Alpha Analytical

Report #: 521477

Client Name: Alpha Analytical

Report #: 521477

Sampling Point: UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 03:07	4932364

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

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Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Client Information

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

Phone: 508.439.5150
Email: mcathcart@alphalab.com

Project Information

Project Location: MA
Project Manager: Maria Cathcart

Turnaround & Deliverables Information

Due Date: 06/30/21
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Report to include Method Blank, LCS/LCSD:

Reference following Alpha Job Number on final report/deliverables: L2132035

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	JV EFFLUENT	06-14-21 11:00	DW	Bromate 4932364 WST	
Relinquished By: <i>C. Seaman</i>					
Date/Time: <i>06/16/21</i>					
Received By: <i>K. Du</i>					
Date/Time: <i>06-17-2021 0915</i>					
Form No: AL_subcoc					

428692
06/17/21

521477



CHAIN OF CUSTODY

PAGE 1 OF 18 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300Date Rec'd in Lab: 6/14/21ALPHA Job #: L2132035**Client Information**Client: Blueleaf, Inc.
Address: 57 Dresser Hill Rd.
Charlton, MA 01507
Phone: 774 200 8029
Email: adavis@blueleafwater.com**Project Information**Project Name: BW Straightway
Project Location: Barnstable MA
Project #: 11204
Project Manager: Aaron Davis
ALPHA Quote #:**Report Information - Data Deliverables** ADEx EMAIL**Billing Information** Same as Client info PO #:**Additional Project Information:****Turn-Around Time** Standard RUSH (only confirmed if pre-approved)

Date Due:

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

ANALYSIS	VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SAMPLE INFO	
	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH		Filtration
	METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> RCP 15		<input type="checkbox"/> Field
	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8		<input type="checkbox"/> Lab to do
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	Preservation	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	PCB: <input type="checkbox"/> PEST	<input type="checkbox"/> Lab to do	
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint			
		Sample Comments	

Bromate

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<u>32035-01</u>	<u>UV EFFLUENT</u>	<u>6/14</u>	<u>11:00</u>	<u>DW</u>	<u>AD</u>

- Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle
- Preservative**
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₅
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type	
Preservative	

Relinquished By: <u>[Signature]</u>	Date/Time: <u>6/14/21 14:15</u>	Received By: <u>[Signature]</u>	Date/Time: <u>6/14/21 14:15</u>
-------------------------------------	---------------------------------	---------------------------------	---------------------------------

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.
FORM NO: 01-01 (rev. 12-Mar-2012)



Subcontract Chain of Custody

Eurofins US
110 South Hill St.
South Bend, IN 46617

Alpha Job Number
L2132035

Client Information

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

Phone: 508.439.5150
Email: mcathcart@alphalab.com

Project Information

Project Location: MA
Project Manager: Maria Cathcart

Turnaround & Deliverables Information

Due Date: 06/30/21
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2132035

Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT	06-14-21 11:00	DW	Bromate	

	Relinquished By:	Date/Time:	Received By:	Date/Time:
	<i>C. Sehan</i>	<i>6/16/21</i>		
Form No: AL_subcoc				



ANALYTICAL REPORT

Lab Number:	L2132277
Client:	Blueleaf Incorporated 57 Dresser Hill Road Charlton, MA 01507
ATTN:	Aaron Davis
Phone:	(508) 248-7094
Project Name:	BW-STRAIGHTWAY
Project Number:	11204
Report Date:	07/01/21

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

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

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



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2132277-01	RAW	DW	BARNSTABLE, MA	06/15/21 10:00	06/15/21
L2132277-02	GSP FILTER HIGH CAP	DW	BARNSTABLE, MA	06/15/21 10:00	06/15/21
L2132277-03	UV EFFLUENT	DW	BARNSTABLE, MA	06/15/21 10:00	06/15/21
L2132277-04	GAC	DW	BARNSTABLE, MA	06/15/21 10:00	06/15/21

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Case Narrative

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

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

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

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

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

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

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Case Narrative (continued)

Report Submission

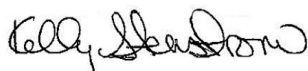
The analysis of Bromate was subcontracted. A copy of the laboratory report is included as an addendum.
Please note: This data is only available in PDF format and is not available on Data Merger.

Carbon Dioxide

L2132277-01 through -04 were analyzed with the method required holding time exceeded by 1 minute.

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

Authorized Signature:

 Kelly Stenstrom

Title: Technical Director/Representative

Date: 07/01/21

INORGANICS & MISCELLANEOUS

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-01
Client ID: RAW
Sample Location: BARNSTABLE, MA

Date Collected: 06/15/21 10:00
Date Received: 06/15/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	180		mg/l	2.0	--	1	-	06/16/21 10:01	121,4500CO2-D	JB
Dissolved Oxygen	3.7		mg/l	0.10	--	1	-	06/15/21 16:20	121,4500O-C	SH
Oxidation/Reduction Potential	200		mv	-	NA	1	-	06/15/21 19:08	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-02
Client ID: GSP FILTER HIGH CAP
Sample Location: BARNSTABLE, MA

Date Collected: 06/15/21 10:00
Date Received: 06/15/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	190		mg/l	2.0	--	1	-	06/16/21 10:01	121,4500CO2-D	JB
Chlorine, Total Residual	0.92		mg/l	0.04	--	2	-	06/15/21 21:47	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	06/15/21 21:47	121,4500CL-D	AS
Dissolved Oxygen	6.4		mg/l	0.10	--	1	-	06/15/21 16:20	121,4500O-C	SH
Oxidation/Reduction Potential	600		mv	-	NA	1	-	06/15/21 19:08	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-03
Client ID: UV EFFLUENT
Sample Location: BARNSTABLE, MA

Date Collected: 06/15/21 10:00
Date Received: 06/15/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	200		mg/l	2.0	--	1	-	06/16/21 10:01	121,4500CO2-D	JB
Dissolved Oxygen	8.7		mg/l	0.10	--	1	-	06/15/21 16:20	121,4500O-C	SH
Oxidation/Reduction Potential	340		mv	-	NA	1	-	06/15/21 19:08	12,1498	AS



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-04
Client ID: GAC
Sample Location: BARNSTABLE, MA

Date Collected: 06/15/21 10:00
Date Received: 06/15/21
Field Prep: Not Specified

Sample Depth:
Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Carbon Dioxide	210		mg/l	2.0	--	1	-	06/16/21 10:01	121,4500CO2-D	JB
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	06/15/21 21:47	121,4500CL-D	AS
Chlorine, Residual Free	ND		mg/l	0.05	--	1	-	06/15/21 21:47	121,4500CL-D	AS
Dissolved Oxygen	4.5		mg/l	0.10	--	1	-	06/15/21 16:20	121,4500O-C	SH
Oxidation/Reduction Potential	350		mv	-	NA	1	-	06/15/21 19:08	12,1498	AS



Project Name: BW-STRAIGHTWAY

Lab Number: L2132277

Project Number: 11204

Report Date: 07/01/21

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02,04 Batch: WG1512544-1									
Chlorine, Total Residual	ND	mg/l	0.02	--	1	-	06/15/21 21:47	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 02,04 Batch: WG1512545-1									
Chlorine, Residual Free	ND	mg/l	0.05	--	1	-	06/15/21 21:47	121,4500CL-D	AS

Lab Control Sample Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2132277

Report Date: 07/01/21

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG1512523-1								
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 02,04 Batch: WG1512544-2								
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 02,04 Batch: WG1512545-2								
Chlorine, Residual Free	108		-			-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02,04 QC Batch ID: WG1512544-4 QC Sample: L2132277-04 Client ID: GAC												
Chlorine, Total Residual	ND	0.25	0.24	96		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number: L2132277

Report Date: 07/01/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG1512464-1 QC Sample: L2132277-04 Client ID: GAC						
Dissolved Oxygen	4.5	4.9	mg/l	9		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG1512523-2 QC Sample: L2132277-01 Client ID: RAW						
Oxidation/Reduction Potential	200	200	mv	0		20
General Chemistry - Westborough Lab Associated sample(s): 02,04 QC Batch ID: WG1512544-3 QC Sample: L2132277-02 Client ID: GSP FILTER HIGH CAP						
Chlorine, Total Residual	0.92	0.89	mg/l	3		20
General Chemistry - Westborough Lab Associated sample(s): 02,04 QC Batch ID: WG1512545-3 QC Sample: L2132277-04 Client ID: GAC						
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG1512778-1 QC Sample: L2132277-01 Client ID: RAW						
Carbon Dioxide	180	180	mg/l	0		

Project Name: BW-STRAIGHTWAY**Lab Number:** L2132277**Project Number:** 11204**Report Date:** 07/01/21**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2132277-01A	Plastic 60ml unpreserved	A	7	7	5.5	Y	Absent		ORP(1)
L2132277-01C	Plastic 250ml unpreserved/No Headspace	A	NA		5.5	Y	Absent		CO2(1)
L2132277-01D	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-01E	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-02C	Plastic 250ml unpreserved/No Headspace	A	NA		5.5	Y	Absent		CO2(1)
L2132277-02D	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-02E	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-02F	Plastic 950ml unpreserved	A	7	7	5.5	Y	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2132277-03A	Plastic 60ml unpreserved	A	7	7	5.5	Y	Absent		ORP(1)
L2132277-03B	Plastic 250ml Other preserved (sub-lab)	A	7	7	5.5	Y	Absent		SUB-BROMATE()
L2132277-03C	Plastic 250ml unpreserved/No Headspace	A	NA		5.5	Y	Absent		CO2(1)
L2132277-03D	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-03E	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-04A	Plastic 60ml unpreserved	A	7	7	5.5	Y	Absent		ORP(1)
L2132277-04B	Plastic 120ml Other preserved (sub-lab)	A	7	7	5.5	Y	Absent		SUB-BROMATE()
L2132277-04C	Plastic 250ml unpreserved/No Headspace	A	NA		5.5	Y	Absent		CO2(1)
L2132277-04D	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-04E	BOD bottle Powder Pillow preserved	A	NA		5.5	Y	Absent		DO-4500(.3)
L2132277-04F	Plastic 950ml unpreserved	A	7	7	5.5	Y	Absent		RFC-4500(1),TRC-4500(1)

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report



Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

Data Qualifiers

the identification is based on a mass spectral library search.

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Project Name: BW-STRAIGHTWAY
Project Number: 11204

Lab Number: L2132277
Report Date: 07/01/21

REFERENCES

- 12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

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

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



Certification Information

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

Westborough Facility

EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene

EPA 625/625.1: alpha-Terpineol

EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

EPA 8270D/8270E: NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO₂, NO₃.

Mansfield Facility

SM 2540D: TSS

EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

Drinking Water

EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,**

EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B

EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

Non-Potable Water

SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1:**

Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E,**

SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.

EPA 624.1: Volatile Halocarbons & Aromatics,

EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II,

Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water

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

EPA 522, EPA 537.1.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.

EPA 245.1 Hg.

SM2340B

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



CHAIN OF CUSTODY

PAGE 1 OF 1

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

Project Information

Project Name: *BW Straightway*
Project Location: *Barnstable, MA*
Project #: *11204*
Project Manager: *Aaron Davis*
ALPHA Quote #:

Date Rec'd in Lab: *6/15/21*

ALPHA Job #: *213277A*

Client Information

Client: *Blueleaf, Inc.*
Address: *57 Dresser Hill Rd.*
Charlton MA 01507
Phone: *774 200 8029*
Email: *adavis@blueleafwater.com*

Turn-Around Time

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

Report Information - Data Deliverables

ADEX EMAIL

Billing Information

Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

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

Additional Project Information:

ANALYSIS		SAMPLE INFO
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	Filtration	
SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	<input type="checkbox"/> Field	PRESERVATION
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15	<input type="checkbox"/> Lab to do	
METALS: <input type="checkbox"/> RCRAS <input type="checkbox"/> RCRAS8	Preservation	LAB TO DO
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	<input type="checkbox"/> Lab to do	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
TPH: <input type="checkbox"/> PCB <input type="checkbox"/> PEST		
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint		
<i>REF TRC</i>		
<i>Bromate</i>		
<i>ORP, DO, CO2</i>		
TOTAL # BOTTLES		


ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<i>32277-01</i>	<i>Raw</i>	<i>6/15/21</i>	<i>10:00</i>		
<i>02</i>	<i>GSP Filter High Cap</i>	↓	↓		
<i>03</i>	<i>UV Effluent</i>	↓	↓		
<i>04</i>	<i>GAC</i>	↓	↓		

- Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle
- Preservative**
A= None
B= HCl
C= HNO₃
D= H₂SO₄
E= NaOH
F= MeOH
G= NaHSO₄
H= Na₂S₂O₃
I= Ascorbic Acid
J= NH₄Cl
K= Zn Acetate
O= Other

Container Type	P P
Preservative	A A

Relinquished By: <i>[Signature]</i>	Date/Time: <i>6/15/21 12:00</i>	Received By: <i>[Signature]</i>	Date/Time: <i>6/15/21 12:00</i>
<i>[Signature]</i>	<i>6/15/21 14:30</i>	<i>[Signature]</i>	<i>6/15/21 14:37</i>

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

		Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617		Alpha Job Number L2132277	
Client Information		Project Information		Regulatory Requirements/Report Limits	
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com		Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/29/21 Deliverables:		State/Federal Program: Regulatory Criteria:	
Project Specific Requirements and/or Report Requirements					
Reference following Alpha Job Number on final report/deliverables: L2132277				Report to include Method Blank, LCS/LCSD:	
Additional Comments: Send all results/reports to subreports@alphalab.com					
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	UV EFFLUENT GAC	06-15-21 10:00 06-15-21 10:00	DW DW	Bromate Bromate	
		Relinquished By:	Date/Time:	Received By:	Date/Time:
		<i>C. Sebeau</i>	<i>6/16/21</i>		
Form No: AL_subcoc					

LABORATORY REPORT

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

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STATE CERTIFICATION LIST

State	Certification	State	Certification
Alabama	40700	Missouri	880
Alaska	IN00035	Montana	CERT0026
Arizona	AZ0432	Nebraska	NE-OS-05-04
Arkansas	IN00035	Nevada	IN00035
California	2920	New Hampshire*	2124
Colorado	IN00035	New Jersey*	IN598
Colorado Radiochemistry	IN00035	New Mexico	IN00035
Connecticut	PH-0132	New York*	11398
Delaware	IN035	North Carolina	18700
Florida(Primary AB)*	E87775	North Dakota	R-035
Georgia	929	Ohio	87775
Hawaii	IN035	Oklahoma	D9508
Idaho	IN00035	Oregon*	4156
Illinois*	200001	Pennsylvania*	68-00466
Illinois Microbiology	17767	Puerto Rico	IN00035
Illinois Radiochemistry	IN00035	Rhode Island	LAO00343
Indiana Chemistry	C-71-01	South Carolina	95005
Indiana Microbiology	M-76-07	South Dakota	IN00035
Iowa	098	Tennessee	TN02973
Kansas*	E-10233	Texas*	T104704187
Kentucky	90056	Texas/TCEQ	TX207
Louisiana*	LA014	Utah*	IN00035
Maine	IN00035	Vermont	VT-8775
Maryland	209	Virginia*	460275
Massachusetts	M-IN035	Washington	C837
Michigan	9926	West Virginia	9927 C
Minnesota*	018-999-338	Wisconsin	999766900
Mississippi	IN035	Wyoming	IN035
EPA	IN00035		

*NELAP/TNI Recognized Accreditation Bodies



110 South Hill Street
 South Bend, IN 46617
 Tel: (574) 233-4777
 Fax: (574) 233-8207
 1 800 332 4345

Laboratory Report

Client: Alpha Analytical
 Attn: Maria Cathcart
 Eight Walkup Drive
 Westborough, MA 01581

Report: 521478
 Priority: Standard Written
 Status: Final
 PWS ID: Not Supplied

Sample Information					
EEA ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
4932365	UV Effluent	317.0	06/15/21 10:00	Client	06/17/21 09:15
4932366	GAC	317.0	06/15/21 10:00	Client	06/17/21 09:15

Report Summary

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Pat Muff at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from EEA.

Authorized Signature

Title

06/27/2021

Date

Client Name: Alpha Analytical

Report #: 521478

Client Name: Alpha Analytical

Report #: 521478

Sampling Point: UV Effluent

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 03:31	4932365

Sampling Point: GAC

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	EEA ID #
15541-45-4	Bromate	317.0	10 *	1.0	< 1.0	ug/L	---	06/25/21 03:56	4932366

† EEA has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis. CCL, CCM, and CCH are the CCC standards at low, mid, and high concentration levels, respectively.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control. FBL, FBM, and FBH are the LFB samples at low, mid, and high concentration levels, respectively.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

If applicable, the calculation of the matrix spike (MS) or matrix spike duplicate (MSD) percent recovery is as follows: $(\text{MS or MSD value} - \text{Sample value}) * 100 / \text{spike target} / \text{dilution factor} = \text{Recovery \%}$

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix. SDL, SDM, and SDH / LFSMDL, LFSMDM, and LFSMDH are the MSD or LFSMD at low, mid, and high concentration levels, respectively.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results. MSL, MSM, and MSH / LFSML, LFSMM, and LFSMH are the MS or LFSM at low, mid, and high concentration levels, respectively.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

428693
521478

	Subcontract Chain of Custody Eurofins US 110 South Hill St. South Bend, IN 46617	Alpha Job Number L2132277
--	--	-------------------------------------

Client Information	Project Information	Regulatory Requirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Phone: 508.439.5150 Email: mcathcart@alphalab.com	Project Location: MA Project Manager: Maria Cathcart Turnaround & Deliverables Information Due Date: 06/29/21 Deliverables:	State/Federal Program: Regulatory Criteria:

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L2132277 Report to include Method Blank, LCS/LCSD:

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

Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	Batch QC
	JV EFFLUENT GAC	06-15-21 10:00 06-15-21 10:00	DW DW	Bromate Bromate 4922365 366 Client Provided Sample Containers WWT	

Relinquished By:	Date/Time:	Received By:	Date/Time:
<i>C. Schem</i>	6/16/21		
Form No: AL_subcoc		K. Quinn	6-17-2021

0915

Appendix E – Greensand Filter Performance Figures

Figure #	Trial	Page #
E.01	A1	E-1
E.02	B1	E-2
E.03	C1	E-3
E.04	D1	E-4
E.05	A2	E-5
E.06	B2	E-6
E.07	C2	E-7
E.08	D2	E-8
E.09	A3	E-9
E.10	B3	E-10
E.11	C3	E-11
E.12	D3	E-12
E.13	A4	E-13
E.14	B4	E-14
E.15	C4	E-15
E.16	D4	E-16
E.17	A5	E-17
E.18	B5	E-18
E.19	C5	E-19
E.20	D5	E-20
E.21	C6	E-21
E.22	D6	E-22
E.23	D7	E-23

Figure E-1: Trial A.1 - Straightway 1 Well

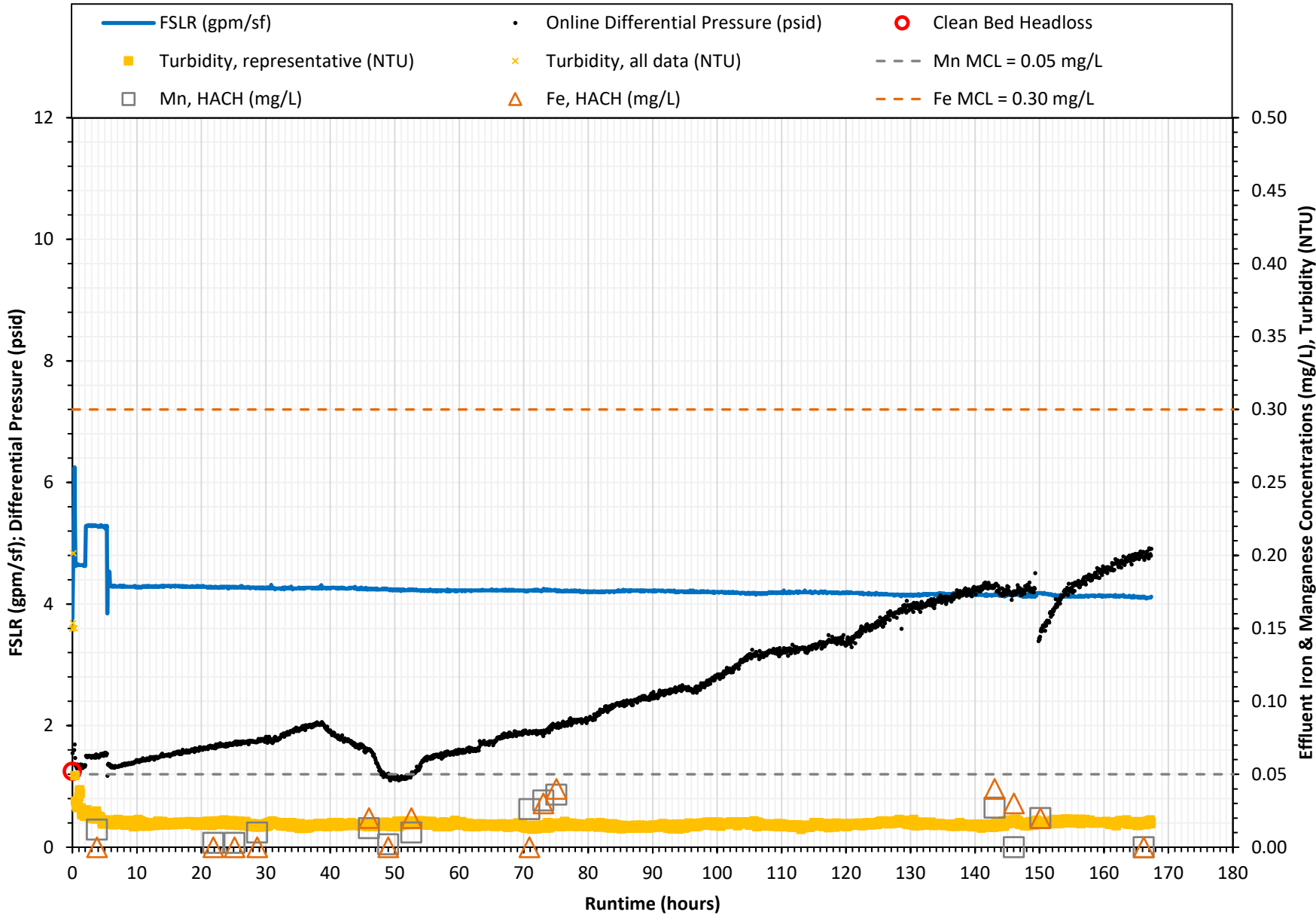


Figure E-2: Trial B.1 - Straightway 1 Well

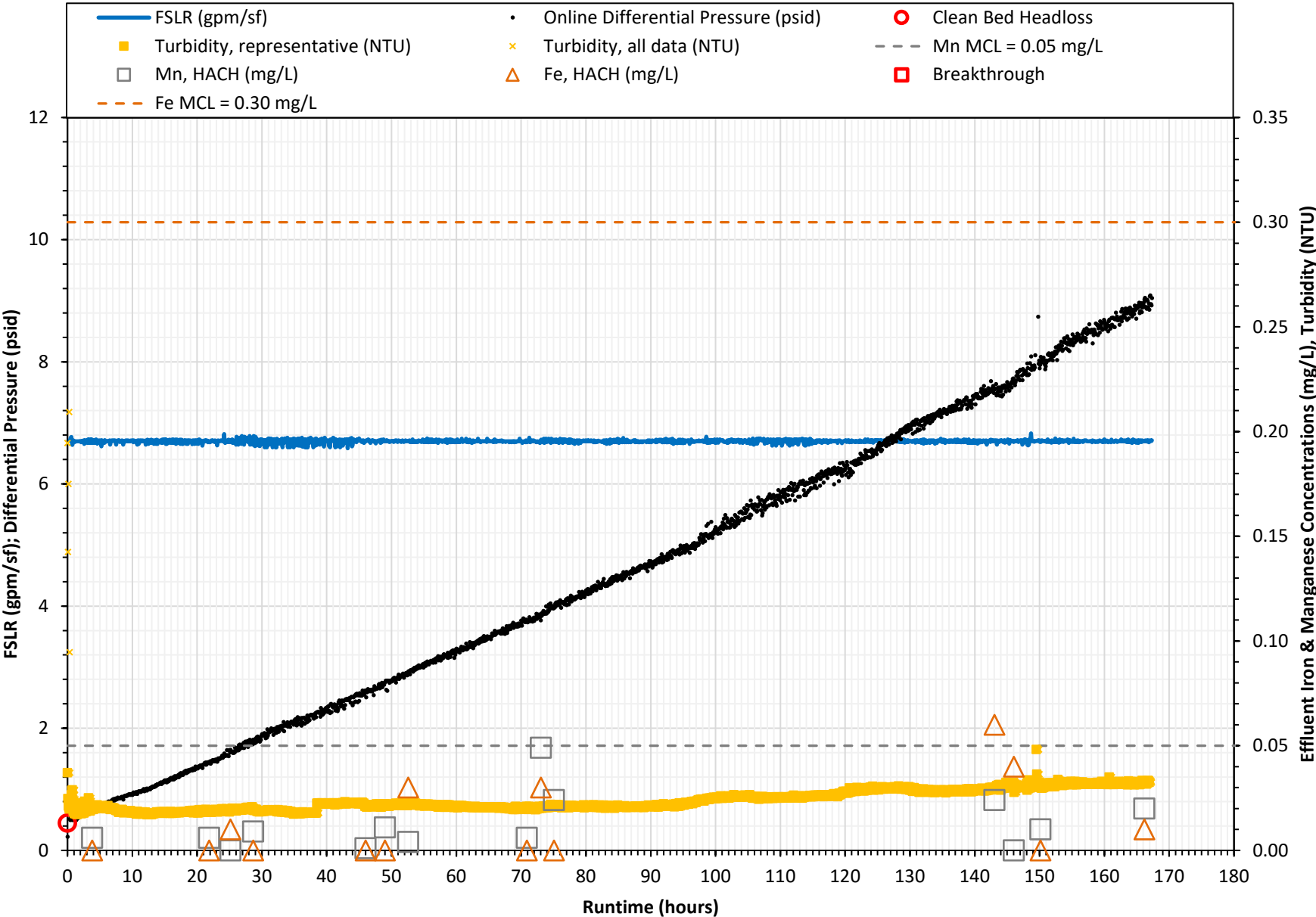


Figure E-3: Trial C.1 - Straightway 1 Well

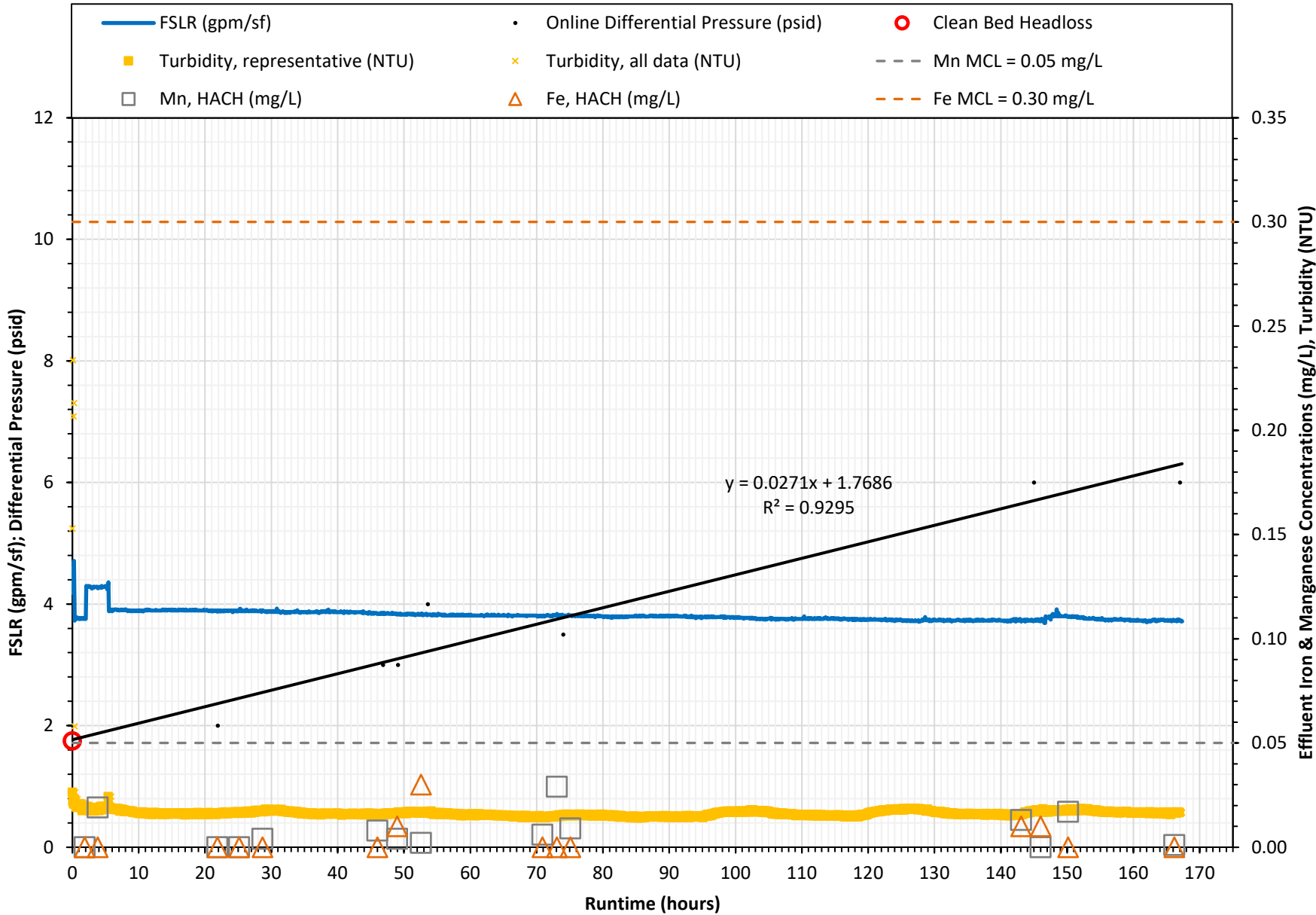


Figure E-4: Trial D.1 - Straightway 1 Well

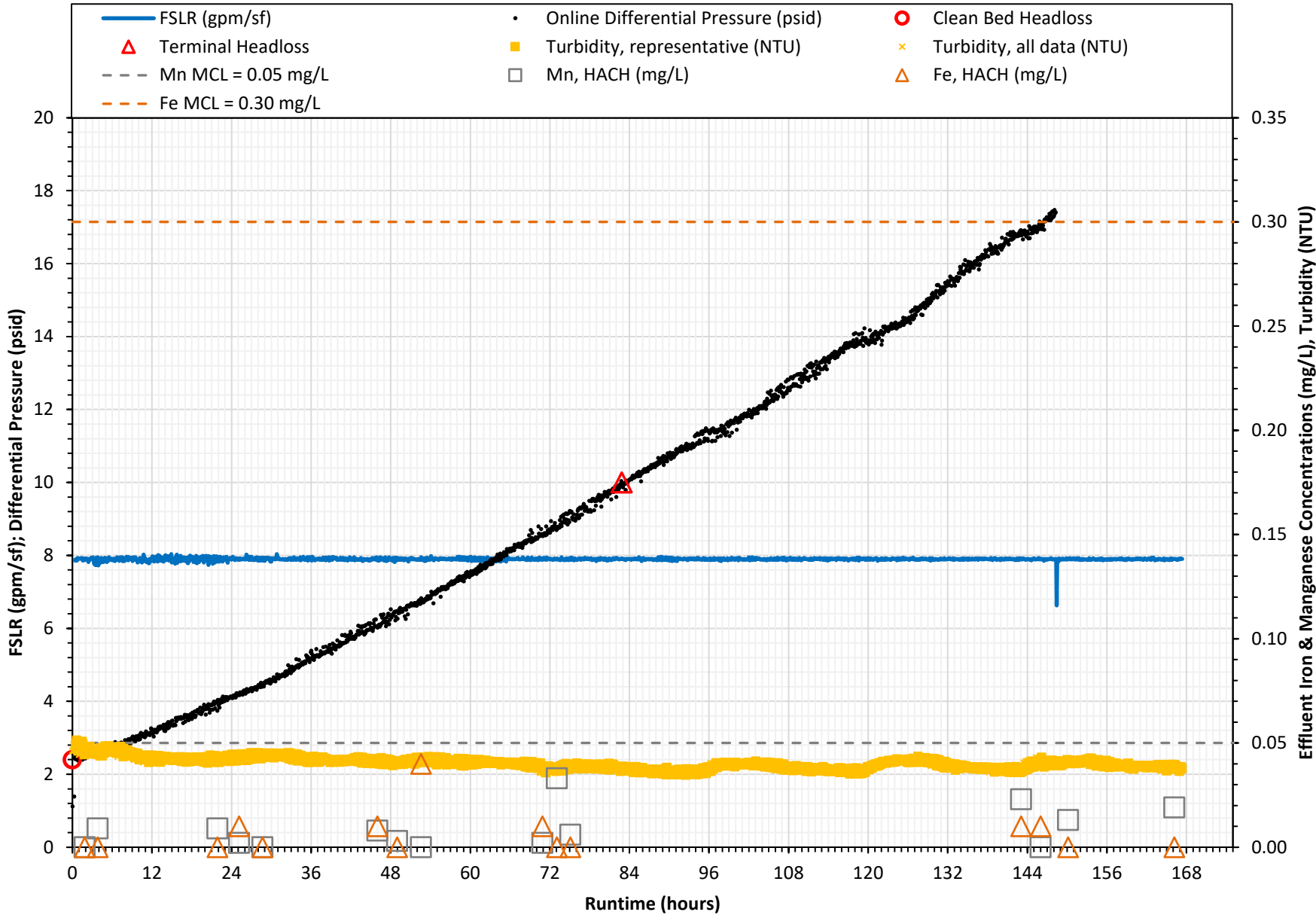


Figure E-6: Trial B.2 - Straightway 2 Well

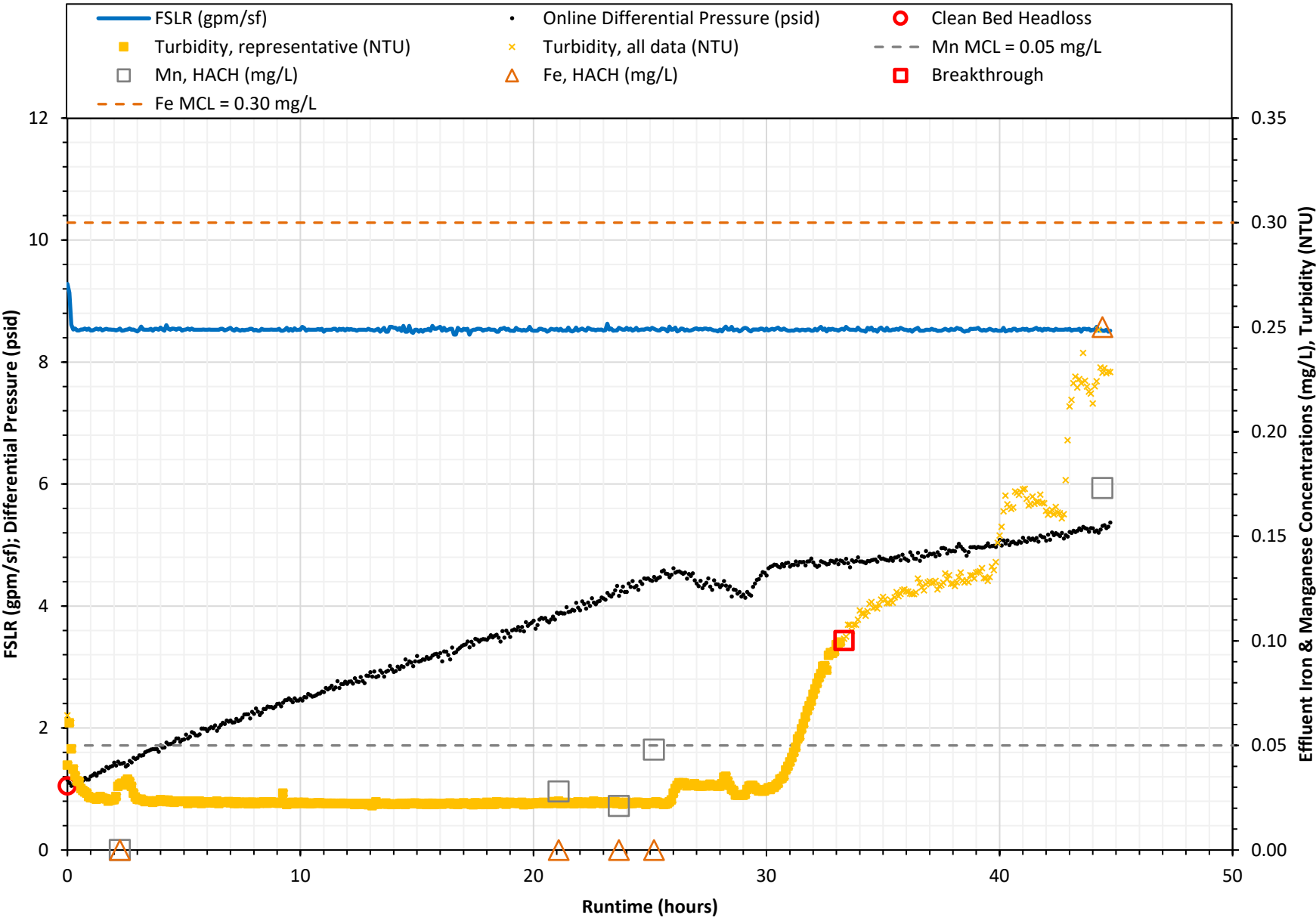


Figure E-7: Trial C.2 - Straightway 2 Well

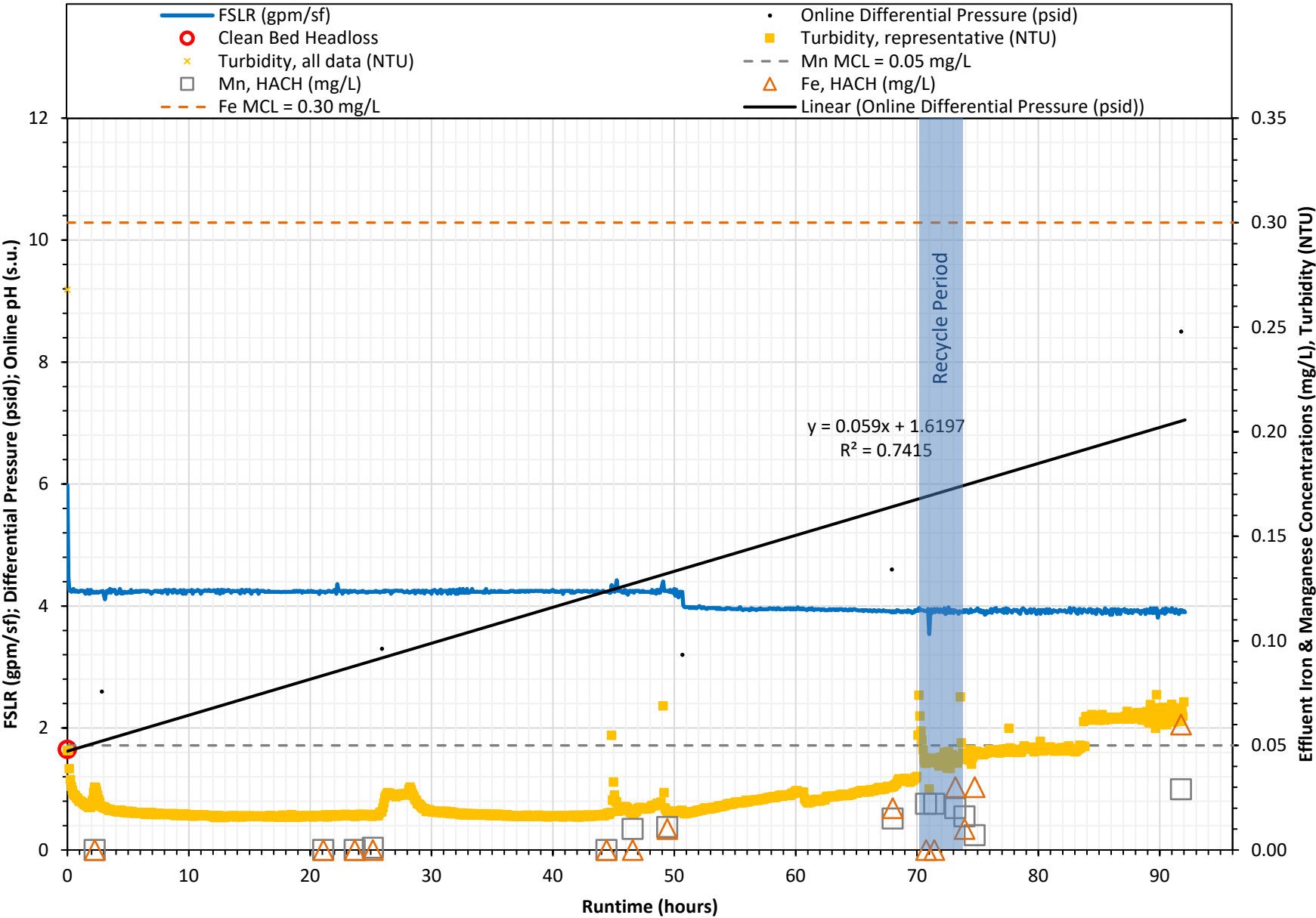


Figure E-8: Trial D.2 - Straightway 2 Well

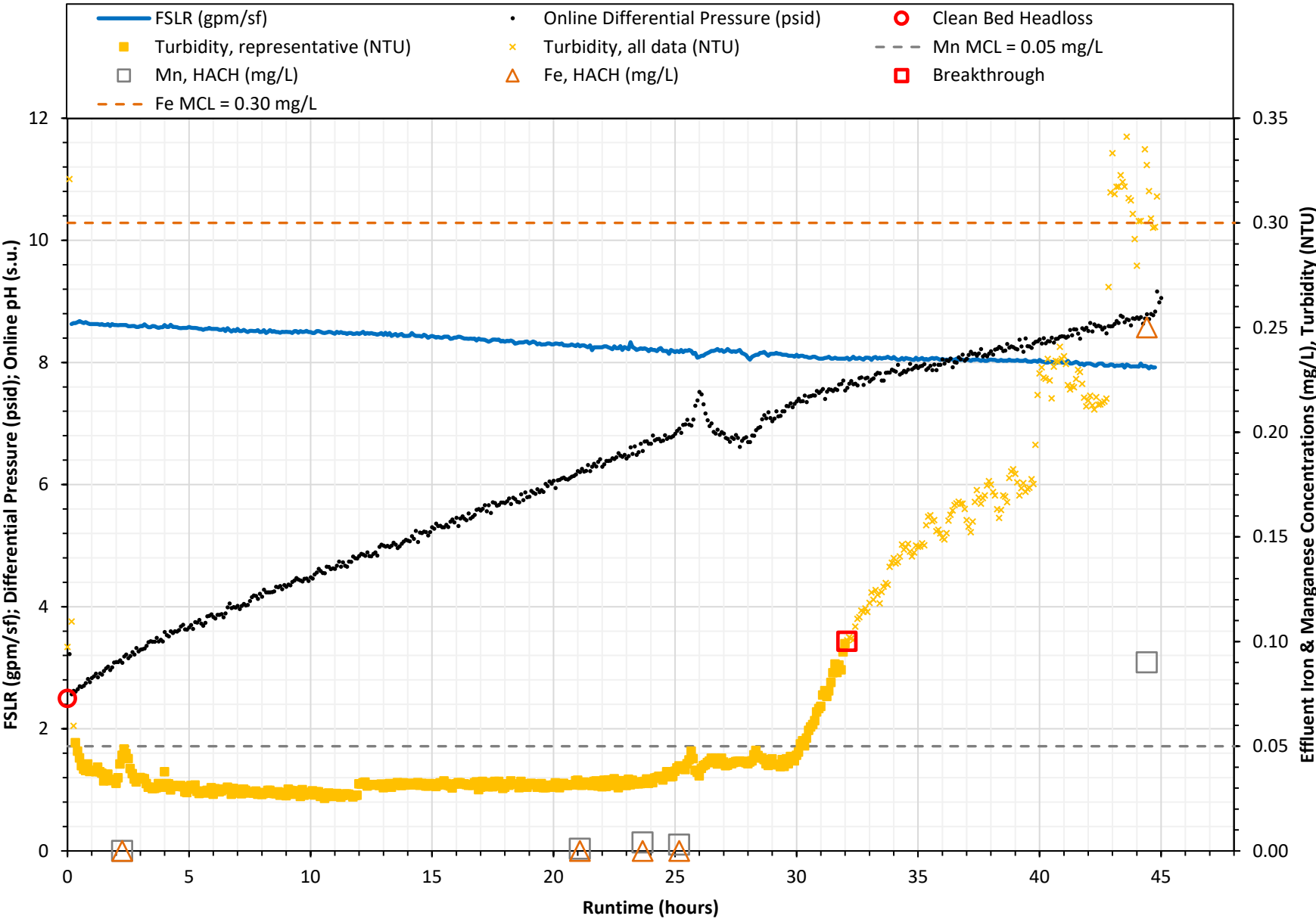


Figure E-9: Trial A.3 - Straightway 2 Well

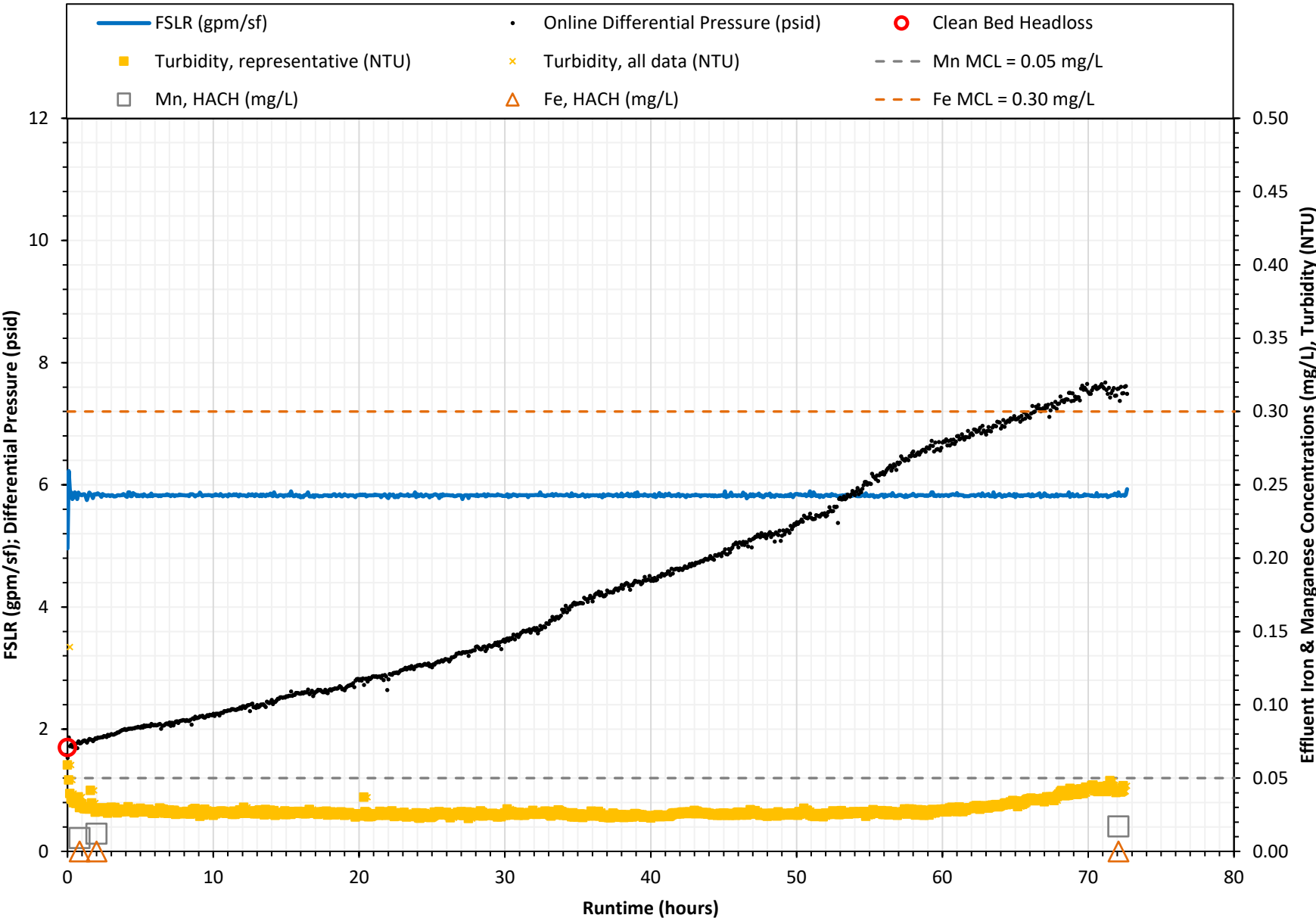


Figure E-10: Trial B.3 - Straightway 2 Well

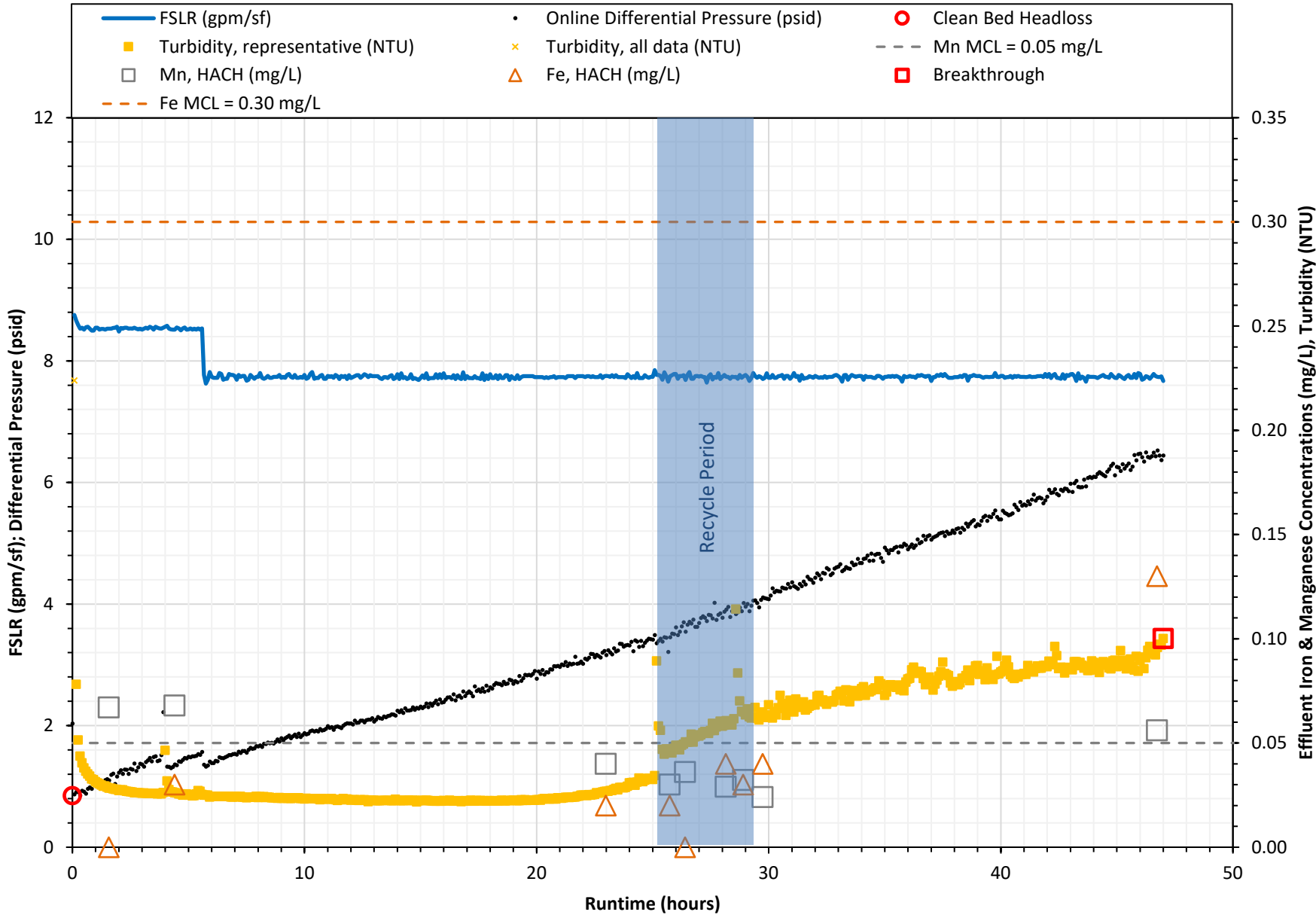


Figure E-11: Trial C.3 - Straightway 2 Well

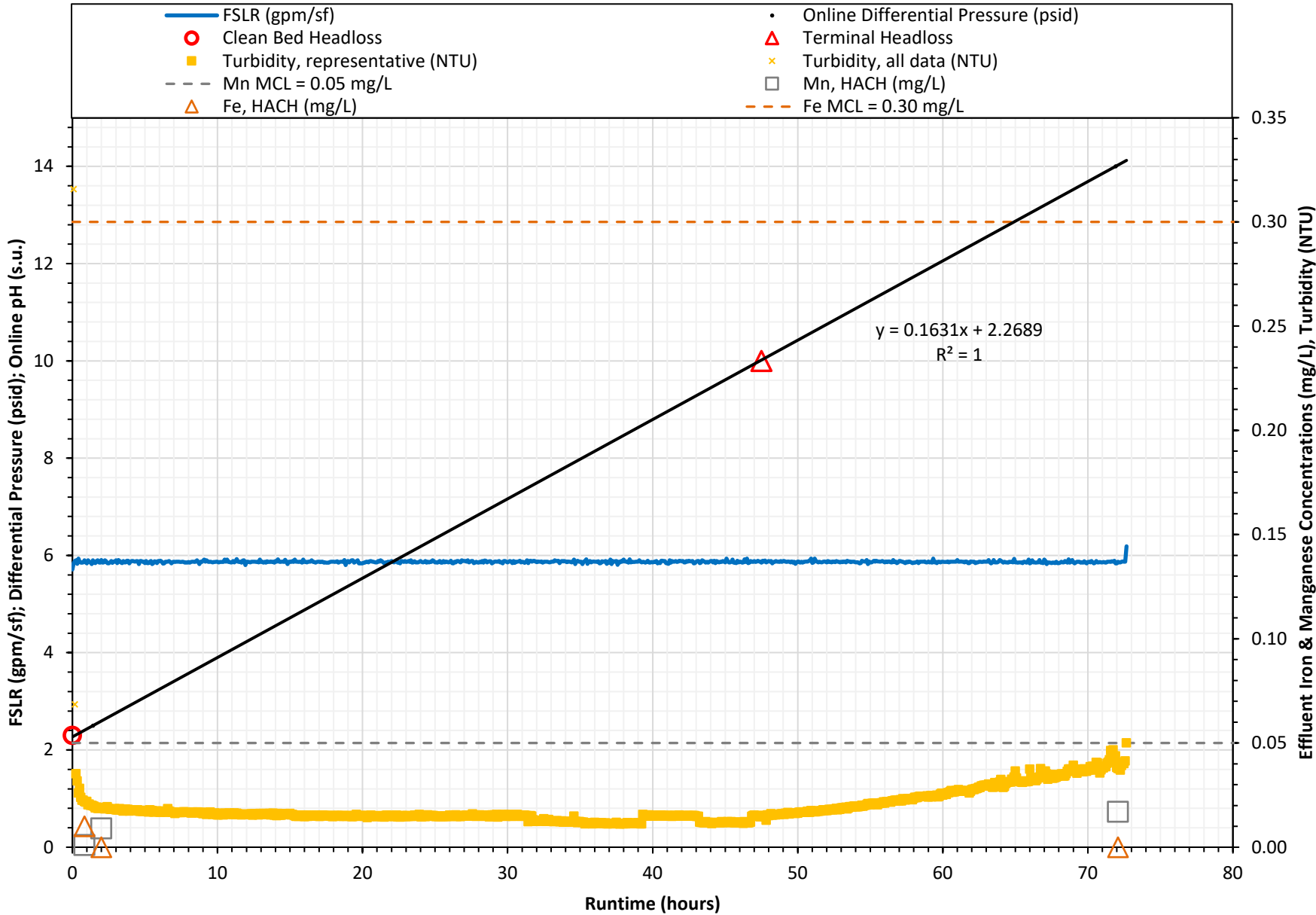


Figure E-12: Trial D.3 - Straightway 2 Well

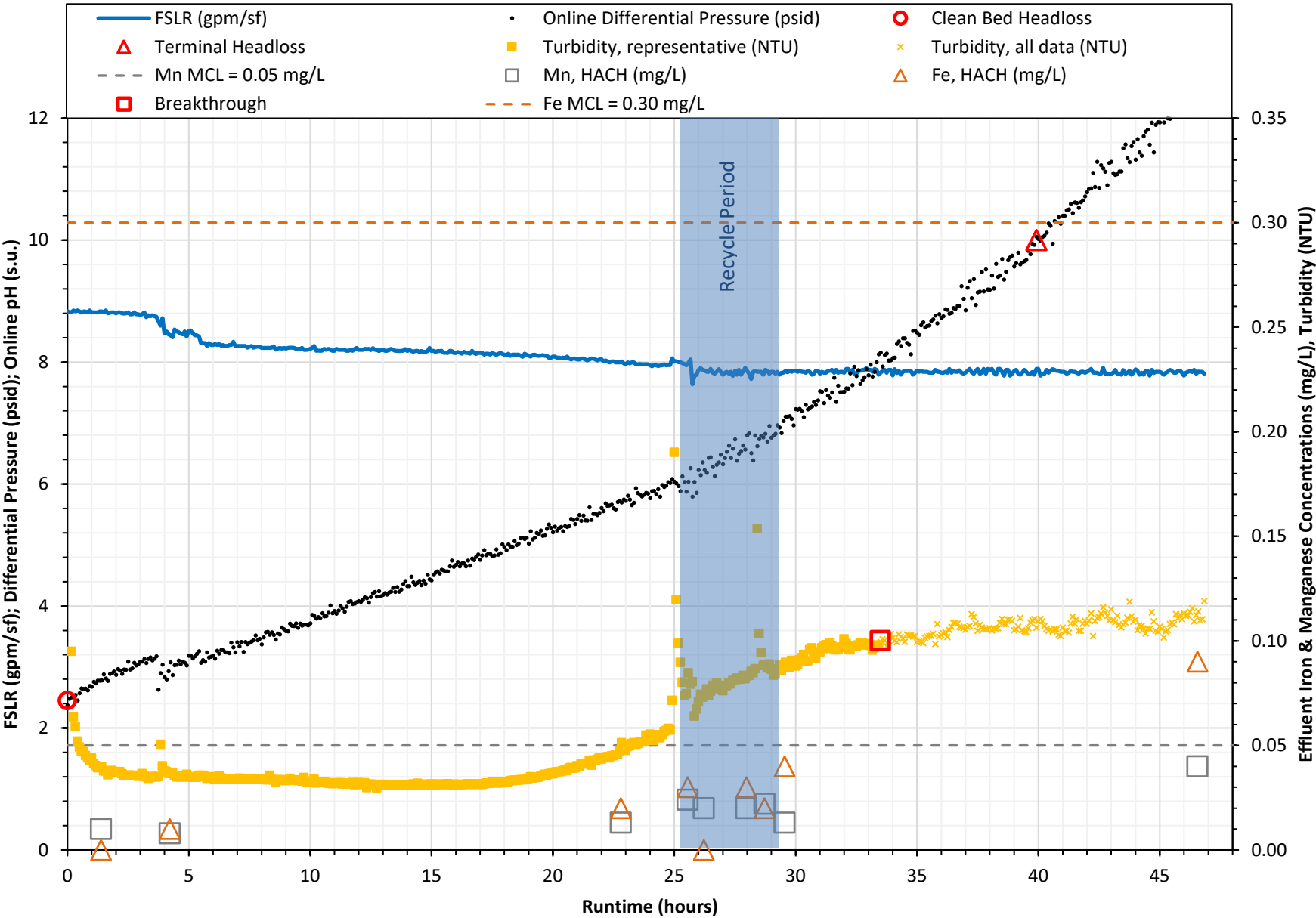


Figure E-13: Trial A.4 - Simmons Pond Well

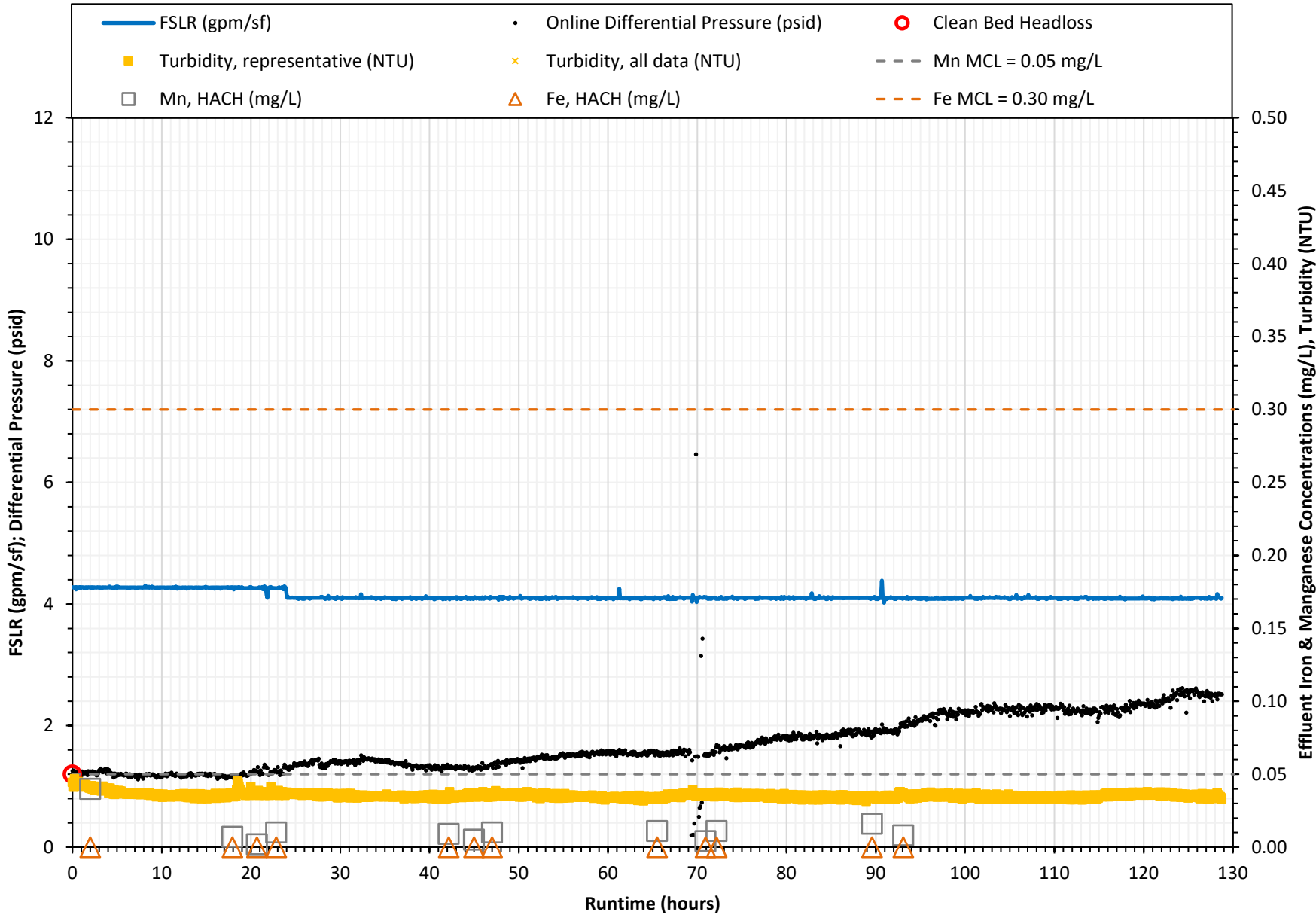


Figure E-14: Trial B.4 - Straightway 2 Well

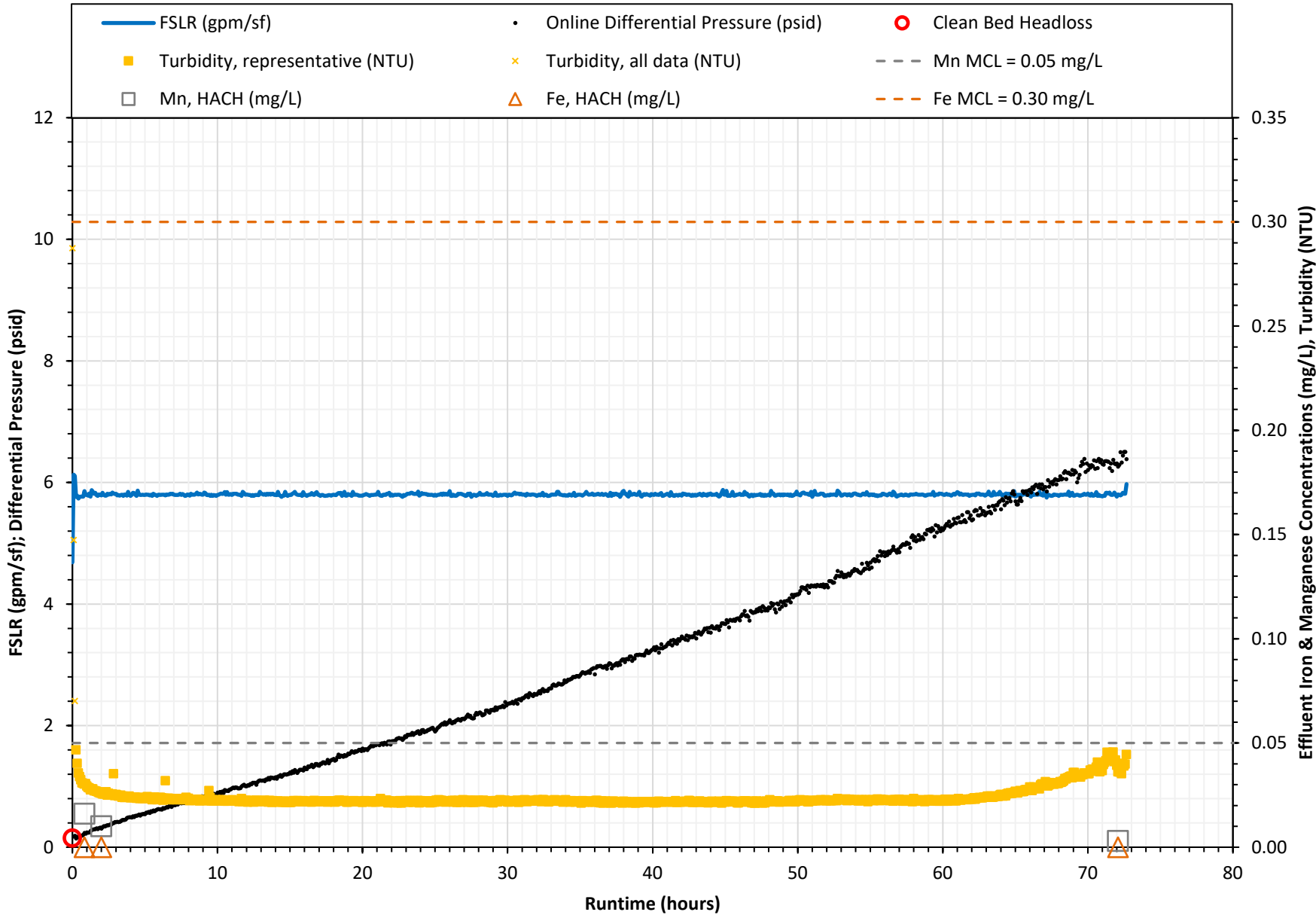


Figure E-15: Trial C.4 - Simmons Pond Well

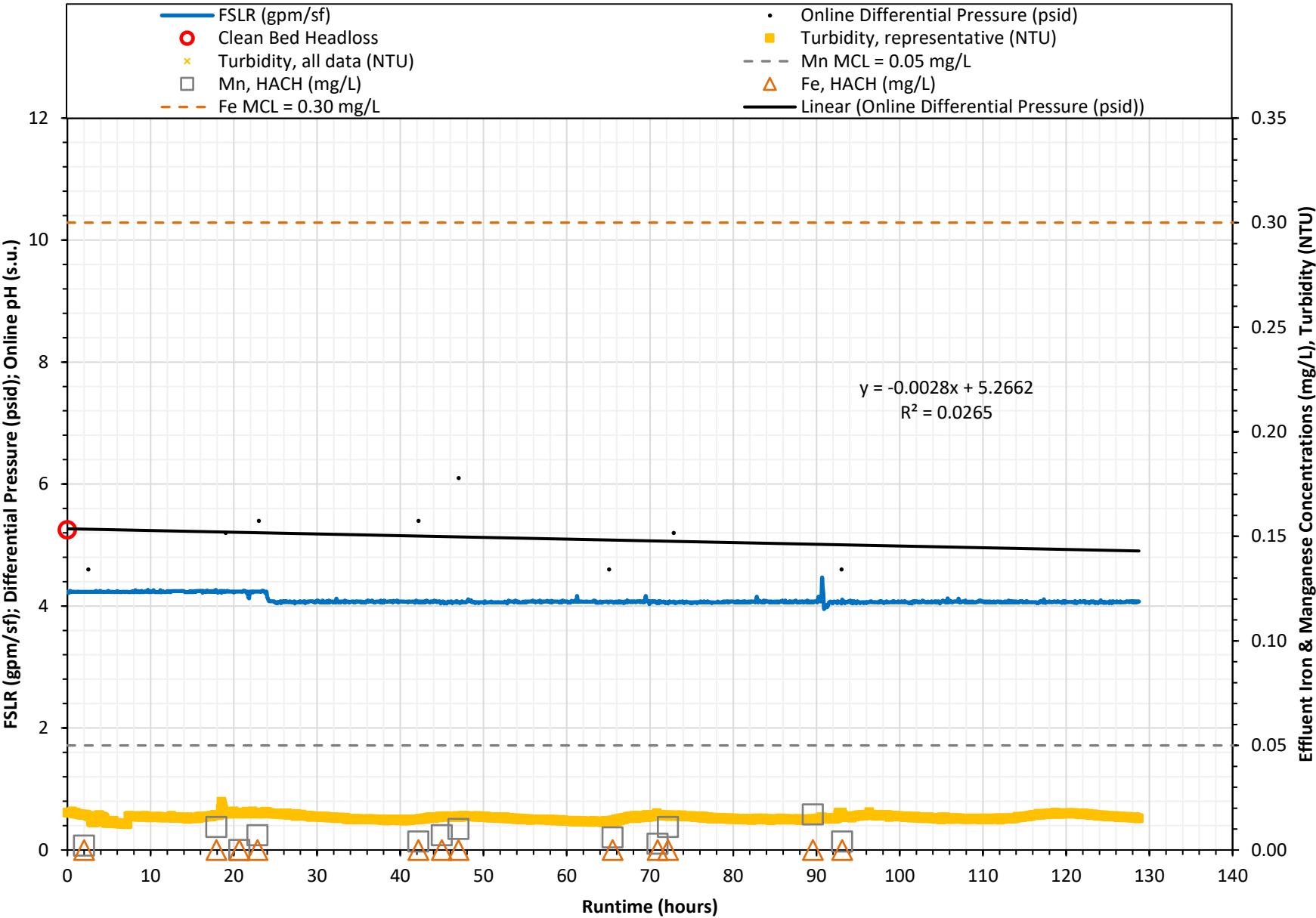


Figure E-16: Trial D.6 - Straightway 2 Well

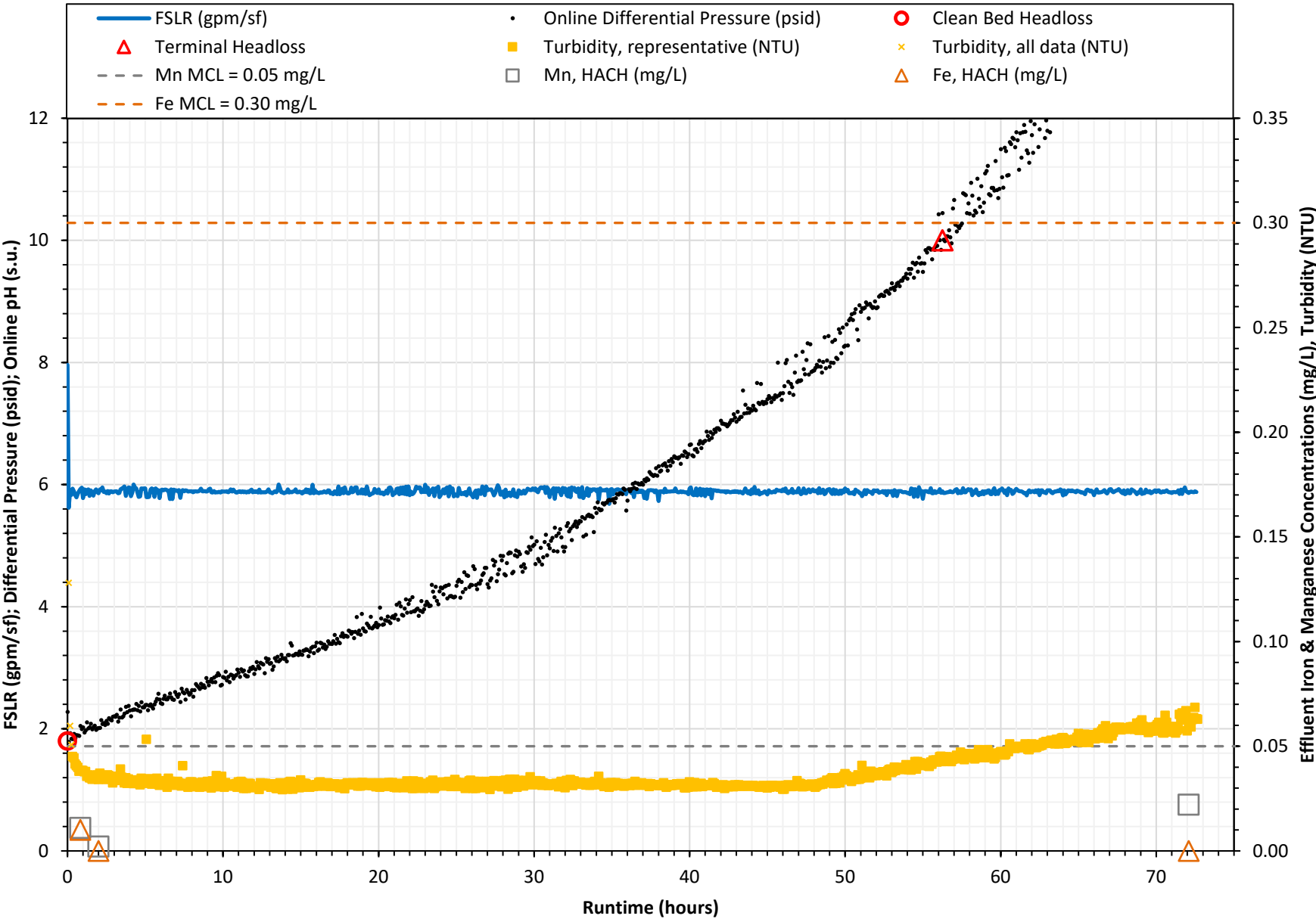


Figure E-17: Trial A.5 - Hyannisport Well

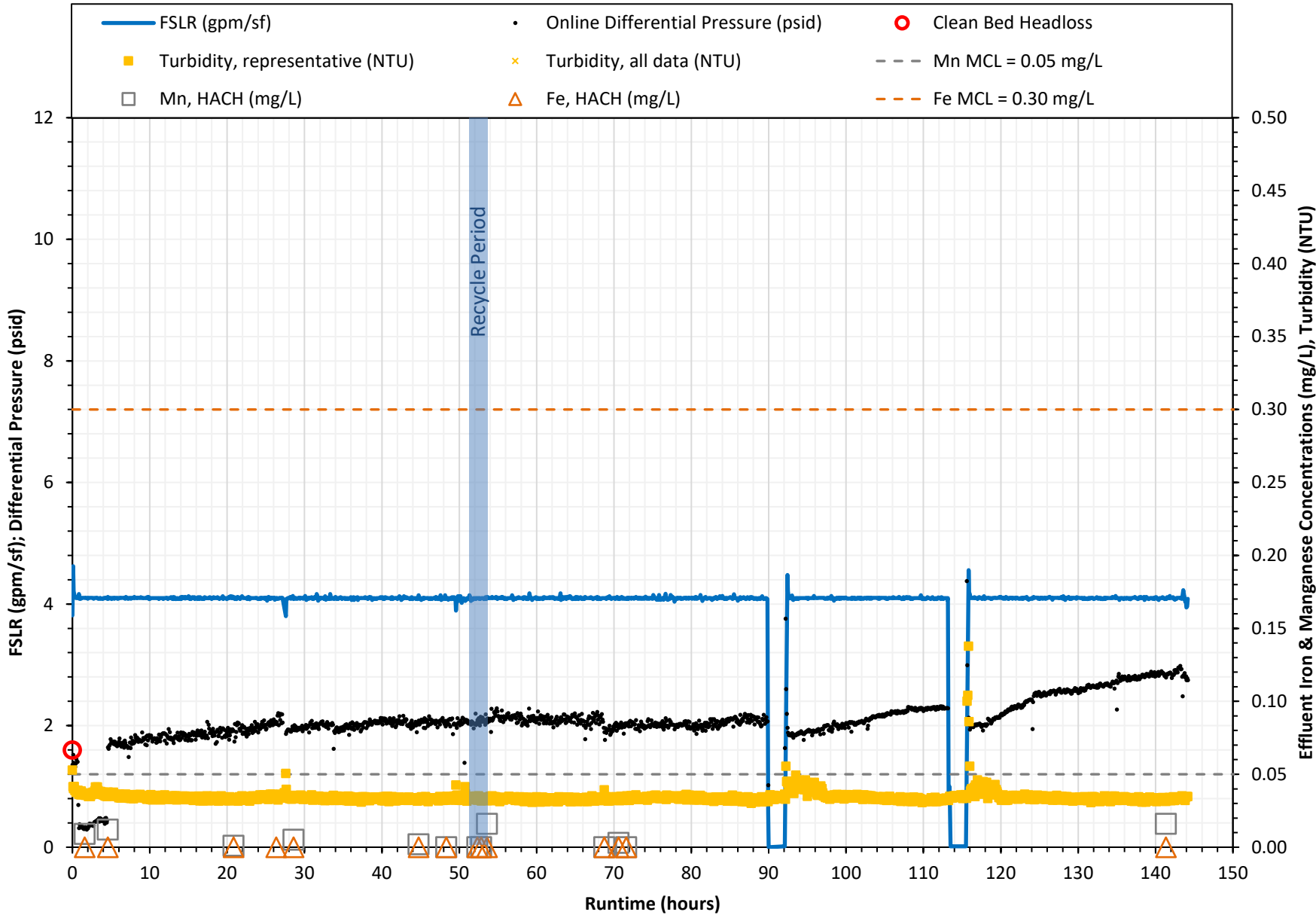


Figure E-18: Trial B.5 - Simmons Pond Well

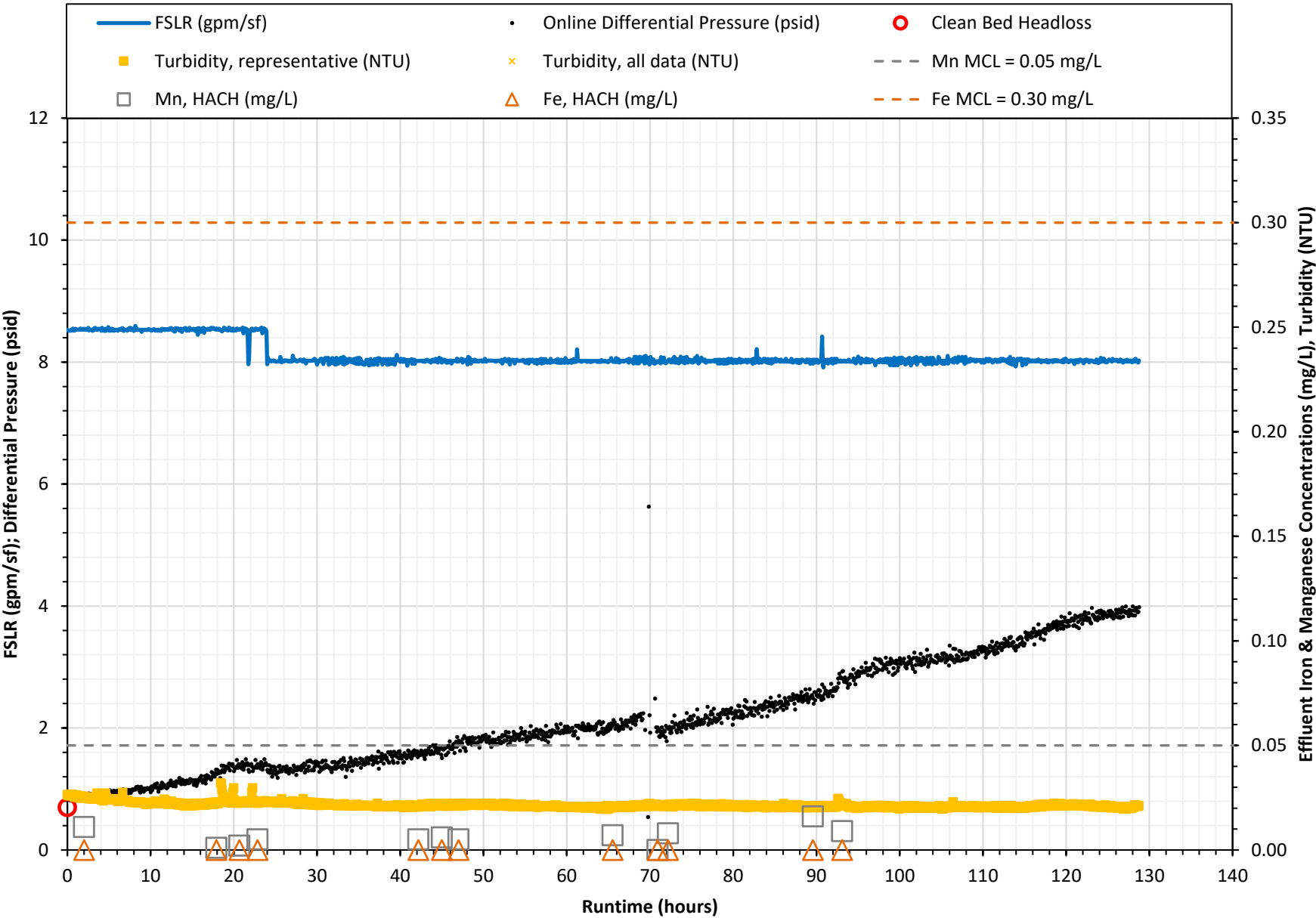


Figure E-19: Trial C.5 - Hyannisport Well

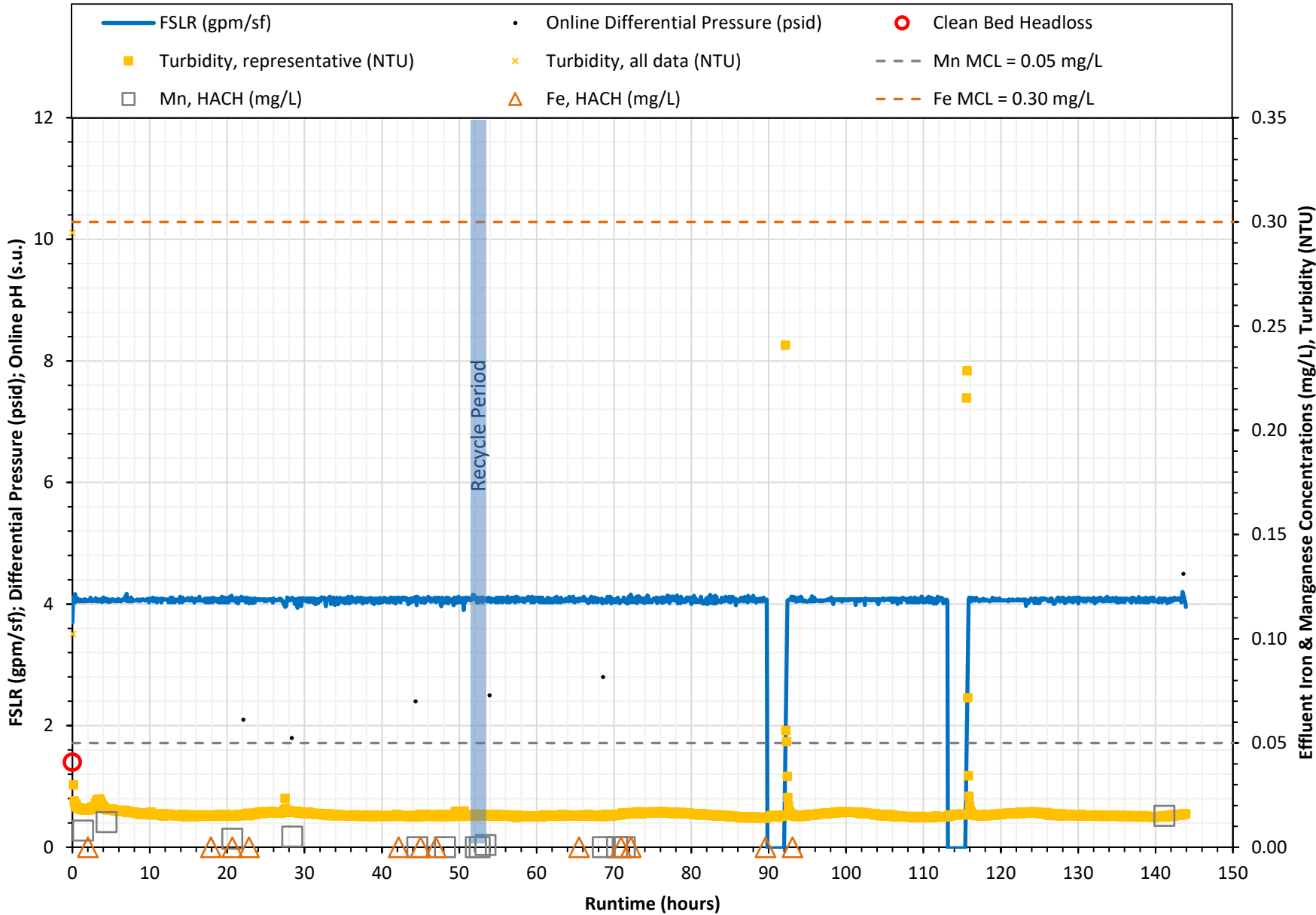


Figure E-20: Trial D.5 - Simmons Pond Well

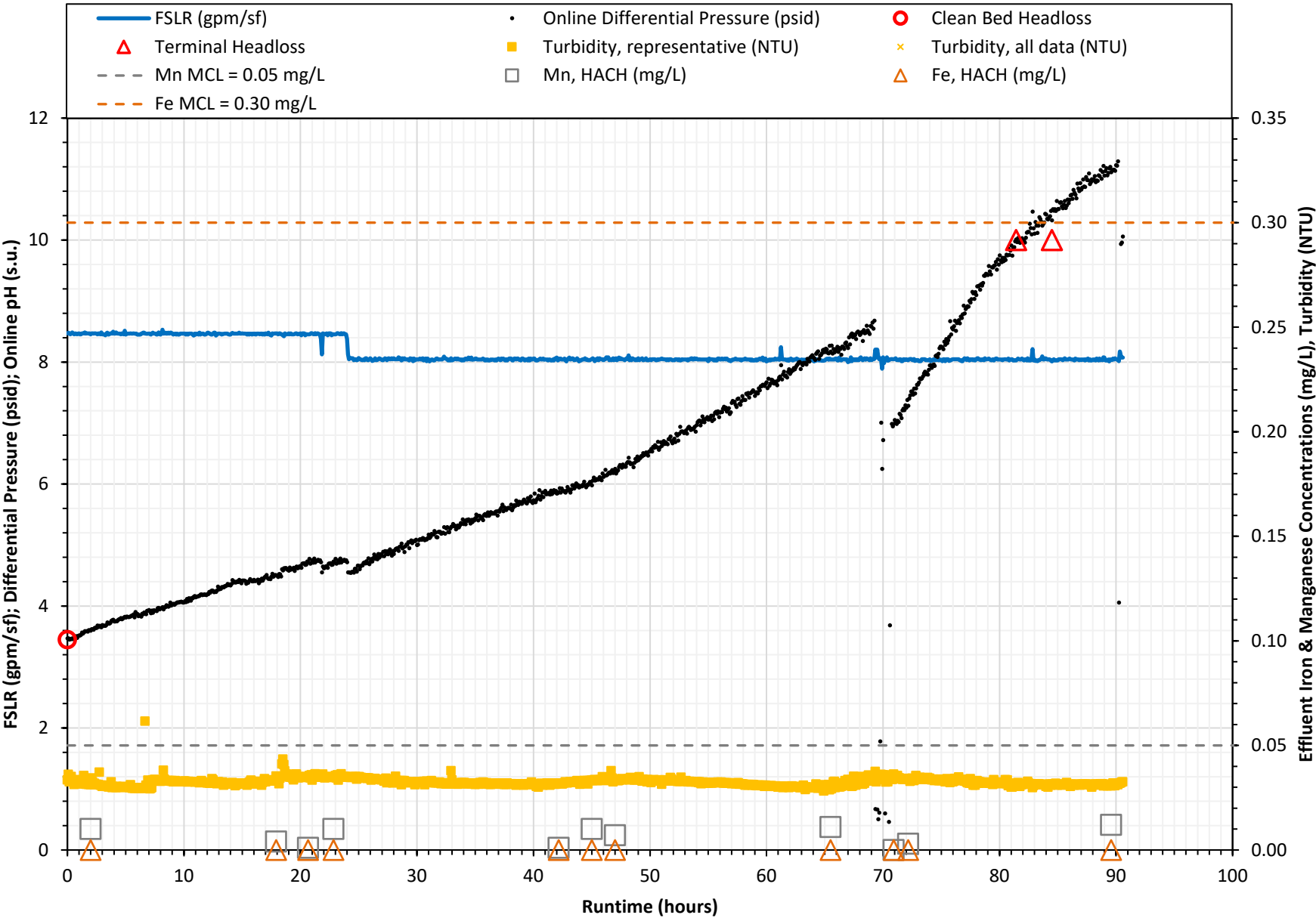


Figure E-21: Trial B.6 - Hyannisport Well

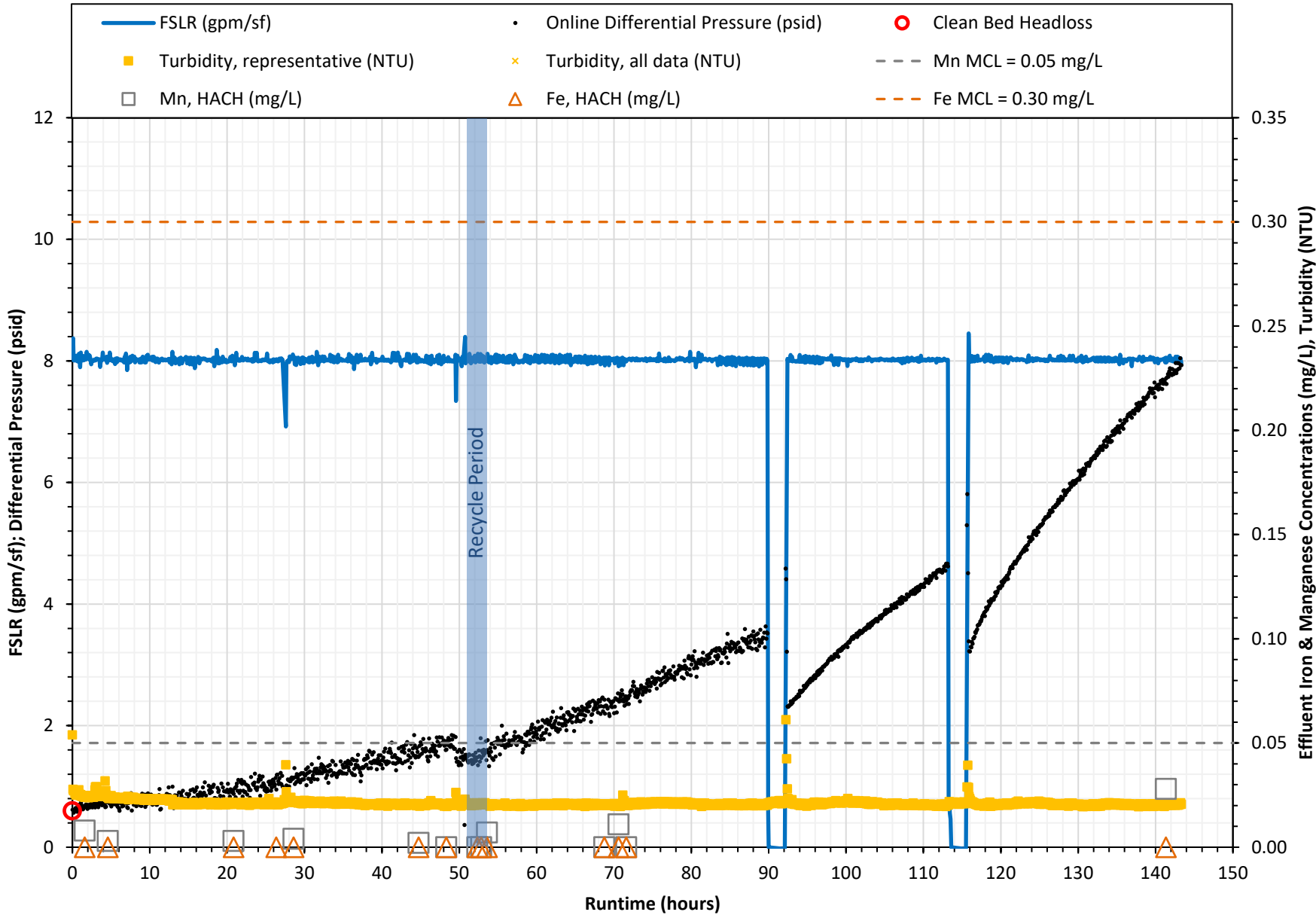


Figure E-22: Trial D.6 - Simmons Pond Well

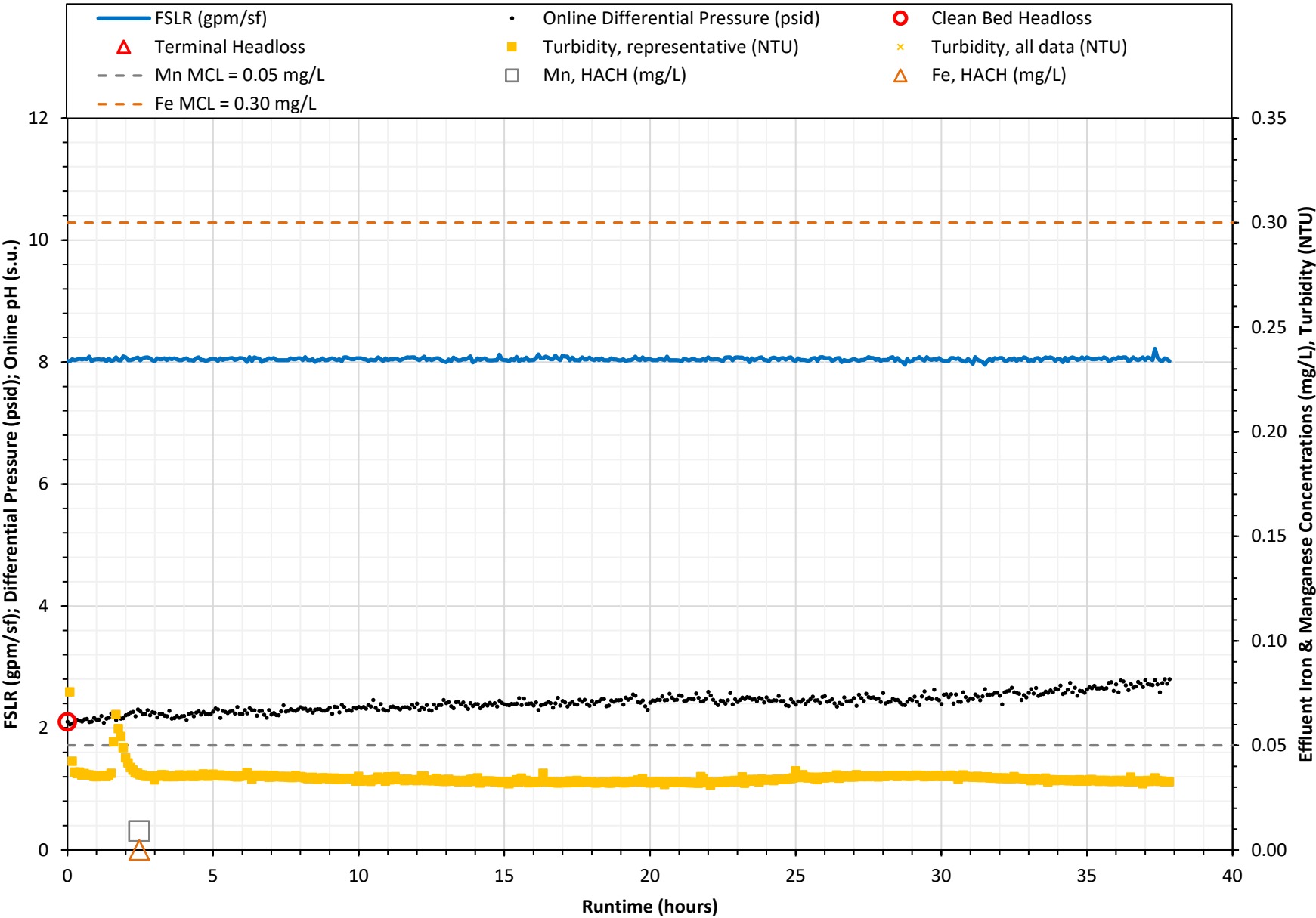
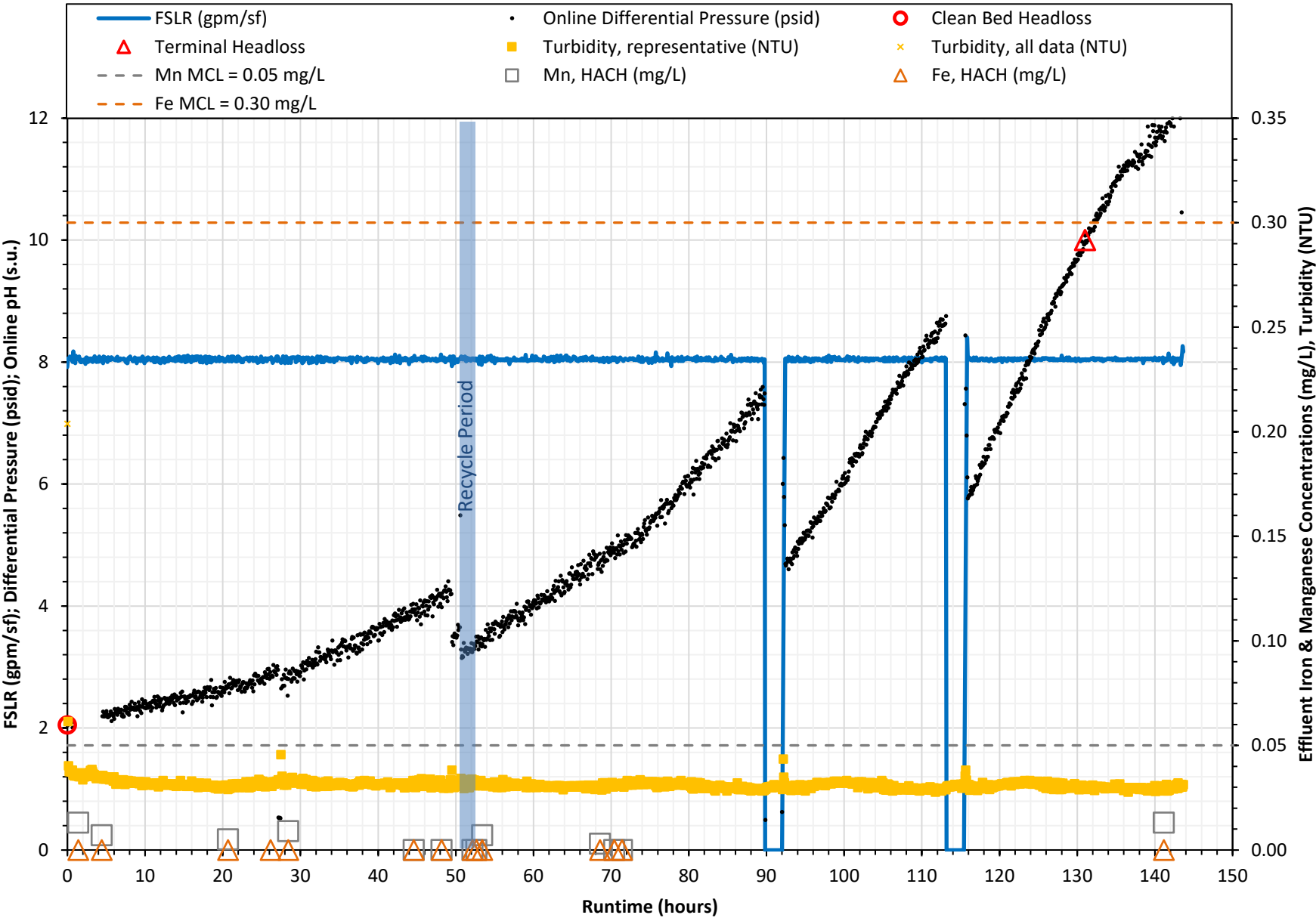


Figure E-23: Trial D.7 - Hyannisport Well



Appendix F – GreensandPlus™ and Calgon Filtrasorb® 400 GAC Product Data Sheets



Performance Media for Water Filtration

Removes iron, manganese, hydrogen sulfide, arsenic and radium.

GreensandPlus™ is a black filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic and radium from groundwater supplies.

The manganese dioxide coated surface of GreensandPlus acts as a catalyst in the oxidation reduction reaction of iron and manganese.

The silica sand core of GreensandPlus allows it to withstand waters that are low in silica, TDS and hardness without breakdown.

GreensandPlus is effective at higher operating temperatures and higher differential pressures than standard manganese greensand. Tolerance to higher differential pressure can provide for longer run times between backwashes and a greater margin of safety.

Systems may be designed using either vertical or horizontal pressure filters, as well as gravity filters.

GreensandPlus is a proven technology for iron, manganese, hydrogen sulfide, arsenic and radium removal. Unlike other media, there is no need for

extensive preconditioning of filter media or lengthy startup periods during which required water quality may not be met.

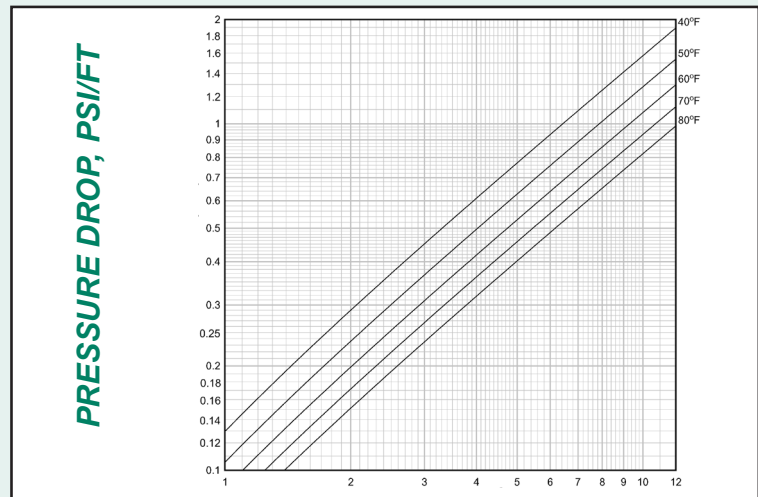
GreensandPlus is an exact replacement for manganese greensand. It can be used in CO or IR applications and requires no changes in backwash rate or times or chemical feeds.

GreensandPlus has the WQA Gold Seal Certification for compliance with NSF/ANSI 61.

REACH Registration
 01-2119452801-43-0020
 for import to the EU.

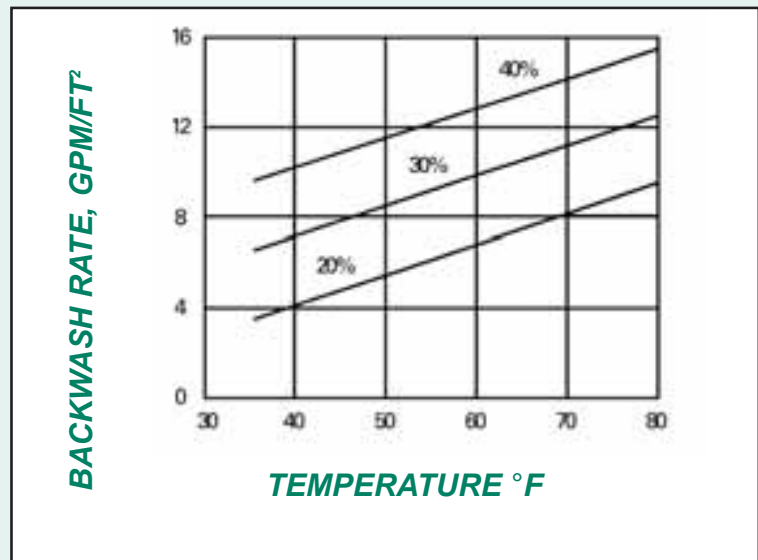
Packaging is available in 1/2 cubic foot bags or 1 metric ton (2,205 lbs) bulk sacks.

GREENSANDPLUS PRESSURE DROP (CLEAN BED)



FLOW RATE (GPM/FT²)

BED EXPANSION DURING BACKWASHING



BACKWASH RATE, GPM/FT²

TEMPERATURE °F

PHYSICAL CHARACTERISTICS

Physical Form

Black, nodular granules shipped in a dry form

Apparent Density

88 pounds per cubic foot net (1410.26 kg/m³)

Shipping Weight

90 pounds per cubic foot gross (1442.31 kg/m³)

Specific Gravity

Approximately 2.4

Porosity

Approximately 0.45

Screen Grading (dry)

18 X 60 mesh

Effective Size

0.30 to 0.35 mm

Uniformity Coefficient

Less than 1.60

pH Range

6.2-8.5 (see General Notes)

Maximum Temperature

No limit

Backwash Rate

Minimum 12 gpm/sq. ft. at 55°F (29.4 m/hr @ 12.78°C)
(see expansion chart)

Service Flow Rate

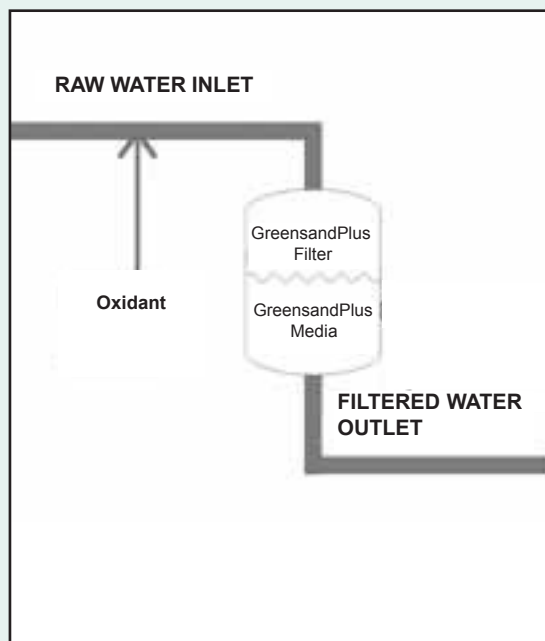
2 -12 gpm/sq. ft (4.9m/hr - 29.4 m/hr)

Minimum Bed Depth

15 inches (381 mm) of each media for dual media beds or 30 inches minimum (762 mm) of GreensandPlus alone.

METHOD OF OPERATION CO

GreensandPlus: Catalytic Oxidation (CO)



Catalytic Oxidation (CO) operation is recommended in applications where iron removal is the main objective in well waters with or without the presence of manganese. This method involves the feeding of a predetermined amount of chlorine (Cl₂) or other strong oxidant directly to the raw water before the GreensandPlus Filter.

Chlorine should be fed at least 10-20 seconds upstream of the filter, or as far upstream of the filter as possible to insure adequate contact time. A free chlorine residual carried through the filter will maintain GreensandPlus in a continuously regenerated condition.

For operation using chlorine, the demand can be estimated as follows:

$$\text{mg/L Cl}_2 = (1 \times \text{mg/L Fe}) + (3 \times \text{mg/L Mn}) + (6 \times \text{mg/L H}_2\text{S}) + (8 \times \text{mg/L NH}_3)$$

SUGGESTED OPERATING CONDITIONS

Bed Type

Dual media: anthracite 15-18 in. (381 mm - 457 mm) and GreensandPlus 15-24 in. (381 mm - 610 mm)

Capacity

700-1200 grains of oxidized iron and manganese/sq.ft. of bed area based on oxidant demand and operation to iron break through or dp limitations.

Backwash

Sufficient rate using treated water to produce 40% bed expansion until waste water is clear, or for 10 minutes, whichever occurs first.

Air/Water Scour

Optional using 0.8-2.0 cfm/sq. ft. (15 m/hr - 7 m/hr) with a simultaneous treated water backwash at 4.0-4.5 gpm/sq. ft. (9.8 m/hr - 11.03 m/hr).

Raw Water Rinse

At normal service flow rate for 3 minutes or until effluent is acceptable.

Flow Rate

Recommended flow rates with CO operation are 2-12 gpm/sq. ft. (4.9 m/hr - 29.4 m/hr). High concentrations of iron and manganese usually require lower flow rates for equivalent run lengths. Higher flow rates can be considered with very low concentrations of iron and manganese. For optimizing design parameters, pilot plant testing is recommended. The run length between backwashes can be estimated as follows:

What is the run length for a water containing 1.7 mg/L iron and 0.3 mg/L manganese at a 4 gpm/sq. ft. service rate:

Contaminant loading

$$\begin{aligned} &= (1 \times \text{mg/L Fe}) + (2 \times \text{mg/L Mn}) \\ &= (1 \times 1.7) + (2 \times 0.3) \\ &= (2.3 \text{ mg/L or } 2.3/17.1 = 0.13 \\ &\quad \text{grains/gal. (gpg)} \end{aligned}$$

At 1,200 grains / sq. ft. loading \div 0.13 gpg
= 9,230 gal./sq. ft.

At 4 gpm / sq. ft. service rate $9,230/4$
= 2,307 min.

The backwash frequency is approximately every 32-38 hours of actual operation.

The Intermittent regeneration (IR) operation is available for certain applications. Contact your Inversand representative for additional information.

GENERAL NOTES

pH

Raw waters having natural pH of 6.2 or above can be filtered through GreensandPlus without pH correction. Raw waters with a pH lower than 6.2 should be pH-corrected to 6.5-6.8 before filtration. Additional alkali should be added following the filters if a pH higher than 6.5-6.8 is desired in the treated water. This prevents the possible adverse reaction and formation of a colloidal precipitate that sometimes occurs with iron and alkali at a pH above 6.8.

Initial Conditioning of GreensandPlus

GreensandPlus media must be backwashed prior to adding the anthracite cap. The GreensandPlus backwash rate must be a minimum of 12 gpm/sq. ft. @ 55 °F.

After backwashing is complete, the GreensandPlus must be conditioned. Mix 0.5 gal. (1.9 L) of 6% household bleach or 0.2 gal (0.75 L) of 12% sodium hypochlorite for

Initial Conditioning of GreensandPlus

every 1 cu. ft. (28.3 L cu. m) of GreensandPlus into 6.5 gallons (25 L) of water.

Drain the filter enough to add the diluted chlorine mix. Apply the diluted chlorine to the filter being sure to allow the solution to contact the GreensandPlus media. Let soak for a minimum of 4 hours, then rinse to waste until the "free" chlorine residual is less than 0.2 mg/L. The GreensandPlus is now ready for service.

REFERENCES

USA

American Water Company, CA
San Jacinto, CA
City of Tallahassee, FL
Adedge Technologies, Inc., Buford, GA
City of Mason City, IL
City of Goshen, IN
City of Hutchinson, KS
City of Burlington, MA
Dedham Water Co., MA
Raynham Center, MA
Northbrook Farms, MD
Sykesville, MD
Tonka Equipment Company, Plymouth, MN
City of New Bern, NC
Onslow County, NC
Hungerford & Terry, Inc., Clayton, NJ
Fort Dix, NJ
Jackson Twsp. MUA, NJ

Radium and Arsenic Removal Using GreensandPlus

The GreensandPlus CO process has been found to be successful in removing radium and arsenic from well water. This occurs via adsorption onto the manganese and/or iron precipitates that are formed. For radium removal, soluble manganese must be present in or added to the raw water for removal to occur. Arsenic removal requires iron to be present in or added to the raw water to accomplish removal. Pilot plant testing is recommended in either case.

USA

Churchill County, NV
Suffolk County Water Authority, NY
City of Urbana, OH
Roberts Filter Group, Darby, PA

International

Watergroup, Saskatoon, SK Canada
BI Pure Water, Surrey, BC Canada
Sydney, Nova Scotia, Canada
PT Beta Pramesta, Jakarta, Indonesia
PT Besflo Prima, Jakarta, Indonesia
Eurotrol, Milanese, Italy
Gargon Industrial, Mexico City, Mexico
River Sands Pty. Ltd., Queensland, Australia
Filtration Tech, Auckland, New Zealand
Alamo Water Poland, Izabeln, Poland
Aquatrol Company, Moscow, Russia
Impulse Group, St. Petersburg, Russia
Brenntag Nordic, Taby, Sweden
EcoFilter Technology, Liechtenstein



The manufacturing of GreensandPlus is an ongoing, 24/7 process to ensure the highest quality water treatment media.

REACH Registration
01-2119452801-43-0020
for import to the EU.

Distributed by:



Inversand Company
SINCE 1925

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Clayton, NJ 08312 USA
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FILTRASORB® 400

Granular Activated Carbon

Applications



FILTRASORB 400 activated carbon can be used in a variety of liquid phase applications for the removal of dissolved organic compounds. FILTRASORB 400 has been successfully applied for over 40 years in applications such as drinking and process water purification, wastewater treatment, and food, pharmaceutical, and industrial purification.

Description

FILTRASORB 400 is a granular activated carbon for the removal of dissolved organic compounds from water and wastewater as well as industrial and food processing streams. These contaminants include taste and odor compounds, organic color, total organic carbon (TOC), industrial organic compounds such as TCE and PCE, and PFAS.

This activated carbon is made from select grades of bituminous coal through a process known as reagglomeration to produce a high activity, durable, granular product capable of withstanding the abrasion associated with repeated backwashing, hydraulic transport, and reactivation for reuse. The raw coal is mined and subsequently manufactured into GAC in the United States to ensure the highest quality and consistency in the finished product. Activation is carefully controlled to produce a significant volume of both low and high energy pores for effective adsorption of a broad range of high and low molecular weight organic contaminants.

FILTRASORB 400 is formulated to comply with all the applicable provisions of the AWWA Standard for Granular Activated Carbon (B604) and Food Chemicals Codex. This product may also be certified to the requirements of NSF/ANSI 61 for use in municipal water treatment facilities. Only products bearing the NSF Mark are certified to the NSF/ANSI 61 - Drinking Water System Components - Health Effects standard. Certified Products will bear the NSF Mark on packaging or documentation shipped with the product.

Features / Benefits

- Produced in the United States from a pulverized blend of high quality, domestically mined bituminous coals resulting in a consistent, high quality product.
- Carbon granules are uniformly activated through the whole granule, not just the outside, resulting in excellent adsorption properties and constant adsorption kinetics.
- The reagglomerated structure ensures proper wetting while also eliminating floating material.
- High mechanical strength relative to other raw materials, thereby reducing the generation of fines during backwashing and hydraulic transport.
- Carbon bed segregation is retained after repeated backwashing, ensuring the adsorption profile remains unchanged and therefore maximizing the bed life.
- Reagglomerated with a high abrasion resistance, which provides excellent reactivation performance.
- High density carbon resulting in a greater adsorption capacity per unit volume.

Specifications¹

FILTRASORB 400

Iodine Number, mg/g	1000 (min)
Moisture by Weight	2% (max)
Effective Size	0.55–0.75 mm
Uniformity Coefficient	1.9 (max)
Abrasion Number	75 (min)
Screen Size by Weight, US Sieve Series	
On 12 mesh	5% (max)
Through 40 mesh	4% (max)

¹Calgon Carbon test method

Typical Properties*

FILTRASORB 400

Apparent Density (tamped)	0.54 g/cc
Water Extractables	<1%
Non-Wettability	<1%

*For general information only, not to be used as purchase specifications.

Safety Message

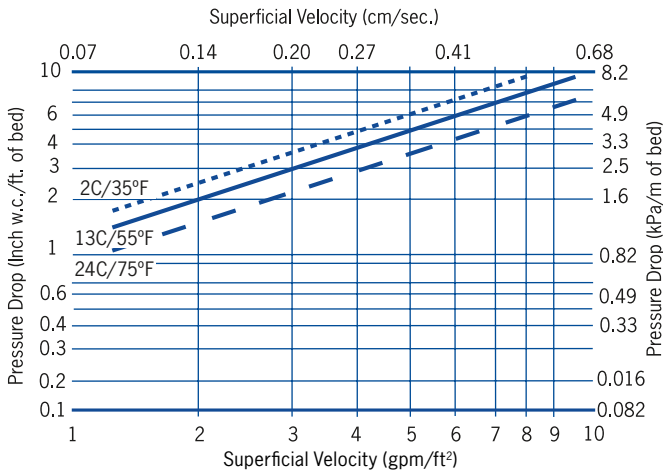
Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

1.800.4CARBON calgoncarbon.com

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DS-FILTRA40019-EIN-E1

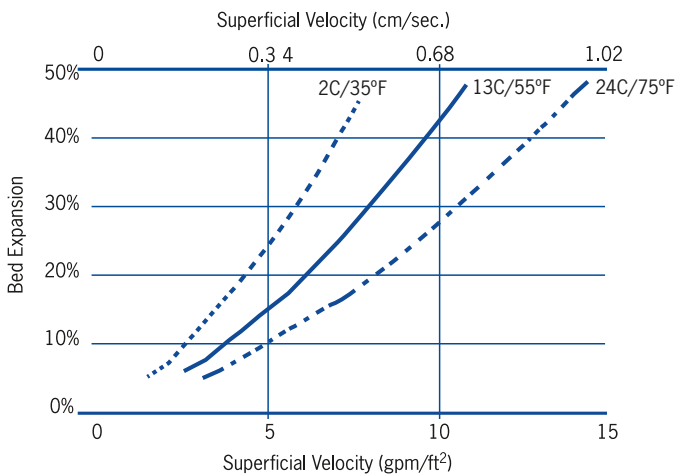
Typical Pressure Drop

Based on a backwashed and segregated bed



Typical Bed Expansion During Backwash

Based on a backwashed and segregated bed



Conditioning and Backwashing

Backwashing and conditioning fresh GAC before placing into operation is critical to GAC performance. The reasons for backwashing before placing fresh media online are to: (1) size segregate the media so subsequent backwashing will return the media to the same relative position in the bed, (2) remove any remaining air from the bed, and (3) remove media fines which can lead to excessive pressure drop and flow restriction. In addition, proper backwashing is a crucial step to collecting the most representative and meaningful post-start up data on compounds of interest, such as metals listed in the NSF/ANSI 61 standard.

Below are the recommended steps for proper conditioning and backwashing of GAC based on Filtrasorb 400 GAC being backwashed at 55°F:

1. Fully submerge GAC bed in clean, contaminant free water for at least 16 hours (overnight)
2. Open backwash inlet and begin up-flow at 3 gpm/ft² for 2 minutes
3. Increase flow to 5 gpm/ft² and maintain for 2 minutes
4. Increase flow to 7 gpm/ft² and maintain for 2 minutes
5. Increase flow to 8.5 gpm/ft² and maintain for 30 minutes*
6. Decrease flow to 7 gpm/ft² and maintain for 2 minutes
7. Decrease flow to 5 gpm/ft² and maintain for 2 minutes
8. Decrease flow to 3 gpm/ft² and maintain for 2 minutes
9. Close backwash inlet and stop flow

*Duration representative of initial backwash conditions. Required duration during operational backwashes can be shorter but will vary by utility, solids load, and GAC throughput. Contact Calgon Carbon for more information"

Design Considerations

FILTRASORB 400 activated carbon is typically applied in down-flow packed-bed operations using either pressure or gravity systems. Design considerations for a treatment system is based on the user's operating conditions, the treatment objectives desired, and the chemical nature of the compound(s) being adsorbed.

Safety Message

Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

1.800.4CARBON calgoncarbon.com

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DS-FILTRA40019-EIN-E1

Appendix G – Trojan Technologies™ Sleeve Fouling Test Results

Simple Reads Report							
Collection Time:	7/13/2021 12:08						
Method:							
Version	5.0.0.999						
Instrument:	Cary 60						
Ave Time (sec)	1						
	Target Sleeve				New Reference Sleeve		
Read	%T	nm	Single wall		%T	nm	Single wall
1	79.375	254	0.890926484		81.919	254	0.905091156
2	79.005	254	0.888847568		80.899	254	0.899438714
3	77.391	254	0.879721547		81.468	254	0.902596255
4	82.84	254	0.91016482		81.441	254	0.902446674
5	81.903	254	0.905002762		81.659	254	0.903653695
6	81.966	254	0.905350761		80.405	254	0.896688352
7	82.932	254	0.910670083		81.523	254	0.90290088
8	82.207	254	0.90668076		81.716	254	0.903969026
9	82.092	254	0.906046356		81.494	254	0.902740273
10	76.863	254	0.876715461		81.511	254	0.902834426
11	82.622	254	0.908966446		81.389	254	0.902158523
12	80.628	254	0.897930955		81.081	254	0.900449888
13	81.771	254	0.904273189		81.055	254	0.900305504
14	82.356	254	0.907502066		80.967	254	0.899816648
15	82.235	254	0.906835156		80.553	254	0.897513231
16	81.612	254	0.903393602		81.544	254	0.903017165
17	78.587	254	0.886493091		79.792	254	0.893263679
18	76.659	254	0.875551255		80.858	254	0.899210765
19	78.241	254	0.884539428		81.291	254	0.901615217
20	77.987	254	0.883102486		81.686	254	0.903803076
21	78.822	254	0.887817549		81.574	254	0.903183259
22	79.34	254	0.890730038		81.289	254	0.901604126
23	78.494	254	0.885968397		81.725	254	0.904018805
24	78.38	254	0.885324799		81.491	254	0.902723656
25	78.763	254	0.887485211		81.138	254	0.90076634
		average	0.895041611			average	0.901432373

Target Sleeve / New sleeve

99.3% Fouling Factor target sleeve compared to brand new sleeve

APPENDIX F
PROCESS FLOW DIAGRAMS



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STRAIGHTWAY TREATMENT FACILITY
 PROCESS FLOW DIAGRAM



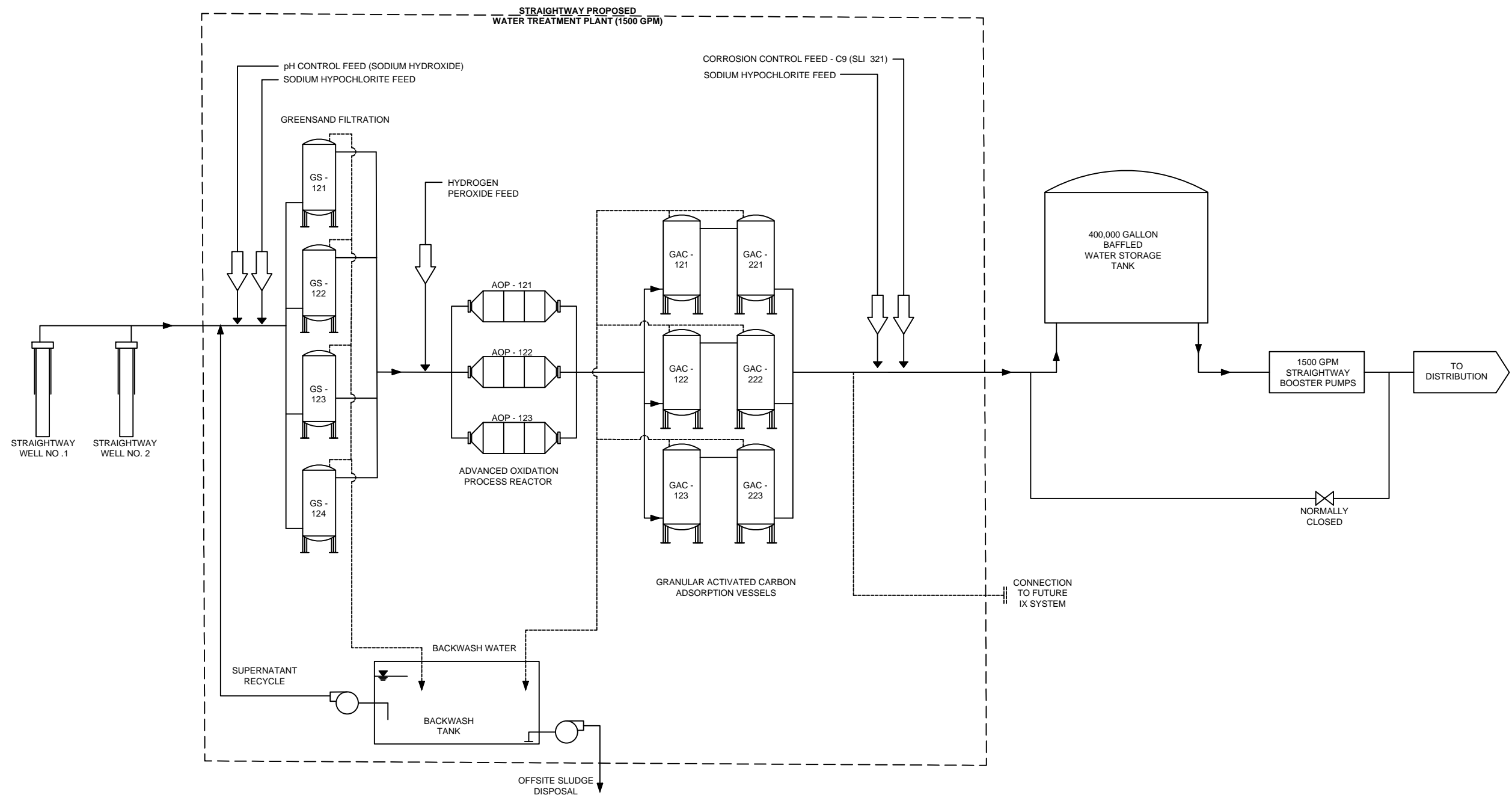
HYANNIS WATER SYSTEM
 BARNSTABLE DPW - WATER DIVISION
 47 OLD YARMOUTH ROAD
 HYANNIS, MA 02601

STRAIGHTWAY AND HYANNISPORT
 PILOTING REPORT

PROJECT NO.	20212329.001A
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CURRENT REVISION	1.0
DESIGNED BY	ABB
DRAWN BY	UC
CHECKED BY	SP
APPROVED BY	SP

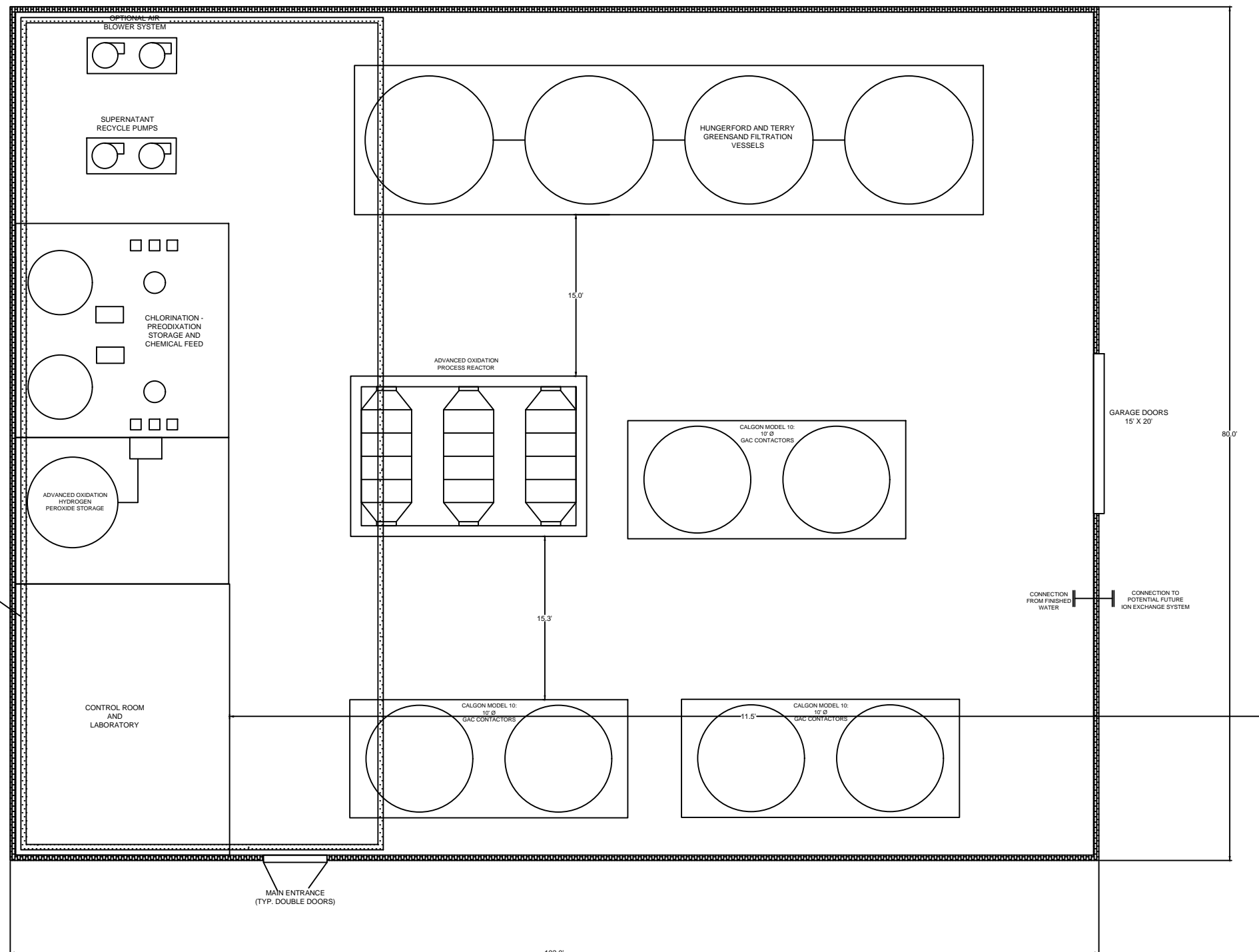
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**STRAIGHTWAY TREATMENT FACILITY
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 PROCESS FLOW DIAGRAM**

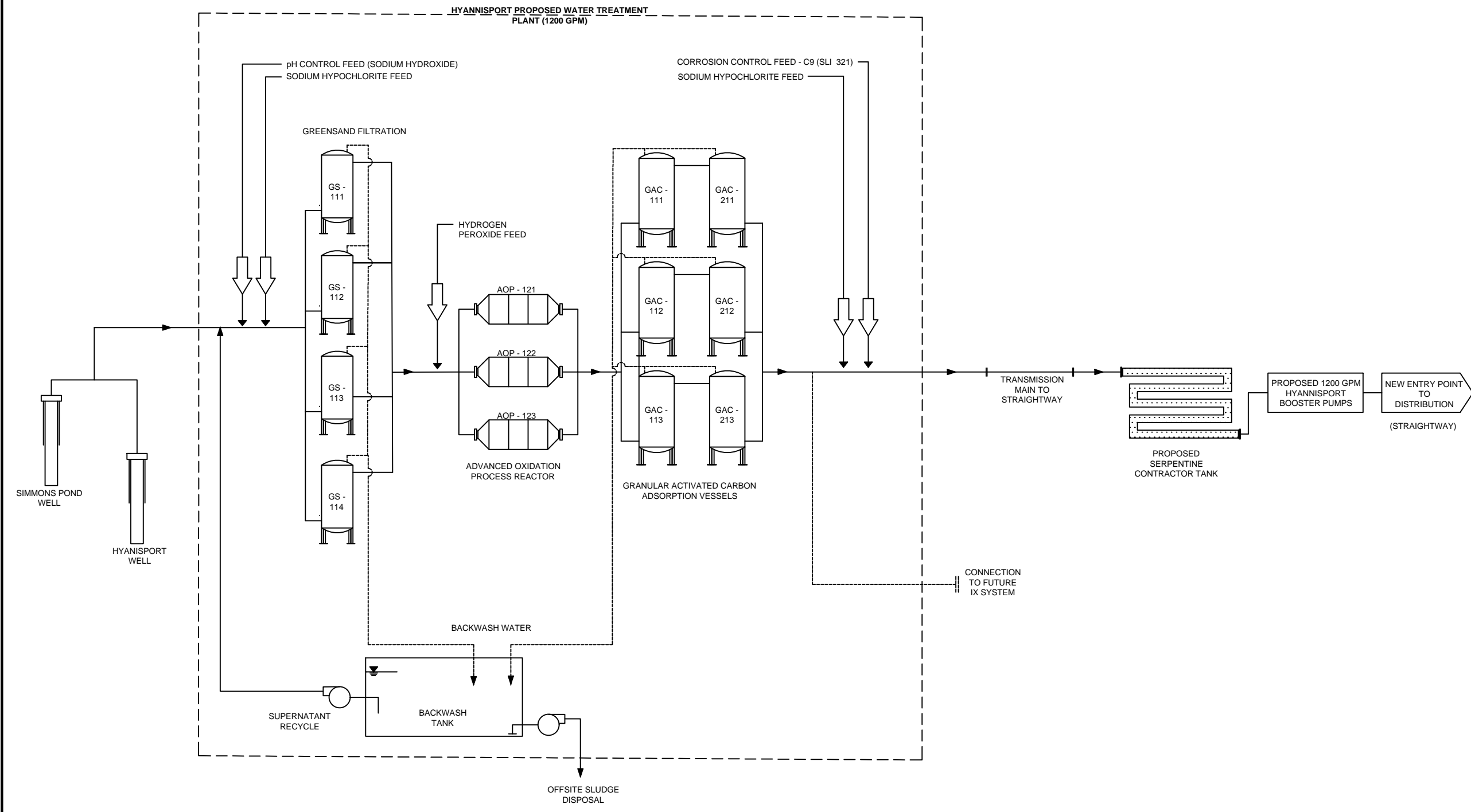


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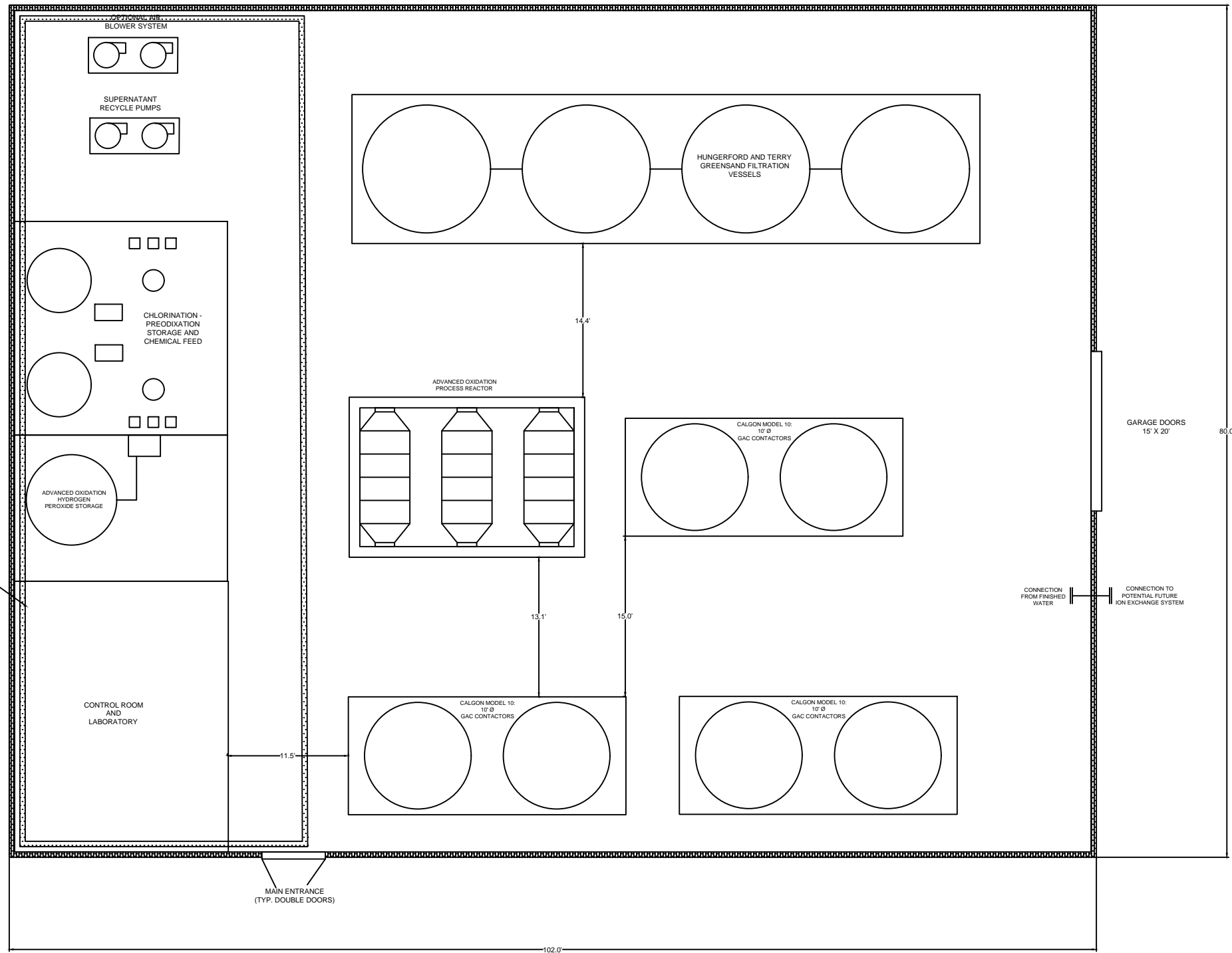
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**HYANNISPORT TREATMENT FACILITY
EQUIPMENT LAYOUT**



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