

Pilot Study Report: Straightway and Hyannisport Facilities Hyannis Water System

Town of Barnstable Department of Public Works November 2021





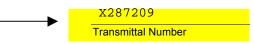








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Massachusetts Department of Environmental Protection Bureau of Resource Protection – Drinking Water Program

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

X287209	
Transmittal Number	
Facility ID# (if known)	

A. Application

1.	Is this	application	for ⊠ a	n Original o	or 🔲	a Resubmittal?
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Boston	MA	02105	Kirsten Ryan	617-498-4778	
City	State	Zip	Contact	Telephone	

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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	SRP 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 304 Water Treatment: Chemical Addition Retrofits of
□ BRP WS 37 Approval of Transient Non-Community Source Less than 7 Gallons per Minute (combines BRP WS 13 and BRP WS 15 submittals)	Water Systems = or < 3,300 people ☐ BRP WS 35A Multiple Vending Installation Approval ☐ BRP WS 35B Multiple POU/POE Installation Approval
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 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 ProtectionBureau of Resource Protection – Drinking Water Program

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Ap C.

X287209
Transmittal Number
Facility ID# (if known)

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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:

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

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TABLE OF CONTENTS

<u>Sect</u>	tion_		Page				
1	EXEC	CUTIVE SUMMARY	1				
2	INTR	INTRODUCTION					
	2.1	PURPOSE	3				
	2.2	BACKGROUND	3				
		2.2.1 Existing Wells, Treatment Facilities and Processes	4				
3	WAT	ER QUALITY AND TREATMENT PROCESSES	8				
	3.1	EXISTING CONDITIONS AND TREATMENT GOALS	8				
	3.2	SYSTEM FLEXIBILITY AND OTHER CONSIDERATIONS	10				
	3.3	WATER QUALITY SAMPLING	10				
4	GREE	ENSAND FILTRATION	13				
	4.1	PROCESS OVERVIEW	13				
	4.2	PILOTING OVERVIEW	13				
	4.3	PILOT DESCRIPTION	14				
	4.4	WATER QUALITY SAMPLING	16				
5	ULTR	AVIOLET – ADVANCED OXIDATION PROCESS	17				
	5.1	PROCESS OVERVIEW	17				
	5.2	PILOT DESCRIPTION	17				
	5.3	WATER QUALITY SAMPLING	19				
6	GRAI	NULAR ACTIVATED CARBON	20				
	6.1	PROCESS OVERVIEW	20				
	6.2	PILOT DESCRIPTION	21				
	6.3	WATER QUALITY SAMPLING	22				
7	PILO	TING RESULTS	23				
	7.1	RAW WATER QUALITY	23				
		7.1.1 Iron	23				
		7.1.2 Manganese	23				
		7.1.3 PFAS	24				
		7.1.4 1,4-Dioxane	24				



	7.2	GREEN	NSAND FILTRATION AND PRE-TREATMENT	25		
	7.3	UV-AC	DP	26		
	7.4	GAC		27		
8	MASS	DEP REC	QUIREMENTS AND COMPLIANCE	28		
	8.1	CORRO	OSION EVALUATION	28		
	8.2	NEW T	TECHNOLOGY APPROVAL	29		
9	DESIG	ON CRITE	RIA UPDATES	30		
	9.1	STRAIG	GHTWAY TREATMENT FACILITY	30		
		9.1.1	Greensand Filtration	30		
		9.1.2	UV-AOP	34		
		9.1.3	GAC	35		
	9.2	HYANI	NISPORT TREATMENT FACILITY			
		9.2.1	Replacement Wells at Hyannisport Site			
		9.2.2	Greensand Filtration			
		9.2.3	UV-AOP			
		9.2.4	GAC			
10	COST	ANALYSI	IS	44		
	10.1		AL COSTS			
	10.2		ATIONS AND MAINTENANCE COSTS			
11	SUMI	MARY &	RECOMMENDATIONS	50		
	11.1		GHTWAY FACILITY			
	11.2		NISPORT FACILITY			
	11.3		MMENDED CAPITAL PLAN & Schedule			
TABL 1 3-1		nary of So	ource Raw Water Quality for Contaminants of Concern			
3-2		osed Treatment Facility Treatment Objectives and Processes				
3-3	-	Sampling Parameters and Schedule				
3-4	Wate	ter Quality Sampling Schedule Summary				
4-1		ensand Pilot Testing Dates				
4-2		arameters for Greensand Filtration Pilot				
5-1		UV Ballast Strength and Hydrogen Peroxide Trial Doses				
6-1		Parameters for GAC Pilot (STWY 2, SP, and HP)				
9-1	_	Straightway Greensand Filter Pretreatment Chemical Dosing				
9-2	_	Straightway Greensand Pressure Filtration Design Criteria				
9-3	straig	Straightway Backwash Design Criteria for Greensand Filters				



9-4	Straightway UV-AOP Design Criteria
9-5	Straightway GAC Design Criteria
9-6	Straightway Backwash Design Criteria – Calgon F400 Carbon
9-7	Hyannisport Greensand Filter Pretreatment Chemical Dosing
9-8	Hyannisport Greensand Pressure Filtration Design Criteria
9-9	Hyannisport Backwash Design Criteria for Greensand Filters
9-10	Hyannisport UV-AOP Design Criteria
9-11	Hyannisport GAC Design Criteria
9-12	Hyannisport Backwash Design Criteria – Calgon F400 Carbon
10-1	Proposed Straightway Treatment Facility Opinion of Probable Cost
10-2	Proposed Hyannisport Treatment Facility Opinion of Probable Cost
10-3	Estimated Annual O&M Costs for Proposed Straightway and Hyannisport Treatment Facilities

FIGURES

- 2-1 Existing Straightway Treatment Facility
- 2-2 Existing Hyannisport Treatment Facility
- 2-3 Installation of Seasonal Interim GAC Filters at Straightway
- 4-1 Initial Testing Greensand Filters (left), High-Capacity Greensand Filters (right)
- 5-1 Trojan UV Phox 12AL30 UV-Oxidation System
- 6-1 GAC Contactors for Initial Testing (left), GAC Contactors Downstream of UV-AOP (right)
- 7-1 Engineer Recording Raw Water Quality Results
- 7-2 UV Lamp Fouling Sleeve Comparison: Sleeve with Black O-ring was Used in Pilot Study

APPENDICES

- A Pilot Testing Proposal
- B MassDEP Pilot Proposal Approval Letter
- C Corrosion Evaluation
- D Oxidation Byproducts Discussion
- E Pilot Study Report Blueleaf, Inc.
- F Process Flow Diagrams



LIST OF ACRONYMS and ABBREVIATIONS

Association for the Advancement of Cost Engineering	A A C E
Association for the Advancement of Cost Engineering	
Massachusetts Department of Environmental Protection	
United States Environmental Protection Agency	
Contaminant of Concern	
Per- and Polyfluorinated Compounds	
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	0&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	



Maher Treatment Facility	MIF
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

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 quidance (EPA or MassDEP)

¹Lowest level of existing or proposed regulation or guidance

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

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

	Minimum Field Sampling Frequency				
Parameter	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		
рН	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:

- <u>Field Parameters</u> includes field sampling and analytical methods defined in Table 3-3.
- <u>Fe/Mn Piloting Analytes</u> 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.
- <u>Corrosion Water Quality Parameters (WQPs)</u> 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.
- <u>1,4-D</u>
- 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 Piloting	Corrosion WQPs	1,4- Dioxane	тос	PFAS
Ctualabtura 1	Raw	✓	✓	✓	✓	✓	✓
Straightway 1	Greensand (post)	✓	✓	✓		✓	
	Raw	✓	✓	✓	✓	✓	✓
Church the control 2	Greensand (post)	✓	✓	✓	✓		
Straightway 2	UV-AOP (post)			✓	✓		
	GAC (post)			✓		✓	✓
	Raw	✓	✓	✓	✓	✓	✓
Hyannisport	Greensand (post)	✓	✓	✓			
	GAC (post)			✓		✓	✓
	Raw	✓	✓	✓	✓	✓	✓
	Greensand (post)	✓	✓	✓	✓		
Simmons Pond	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 preoxidation 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	

GreensandPlusTM 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 GreensandPlusTM 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 (NaOCI) 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 H_2O_2 "). The four combinations of UV strength and H_2O_2 dose (i – high H_2O_2 /high BPL, ii- low H_2O_2 /high BPL, iii – high H_2O_2 /low BPL, iv- low H_2O_2 /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)
	High/High	100%	10	9.0
Straightway 2	Low/High	60%	10	9.0
Straightway 2	High/Low	100%	5	3.5
	Low/Low	60%	5	4.5
	High/High	100%	8	7.0
Simmons Pond	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)

Downston	GAC Contactor		
Parameter	Total		
Calgon F400 Media Depth:	120-inches (10-ft)		
Contactor Diameter:	6-Inces		
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

<u>Field analyses</u> – 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. <u>Laboratory analyses</u> – 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.



November 24, 2021

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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.

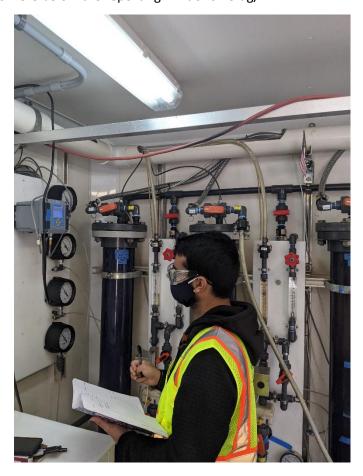


Figure 7-1: Engineer Recording Raw Water Quality
Results



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.

- <u>Pre-oxidation</u> 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.
- <u>pH adjustment</u> 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.
- <u>Filter surface loading rates (FSLR)</u> 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.
- <u>Filter runtimes</u> 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.
- <u>Backwashing</u> 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 μ g/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 H_2O_2 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 H_2O_2 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.



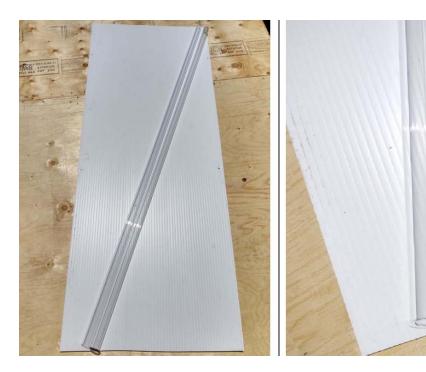


Figure 7-2: UV Lamp Fouling Sleeve Comparison: Sleeve with Black O-ring was Used in Pilot Study

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-Photolosis 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 pretreatment 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 ft²
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

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

- 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.
- 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.
- 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

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



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 H_2O_2 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
Design now have	(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
Design flow Nate	(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 ft²
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 or 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/ft²
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

	NaOCI 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/ft²
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.
- <u>UV-AOP</u> 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.
- <u>GAC</u> 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.
- <u>Building</u> 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:

- <u>Greensand</u> 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.
- <u>UV-AOP</u> 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.
- <u>GAC</u> 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.
- <u>Disinfection</u> A new pipe loop is included for disinfection. The cost included upgrading the well supply pumps.
- <u>Building</u> the cost was updated to utilize a metal building instead of CMU.
- <u>Well Replacement</u> 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 B	Budgetary Cost	ltem	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			
Subtotal	\$	5,056,000							
Installation 25%						\$ 1,264,000			
Major Equipment & Systems		6,320,000							
Unit Price	& Other Item	s							
Concrete Base Slab - Backwash Tank; Building	503	CY	\$	650	\$	328,000			
Concrete Side Walls - Backwash Tank	rete Side Walls - Backwash Tank 84 CY \$				\$	81,000			
Excavation, Backfill, compaction, grading, seeding	906	CY	\$	45	\$	41,000			
Unit Price & Other Item Su		450,000							
В	uildings								
Pre-Engineered Metal Building (102 x 80) (w/ Mech, HVAC)	8160	SF	\$	250	\$	2,040,000			
Buildings Subtotal	\$	2,040,000							
Bulk Work Perce	ntage and Othe	er Items							
Site civil		10%			\$	881,000			
Electrical	18%				\$	1,586,000			
Instrumentation & Controls	5%				\$	441,000			
Yard Piping	2%					180,000			
Bulk Work Subtota		3,088,000							
Subtotal STWY WTF Direct	\$	11,898,000							
GC Overhead and Profit 20%				\$	2,380,000				
Contingency 25%					\$	2,975,000			
TOTAL STWY WTF BUDGETARY CON	\$	17,253,000							
Design, Permitting and Construction Administration 15%				\$	2,588,000				
TOTAL STWY WTF BUDGETARY CAPITAL COST (w/ 25% contingency)									
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	ltem	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	2	LS					
20% contingency	_		\$ 1,090,000	\$	2,180,000		
Well Replacement Subtotal		-		\$	2,430,000		
Hyannisport Water T		ity					
Major Equipmer Greens and 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 Booster Pump station Building	1	LS LS	\$ 81,000 \$ 45,000	\$	81,000 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		
Subtotal	1			\$	5,244,000		
Installation		25%		\$	1,311,000		
		Major Equipmer	nt & Systems Subtotal		6,555,000		
Unit Price & O			1.				
Concrete Base Slab	468	CY	\$ 650	\$	304,000		
Concrete Side Walls Excavation, Backfill, compaction, grading, seeding	906	CY CY	\$ 950 \$ 45	\$	76,000 41,000		
excavation, backini, compaction, grading, seeding	906		↓ २	Ş	421,000		
Duildi	200	Omt Frice e	x Other Item Subtotur		421,000		
Buildin Pre-Engineered Metal Building (102 x 80) (w/ Mech, HVAC)	8160	SF	\$ 250	\$	2,040,000		
The Engineer ed Metal Buriding (102 x 80) (w) Meen, TVAC)	0100	31	Buildings Subtotal		2,040,000		
				7	_,,,,,,,,,		
Bulk Work Percentago	and Other Ite	ms	•				
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		
					3,226,000		
HYPT WTF - TOTAL BUDGETARY CONSTRUCTION COST					18,710,000		
Design, Permitting and Construction Administration 15%				\$	2,807,000		
TOTAL HVI	PT WTF BLIDGET	ARY CAPITAL CO	OST (25% contingency)	\$	21,517,000		
TOTAL HYPT WTF BUDGETARY CAPITAL COST (25% contingency) 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.

- NaOCI (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.
- $\underline{H_2O_2}$ Assumes a chemical cost for 50% H_2O_2 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:

<u>Electricity</u> – 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.



• <u>Lamp Replacement</u> – 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_2O_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:

<u>Iron and Manganese Removal:</u> 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 take 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.

<u>1,4-Dioxane Destruction:</u> 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 H_2O_2 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 H_2O_2 dosing (5 mg/L or lower) while keeping the treated water 1,4-D below the detection limit.



<u>PFAS adsorption:</u> 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:

<u>Iron and Manganese Removal:</u> 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 take 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.

<u>1,4-Dioxane Destruction:</u> 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 H_2O_2 dosing (5 mg/L or lower) while keeping the treated water 1,4-D below the detection limit.

<u>PFAS adsorption:</u> 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

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APPENDIX B MASSDEP PILOT PROPOSAL APPROVAL LETTER



APPENDIX C CORROSION EVALUATION



APPENDIX D OXIDATION BYPRODUCTS DISCUSSION



APPENDIX E BLUELEAF PILOT STUDY REPORT

20212329.001A November 24, 2021
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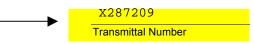
APPENDIX F PROCESS FLOW DIAGRAMS

20212329.001A November 24, 2021
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APPENDIX A PILOT TESTING PROPOSAL

Enter your 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	Ā.	Permit Information BRP WS 21D		Water Trea	tment Approvals					
must be completed for each permit	1. Permit Code: 4 to 7 character code from permit instructions BRP WS21D to Conduct Pilot Study = 0			2. Name of Permit Category or > 1 mgd						
application.	3. Type of Project or Activity									
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.	В.	B. Applicant Information – Firm or Individual Town of Barnstable DPW								
		Name of Firm - Or, if party needing this approval is an individual enter name below: Nathan				4. MI				
		2. Last Name of Individual 382 Falmouth Road	3. First Name of Individual							
3. Three copies of this form will be needed.		5. Street Address Hyannis	MA	02601	774-377-4934					
		6. City/Town Nathan Collins, PE	7. State	8. Zip Code nathan.coll	9.Telephone # .ins@town.barnsta	10.Ext.# ble.ma.us				
Copy 1 - the original must accompany your		11. Contact Person		12. e-mail address						
permit application. Copy 2 must accompany your	C.	Facility, Site or Individual Requir			nnisport Faciliti	.es				
fee payment. Copy 3 should be		1. Name of Facility, Site Or Individual 47 Old Yarmouth Rd								
retained for your records		2. Street Address Hyannis	MA	02601						
4. Both fee-paying		3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #				
and exempt applicants must mail a copy of this		8. DEP Facility Number (if Known) 9. Federal I.D. Number (if Known) 10. BWSC Tracking # (if Known)								
transmittal form to:	D.	Application Prepared by (if differ	ent from	Section B)*						
MassDEP P.O. Box 4062		Kleinfelder								
Boston, MA 02211		1. Name of Firm Or Individual One Beacon Street								
***		2. Address Boston	MA	02105	617-498-4778					
* Note: For BWSC Permits, enter the LSP.		3. City/Town Kirsten Ryan	4. State	5. Zip Code	6. Telephone #	7. Ext. #				
citici tilo Loi .		8. Contact Person	9. LSP Number (BWSC Permits only)							
	E. Permit - Project Coordination									
	Is this project subject to MEPA review? ☐ yes ☒ no If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:									
	F.	F. Amount Due								
DEP Use Only		ecial Provisions:								
Permit No:	1.									
Rec'd Date:	 Hardship Request - payment extensions according to 310 CMR 4.04(3)(c). Alternative Schedule Project (according to 310 CMR 4.05 and 4.10). Homeowner (according to 310 CMR 4.02). 									
Reviewer:		, , ,								

Dollar Amount

Check Number

Date



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Drinking Water Program

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

X287209	
Transmittal Number	
Facility ID# (if known)	-

A. Application

1.	Is this application for	or 🔼 an	Original or L	_ a Resubmittal?
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Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





2.	4-1 10WII 01	Barnstable Supply Div		382 Falmouth Road	ī.
	Name Hyannis	MA	02601	Address Nathan Collins,PE	774-487-8390
	City	State	Zip	Contact	Telephone
3.	Consultant:				
	Kleinfelder			One Beacon Street	
	Name Boston	MA	02105	Address Kirsten Ryan	617-498-4778
	City	State	Zip	Contact	Telephone

B. Permit

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

New Tech	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 ce 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	Water Treat	atment Approvals BRP WS 21A To Conduct Pilot Study < 40,000 gpd BRP WS 21B To Conduct Pilot Study = or > 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 > 40,000 gpd and < 1 mgd BRP WS 24 To Construct Facility = or > 200,000 gpd and < 1 mgd BRP WS 25 Treatment 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 34 Water Treatment: Chemical Addition Retrofits of Water Systems = or < 3,300 people
	BRP WS 37 Approval of Transient Non-Community Source Less than 7 Gallons per Minute (combines BRP WS 13 and BRP WS 15 submittals)		Water Systems = or < 3,300 people BRP WS 35A Multiple Vending Installation Approval BRP WS 35B Multiple POU/POE Installation Approval
New Source	ce 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	Water Qua	ality Assurance BRP WS 26 Sale or Acquisition of Land for Water Source BRP WS 36 Abandonment of Water Source
	BRP WS 20 To Construct Source	Distribution	n 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

BRP WS Application

For Drinking Water Program (Water Supply) Permits or **Approvals**

X287209
Transmittal Number
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 Keijset Print Name

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

Supervisor, Water Supply Division

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 Concern ¹	0.3	0.05	0.3	20
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 ¹Lowest level of existing or proposed regulation or guidance

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.

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

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)
Level of Concern ¹	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

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	IVIIIUS
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)

¹Lowest 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

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:

<u>NaOH dose</u> - 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.

<u>Filter Surface Loading Rate</u> – 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.

<u>UV System Ballast Strength and Hydrogen Peroxide Dose</u> – 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
Studiahturar	Straightway 1	✓			
Straightway	Straightway 2	✓	√ *	√ *	√ *
	Hyannisport	✓			✓
Hyannisport	Simmons Pond	✓	✓	✓	✓
Mary Dunn	Airport	✓			
South	Mary Dunn 1	✓			
	Mary Dunn 2	✓			
Mary Dunn North	Mary Dunn 3	✓			
North	Mary Dunn 4	✓			

[✓] Indicates proposed piloting run

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

⁻⁻⁻ indicates no proposed piloting of associated process.

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

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 (NaOCI) 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.

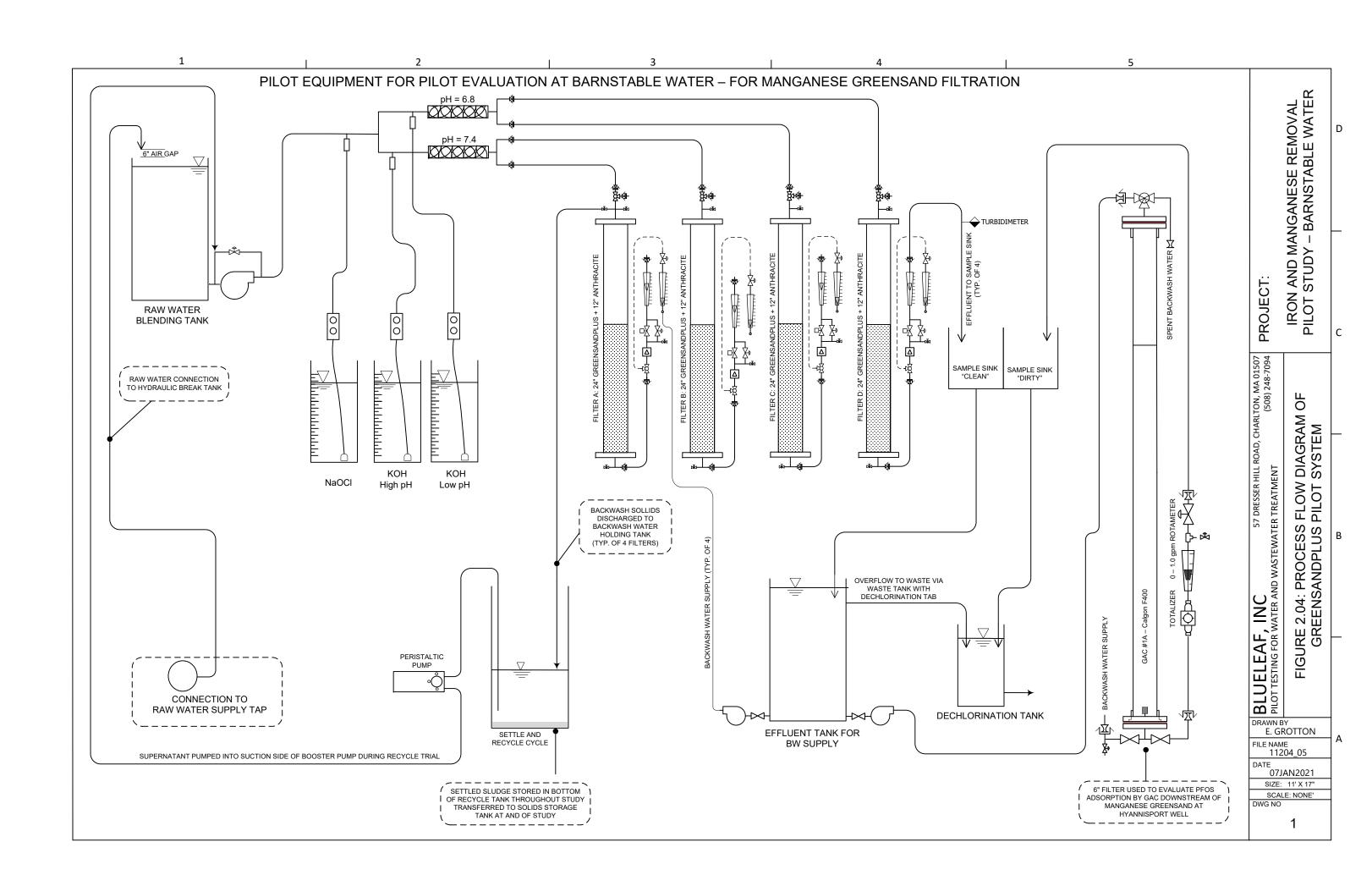
Table 5: Field Sampling Parameters and Schedule

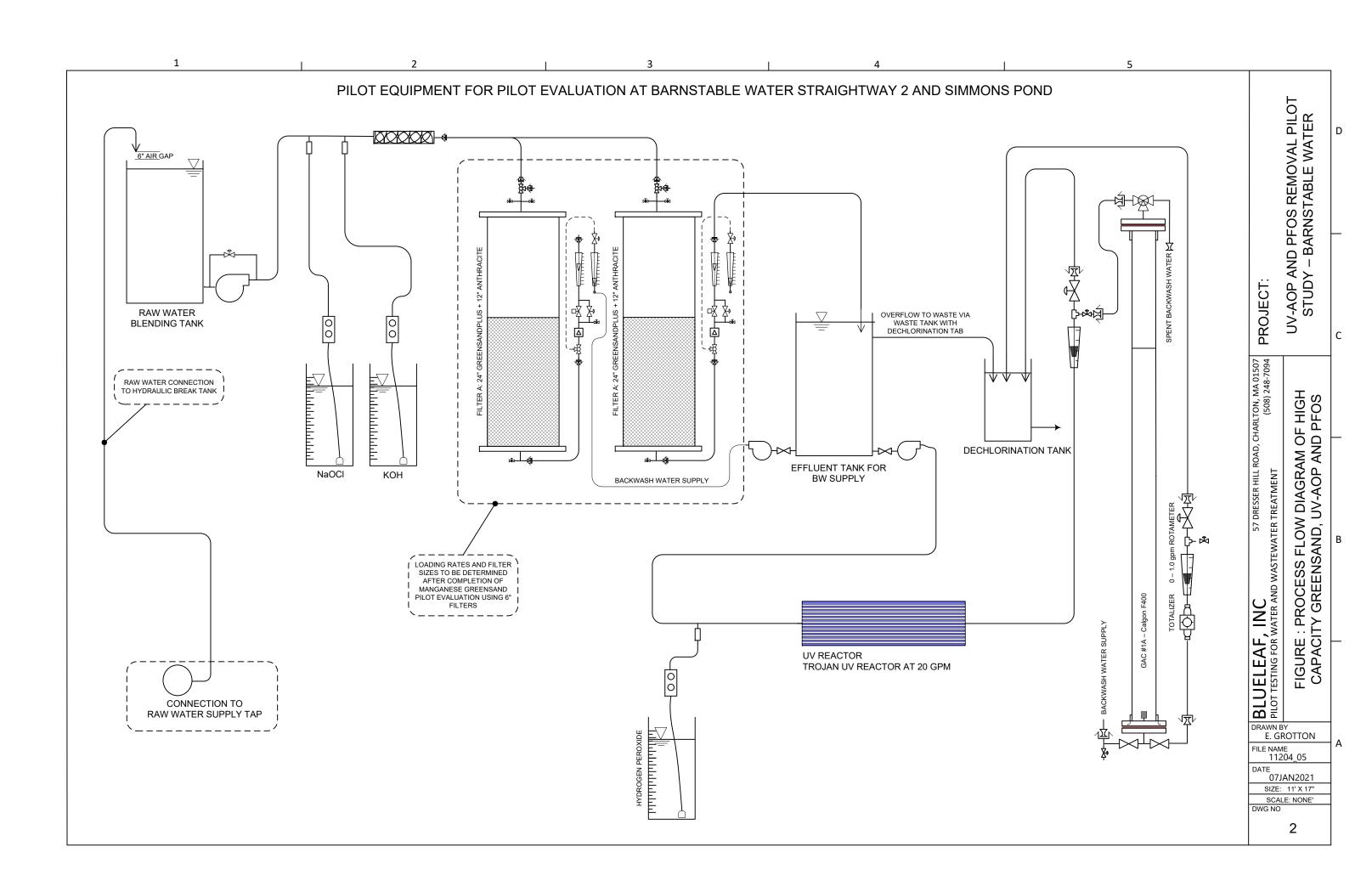
Parameter		Minimum Field Sampling Frequency				
Parameter	Source Water	Pretreated	UV Treated	GAC		
Total Iron	3 per source	3 per run	2 per Day	2 per day		
Dissolved Iron	3 per source	3 per run	2 per Day	2 per day		
Total Manganese	3 per source	3 per run	2 per Day	2 per day		
Dissolved Manganese	3 per 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			
рН	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.





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

Kust N. Com



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		✓
рН	✓	✓
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 CaCO₃		✓
рН	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 CaCO₃		✓
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		<u> </u>



ATTACHMENT B: WATER QUALITY SAMPLING SCHEDULE

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

[✓] indicates samples to be collected

⁻⁻⁻ indicates samples will not be collected

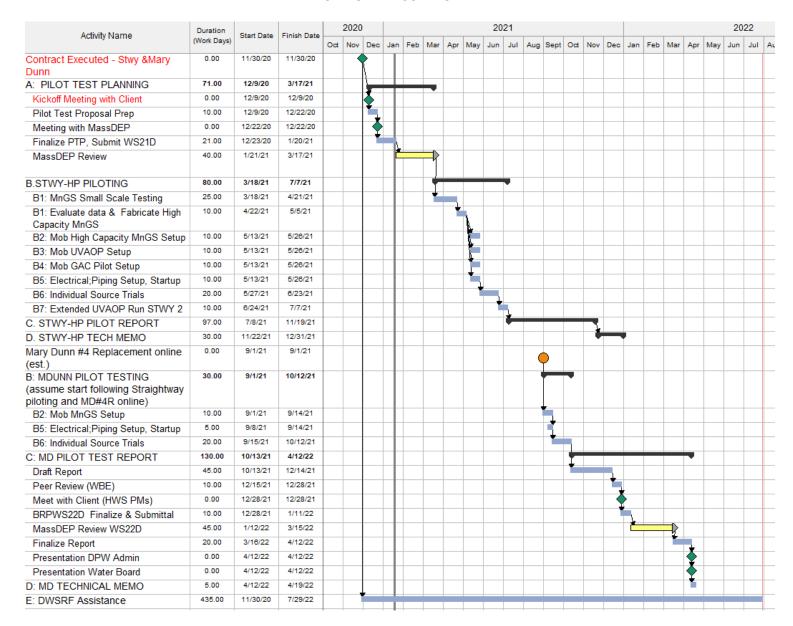
¹Field parameters presented in Table 5

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

Jim In Lunglin

IM/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, hans.keijser@town.barnstable.ma.us
Barnstable Board of Health, health@town.barnstable.ma.us

Michael Leahy, <u>Michael.Leahy@suez.com</u> Kevin Sampson, <u>Kevin.Sampson@suez.com</u>

Larry VandeVenter, <u>LVandeVenter@kleinfelder.com</u> Kirsten Ryan, <u>KRyan@kleinfelder.com</u>

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 μ g/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 GreensandPlusTM 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	
Ctraightman	Straightway 1	4020004-01G	
Straightway	Straightway 2	4020004-12G	
Livannianort	Hyannisport	4020004-03G	
Hyannisport	Simmons Pond	4020004-06G	
M D C4l-	Airport	4020004-10G	
Mary Dunn South	Mary Dunn 1	4020004-04G	
	Mary Dunn 2	4020004-05G	
Mary Dunn North	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), perfluoronanoic 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 GreensandPlusTM filters; and a high capacity unit with chemical addition, high capacity GreensandPlusTM 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 6inches in diameter with 24-inches of GreensandPlusTM 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 GreensandPlusTM 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 GreensandPlusTM 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, ISBN 978-1-60573-110-0.

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, ISBN 978-1-60573-110-0. 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.

TABLES REPRODUCED FROM THE KLEINFELDER AMENDED PROPOSAL DATED 2/5/2021

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

1 - Laborato	1 - Laboratory Sampling Parameters and Frequencies for All Sources (All sites)	
Sample	Parameter and Frequency	Frequency
Location		
	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True	1 nor ctudy nor well course
1	Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	The study bel well source
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved	
í	Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium	1 per study per well source
Kaw	(Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	1000 No. 100
	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	1 per study per well source
	Dioxide	No. of the Police All
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved	
Post Mings	Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium	1 per study per well source
riller	(Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	
	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	Total Solids, Total Suspended Solids	Each backersch grout
Backwash	(note that total volume and settling rate to be completed in field)	racii backwasii evelit
See below -for	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- Laborator	2- Laboratory Sampling Parameters and Frequencies for Hyannisport Well, with GAC	
Sample	Parameter and Frequency	Frequency
Location		
	Parameters Required by MaDEP Policy 90-04, Appendix 2: Turbidity, Total Iron, total Manganese, pH, True	1 ner stildv per well sollice
	Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	t ber sead ber men soare
	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	1 per study per well source
Kaw	(Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	
1	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:	
10	Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon	1 per study per well source
	Dioxide	
	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved	
Post Mings	Oxygen, Total conductivity, hardness, total dissolved solids (TDS), calcium (Ca), sodium (Na), magnesium	1 per study per well source
riller	(Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	
	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	1 per study
787	solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sulfate (SO4-), chloride (Cl), zinc (Zn)	
240	Other Parameters of Interest: TOC	1 per study
	PFOS (EPA extraction 537.1)	3 Samples
	1,4-Dioxane	None
MnGS	Total Solids, Total Suspended Solids	Fach backwash event
Backwash	(note that total volume and settling rate to be completed in field)	

Sample	Parameter and Frequency	Frequency
	<u>Parameters Required by MaDEP Policy 90-04, Appendix 2</u> : Turbidity, Total Iron, total Manganese, pH, True Color, Apparent Color, Alkalinity, Total Coliform, Carbon Dioxide	1 per study per well source
Raw	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)
9	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 (Ma), culfate (SOM), chloride (Cl), sinc (7a)	1 per study per well source
	Other Decembers of Interest: TOC TTUM and TUAMS	1 nor chudy nor woll course
	DEDC (FDA sytematics 527.1)	A per study per well source
	PFUS (EPA extraction 337.1)	Notice (A total)
	1-4 dioxane	1 per UV-AOP condition (4 total)
	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	Corrosion Control Parameters not included in 90-04 parameters: Oxidation Reduction Potential, Dissolved	
Process	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	1 per study
GAC	solids (TDS), calcium (Ca), sodium (Na), magnesium (Mg), sultate (SO4-), chloride (Cl), zinc (Zn)	4
	Other Parameters or Interest: IOC, Bromate, 11HM and 1HAA5	1 per study
	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.

<u>Iron and manganese sequestration</u> - 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.

<u>pH adjustment</u> – 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.

<u>Zinc orthophosphates</u> - 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.

<u>Disinfection</u> -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 deadend 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	37 Wellesley Circle 10/14/2020		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

WPQs 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)

	рН	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)

	рН	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.

<u>Pre-oxidation</u> – 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.

<u>pH adjustment</u> – 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.



<u>Advanced Oxidation Process</u> – 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.

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

<u>Disinfection</u> -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.

<u>Comparison to Maher</u>: 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.

- <u>pH</u>- 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 calculatedCO₂ 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.



- <u>Calcium</u>- 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.
- <u>Chloride</u> 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.
- <u>Sulfate</u>- 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.

Langelier Saturation Index (LSI) = pHs - pH

where: pH = pH of solution

pHs = 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:

= 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 CaCO₃) Alk = alkalinity concentration (mg/L as CaCO₃)

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 <u>qualitative</u> 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.

Larson-Skold Index (LSK) = [Chlorides] + [Sulfates]
[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:

<u>LSI</u> – 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.

<u>Larson Skold</u> – 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 $CaCO_3$ and increased to 51 and 65.5 mg/L as $CaCO_3$ 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.



<u>CSRM</u> – 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:

<u>LSI</u> – 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 waters ability to dissolve calcium carbonate scale but are not a significant increase.

<u>Larson Skold</u> – 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.

<u>CSRM</u> – 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:

<u>LSI</u> – 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.

<u>Larson Skold</u> – 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.

<u>CSRM</u> – 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:



<u>LSI</u> – 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.

<u>Larson Skold</u> – 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.

<u>CSRM</u> – 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.

<u>Stage 1/Stage 2 Disinfectants and Disinfection By-Product Rule (DBPR):</u> 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

Karyn E. Polito Lieutenant Governor Kathleen A: Theoharides Secretary

> 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/eea/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	ı

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.

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Sincerely,

Jim McLaughlin, Chief Drinking Water Program Bureau of Water Resources

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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 90 th Percentile Co	mpliance Worksheet)

ec: 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

LCR-SP-A

LEAD AND COPPER SAMPLING PLAN

Primary Sites

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nforma	ation for	NTNC Systems		1985						
lier 1: Contain	copper	pipes with lead so	lder installed after 1982 or contain lea	† <u>Tier 2:</u> ad Copper p	ipes with lead	solder	installe	† <u>Tier</u> d before Not a	3: oplicable	
ipes, a	any mo n	served by a lead	service line (LSL) MassDEP approved sampling site sh	1983						DEP
	SSDEP L	ise: Approved	Deficient/Disapproved	Com	ment [
	Rev.	10-2019 DEP	Deficient/Disapproved □ SAAFF: GiliANE JAA	POTEU	Date;	5/1	7/2	/ Pa	ge 1 of <u>6</u>	_

LCR-SP-A

LEAD AND COPPER SAMPLING PLAN

Primary Sites - continuation sheet

MassDEP	staff	name:
---------	-------	-------

This form is available at the MassDEP website at https://www.mass.gov/doc/lcr-sp-a-lead-and-go

Date: Townon Barnstable

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 Sample			How will the samples be colle one			d? Check
Tier†	Tier Class‡	Primary ¹ Sample Site Address	Location K ² B ³	PWS	Homeowner or Resident	Lab	Other
1	В	46 Wayland Road- Hyannis	\boxtimes		\boxtimes		
1	В	93 Uncle Willie's Way- Hyannis	\boxtimes		\boxtimes		$\overline{\Box}^{\circ}$
1	В	21 Saint Joseph Street- Hyannis	\boxtimes		\boxtimes		Ē
1	В	36 Delta Street- Hyannis			\boxtimes		Ē
1	В	29 lexington Drive- Hyannis			\boxtimes		ñ
1	В	56 lexington Drive- Hyannis			\boxtimes		$\bar{\Box}$
1	В	40 Goatfield- Hyannis			\boxtimes		
1	В	206 Sudbury Lane- Hyannis			\boxtimes		
1	В	4 Saint Francis Circle- Hyannis	\boxtimes		\boxtimes		
1	В	155 Sudbury Lane- Hyannis			\boxtimes		
1	В	46 Lexington Drive- Hyannis			\boxtimes		
1	В	35 Pasture Lane- Hyannis			\boxtimes		
1	В	15 Carla Road- Hyannis	\boxtimes		\boxtimes		
1	В	79 Wagon Lane- Hyannis			\boxtimes		
1	В	62 Quisset Road- Centerville			\boxtimes		
1	В	39 Marks Path- Hyannis			\boxtimes		
1	В	99 Wagon Lane- Hyannis			\boxtimes		
1	В	23 Uncle Willies Way- Hyannis	\boxtimes		\boxtimes		
1	В	59 Goatfield Lane- Hyannis			\boxtimes		
1	В	20 Erin Lane- Hyannis					
1	В	505 Lincoln Road EXT Hyannis	\boxtimes		\boxtimes		
1	В	57 Seagate Lane- Hyannis			\boxtimes		
1	В	36 Lexington Drive- Hyannis			\boxtimes		
1	В	20 Weston Circle- Hyannis		· .	\boxtimes		
1	В	130 Wagon Lane- Hyannis	\boxtimes		\boxtimes		

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.



Massachusetts Department of Environmental Protection **Drinking Water Program**

LEAD AND COPPER SAMPLING PLAN

LCR-SP-A

Primary Sites - continuation sheet

	INFO		

PWSID#:

Phone:

4020004

508-775-0063 X3524

PWS Name: Hyannis Water System

Population: 18,000 Samples Required: Plan P Redui Reduced

COM NTNC

Barnstable

II. REPORTING:

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

	mple egory	Sample			How will the samples be collected? Cr				
Tiert	Tier Class‡	Primary ¹ Sample Site Address	Loc K²	ation B³	PWS	Homeowner or Resident	Lab	Other	
1	В	294 \$cudder Lane- Hyannis	\boxtimes				М	\Box	
1	В	253 Sudbury Lane- Hyannis		\boxtimes	Ē	Ä	П	H	
1	В	154 Woodland Avenue- Hyannis	\boxtimes		$\overline{\Box}$	Ħ	Ä	7	
1	В	40 Simmons Pond Circle- Hyannis	$\overline{\Box}$	\boxtimes		ā			
1	В	285 Old Town Road- Hyannis	×			h .			
1	В	30 Marks path- Hyannis	\boxtimes			ă			
1	В	39 Wellesley Circle- Hyannis	\boxtimes			Ī		\Box	
1	В	58 Lexington Drive- Hyannis	\boxtimes			ñ			
1	В	57 Saint John Street- Hyannis		\boxtimes	$\bar{\Box}$	\Box	ī		
1	В	5 Lil Lane- Hyannis	\boxtimes			ñ			
1	В	58 Wagon Lane- Hyannis	\boxtimes			ī		Ħ	
1	В	41 Wellesley Circle- Hyannis	\boxtimes				ñ		
1	В	6 Lexington Drive- Hyannis		\boxtimes		\Box	Ē	ī	
1	В	36 Worcester Lane- Hyannis		\boxtimes		ī		Ħ	
1	В	25 Goatfield Lane- Hyannis	\boxtimes				Ē	Ħ	
1	В	290 Sudbury Lane- Hyannis	\boxtimes			百	$\overline{\Box}$	ī	
1	В	64 Melbourne Road- Hyannis	\boxtimes			$\overline{\Box}$	$\overline{\Box}$	Ä	
1	В	53 Lexington Drive- Hyannis	\boxtimes				$\bar{\sqcap}$	Ē	
1	В	395 Old Strawberry Hill Road- Hyannis	\boxtimes				Ē	F	
1	В	32 Buckwood Drive- Hyannis	\boxtimes					Ħ	
							Ä	m	
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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

I. PWS INFORMATION:

PWSID#: 4020004

PWS Name: Hyannis Water System

Phone:

508-775-0063

X3524

Population:

18,000

Samples Required:

Standard Plan 🖂

PWS Town:

Reduced Plan 🗌

Barnstable

LCR-SP-B

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		Sample		How will the samples be collected? Cone			
	Tier [†]	Tier Class‡	Alternative ¹ Sample Site Address	Location K ² B ³	PWS	Homeowner or Resident	Lab	Other
1	1	В	36 Kelley Road- Hyannis	\boxtimes \Box				
2	1	В	71 Peacock Drive- hyannis			$\overline{\boxtimes}$	Ħ	H
3	1	В	19 Erin lane- Hyannis	\boxtimes		$\overline{\boxtimes}$	ī	Ħ
4	1	В	37 Wellesley Circle- Hyannis			$\overline{\boxtimes}$	\Box	Ħ
5	1	В	23 Park Place- Hyannis			$\overline{\boxtimes}$	ñ	Ħ
6	1	В	23 Marks Path- Hyannis			$\overline{\boxtimes}$	Ħ	Ħ
7	1 ×	В	81 Melbourne Road- Hyannis	\boxtimes		×	Ħ	Ë
8	1	₿	25 Greenwood Avenue- Hyannis	\boxtimes		X	Ħ	
9	1	В	1 Peacock Drive- Hyannis			⊠	Ħ	占
10	1	В	15 Seagate Lane- Hyannis			⊠	Ħ	Ħ
11	1	В	23 Simmons Pond Circle- Hyannis			☒	Ħ	H
12	: 1	В	17 Worcester Lane- Hyannis			ᅒ	ñ	Ħ
13	1	В	31Wocester Lane- Hyannis	\boxtimes		$\overline{\boxtimes}$	Ħ	П
14	1	В	83 Peacock Drive- Hyannis			×	Ħ	ñ
15	1	В	104 Pitchers Way- Hyannis	\boxtimes	\Box	$\overline{\boxtimes}$	ñ	9 E
16	1	В	619 Falmouth Road- Hyannis		Ē		Ħ	Ħ
17	1	В	77 Peacock Drive- Hyannis	\boxtimes \Box	Ħ	×	Ħ	H
18	1	В	19 Kennedy Circle- Hyannis	\boxtimes \Box	ñ	X	H	Ä
19	1	В	25 Lexington Drive- Hyannis	$\boxtimes \Box$	$\overline{\Box}$	X	Ħ	H
20	1	В	127 Nobadeer Road- Hyannis			×	ñ	Ħ
21	1	В	60 Lexington Drive- Hyannis			×	Ħ	
22	1	В	39 Peacock Drive- Hyannis			$\overline{\boxtimes}$	ñ	Ħ
23	1	В	112 Wayland Road- Hyannis	\boxtimes		☒	ñ	Ħ
24	1	В	44 Nobadeer Road- Hyannis	\boxtimes	334	$\overline{\boxtimes}$	ñ	Ä
25	1	В	545 Lincold Road EXT Hyannis	\boxtimes		$\overline{\boxtimes}$	ī	Ä
26	1	В	38 Fawcett Lane- Hyannis			$\overline{\boxtimes}$	<u> </u>	Ħ
27	1	В	50 Oakview Terrace- Hyannis			$\overline{\boxtimes}$	П	Ħ
28	1	В	39 Mainsail Lane- Hyannis			$\overline{\bowtie}$	ñ	Ħ
29	1	В	455 Scudder Avenue- Hyannis	\boxtimes		$\overline{\boxtimes}$	Ħ	H
30	1	В	47 Pitchers Way- Hyannis		ā			ä

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	Minania Minani	How will the samples be collected? Chec					
Tie	rt Tier Class‡	Alternative ¹ Sample Site Address	Location K ² B ³	PWS	Homeowner or Resident	Lab	Other		
1	В	114 Sudbury Lane- Hyannis		Π	Or Resident	Th'			
, 1	В	134 Sudbury Lane- Hyannis				H	H		
1	Tracto B	124 Sudbury Lane- Hyannis				124 H	H		
a 1	В	36 Wellesley Circle- Hyannis				H-	H		
1	В	70 Buckwood Drive- Hyannis				· H- ·	- 7		
_ 1	В	251 Arrowhead Drive- Hyannis		in .	X X	H	. 님		
	В	19 Wagon Lane- Hyannis		Ti Ti	X	H	H		
· · · · · · · · · · · · · · · · · · ·	В	24 Wellesley Circle- Hyannis		T		Ħ-	- 片・		
1	В	33 Simmons Pond Circle- Hyannis		Ξ-		Ħ.	금		
1	B	76 Smith Street- Hyannis			\square	- 吉 - 1	Ħ		
1	<u>B</u>	61 Peacock Drive Hyannis				Ä.			
an and 1	<u>B</u>	82 Buckwood Drive-Hyannis							
1	В	7 Pitchers Way				Ħ			
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Page of 6



Massachusetts Department of Environmental Protection Drinking Water Program

LEAD AND COPPER SAMPLING PLAN

Schools and Early Education and Care Facilities

LCR-SP-C

J. PWS INFORMATION:

PWSID#:

4020004

PWS Name:

Hyannis Water System

GOUTH 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	Chec	k type	Was facility previously	Date of
	(and School Org code if known)	School	EECF	sampled by the	next sample?
1	Barnstable High School- 744 West Main Street			Yes No	
2	Barnstable Community Horace Mann- 165 Bearses Way			Yes No 🗆	
3	Barnstable Intermediate School- 895 Falmouth Road	Ø		Yes No 🗌	
4	Hyannis West Elementary- 549 West main Street			Yes No	
5	Enoch Cobb Early Learning Center- 77 Old Craigville Road	\boxtimes		Yes No	- Property
6	Academy of Early Learning- 465 Falmouth Road			Yes No No	
7	ST. John Paul II High School- 120 High School Road			Yes No No	
8	ST. Francis Xavier Prep- 33 Cross Street			Yes No No	
9	Little Step Daycare- 184 Compass Circle		\boxtimes	Yes No 🛛	
10	Crystal Hyannis- 1582 Iyannough Road		\boxtimes	Yes No 🛛	
11	Child Development- 154 Barnstable Road		\boxtimes	Yes No No	****
12	Kiddie Kollege- 154 Bearses Way	1 5		Yes No 🗌	
13	Early learning Center- 744 main Street		$\overline{\square}$	Yes No No	
14	Cape Cod Child Development- 83 Pearl Street			Yes No	*********
15	Cape Cod Child Development- 979 Pearl Street			Yes No No	
16	Crystal Garden Children Center- 64 Enterprise Road		Ø	Yes No No	
17	Bourne Sandwich Pre school- 90 Stevens Street		<u> </u>	Yes No 🛇	
18	Stevens Street Pre School- 116 Stevens Street		—————————————————————————————————————	Yes No 🗵	
19	Cape Care Network Cape Cod- 372 North Street		— <u>—</u>	Yes No No	
20	Sturgis Charter Public School- 427 Main Street			Yes No No	··· ····
21	Faith Christian Academy- 270 Communication Way			Yes No 🛇	
22	A Company of the Comp			Yes No No	
23				Yes No	
24				Yes No No	
25				Yes No No	

ATTACHMENT 2 HWS HYDRAULIC MODEL SCENARIOS

ATTACHMENT 3 WATER QUALITY SUMMARY OF KLEINFELDER SAMPLING & MAHER SAMPLING



			Hyannisport			Straightwa	y 2	Simmons Pond Maher Treatment Plant				tment Plant		
Parameter	Unit	Raw	Existing Treatment*	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Existing Treatment	Simulated Finished	Raw	Greensand Treated	UV Treated	GAC Treated
рН	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 CaCO₃	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	0.00322	0.00322	0.00322	1.365	0.00322	0.00322	0.0355	0.00322	0.0032 ²	0.0603	0.00322	0.00322	<u>0.00323</u>
Manganese	mg/L	0.12	0.0012	<u>0.0115³</u>	0.975	0.0255	<u>0.00125³</u>	0.155	0.0087	<u>0.0012³</u>	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	<u>0.0845³</u>	0.3	0.4*		0.25	0.3		0.3	0.45				
Total Hardness	mg/L as CaCO₃	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



	Hyannisport				Straightway 2			Simmons Po	ond	Maher Treatment Plant			
Parameter Raw Existing Simulated Treatment* 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

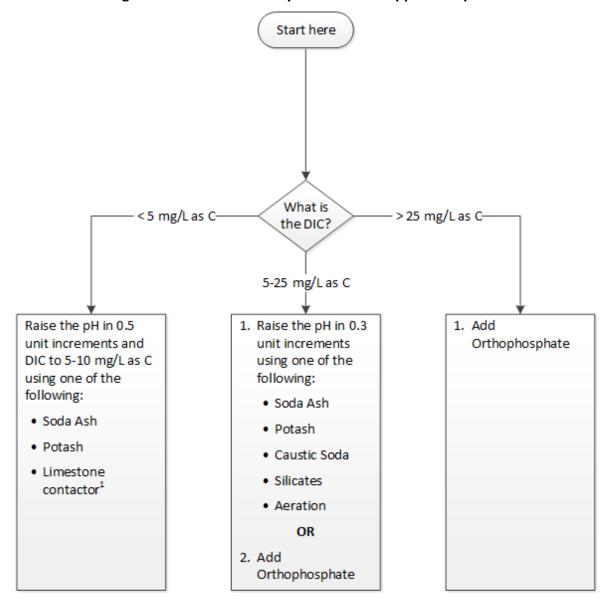
Annoit 3.3. Identifying ti	ic Appropriate Howena	it ioi i iciiiiiiai y cci oc	
Is iron or manganese	What is the	What is the finished	Use This Flowchart ²
present in finished	contaminant to be	water pH?	
water? ¹	addressed?		
	Lead only, or	< 7.2	1a
	Both Lead and	7.2 - 7.8	1b
	Copper	>7.8 - 9.5	1c
No		>9.5	1d
		< 7.2	2 a
	Copper only	7.2 - 7.8	2b
		>7.8	2c
Yes	Lead and/or Copper	< 7.2	3 a
		≥ 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



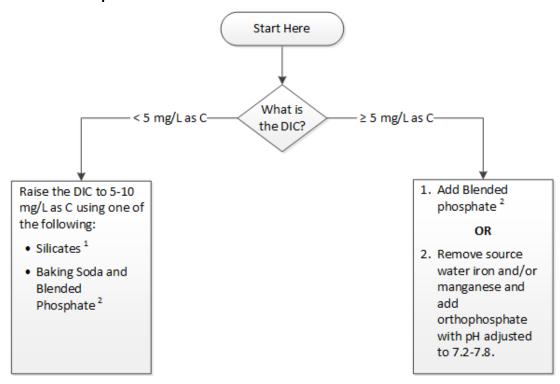
KEY:

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:

 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:

- 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 PO Number: None Kleinfelder Job ID: 56787 4 Technology Dr. Date Received: 4/29/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

lucer

Chief Operating Officer Total number of pages: 19

Date of Approval: 5/13/2021

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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 Reporting Instr Dil'n Prep **Analysis** Limit **Parameter** Result Units Factor Analyst Date Batch Date Time Reference 1,4-dioxane < 0.25 0.25 ug/L 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		Reporting		Instr Dil'n	Prep	Analysis			
Parameter	Result	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	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 Limit	lı Units	nstr Dil'n Factor	Analyst	Prep Date	Analysis Batch Date Time			Reference
Alkalinity, Total (as CaCO3)	6	5	mg/L	1	SFM		2101167 5		14:30	SM2320B
Apparent Color	< 5.0	5.0	CU	1	DJM		2101150 4	1/30/21	16:35	SM2120B
Bromide	< 0.1	0.1	mg/L	1	DBV		2101192 5	5/4/21	14:12	E300.0A
Chloride	100	2.5	mg/L	5	DBV		2101156 4	1/30/21	14:34	E300.0A
Nitrate-N	4.4	0.1	mg/L	1	DBV		2101156 4	1/30/21	20:20	E300.0A
Nitrite-N	< 0.1	0.1	mg/L	1	DBV		2101156 4	1/30/21	20:20	E300.0A
ortho-phosphate as P	< 0.1	0.1	mg/L	1	DBV		2101156 4	1/30/21	20:20	E300.0A
Sulfate	15	0.5	mg/L	1	DBV		2101156 4	1/30/21	20:20	E300.0A
Total Dissolved Solids (TDS)	220	20	mg/L	1	SFM		2101164 4	1/30/21	18:00	SM2540C
Total Coliform Bacteria	absent			1	DBV		2101144 4	1/29/21	16:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2101144 4	1/29/21	16:40	SM9223BColilert
Conductivity	420	5 ι	umhos/cn	n 1	SFM		2101137 4	1/30/21	12:30	SM2510B
рН	6.1 H		рН	1	SFM		2101180 4	1/29/21	18:30	SM4500H+B
H = Sample was receive	H = Sample was received beyond method holding time.									
Turbidity	< 1.0	1.0	NTU	1	EB		2101143 4	1/30/21	11:45	SM2130B

Sample#: 56787-001 Sample ID: Raw-HP Matrix: Water

Sampled: 4/29/21 8:45		Reporting	Instr Dil'n			Prep	p Analysis			
Parameter	Result	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	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		Reporting			Dil'n		Prep		Anal	ysis
Parameter	Result	Limit		Units	Factor	Analyst	Date	Batch	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	5/5/21	11:44
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.33	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorobutane sulfonic acid (PFBS)	5.9	1.7	0.42	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorodecanoic acid (PFDA)	1.7 U	1.7	0.29	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorododecanoic acid (PFDOA)	1.7 U	1.7	0.36	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluoroheptanoic acid (PFHPA)	3.1	1.7	0.28	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorohexane sulfonic acid (PFHXS)	20	1.7	0.33	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorohexanoic acid (PFHXA)	6.4	1.7	0.29	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorononanoic acid (PFNA)	0.88 J	1.7	0.38	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorooctane sulfonic acid (PFOS)	16	1.7	0.34	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorooctanoic acid (PFOA)	6.6	1.7	0.28	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.42	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	ACA	5/5/21	13842 5	5/5/21	11:44
perfluoroundecanoic acid (PFUNA)	1.7 U	1.7	0.27	ng/L	1	ACA	5/5/21	13842 5	5/5/21	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	5/5/21	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	5/5/21	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	5/5/21	11:44
Surrogate Recovery		Limits								
13C2-PFHxA SUR	92	70-130)	%	1	ACA	5/5/21	13842 5	5/5/21	11:44
13C2-PFDA SUR	96	70-130)	%	1	ACA	5/5/21	13842 5	5/5/21	11:44
D5-NEtFOSAA SUR	82	70-130)	%	1	ACA	5/5/21	13842 5	5/5/21	11:44
13C3-HFPO-DA SUR	104	70-130)	%	1	ACA	5/5/21	13842 5	5/5/21	11:44

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



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

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

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



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

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 Ar	mt 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 A	mt 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 A	Amt Added	%R		Limits		RPD	RPI) Limit
E300.0A	BLK2101156	Chloride		<	0.5	mg/L								
		Nitrate-N		<	0.1	mg/L								
		Nitrite-N ortho-phosphate as P		<	0.1 0.1	mg/L mg/L								
		Sulfate		<	0.5	mg/L								
E300.0A	DUP2101156	Chloride ortho-phosphate as P	56785-001 56785-001		110 18	mg/L mg/L						1 8		10 10
F200 04	1.000101157		30703 001				100	0.4		00	110	Ü		10
E300.0A	LCS2101156	Chloride Nitrate-N			94 9.6	mg/L mg/L	100 10	94 96		90 90	110 110			
		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				95	mg/L	100	95		90	110		0	10
		Nitrate-N			9.6	mg/L	10	96		90	110		0	10
		Nitrite-N ortho-phosphate as P			15 9.8	mg/L mg/L	15 10	99 98		90 90	110 110		0 4	10 10
		Sulfate			100	mg/L	100	100		90	110		0	10
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	10
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	10
SM2320B	PB2101167	Alkalinity, Total (as CaCO3)		<	5	mg/L								
						-								



Method	QC ID	Parameter	Associated Sample		Result	Units A	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	рН	56796-002		5.4	рН						
SM4500H+B	DUP2101180	рН	56823-001		5.5	рН						
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		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	t	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		90			%			70 13	30	
		13C2-PFDA SUR		95			%			70 13	30	
		D5-NEtFOSAA SUR		81			%			70 13	30	
		13C3-HFPO-DA SUR		94			%			70 13	30	



Method	QC ID	Parameter		ociated ample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13842	2,3,3,3-tetrafluoro-2-(heptafluoro acid (GenX acid) (HFPODA)	propoxy)propanoic 567	773-009	0.76 J	1.7	0.26	ng/L					30
		n-ethyl perfluorooctanesulfonam (NETFOSAA)	ido acetic acid 567	773-009	1.7 U	1.7	0.33	ng/L					30
		n-methylperfluorooctane sulfona (NMEFOSAA)	mido acetic acid 567	773-009	1.7 U	1.7	0.27	ng/L					30
		perfluorobutane sulfonic acid (PI	FBS) 567	773-009	2.6	1.7	0.42	ng/L				2	30
		perfluorodecanoic acid (PFDA)	567	773-009	1.5 J	1.7	0.29	ng/L					30
		perfluorododecanoic acid (PFDC	DA) 567	773-009	1.7 U	1.7	0.36	ng/L					30
		perfluoroheptanoic acid (PFHPA) 567	773-009	12	1.7	0.28	ng/L				3	30
		perfluorohexane sulfonic acid (P	FHXS) 567	773-009	29	1.7	0.33	ng/L				1	30
		perfluorohexanoic acid (PFHXA)	567	773-009	7.1	1.7	0.29	ng/L				5	30
		perfluorononanoic acid (PFNA)	567	773-009	4.1	1.7	0.38	ng/L				17	30
		perfluorooctane sulfonic acid (PF	FOS) 567	773-009	58	1.7	0.34	ng/L				5	30
		perfluorooctanoic acid (PFOA)	567	773-009	56	1.7	0.28	ng/L				4	30
		perfluorotetradecanoic acid (PF)	EA) 567	773-009	1.7 U	1.7	0.42	ng/L					30
		perfluorotridecanoic acid (PFTRI	A) 567	773-009	1.7 U	1.7	0.11	ng/L					30
		perfluoroundecanoic acid (PFUN	A) 567	773-009	1.7 U	1.7	0.27	ng/L					30
		11-chloroeicosafluoro-3-oxaunde acid (11CLPF3OUDS)	ecane-1-sulfonic 567	773-009	1.7 U	1.7	0.33	ng/L					30
		9-chlorohexadecafluoro-3-oxano (9CLPF3ONS)	ne-1-sulfonic acid 567	773-009	1.7 U	1.7	0.34	ng/L					30
		4,8-dioxa-3h-perfluorononanoic a (ADONA)	acid (ADONA acid) 567	773-009	1.7 U	1.7	0.15	ng/L					30
		13C2-PFHxA SUR	567	773-009	42			%			70 130	*	
		13C2-PFDA SUR	567	773-009	145			%			70 130	*	
		D5-NEtFOSAA SUR	567	773-009	74			%			70 130		
		13C3-HFPO-DA SUR	567	773-009	38			%			70 130	*	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limi	its	RPD	RPD Limit
E537.1	LCS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	t	3.1	2.0	0.40	ng/L	3.74	83	50	150		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	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-NEtFOSAA SUR		85			%			70	130		
		13C3-HFPO-DA SUR		110			%			70	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Jnits	Amt Added	%R	Lin	nits	RPD	RPD Limit
E537.1	MS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	c 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-NEtFOSAA SUR	56787-001	80			%			70	130		
		13C3-HFPO-DA SUR	56787-001	104			%			70	130		



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Sample		ield	AINE			7000000								EB		24.1	ADEP	24.2	DRO C	AH [800	37.1	664	B0D	Sec	Metals	fetals-	ved Me	nia C	phoru	0	0	ivity	Vetals			or C
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Samples Receive					IEx D-USI		L	ab Co	uri	er U-Che		rop-off	□ E-Yes	□-No
Custody Seals	- present & i	ntact:		J-No				1.			_			
Receipt Temp:		°C			Yes								igo? □-Yes	No
6			PFAS-onl	y real	ice? XYes	1-1	No U-N	N/A		Any si	gns o	f freezi	ng? □-Yes	⊠ -No
Comments:					D1 C:	//T	0.0					Charle	II 6 AT I	annliashla*
Preservation					Bottle Size	Type	& Qua	ntity					pH for ALL es and docum	
/ Analysis	40mL(G)		250mL(P)		500mL(P)		1L(G)					Sample	and docum	icit.
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)		IL(G)					OHL	2500	and the second
H ₂ SO ₄	40mL(G)	2	60mL(P)	-	125mL(P)		250mL(P)		500mL(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)	4								and the second	the second secon	PFAS, TOC,O&C
NH ₄ Ac	125mL(P)		250mL (P)	1									al Cl not pre	
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MeOH	20mL(G)		40mL(G)									Dacteria	a Resci + by a	naryst
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PFAS: Lab spec	cific bottles?	QC rec	ceived, if requi	ired?		X	5	_	-					
Bacteria bottles	provided by	ARA?	5.			7	>							
Samples within	holding time					X								
Immediate tests	communicat	ed in	writing:	1.00			/	D	12	VISPA	1 0	-0		
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QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

PO Number: None Alex Bishop Kleinfelder Job ID: 56785 4 Technology Dr. Date Received: 4/29/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 5/13/2021

Total number of pages: 13

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

NH902 Maine

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		Reporting		Instr Dil'n		Prep		Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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		Reporting		Instr Dil'n	Prep		Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst Date	Batch	Date	Time	Reference
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	F	Reporting	Ir	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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	100 M	2.5	mg/L	5	DBV		2101156	4/30/21	13:45	E300.0A
M = The recovery for the m samples were acceptable.	natrix spike	was 85%.	The ac	ceptance	e criteria is	90-11	0%. All ot	her asso	ciated Q	С
ortho-phosphate as P	16 M	0.5	mg/L	5	DBV		2101156	4/30/21	13:45	E300.0A
M = The recovery for the m samples were acceptable.	natrix spike	was 85%.	The ac	ceptance	e criteria is	90-11	0%. All ot	her asso	ciated Q	С
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 u	mhos/cm	1 1	SFM		2101137	4/30/21	12:30	SM2510B
рН	6.5 H		рН	1	SFM		2101132	4/29/21	18:12	SM4500H+B
H = Sample was received	beyond me	thod holdii	ng 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 Reporting **Analysis** Prep Instr Dil'n Limit Analyst Date Date Time Parameter Result Units Factor Batch Reference mg/L 2101189 5/4/21 Total Organic Carbon (TOC) < 1.0 1.0 DBV 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.

alibration	
o exceptions noted.	
ethod Blank	
o exceptions noted.	
irrogate Recoveries	
o exceptions noted.	
aboratory Control Sample Results	
o 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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits	<u> </u>	RPD	RPD Lim
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 A	mt Added	%R	Limits	S	RPD	RPD Lim
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 A	Amt Added	%R		Limits	;	RPD	RP	D 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	10
		Sulfate			98	mg/L	100	98		90	110		0	10
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				95	mg/L	100	95		90	110		0	10
		ortho-phosphate as P			9.8	mg/L	10	98		90	110		4	10
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	20
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		Alkalinity, Total (as CaCO3)			26	mg/L	25	103		90	110		1	10
SM2320B	PB2101167	Alkalinity, Total (as CaCO3)		_	5	mg/L								
JIVIZJZUD	FDZ 10110/	minallility, Tutal (as CaCU3)		<	3	my/L								



Method	QC ID	Parameter	Associated Sample		Result		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	рН	56730-001		7.0	рН						
SM4500H+B	DUP2101132	рН	56757-001		7.7	рН						
SM4500H+B	DUP2101132	рН	56785-001		6.7	рН						
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		



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Lab	r	ald	# CONTAINERS	N	/latrix	(Pre	serva	tion	Meth	nod	Sa	ampling	_				2 0 %	TPH □ DRO 8015	□ 8270PAH □ 8270ABN □ 625.1 □ EDB	080	-	☐ 0&G 1664 ☐ Mineral 0&G 1664	CAPH - BOD CLEONductivity Offurbidity Chapparent Color	D SQ	☐ RCRA Metals ☐ Priority Pollutant Metals	Total Metals-list: (a, Na, Mg)	Unissolved Metals-list:	CA:Phosphorus C Bacteria P/A	□ Cvanide □ Sulfide □ Nitrate + Nitrite	□ Nitrate □ Nitrite □ Chloride □ Stilfate □ Bromide □ Fluoride	☐ Corrosivity ☐ Ignitibility/FP	☐ TCLP Metals ☐ TCLP V0C	Subcontract: Grain Size Herbicides	C	Grab (G) or Composite (C)
Sample		eld D	NTAIL	E.	0	E.			-4	_	_		1,000	SAMPLER	□ V0C 8260	□ V0C 624.1	C VPH MADEP	□ V0C 524.2	00	OPAH.	12 PCB	PFAS 537.1	3 1664	□ B0	OTSS ONDS	3A Met	al Meta	U Dissolved P	hosor	nide	ate C	rosivity	P Met	ntract	Total	G) or
(Lab Use Only)	_	0.00	00 #	WATER	SOLID	OTHER	HCI	HNO	H ₂ SO₄	NaOH	МеОН	DATE	TIME	SAME	2 VOC	00V E	□ VPH	00V C	TPH	7 827	2 808 □	PFA	_ 0&(A pH	Z TSS	□ RCF	□ Tota	SIO	4	Cva	□ Nitr	□ Con	D TCL	Subco	6	Grab (
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				San	ple Recei	ipt (Conc	litio		-		56785	
Absolute Re		socia						_		Job Numb			
Samples Receive				J-Fee			2	Lab	Cour			rop-off	
Custody Seals				J-No						CoC s	C		
Receipt Temp:	_3	°C	Samples o									24 hrs ago? ☐-Yes ☐-No	
Comments:			PFAS-onl	y real	ice? □-Yes	1-0	No D	(N/	A	Any si	gns o	f freezing? □-Yes □No	
Preservation					Bottle Size	Type	& O	uanti	itv			Check pH for ALL applicable*	_
/ Analysis						-31			-5			samples and document:	
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(0)				11/ = 50	
HNO ₃	125mL(P)	_	250mL(P)		500mL(P)	-	250	Tom		500 T m		OTICE ALL SUCKA	
H ₂ SO ₄ NaOH	40mL(G) 125mL(P)	1	60mL(P) 250mL(P)		125mL(P)	1	250n	тГ(_Б)	-	500mL(P)		PHEZINI	
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)								
ZnAc-NaOH	125mL(P)	-	250mL(P)										
Trizma	125mL(P)		250mL (P)									*pH ✓ by analyst: VOC, PFAS, TOC,O&	G
NH ₄ Ac	125mL(P)		250mL (P)									Residual Cl not present:	
NaS ₂ O ₃	40mL(G)		120mL(P)									ABN625Pest608	
MeOH	20mL(G)		40mL(G)								100	Bacteria ResCl ✓ by analyst	
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syrin	ge				PC Dry applicable? Y N	
None (water)	40ml (G)	3	60mL(P)G	3	125mL(P)	3	250n	L(P)	1	500mL(P)	1	1L(G) 1L (P)	
	180 P												
Mold	Cassette		Bulk		Plate		Tape	Lift					
Asbestos	Cassette		Bulk										
Lead	Cassette		Bulk		Wipe				-				
									_				
Login Review	,	350			BERNER	Yes	N	N	J/A	Comments			
Proper lab sam		s/enou	igh volume/co	orrect	preservative?	×							
Analyses marke						大							
VOC &TOC W						>							
VOC Solid-MeO			ks, Prep Expira	tion C	K?	-							
PFAS: Lab spec	cific bottles? (QC rec	ceived, if requi	ired?		-			X				
Bacteria bottles	provided by	ARA?				>		-	X	TESLLY	1/26		
Samples within	holding time	?				X							
Immediate tests	communicat	ed in v	writing:			~	/						
NO ₃ , NO ₃ o-PO ₄ (r Surfactants, Turbid	BOD, Colifo	Ferrous	Trop Dissolved), Enter	Linnes 624	~	•						
Date, time & II				xygen,	Onpres 024	8	-					AND THE RESERVE OF THE PARTY OF	
Rushes commu		The second				-		3	X				
Subcontract not		-	8			×	1			HAA			
Pesticides EPA						12			×	11111			
Compliance san	-	discre	pancies/requi	ire no	flags?					(Or must be	rejecte	ed)	
Log-in Supervis									1	Discrepancies DoD etc.) or u		bliance samples (NHDES, MADEP,	
	Inspected	and I	Received By:		0	12	V	ī	Date /	Time: 4/2	41:	21 17.06	
Peer Review C		and i	deceived by.	_			_		Jate,	Timev	1.		٦
			On Inc. T.		OV)		_	1 0		ID.		Analyses in Correctly	
Client ID/F			On Ice, To				_		ample	1108		☐ Analyses in Correctly	1
☐ Project Nan			□ PO# (if p						latrix			-references	1
☐ TAT/rushe	s communica	ted	☐ Sub sampl	les ser	nt? Shipping Ch	arge?				ime collected		-wastewater methods	ı
☐ Received D	ate/Time		☐ Issues not viewed By:		ove communic	ated?	I	l Si Date:		ITs communic	cated	□ Notes from CoC in LIMS	
Notes: (conti	nue on bac							I, E		Initials	Date	What was sent?	
							Upl	oade	d / PI	-		Report / Data / EDD / Invoid	ce
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									d/PI			Report / Data / EDD / Invoid	
											(QSD-04 Rev8 01/06/21 JVG (Page 1 of	1)



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: Work Order #: 05/13/2021 2105-00651

Client Job #:

05/05/2021

Date Received: 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

Donald a. D



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

Fails EPA Primary
Fails EPA Secondary
Fails State Guideline
Attention

Passes

 DATE AND TIME COLLECTED:
 04/29/2021
 11:45AM

 DATE AND TIME RECEIVED:
 05/05/2021
 11:17AM

Legend

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 4.9° CELSIUS

MORE LOC INFO: CLIENT JOB #:

MUKE LUC INFU.					CLIE	NI JUD#.			
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	05/07/2021 04:08PM



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
lowa	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

Revision date: 09/29/2020



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 Report: 516911

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 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: Alph

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 MRL† Result Limit		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:	*	۸	!

Client Name: Alpha Analytical Report #: 516911

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

425132 pm 5|5|21

	Subcontract Chain of Custody
APHA	Eurofins US 110 South Hill St. South Bend, IN 46617

Alpha Job Number L2122108

World Class Chemistry							516911	
Client	Information		Project Info	ormation		Regulatory Requiremen		
Client: Alpha Analyti ddress: Eight Walkup Westborough	cal Labs Drive , MA 01581-1019	Project Location: No Project Manager: Turnarour	The state of the s	vis Prables Informat	Regul	Federal Program: atory Criteria:		
Phone: 508.439.5170 Email: nlewis@alpha) alab.com	Due Date: Deliverables:						
ALL TO THE		Project Specific	Requireme	nts and/or Repo	ort Requirements			
Refere	ence following Alpha Job Nur	nber on final report/d	eliverables:	L2122108	Report to inc	clude Method Blank, LCS/L	.CSD:	
Additional Comments	: Send all results/reports to s	ubreports@alphalab.	com					
Lab ID	Client ID	Collection Date/Time	Sample Matrix	į.	Analysis		Bate QC	ch
4892364	SIMULATED-HP	04-29-21 11:45	DW	Bromate		Client Provided Sample (
	Relinquished B	y:		Date/Time:	Receiv	ed By:	Date/Time:	
orm No: AL subcoc	2	8		6 4 2			5/5/2021 0	815
				<u> </u>			1000	-

ALPHA 8 Walkup Drive	CHAIN O	Project	Informati	on	GE	OF	-	_	in Lab:	_					-	THE OWNER OF THE OWNER, OH	1000	b#:		12210	8
Westboro, MA (Tel: 508-898-92	01581 Mansfield, MA 02048	Project N	ame: Scr	shipl	e		ΠA	DEx		EN EN	AIL				0	Same	as Cl	lient in	fo Po	O #:	
Client Information	on Aluena	Project Le	ocation:	yenit 1	out u	ell	THE RESERVE TO SERVE THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED	NO COLUMN TWO	ry Req	District Property lies					Info	TO 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	T. 41 A. 40.0 J	0.12	SUIT VICTORIA	OWNERS OF STREET	
Client: (clein f	elder	Project #		4			☐ Ye	S D N	o MA M o Matrix	CP An Spike	alytic	al Met	thods on thi	SDG	? (R					Analytical Me ics)	thods
		Project M	anager:				☐ Ye	N	o GW1	Standa	ards (Info R	Requir	ed for	Meta	ls & E	PH w	ith Tar	gets)		
Weed	chrology Dr. Horough MA	ALPHA	Quote #:						o NPDE ate /Fed								Criter	ia			
Phone: 914-	400-9598	Turn-A	round Tin	ne					1	15	/ 5	12	/_	1		1	/	7	II		
Additional P	hop & Kleinfelder.co Project Information: ports to 2 Kleinfelder.com	Date D	lue:	RUSH (unity o		0,00250	Dases ANALYSIC	SVOC: D ABW D 524 2	METALS: DMCP 13 D.	EPH: DR.	VPH. CID.	D PCB Targels D P.	Journal Manges	Score Deingerprins	1000	//			//	SAMPLE II Filtration Field Lab to de Preservatio	o m
ALPHA Lab ID (Lab Use Only)	Sample ID		Colle Date	ection Time	Sample Matrix	Sampler Initials	, voc.	SVOC	METAL	EPH:	VPHE	D PCE	TPH: C	120					Sa	mple Comm	
22108 - 01	Rew-HP		4/29/21	0845	000	AB								X					A		
-02	Finished - HP	>	4/28/21	1150	DW	AB			9					X							
-03	Simulated - 15		4/24/21	1145	OW	AB		-						X							
Container Type P= Ptastic A= Amber glass Y= Vial G= Glass B= Bacteria cup C= Cube	Preservative A= None B= HCI C= HNO ₃ D= H ₂ SO ₄ E= NBOH F= MeOH	Reling	uished By:		Pr	ainer Type reservative te/Time			Recei	ved B	y.		RA	D	ate/Ti	me					. Alto of
C= Cube O= Other E= Encore D= BOD Bottle	F= MeOH G= NaHSO ₄ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ CI K= Zn Acetale C= Other	Q			4/29	1205	00	i el	- Y	-3	IA	7	4/2	4/29/2	1	141	OS	lpha's ee rev	Terms erse si	bmitted are si and Condition de. ev. 12-Mar-2012)	ns.



Subcontract Chain of Custody

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

Alpha Job Number L2122108

Client	Information		Project In	formation	Regulatory Req	Requirements/Report Limits			
Client: Alpha Analyti Address: Eight Walkup Westborough	cal Labs Drive , MA 01581-1019	Project Location: Project Manager: Turnarou		wis erables Information	State/Federal Program: Regulatory Criteria;	55			
Phone: 508.439.5170 Email: nlewis@alpha	0 alab.com	Due Date: Deliverables:							
		Project Specific	Requirem	ents and/or Report Re	equirements				
Particular consumer consumer that the	ence following Alpha Job Nur : Send all results/reports to s			L2122108	Report to include Method Blar	nk, LCS/LCSD:			
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Ana	lysis	Batch			
	SIMULATED-HP	04-29-21 11:45	DW	Bromate					
	Relinquished B	By:		Date/Time:	Received By:	Date/Time:			
	- 2	7		5 4 2					
Form No: AL_subcoc									

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 56823 4 Technology Dr. Date Received: 5/3/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 5/13/2021

Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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
				,



Job ID: 56823

Sample#: 56823-001 Sample ID: Raw-HP Matrix: Water

Sampled: 5/3/21 9:00 Reporting Instr Dil'n Prep **Analysis** Time **Parameter** Result Limit Analyst Date Batch Date Units Factor Reference 1,4-dioxane < 0.25 0.25 ug/L LMM 2101197 5/5/21 7:26 SW8260Dmod



Job ID: 56823

Sample#: 56823-001 Sample ID: Raw-HP Matrix: Water

Sampled: 5/3/21	9:00		Reporting		Instr Dil'n	Prep		Ana	lysis	
Parameter		Result	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		Reporting	lı	nstr Dil'n		Prep		Ana	lysis	
Parameter	Result	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 u	ımhos/cn	n 1	SFM		2101173	5/4/21	10:15	SM2510B
рН	5.7 H		рН	1	SFM		2101180	5/3/21	17:20	SM4500H+B
H = Sample was received	d beyond me	ethod holdi	ng 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		Reporting		Instr Dil'n		Prep		Ana	lysis	
Parameter		Result	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

Job ID: 56823

Sample#: 56823-001 Sample ID: Raw-HP Matrix: Water

Sampled: 5/3/21 9:00

Method Reference: E537.1		Reporting	a		Dil'n		Prep		Anal	ysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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

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



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

Job ID: 56823

Sample#: 56823-002 Sample ID: Field Blank Matrix: Water

Sampled: 5/3/21 0:00

Method Reference: E537.1		Reporting	a		Dil'n		Prep		Anal	lysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch		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

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



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

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

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- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Ar	mt 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 A	mt 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 A	mt Added	%R		Limits	S	RPD	RP	D 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				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								
JIVIZJZUD	1 02 10 1240	Amaining, rotal (as CaCOs)		_	5	mg/L								



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limit	S	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	рН	56796-002		5.4	рН						
SM4500H+B	DUP2101180	рН	56823-001		5.5	рН						
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	Limi	ts I	RPD	RPD Limit
E537.1	BLK13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	d	2.0 U	2.0	0.40	ng/L						
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L						
		13C2-PFHxA SUR		93			%			70	130		
		13C2-PFDA SUR		99			%			70	130		
		D5-NEtFOSAA SUR		79			%			70	130		
		13C3-HFPO-DA SUR		101			%			70	130		



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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 13	30	
			13C2-PFDA SUR	56817-002	93			%			70 13	30	
			D5-NEtFOSAA SUR	56817-002	76			%			70 13	30	
			13C3-HFPO-DA SUR	56817-002	99			%			70 13	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	LCS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-NEtFOSAA 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	Limit	ts	RPD	RPD Limit
E537.1	MS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-NEtFOSAA SUR	56821-001	80			%			70	130		
		13C3-HFPO-DA SUR	56821-001	91			%			70	130		



18 of 19

Sample Receipt Condition Report

56823

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Absolute Re	esource As	socia				E197.0			Job Numb	er:		
Samples Recei	ved from:		□-UPS □	J-Fed	lEx □-US	PS	O-L	ab C	our	ier D-Clie	ent D	rop-off
	Custody Seals - present & intact: □-Yes □-No □-N/A Receipt Temp: °C Samples on ice? □-Yes									CoC s		
Receipt Temp:		°C	Samples o	n ice	□-Yes	i-D	No D-N	J/A		Sampl	ed <	24 hrs ago? □-Yes □-No
			PFAS-onl				No O-1					of freezing? □-Yes □-No
Comments:												
Preservation				FU	Bottle Size	/Туре	e & Qua	ntity				Check pH for ALL applicable*
/ Analysis												samples and document:
HCl	40mL(G)		250mL(P)	,	500mL(P)		1L(G)					011/2=0
HNO ₃	125mL(P)		250mL(P)	1	500mL(P)		250 5	-		500 T m		PH25Pm
H ₂ SO ₄	40mL(G)	12	60mL(P)	-	125mL(P)	-	250mL	(P)		500mL(P)		
NaOH	125mL(P) 60mL(P)	-	250mL(P) 125mL(P)		250mL(P)				-			
(NH ₄) ₂ SO ₄ ZnAc-NaOH	125mL(P)	-	250mL(P)		230mL(P)							
Trizma	125mL(P)		250mL (P)	3				-				*pH ✓by analyst:VOC, PFAS, TOC,O&G
NH ₄ Ac	125mL(P)	-	250mL (P)	3								Residual Cl not present:
NaS ₂ O ₃	40mL(G)		120mL(P)									ABN625 Pest608
MeOH						17-11						Bacteria ResCl ✓ by analyst
	20mL(G)		40mL(G)		9am(C)		Syringe		-			PC Dry applicable? Y N
None (solid)	2oz(G)	-	4oz(G)	7	8oz(G) 125mL(P)	3	250mL	_		500mL(P)	1	1L(G) 1L (P)
None (water)	40ml (G)	1	60mL(P)	-	123HL(P)	9	2301111	(1-)	1	JOHIL (P)	-	IL(G) IL(I)
26.11	-		D 11		TNI.							
Mold	Cassette		Bulk		Plate		Tape Lif	t				
Asbestos Lead	Cassette		Bulk Bulk		Wipe							
Leau	Cassette		Duik		wipe							
Login Review	v					Ye	s No	N/	A	Comments		
Proper lab sam		s/enoi	igh volume/co	orrect	preservative?	X						
Analyses marke					Preservation	1						
VOC &TOC W			ottles received	A.F		1	1		-		-	
VOC Solid-MeC			ks. Prep Expira	tion C	K?	1>						
PFAS: Lab spe				-		×					1111	
Bacteria bottles	The second second					-	*				-	
	-					V			-		_	
Samples within				_			1	. ^	2	0. 40	50.	n N 1/2 1/2
Immediate test). Enter	rococci. Color	1>	SP	~(U	N 1/2	0,-	5/3/21
Surfactants, Turbid	lity Odor, CrVI,	Ferrous	Iron, Dissolved (Oxygen,	Unpres 624	-	1	A				010121
Date, time & II	O on samples	match	CoC?			>						
Rushes commu	inicated to an	alyst in	writing?					>	<			
Subcontract no	te on login bo	pard?						1		planter a		
Pesticides EPA												
Compliance sar	-	diece	enancies / requ	ire no	flage?					(Or must be	reject	ed)
		34					-	1		A		bliance samples (NHDES, MADEP,
Log-in Supervis	sor notified in	nmedi	ately of follow	ring ite	ems:			9		DoD etc.) or u		
					//	1.0				11	2 4	11:0
	Inspected	and I	Received By:		21	<i></i>		Da	te/	Time: 0	3/2	(1631)
Peer Review (Checklist							-115			5/11/5	
☐ Client ID/I	Project Manag	rer	☐ On Ice, T	empe	rature OK?			Sam	ple	IDs		☐ Analyses in Correctly
			□ PO# (if p	-				Mat	-			-references
			2 12		- 27.							
	es communica		☐ Sub samp			1100				ime collected		-wastewater methods
☐ Received D	ate/Time		☐ Issues not		ove communic	cated?			rt H	Ts communic	cated	□ Notes from CoC in LIMS
		Re	viewed By:				Da	te: _				
Notes: (conti	inue on ba	ck as	needed)							<u>Initials</u>	Date	What was sent?
							Uploa	ded /	PE	OF		_ Report / Data / EDD / Invoice
							Uploa					Report / Data / EDD / Invoice
							Uploa	ded /	PE	OF		Report / Data / EDD / Invoice

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 56821 4 Technology Dr. Date Received: 5/3/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 5/13/2021

Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 56821

Sample#: 56821-001 **Sample ID:** Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00		Reporting		Instr Dil'n		Prep		Ana	alysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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		Reporting		Instr Dil'n		Prep		Ana	lysis		
Parameter		Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference	
1.4-dioxane		< 0.25	0.25	ua/L	1	LMM		2101197	5/5/21	6:55	SW8260Dmod	

Job ID: 56821

Sample#: 56821-001 Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21	11:00		Reporting		Instr Dil'n	Prep		Ana	llysis	
Parameter		Result	Limit	Units	Factor	Analyst Date	Batch	Date	Time	Reference
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	ma/l	1	AGN 5/5/21	13845	5/6/21		SM2340B



Job ID: 56821

Sample#: 56821-001 Sample ID: Finished-HP

Matrix: Water

Sample	d: 5/3/21 11:00	F	Reporting	Ir	nstr Dil'n		Prep		Ana	lysis	
Parameter		Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Alkalinity, Tot	al (as CaCO3)	51	5	mg/L	1	SFM		2101240	5/7/21	11:00	SM2320B
Apparent Cold	or	< 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		4.4 M	0.1	mg/L	1	DBV		2101192	5/4/21	11:27	E300.0A
	M = The recovery for the samples were acceptable	•	was 56%	. The acc	ceptance	criteria is	90-11	0%. All o	ther asso	ciated Q	С
Nitrite-N		< 0.1M	0.1	mg/L	1	DBV		2101192	5/4/21	11:27	E300.0A
	M = The recovery for the samples were acceptable	-	was 88%	. The acc	ceptance	criteria is	90-11	0%. All o	ther asso	ciated Q	С
ortho-phospha	ate as P	0.3	0.1	mg/L	1	DBV		2101192	5/4/21	11:27	E300.0A
Sulfate		19 M	0.5	mg/L	1	DBV		2101192	5/4/21	11:27	E300.0A
	M = The recovery for the samples were acceptable		was 81%	. The acc	ceptance	criteria is	90-11	0%. All o	ther asso	ciated Q	С
Total Dissolve	ed Solids (TDS)	290	20	mg/L	1	SFM		2101237	5/6/21	16:00	SM2540C
Total Phospho	orus as P	0.19	0.01	mg/L	1	SFM		2101221	5/6/21	14:40	E365.3
Total Coliform	n Bacteria	absent			1	DBV		2101185	5/3/21	16:25	SM9223BColilert
E. coli Bacteri	a	absent			1	DBV		2101185	5/3/21	16:25	SM9223BColilert
Conductivity		530	5 ι	ımhos/cm	1	SFM		2101173	5/4/21	10:15	SM2510B
pН		6.8 H		рН	1	SFM		2101180	5/3/21	17:13	SM4500H+B
	H = Sample was receive	d beyond me	thod holdi	ing 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 Reporting Instr Dil'n Prep **Analysis** Limit Date **Parameter** Analyst Date Time Result Units Factor Reference Total Organic Carbon (TOC) < 1.0 1.0 mg/L DBV 2101189 5/4/21 16:23 SM5310C 1



Job ID: 56821

Sample#: 56821-001 Sample ID: Finished-HP

Matrix: Water

Sampled: 5/3/21 11:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time ng/L 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 **ACA** 5/12/21 13843 5/5/21 18:41 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 **ACA** 5/12/21 13843 5/5/21 18:41 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 **ACA** 5/12/21 13843 5/5/21 18:41 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U **ACA** 1.7 0.42 ng/L 1 5/12/21 13843 5/5/21 18:41 **ACA** perfluorodecanoic acid (PFDA) 1.7 U 1.7 0.29 ng/L 1 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 na/L 1 **ACA** 5/12/21 13843 5/5/21 18:41 ng/L perfluorohexanoic acid (PFHXA) 0.51 J 0.29 1 **ACA** 5/12/21 13843 5/5/21 1.7 18:41 perfluorononanoic acid (PFNA) 1.7 U 0.38 ng/L 1 **ACA** 5/12/21 13843 5/5/21 1.7 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 0.11 1 **ACA** 5/12/21 13843 5/5/21 18:41 1.7 ng/L 1.7 U ACA perfluoroundecanoic acid (PFUNA) 0.27 ng/L 1 5/12/21 13843 5/5/21 18:41 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 **ACA** 5/12/21 13843 5/5/21 1.7 U 1.7 ng/L 1 18:41 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.33 ng/L 1 **ACA** 5/12/21 13843 5/5/21 18:41 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 **ACA** 5/12/21 13843 5/5/21 18:41 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 89 70-130 1 5/12/21 13843 5/5/21 18:41 13C2-PFDA SUR 70-130 % 1 **ACA** 5/12/21 13843 5/5/21 18:41 93 D5-NEtFOSAA SUR 76 70-130 % 1 **ACA** 5/12/21 13843 5/5/21 18:41 % 1 **ACA** 13C3-HFPO-DA SUR 92 70-130 5/12/21 13843 5/5/21 18:41

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



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

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	Unite A	mt Added	%R	Limits		RPD	RPD L	imit
			Associated Sample				mi Added	% K	LIIIIIIS		KPD	KPD L	Ш
E524.2	BLK2101172	chloroform		<	0.50	ug/L							
		bromodichloromethane		<	0.50	ug/L							
		dibromochloromethane		<	0.50	ug/L							
		bromoform 4-bromofluorobenzene SUR		<	0.50	ug/L %			70	120			
					96 104	% %			70 70	130 130			
		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 A	mt 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 A	Amt Added	%R	Lin	nits	RPD	RPD Limit
E300.0A	BLK2101192	Bromide		<	0.1	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1 0.1	mg/L mg/L						
		ortho-phosphate as P Sulfate		<	0.1	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 ortho-phosphate as P	56821-001 56821-001	<	0.1	mg/L mg/L					9	10 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 99	90	110 110		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	70	110		
		Nitrite-N	56821-001 56821-001		2.2 1.8	mg/L	2.53	88 [*] 91	70	110 110		
		ortho-phosphate as P Sulfate	56821-001		33	mg/L mg/L	1.66 16	91 81 '	90	110		
		Junate	30021-001		55	mg/L	10	01	70	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		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 A	mt Added	%R	Limits		RPD	RPE) 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	рН	56796-002		5.4	рН							
SM4500H+B	DUP2101180	pH	56823-001		5.5	рН							
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	Limi	ts	RPD	RPD Limit
E537.1	BLK13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	d	2.0 U	2.0	0.40	ng/L						
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L						
		13C2-PFHxA SUR		93			%			70	130		
		13C2-PFDA SUR		99			%			70	130		
		D5-NEtFOSAA SUR		79			%			70	130		
		13C3-HFPO-DA SUR		101			%			70	130		



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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 13	30	
			13C2-PFDA SUR	56817-002	93			%			70 13	30	
			D5-NEtFOSAA SUR	56817-002	76			%			70 13	30	
			13C3-HFPO-DA SUR	56817-002	99			%			70 13	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	ts	RPD	RPD Limit
E537.1	LCS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-NEtFOSAA 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	Limit	ts	RPD	RPD Limit
E537.1	MS13843	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-NEtFOSAA SUR	56821-001	80			%			70	130		
		13C3-HFPO-DA SUR	56821-001	91			%			70	130		



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PO #:			10			_		-	W	~	ment Pricing		-	☐ VOC 8260 NHDES	VOC BT	GR0 8	☑ VOC 524.2 ☐ VOC 524.2 NH List	115	□ 8270ABN □ 625.1	100	G PFAS 537.1 □ 0&G 1664 □ Mineral 0&G 1664	Condu	TS C	D Priori	127	s-list:	_ do	□ Bact	fide C	Anitrate Anitrite (1) Chiloride	☐ Ignitibility/FP	TCLP	☐ Grain Size	0	Composite (C)
Lab Sample	Fir	eld	CONTAINERS		/latri:	K	Pre	servation	n Me	thod	Sai	mpling	T ~	ì	-	D dag	.2 🗆	DR0 80	80 0	,	2 4	00	LQS C	stals	als-list	d Metal	00	snuou	ns 🗆	Aitri	□ ≱	tals C		- 2	or Com
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TAT REQUESTION Priority (24 h	ir)* 🗆	See absolution for samp		eptan	ce po	olicy a		SPEC	CIAL II	NSTF	RUCTIONS to (- Ryca	~(0	ak	lei	nfe	والم	2		2	~														
Standard (10 Busines	ss Days)	REPORT	ΓING	INST	RUC	CTIO	NS	PD	F (e-n	nail ac	ddress) &	shisto	no	-Kle	2/2	fel 1	e-	100	m		1.	are	7				_	REC	CEIV	ED (I NC	CE	×	ÉS	ONO
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	RECORD QSD-01 Revision 03/09/2020 Relinquished by:					X			5(3)	te	15°	me Received by Laborators:										Sate 21 (5°31													
		1	M	L	$\stackrel{\sim}{}$	1/2	5				15/5/	4	5:	0	Ц			#	1/	N		1	_	-		_				0	6	2	1	5:	5]
		O										18 (of 19																						

Sample Receipt Condition Report 56821 Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS De Lab Courier ☐-Client Drop-off Samples Received from: □-No Custody Seals - present & intact: □-Yes □-No DIN/A CoC signed: Yes Receipt Temp: ____ °C Samples on ice? Yes O-No O-N/A Sampled < 24 hrs ago? □-Yes □-No PFAS-only real ice? ■Yes □-No □-N/A No. Any signs of freezing? □-Yes Comments: Preservation Bottle Size/Type & Quantity Check pH for ALL applicable* / Analysis samples and document: 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl 250mL(P) HNO₃ 125mL(P) 500mL(P) 500mL(P) 40mL(G) 60mL(P) 125mL(P) 250mL(P) H₂SO₄ NaOH 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) 125mL(P) 250mL(P) 125mL(P) 250mL(P) ZnAc-NaOH *pH √by analyst: VOC, PFAS, TOC,O&G 125mL(P) 250mL (P) Trizma Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625_ Pest608 NaS2O3 120mL(P) 40mL(G) Bacteria ResCl √by analyst MeOH 20mL(G) 40mL(G) None (solid) PC Dry applicable? Y 2oz(G) 4oz(G) 8oz(G) Syringe None (water) 40ml (G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 1L(G) 1L (P) NHUC 60MG Mold Cassette Bulk Plate Tape Lift Bulk Asbestos Cassette 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? X TB 50- 5/3/2/ PFAS: Lab specific bottles? QC received, if required? Bacteria bottles provided by ARA? Samples within holding time? DBV, SFM AS Immediate tests communicated in writing NO₃, NO₇, PO₁, EH BOD, Coliform/E. cali (VA) or MPN), Enterococca, Color Surfactants, Carbidity 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?

Inspected and	l Received By:	Sh	Date/	Time: 6/3	h	(8>	55
Peer Review Checklist							
☐ Client ID/Project Manager	☐ On Ice, Tempera	ature OK?	☐ Sample	e IDs			Analyses in Correctly
☐ Project Name	☐ PO# (if provided	d)	☐ Matrix				-references
☐ TAT/rushes communicated	☐ Sub samples sent	t? Shipping Charge?	□ Date/	l'ime collecte	d		-wastewater methods
☐ Received Date/Time	☐ Issues noted abo	ve communicated?	☐ Short I	Trs commun	icated		Notes from CoC in LIMS
R	Reviewed By:		Date:				
Notes: (continue on back a	is needed)	NEW YORK STREET		<u>Initials</u>	Date		What was sent?
		Uı	ploaded / P	DF		Repo	ort / Data / EDD / Invoice

Pesticides EPA 608 pH5-9?

Compliance samples have no discrepancies/require no flags?

Log-in Supervisor notified immediately of following items:

Report / Data / EDD / Invoice
OSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Report / Data / EDD / Invoice

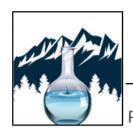
(Or must be rejected)

DoD etc.) or uncommon requests.

Discrepancies, compliance samples (NHDES, MADEP,

Uploaded / PDF

Uploaded / PDF



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: Work Order #:

05/20/2021 2105-00872

Client Job #:

05/06/2021

Date Received: 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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

CLIENT ADDRESS: 124 Heritage Avenue, Suite 10

Portsmouth, NH 03801

SAMPLE ID #: 2105-00872-001

SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS:

Finished-HP

MA

Legend

Passes Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

DATE AND TIME COLLECTED: 05/03/2021 11:00AM 05/06/2021 **DATE AND TIME RECEIVED:** 11:20AM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 4.3° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	5/13/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 10:44AM
2,3-Dibromopropionic Acid	112	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	5/14/2021 10:44AM

Donald a. L. Donald A. D'Anjou, Ph. D. **Laboratory Director**

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 56822 4 Technology Dr. Date Received: 5/3/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 5/13/2021

Total number of pages: 13

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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		Reporting		Instr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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		Reporting		Instr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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		Reporting		Instr Dil'n	Prep		Ana	lysis	
Parameter		Result	Limit	Units	Factor	Analyst Date	Batch	Date	Time	Reference
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		Reporting	Ir	nstr Dil'n		Prep		Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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	n 1	SFM		2101173	5/4/21	10:15	SM2510B
рН	7.7 H		рН	1	SFM		2101180	5/3/21	17:17	SM4500H+B
H = Sample was receive	d beyond me	ethod hold	ling 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 Reporting Instr Dil'n Prep **Analysis Parameter** Limit Analyst Date Batch Date Time Result Units Factor Reference Total Organic Carbon (TOC) < 1.0 1.0 mg/L 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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits	S	RPD	RPD L	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 A	mt Added	%R	Limits	S	RPD	RPD Lim
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 A	Amt Added	%R	Lin	nits	RPD	RPD Limit
E300.0A	BLK2101192	Bromide		<	0.1	mg/L						
		Nitrate-N		<	0.1	mg/L						
		Nitrite-N		<	0.1 0.1	mg/L mg/L						
		ortho-phosphate as P Sulfate		<	0.1	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 ortho-phosphate as P	56821-001 56821-001	<	0.1	mg/L mg/L					9	10 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 99	90	110 110		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	70	110		
		Nitrite-N	56821-001 56821-001		2.2 1.8	mg/L	2.53	88 [*] 91	70	110 110		
		ortho-phosphate as P Sulfate	56821-001		33	mg/L mg/L	1.66 16	91 81 '	90	110		
		Junate	30021-001		55	mg/L	10	01	70	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		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 A	mt Added	%R	Limits		RPD	RPE) 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	рН	56796-002		5.4	рН							
SM4500H+B	DUP2101180	pH	56823-001		5.5	рН							
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			

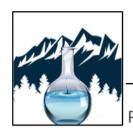


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Phone #: 414	1-406	9598						Pr	otoco	01:	MCP	•	NHD	ES	DOD		☐ VOC 8260 MADE	□ V0C 8021VT	kane	☐ Gases-List:	☐ TPH Fingerprint	90	3 Pest/			30	785-2		5		LIUN MINIO	S S S	3 0		00				
Invoice to:	Tenfel	des						- Re	porti nits:		QAP EPA	P D₩	GW-		S-1		0,0		☐ 1,4-Dioxane	17.00	500	1 CI EDB	☐ 608.3 Pest/PCB		_	Turbidity	Alkalinity	t Meta	7			Nitrite	Sulfate		CI TCLP SVOC	☐ Herbicides			
Report To: Alex Phone #: alex Invoice to: Email: Cable	sisher.	ckled	n Re	Ide	25.6	dr	~	Qı	uote #								KADES	UVOC BTEX MtBE, only	1	☐ VOC 524.2 NH List	CI EPH MADEP				G 1664		NS G	Pollutan	3	1		ar/A	luate :				1		
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Sample	Fie		# CONTAINERS	m		œ		DH EE									8260	□ V0C 624.1	U VPH MADEP	₫ V0C 524.2	D DR		☐ 8082 PCB	☐ PFAS 537.1	1664	C 800	SOLO	Meta	Protal Metals-list:	☐ Dissolved №	onia	iolidso	20 0	J Airie	TCLP Metals	tract:	1	HAA4	10
(Lab Use Only)	"	D	CO	WATER	SOLID	OTHER	豆 모	HNO ₃ H ₃ SO ₄ NaOH MeOH TIME SAMPLER								V0C	VPH	NOC	TPH	☐ 8270PAH	8082	PFAS	0&G	3	O TSS	RCR/	Total	Disso	Amm A	1-1-1	Cyan	Corre	TCLP	Subcontract:	16/10	T	Grab (G)		
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Absolute Re	source Ass	ocia		Sam	ріе кесе	ipt C	onan	1011	-	ob Numb	er:	568	22	
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Custody Seals		ntacti		J-No	DeN/A		L-1	ab Co	Julie	CoC s			Yes	□-No
								- / .						
Receipt Temp:		,C	Samples of				No O-N						go? Yes	□-No
			PFAS-only	y real	ice?	□-N	10 1	N/A		Any si	gns o	f freezin	g?	No.
Comments:														
Preservation					Bottle Size	/Type	& Qua	ntity						applicable*
/ Analysis	10 7 10		450 F M		500 T M		47					samples	and docum	ient:
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)	-					04/200	40
HNO ₃	125mL(P)	-	250mL(P)	1	500mL(P)	1	250 T	(T)	-	500 T m		aller	04252	0
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)	1	250mL	(P)		500mL(P)		pt Ion	10 4 1 KO	m
NaOH	125mL(P)		250mL(P)		250I (D)			-	-					
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)	-			-				-	
ZnAc-NaOH	125mL(P)		250mL(P)					-	-			*n∐ √hu	analyst:VOC	PFAS, TOC,O&G
Trizma	125mL(P)		250mL (P)					-					l Cl not pre	
NH ₄ Ac	125mL(P)		250mL (P)						-				5Pest	
NaS ₂ O ₃	40mL(G)		120mL(P)						1				ResCl ✓ by a	
MeOH	20mL(G)		40mL(G)										-	
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syringe					PC Dry	applicable?	YN
None (water)	40ml (G)		60mL(P)	3	125mL(P)	Z	250mL	(P)	1	500mL(P)		1L(G)		1L (P)
HAA	60 mlb	3												
Mold	Cassette		Bulk		Plate		Tape Lit	r						
Asbestos	Cassette		Bulk		Tiate		Tape La							
Lead	Cassette		Bulk		Wipe									
Dead	Cassette		Duik		wipe				1				_	
Login Review	7			122		Yes	No	N/I	1	Comments			E9 5.0 (
		1	ah mahama /am			10.		14/1	1 0	onnicits				
Proper lab sam		-			preservatives	-			-					
Analyses marke			ottles received	13		~	5							
VOC &TOC W						X								
VOC Solid-MeC	The second secon	State of the last			K?	-			-					
PFAS: Lab spec	cific bottles?	QC rec	ceived, if requi	red?				×	-					
Bacteria bottles	provided by	ARA?				X								
Samples within	holding time?			- 11		X								
Immediate tests			writing:			17	0	110	/ [AN A				
NO3, NO), (CPO.)	BOD, Colifo	rm/E.	coli (P/A) or MPN)			X	11	DV 19	04	Tail Dr)			
Surfactants, Furbida)xygen,	Unpres 624									
Date, time & II	on samples	match	CoC?			X								
Rushes commu	nicated to ana	lyst in	writing?					×						
Subcontract no	te on login bo	ard?				V		-	-1	A 65A		THE STATE OF		
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☐ Client ID/I			On Ice, To				П		ple II	Us			Analyses in (Correctly
☐ Project Nan	ne		□ PO# (if p	rovide	ed)			Mati	rix			-	references	
☐ TAT/rushe	s communicat	ted	☐ Sub sampl	les ser	nt? Shipping Ch	arge?		Date	/Tin	ne collected		-	wastewater	methods
☐ Received D	ate/Time		☐ Issues not	ed abo	ove communic	cated?		Shor	t HT	's communi	cated		Notes from	CoC in LIMS
	, , , , , , , , , , , , , , , , , , , ,		viewed By:				Da							
Notes: (conti	nue on ha			N/ I/I					77.	Initials	Date		What wa	as sent?
rvotes. (conti	nue on bac	A as	needed)				T I1	ded /	DIN		Date			
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13 of 13

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #: 05/20/2021 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

Donald a. D



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:

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:** 11:19AM 05/06/2021

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 4.3° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	5/13/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/14/2021 09:22AM
2,3-Dibromopropionic Acid	106	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	5/14/2021 09:22AM

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

Donald a. D.

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57187 4 Technology Dr. Date Received: 5/27/21

Suite 110

Westborough, MA 01581

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/9/2021

Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57187

Sample#: 57187-001 Sample ID: Raw-SW2 Matrix: Water

Sampled: 5/27/21 10:00 Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Analyst Date Batch Date Time Units Factor Reference 1,4-dioxane 0.70 0.25 ug/L LMM 2101601 6/5/21 8:04 SW8260Dmod



Job ID: 57187

Sample#: 57187-001 Sample ID: Raw-SW2 Matrix: Water

Sampled: 5/27/21 10:00		Reporting		Instr Dil'n	Prep		Ana	lysis	
Parameter	Result	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		Reporting	lı	nstr Dil'n		Prep	,	nalysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch Dat	e Time	Reference
Alkalinity, Total (as CaCO3)	48	5	mg/L	1	DJM		2101535 6/2/2	1 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 6/2/2	1 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	n 1	SFM		2101528 6/1/2	1 14:00	SM2510B
рН	7.1⊦	ł	рН	1	SFM		2101511 5/28/	21 10:23	SM4500H+B
H = Sample was receive	ed beyond m	ethod hold	ling 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		Reporting		Instr Dil'n		Prep		Ana	lysis	
Parameter	Result	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



Job ID: 57187

Sample#: 57187-001 Sample ID: Raw-SW2 Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1		Reporting	מ		Dil'n		Prep		Ana	lysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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-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	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	%	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

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



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

Job ID: 57187

Sample#: 57187-002 Sample ID: Field Blank Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L WAS 6/1/21 13921 6/2/21 5:32 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/1/21 13921 6/2/21 5:32 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 WAS 6/1/21 13921 6/2/21 5:32 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U WAS 1.7 0.42 ng/L 1 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 na/L 1 WAS 6/1/21 13921 6/2/21 5:32 1.7 U ng/L WAS perfluorohexanoic acid (PFHXA) 0.29 1 6/1/21 13921 6/2/21 5:32 1.7 perfluorononanoic acid (PFNA) 1.7 U 0.38 ng/L 1 WAS 6/1/21 13921 6/2/21 5:32 1.7 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 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 0.11 WAS 6/1/21 13921 6/2/21 5:32 1.7 ng/L 1 1.7 U WAS 5:32 perfluoroundecanoic acid (PFUNA) 1.7 0.27 ng/L 1 6/1/21 13921 6/2/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 5:32 1.7 U 1.7 ng/L 1 WAS 6/1/21 13921 6/2/21 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 WAS 6/1/21 13921 6/2/21 5:32 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 WAS 6/1/21 13921 6/2/21 5:32 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR WAS 5:32 111 70-130 % 1 6/1/21 13921 6/2/21 13C2-PFDA SUR 70-130 % 1 WAS 6/1/21 13921 6/2/21 5:32 125 WAS D5-NEtFOSAA SUR 104 70-130 % 1 6/1/21 13921 6/2/21 5:32 % 1 WAS 5:32 13C3-HFPO-DA SUR 114 70-130 6/1/21 13921 6/2/21

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



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

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

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- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Ar	nt Added	%R	Limits	6	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 A	mt 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			



E300.0A	Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limits		RPD	RPI	D Limit
E300.0A LCS2101520 Bromide Chloride Sulfate	E300.0A	BLK2101520	Bromide		<	0.1	mg/L							
E300.0A					<		•							
Chloride			Sulfate		<	0.5	mg/L							
E300.0A LCSD2101529 Bromide	E300.0A	LCS2101520	Bromide			9.4	mg/L	10	94	90	110			
E300.0A LCSD2101520 Bromide Chloride Sulfate			Chloride			97	mg/L	100	97	90	110			
Chloride Sulfate Sulfate Sulfate Stock Sto			Sulfate			96	mg/L	100	96	90	110			
Sulfate Sulf	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 SM2120B DUP2101509 Apparent Color 57139-001 8 CU 5 5 0 0 110 SM2120B DUP2101509 Apparent Color 57139-005 8 CU 35 0 30 40 SM2120B LCS2101509 Apparent Color 57139-005 8 CU 35 0 30 40 SM2120B BLK2101510 True Color 57187-001 5 CU 5			Chloride			97	mg/L	100	97	90	110		0	10
SM2120B DUP2101509 Apparent Color 57139-001 8 CU 0 SM2120B DUP2101509 Apparent Color 57139-005 8 CU 5 0 SM2120B LCS2101509 Apparent Color 335 CU 35 30 40 0 SM2120B PB2101509 Apparent Color < 5			Sulfate			96	mg/L	100	96	90	110		0	10
SM2120B DUP2101509 Apparent Color 57139-005 8 CU 35 0 40 SM2120B LCS2101509 Apparent Color 35 CU 35 30 40 SM2120B PB2101509 Apparent Color < 5	E300.0A	MS2101520	Bromide	57065-002		95	mg/L	100	95	90	110			
SM2120B LCS2101509 Apparent Color 35 CU 35 30 40 SM2120B PB2101509 Apparent Color < 5	SM2120B	DUP2101509	Apparent Color	57139-001		8	CU					0		20
SM2120B PB2101509 Apparent Color < 5 CU 5 SM2120B BLK2101510 True Color < 5 CU	SM2120B	DUP2101509	Apparent Color	57139-005		8	CU					0		20
SM2120B BLK2101510 True Color 5 CU 5 SM2120B DUP2101510 True Color 57187-001 5 CU 35 CU 35 Alkalinity 30 40 40 40 40 5 5 5 6.04 pH 5.94 6.06 6.06 6.04 pH 5.94 6.06 6.06 6.04 pH 5.94 6.06 6.06 6.06 pH 3.94 4.06 6.06 6.06 pH 3.94 4.06 6.06 6.06 pH 3.94 4.06 6.06 5.94 6.06 <	SM2120B	LCS2101509	Apparent Color			35	CU	35		30	40			
SM2120B DUP2101510 True Color 57187-001 < 5 CU CU 35 CU 35 CU 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) 57190-004 75 mg/L 3.94 4.06 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 25 97 90 110 SM2320B LCS2101535 Alkalinity, Total (as CaCO3) 24 mg/L 25 97 90 110 1 SM2320B LCSD2101535 Alkalinity, Total (as CaCO3) 25 mg/L 25 98 90 110 1	SM2120B	PB2101509	Apparent Color		<	5	CU			5				
SM2120B LCS2101510 True Color 35 CU 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) 57190-004 75 mg/L 3.94 4.06 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 2 2 SM2320B LCS2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 25 97 90 110 1 SM2320B LCSD2101535 Alkalinity, Total (as CaCO3) 24 mg/L 25 98 90 110 1	SM2120B	BLK2101510	True Color		<	5	CU			5				
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) 57190-004 75 mg/L 3.94 4.06 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-004 75 mg/L 2 2 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 25 97 90 110 1 SM2320B LCS2101535 Alkalinity, Total (as CaCO3) 24 mg/L 25 98 90 110 1	SM2120B	DUP2101510	True Color	57187-001	<	5	CU							20
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 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 2 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	SM2120B	LCS2101510	True Color			35	CU	35		30	40			
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 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 2 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	CCVB2101535	Alkalinity, Total (as CaCO3)			6.04	рН			5.94	6.06			
SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-004 75 mg/L 3 SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 2 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	CCVE2101535	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06			
SM2320B DUP2101535 Alkalinity, Total (as CaCO3) 57190-007 15 mg/L 2 SM2320B LCS2101535 Alkalinity, Total (as CaCO3) 24 mg/L 25 97 90 110 1 SM2320B LCSD2101535 Alkalinity, Total (as CaCO3) 25 mg/L 25 98 90 110 1	SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06			
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	DUP2101535	Alkalinity, Total (as CaCO3)	57190-004		75	mg/L					3		10
SM2320B LCSD2101535 Alkalinity, Total (as CaCO3) 25 mg/L 25 98 90 110 1	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 PB2101535 Alkalinity, Total (as CaCO3) < 5 mg/L	SM2320B	LCSD2101535	Alkalinity, Total (as CaCO3)			25	mg/L	25	98	90	110		1	10
	SM2320B	PB2101535	Alkalinity, Total (as CaCO3)		<	5	mg/L							



Method	QC ID	Parameter	Associated Sample		Result	Units A	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	рН	57136-001		8.3	рН						
SM4500H+B	DUP2101511	рН	57179-001		8.1	рН						
SM4500H+B	DUP2101511	рН	57186-001		7.3	рН						
SM4500H+B	DUP2101511	pH	57190-009		7.4	рН						
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	Limit	s RPI	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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 1	30	
		13C2-PFDA SUR		117			%			70 1	30	
		D5-NEtFOSAA SUR		104			%			70 1	30	
		13C3-HFPO-DA SUR		110			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid acid (GenX acid) (HFPODA)	,	42	2.0	0.30	ng/L	40	106	70 13	0	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		42	2.0	0.39	ng/L	40	105	70 13)	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		40	2.0	0.33	ng/L	40	99	70 13)	
		perfluorobutane sulfonic acid (PFBS)		35	2.0	0.50	ng/L	35	99	70 13)	
		perfluorodecanoic acid (PFDA)		38	2.0	0.34	ng/L	40	95	70 13)	
		perfluorododecanoic acid (PFDOA)		45	2.0	0.43	ng/L	40	112	70 13)	
		perfluoroheptanoic acid (PFHPA)		45	2.0	0.33	ng/L	40	113	70 13)	
		perfluorohexane sulfonic acid (PFHXS)		39	2.0	0.40	ng/L	38	103	70 13)	
		perfluorohexanoic acid (PFHXA)		40	2.0	0.35	ng/L	40	101	70 13)	
		perfluorononanoic acid (PFNA)		43	2.0	0.45	ng/L	40	108	70 13)	
		perfluorooctane sulfonic acid (PFOS)		35	2.0	0.40	ng/L	38	90	70 13)	
		perfluorooctanoic acid (PFOA)		42	2.0	0.33	ng/L	40	105	70 13)	
		perfluorotetradecanoic acid (PFTEA)		40	2.0	0.50	ng/L	40	100	70 13)	
		perfluorotridecanoic acid (PFTRIA)		41	2.0	0.13	ng/L	40	103	70 13)	
		perfluoroundecanoic acid (PFUNA)		40	2.0	0.32	ng/L	40	101	70 13)	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		32	2.0	0.39	ng/L	37	85	70 13)	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)		34	2.0	0.40	ng/L	37	92	70 13)	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	1	43	2.0	0.18	ng/L	37	113	70 13)	
		13C2-PFHxA SUR		113			%			70 13)	
		13C2-PFDA SUR		126			%			70 13)	
		D5-NEtFOSAA SUR		102			%			70 13)	
		13C3-HFPO-DA SUR		120			%			70 13)	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Lim	its	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-chloroeicosafluoro-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		



	QSD-01 Revision 03/09/2020	RECORD	CHSTODY	(10 Business Days) *Date Needed	TAT REQUESTED Priority (24 hr)*	Or Field	+	2			5/18/21 Raw -	le nly)	Lab	PO #:	Email: clobs stope	Invoice to: Ke, he	Phone #: 914 - 400	Alex Bishex	7	Company Address:	Mentela		9	Absolute Resource	
N N N	Refinquished by:	Refinquished by:	Relinguished by Sampler:	REPORTING INSTRUCTIONS - HARD COPY REQUIRED U	See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.	Blank 1	0	2	2	44	-Sw2 -X	# CONTAINE WATER SOLID OTHER	ERS Matrix		e Kleinfelder, con	Elder	8756-0	O	sive westersay		5		ssociates	Resource	
1 2.0	1	3/27/7, 14:20	5/27 T	US BPDF (e-mail address) 4 bららんのの	special instructions * Use reporting limit	Tan2 4 4 4	20	***	727	7	Thio 8/27/21 10:00 VC	DATE	Preservation Method Sampling	☐ NH Reimbursement Pricing	Quote #	BPA DW Other	Reporting QAPP GW-1 S-1	Protocol: RCRA SDWA NPDES	3	Droine to continue		Project Name: Barnstake Gu7	absoluteresourceassociates.com	124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001	
	Time Beceived by Laboratory:	me Bearinger by:	Time Réceived by:	iclemalder.com	of 0.13 us/L for 1,4 Diorane	*	*		7	× < < × > ×	(UVOC 624.1 VPH MADEP VOC 524.2 TPH 8100 8270PAH 8082 PCB PFAS 537.1 0 &G 1664 PH BOD TSS TOS RCRA Metals	0 V0 0 G G V0 0 DR(0 0 1 827/ 0 808 0 PP	C 524. 0 8015 0 8015 1 Pest FAS 53. conduct Priority	MIBE LEP LEP LEP LEP LEP LEP LEP L	only 1,4-Di 1,4-Di H MAC 1 0 600 FAS isi	Gases- DEP EDB 8.3 Pes otope d dity inity als	List: TPH F Appar	vT ingerpr	lor /-	TYV		ANALYSIS RE	AND ANALYSIS REQUEST	
1 0111111111111111111111111111111111111	Totale Time	5-27 14:20	Date Time	RECEIVED ON ICE TYPES UNO	\			*	9	*	*	Dissolved Me Ammonia T-Phosphorus Cyanide Sintrate Nitrate TCLP Metals Subcontract: Grab (G) or Co	Sulfiditrite Ign	Bacter Chi itibility. CLP VC in Size	ia P/A litrate oride (FP	Bank Nitrit	cteria M te 🗆 (fate 🔎	MPN Dortho P Brom	Phide Pestic	ococc enois Fluor	ci .		REQUEST	57187	

Sample Receipt Condition Report Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS -Lab Courier □-Client Drop-off Samples Received from: □-Yes □-No O-N/A CoC signed: U-Yes Q-No Custody Seals - present & intact: D-Yes D-No D-N/A □-No Samples on ice? Sampled < 24 hrs ago? ☐-Yes Receipt Temp: ___ ☑-Yes □-No □-N/A Any signs of freezing? □-Yes -No PFAS-only real ice? Comments: Bottle Size/Type & Quantity Check pH for ALL applicable* Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl HNO₃ 125mL(P) 250mL(P) 500mL(P) 500mL(P) H₂SO₄ 40mL(G) 60mL(P) 125mL(P) 250mL(P) NaOH 125mL(P) 250mL(P) 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) ZnAc-NaOH 250mL(P) 125mL(P) *pH √by analyst:VOC, PFAS, TOC,O&G Trizma 125mL(P) 250mL (P) Residual Cl not present: NH₄Ac 250mL (P) 125mL(P) ABN625 Pest608 NaS2O3 40mL(G) 120mL(P) Bacteria ResCl √by analyst 40mL(G) MeOH 20mL(G) PC Dry applicable? Y None (solid) 2oz(G)4oz(G) 8oz(G)Syringe 40ml (G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 1L(G) 1L (P) None (water) Mold Bulk Plate Cassette Tape Lift Bulk Asbestos Cassette Wipe Lead Cassette Bulk N/A Comments Login Review Yes No 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:

NO3, NO20 PO pH BOD Coliform/E. add P Yor MPN), Enterococci Color Surfactants, Turbidity, Odor, Crv1, 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? (Or must be rejected) Compliance samples have no discrepancies/require no flags? Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. Date/Time: Inspected and Received By: Peer Review Checklist Analyses in Correctly Sample IDs ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? -references ☐ PO# (if provided) Matrix ☐ Project Name -wastewater methods ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected Notes from CoC in LIMS Short HTs communicated ☐ Received Date/Time ☐ Issues noted above communicated? Reviewed By: Date: Notes: (continue on back as needed) Initials Date What was sent? Report / Data / EDD / Invoice Uploaded / PDF Uploaded / PDF Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57186
4 Technology Dr. Date Received: 5/27/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/9/2021

Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57186

Sample#: 57186-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45		Reporting		Instr Dil'n		Prep		Ana	alysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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		Reporting	Instr Dil'n		Prep		Prep Analysis				
Parameter		Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference	
1.4-dioxane		< 0.25	0.25	ua/L	1	LMM		2101601	6/5/21	7:33	SW8260Dmod	

Job ID: 57186

Sample#: 57186-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45		Reporting		Instr Dil'n	Prep		Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst Date	Batch	Date	Time	Reference
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

Job ID: 57186

Sample#: 57186-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45	F	Reporting	lr	nstr Dil'n		Prep	Ana	alysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch Date	Time	Reference
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	65 M	0.5	mg/L	1	DBV		2101549 6/2/21	15:46	E300.0A
M = The recovery for the m samples were acceptable.	atrix spike	was 30%	. The ac	ceptance	criteria is	90-11	0%. All other ass	ociated C	eC .
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 ι	ımhos/cm	n 1	SFM		2101528 6/1/21	14:00	SM2510B
рН	7.4 H		рН	1	SFM		2101511 5/28/21	10:03	SM4500H+B
H = Sample was received b	peyond met	hod holdi	ing 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 Reporting **Analysis** Instr Dil'n Prep **Parameter** Limit Date Batch Date Time Result Units Factor Analyst Reference Total Organic Carbon (TOC) DBV 2101548 6/2/21 < 1.0 1.0 mg/L 1 13:06 SM5310C



Job ID: 57186

Sample#: 57186-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 5/27/21 10:45

Method Reference: E537.1		Reporting		•			Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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-chloroeicosafluoro-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

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



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

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

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- QC Report -

			- QC Nepi	J1 C								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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)									
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 A	mt 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 A	mt Added	%R	Limits		RPD	RPI) 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		0	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	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		0	10
												U	10
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		3	20
E365.3	PB2101506	Total Phosphorus as P		<	0.01	mg/L							
_000.0	1 52 10 1000	Total i Hospilolus us I		`	0.01	mg/L							



Method	QC ID	Parameter	Associated Sample		Result	Units /	Amt Added	%R	Limits	6	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	рН			5.94	6.06		
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06		
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)			4.06	рН			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	рН	57136-001		8.3	рН						
SM4500H+B	DUP2101511	pH	57179-001		8.1	рН						
SM4500H+B	DUP2101511	pH	57186-001		7.3	рН						
SM4500H+B	DUP2101511	рН	57190-009		7.4	рН						



Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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	Limit	s RPD	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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 1	30	
		13C2-PFDA SUR		117			%			70 1	30	
		D5-NEtFOSAA SUR		104			%			70 1	30	
		13C3-HFPO-DA SUR		110			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	s F	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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	<u>!</u>	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-chloroeicosafluoro-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 1	130		
		13C2-PFDA SUR	57136-001	111			%			70 1	130		
		D5-NEtFOSAA SUR	57136-001	104			%			70 1	130		
		13C3-HFPO-DA SUR	57136-001	121			%			70 1	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Lim	its	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	MS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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		



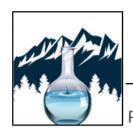
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H ₂ SO ₄	40mL(G)	1	60mL(P)	1	125mL(P)		250mL(P)	500mL(1) T	phos	ptu	2.10
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(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)								
ZnAc-NaOH	125mL(P)		250mL(P)	_								1 1100	nn. 12 mag a 1
Trizma	125mL(P)		250mL (P)	2									PFAS, TOC,O&G
NH4Ac	125mL(P)		250mL (P)								The State of the S	al Cl not pre	
NaS ₂ O ₃	40mL(G)		120mL(P)									25Pest6 ResCl ✓by a	
MeOH	20mL(G)		40mL(G)									- Charles	1
None (solid)	2oz(G)		4oz(G)	_	8oz(G)		Syringe				PC Dry	y applicable?	Y (N)
None (water)	40ml (G)	2	60mL(P)	3	125mL(P)	3	250mL(P)	500mL(I	")	1L(G)		1L (P)
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QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/08/2021 2106-00278

Client Job #:

06/02/2021

Date Received: 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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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 09:00AM

DATE AND TIME RECEIVED: 06/02/2021 **ANALYSIS PACKAGE:** HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	6/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 01:31AM
2,3-Dibromopropionic Acid	90	%	√			70-130%	EPA 552.2 - SS	KV-NH 0	6/05/2021 01:31AM

Donald a. L. Donald A. D'Anjou, Ph. D. **Laboratory Director**

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Phone #:	ex Bis	hop						Protoc	35.	RCR	A SE	WA-			☐ VOC 8260 MADEP	□ V0C 8021VT	*	☐ Gases-List:	TPH Fingerprint		© 608.3 Pest/PCB	1664	2	☐ Acidity	O TAL	CIV		9	N. I		b	☐ TCLP SV0C ☐ TCLP Pesticide	Asbe	+	
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PO #:	#: 914 - 406-9598 eto: kleinfelder-com abbishop@kleinfelder.com abb										ment Pri	cing	X		3 8260	C BTE	IRO 80	C 524	3 8015	OABN	31 Pes	Mineral 0&G	onduc	S	Priority	9	list:	5	pacte	1 3	itipility	OTCLP VOC	in Size	110	site (C
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57188 4 Technology Dr. Date Received: 5/27/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Date of Approval: 6/9/2021

Maine 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



Job ID: 57188

Sample#: 57188-001 Sample ID: Simulated-SW2

. **Matrix:** Water

Sampled: 5/27/21 11:15		Reporting		Instr Dil'n		Prep		Ana	llysis	
Parameter	Result	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		Reporting		Instr Dil'n	P	rep	Analy	sis	
Parameter		Result	Limit	Units	Factor	Analyst D	ate Batch	Date	Time	Reference
Calcium		19	0.50	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Iron		< 0.050	0.050	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Magnesium		5.4	0.10	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Manganese		< 0.010	0.010	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Sodium		42	0.10	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Zinc		0.081	0.010	mg/L	1	AGN 6/7/2	21 13945	6/7/21	19:58	E200.8
Hardness (as CaCO3)		69	3	mg/L	1	AGN 6/7/2	21 13945	6/8/21		SM2340B



Job ID: 57188

Sample#: 57188-001 Sample ID: Simulated-SW2

Matrix: Water

Sampled: 5/27/21 11:15		Reporting	ı İr	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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	n 1	SFM		2101528	6/1/21	14:00	SM2510B
рН	7.4 H		рН	1	SFM		2101511	5/28/21	10:31	SM4500H+B
H = Sample was receive	ed beyond me	thod hold	ling 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 Reporting Prep **Analysis** Instr Dil'n **Parameter** Result Limit Units Factor Analyst Date Batch Date Time Reference Total Organic Carbon (TOC) < 1.0 1.0 mg/L 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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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 Total Trihalomethanes (THMs)		114	%			70	130		



Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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			



	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits		RPD	RPI) 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	8 CU		%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	рН			5.94	6.06		
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06		
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)			4.06	рН			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	рН	57136-001		8.3	рН						
SM4500H+B	DUP2101511	pH	57179-001		8.1	рН						
SM4500H+B	DUP2101511	pH	57186-001		7.3	рН						
SM4500H+B	DUP2101511	рН	57190-009		7.4	рН						



Method	QC ID	Parameter	Associated Sample		Result Units Amt		mt 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			

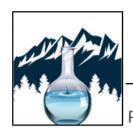


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Absolute F	s o c i a t e :	S N				abs	olute			6-2001 eassoci	ates.co	om		No.		44				I	N	ALY	/SI	S	RE	QL	JES	ST				11010			
Company Name: Klein Colba Company Address: 4 Tech De Report To:	5. West B	500	scy's	M	Accreditation Required? NAV. Protocol: RCRA SDWA NPDES MCP NHDES DOD Reporting QAPP GW-1 S-1											s-List: TTHM	□ DRO 8015 □ EPH MADEP □ TPH Fingerprint		est/PCB	dilution		ZepH □ BOD Geonductivity Zentribidity QApparent Color (1706		☐ TAL Metals ☐ Mardness	2n,mg		CATOC - Ferrous Iron	☐ Bacteria MPN ☐ Enterococci	□ Sulfide • Collitate • Nierite • Ortho P □ Phenols	Chirite Cefiloride Stiffate Caromide Inoride		☐ TCLP SV0C ☐ TCLP Pesticide	l Asbestos	A per AUD	5
Phone #: 914-406 nvoice to: abo sho Email: 444 8	Palclein	fel	der	- ce	m	Repor		QAP	Р				-		☐ GRO 8015 ☐ 1,4-Dioxane	List 🗆 Gases-List:	EPH MADEP	□ 8270ABN □ 625.1 □ EDB	s 🗆 608.3 Pest/PCB	PFAS isotope	664	Z Turbidity		stant Metals	Mg, Fe,				e - Mitrite	e-Coulfate		TCLP SV0C	-	Colitorn P/A	
	<i>xwp</i>					Quote							8260 NHDES	TEX MtE	3015	4.2 NH	15 🗅	9 0	sticide	533	0&G 1	ctivity	SVLC	ity Pollu	Na		TKN	teria P/	Militar	Chlorid			Ze 🗆	5	0
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(Lab Use Only)	wheel-swall	✓ WATER	SOLID	ОТНЕВ												O Ar		X	X	0)TO	Subc	<u> </u>	Grab (G)											
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Standard (10 Business Days) *Date Needed	REPORTING				IONS PDF (e-mail address) abbridge Kleinfelder com + ICRyene Kleinfelder.com											_	REC					∃Y1	ES	_°C											
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QSD-01 Revision 03/09/2020	Relinquished b	Y.		7		/	_			S ^{Date}		-	mer	7	Red	1	ed b	1.1	bora	atory	7	8	1				/		4	7/	Date	1/2	1)	Tim 79	e,
					13 of 14											_	_				ı				1.1										

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Custody Seals		intact:]-No					CoC s			es D-No
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Receipt Temp.		C			ice?						f freezing?	
Comments:			PFAS-OIII	y rear	icer L-1es	8 🗀-1	10 [2]	N/II	Ally Si	giis o	i iteezhig: 🗕-1	C3 22-140
Preservation					Bottle Size	/Type	& Oua	ntity			Check pH for A	LL applicable*
/ Analysis					Dottie Size	/ Type	e & Qua	intity			samples and doo	
HCl	40mL(G)	2	250mL(P)	2.11	500mL(P)	T	1L(G)				110	
HNO ₃	125mL(P)	-	250mL(P)	1	500mL(P)						PHIL	
H ₂ SO ₄	40mL(G)	2	60mL(P)		125mL(P)		250mL	(P)	500mL(P)	T.	phos off	1200
NaOH	125mL(P)		250mL(P)									
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)							
ZnAc-NaOH	125mL(P)		250mL(P)								*nU /by analyst VC	OC DEAS TOCOSC
Trizma	125mL(P)		250mL (P)			-					Residual Cl not	OC, PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)	-							ABN625 Pe	
NaS ₂ O ₃	40mL(G)		120mL(P)								Bacteria ResCl ✓b	
MeOH	20mL(G)		40mL(G)				200 200					
None (solid)	2oz(G)		4oz(G)	0	8oz(G)	1	Syringe				PC Dry applicab	The same of the sa
None (water)	40ml (G)		60mL(P)	3	125mL(P)	3	250mL	(P)	500mL(P)	1	1L(G)	1L (P)
NHyCL	60M(G)	3										
Mold	Cassette		Bulk		Tape Lit	t						
Asbestos	Cassette		Bulk									
Lead	Cassette	_	Bulk		Wipe							
_						1						
Login Review						Ye	s No	N/A	Comments			
Proper lab sam					preservative?	V	/					
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VOC &TOC W												
VOC Solid-MeC					OK?	-						
PFAS: Lab spec			eived, if requi	red?		V						
Bacteria bottles	provided by	ARA?				V						
Samples within	holding time	?			the appar	enx						
Immediate tests	communicat	ted in v	vriting:		1/			/				
NO3, NO 0-PO) (Surfactants, Turbid	H)BOD Colife	orm/E. a	roli (P/A or MPN	, Enter	rococci, Color	1	NR1/	STN	h AN			
Date, time & II)xygen.	, Unpres 024	.,	J.V.	W.	11			
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Pesticides EPA						-	1	/	100	•		
Compliance san								-	(Or must be	-	oliance samples (NH	DES MADEP
Log-in Supervis	sor notified in	nmedia	itely of follow	ing ite	ems:			/	DoD etc.) or i			
	Inspected	l and I	Received By:			K)	Date	/Time: 5/	27	121 18:2	8
Peer Review C	Checklist			11/22								
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The second second								Matrix			-reference	
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QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/08/2021 2106-00273

Client Job #:

06/02/2021

Date Received: 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

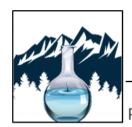
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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

Fails State Guideline Attention

Passes

Fails EPA Primary

Fails EPA Secondary

DATE AND TIME COLLECTED: DATE AND TIME RECEIVED: **ANALYSIS PACKAGE:**

RECEIPT TEMPERATURE:

Legend

11:15AM

05/27/2021

06/02/2021 09:00AM

HAA GSA ON ICE 3.1° CELSIUS

OLIENT IOD #

MORE LOC INFO:					CLIE	NT 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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 12:50AM

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

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4 Tech Dr Report To: Alex Birth	C			F-R-1			Prot	tocol:		RCRA	4	SDWA	NPD		☐ VOC 8260 MADEP	☐ VOC 8021VT		☐ Gases-List:	TPH C		st/PCI	dilutio		April	☐ Acidity	IA	Znmo	1	MPN	A STORY	1		D TC	ا ق	A	
Phone #: 914 - 406	-9598						Post		N	APF		NHDE)	C 82	0, [xane	sases	8	□ EDB	.3 Pe	tope		A)	Įį.	SE	0	1	teria	1	ate		700		2	
Invoice to: Clobosho	Calcle 1	A	14	0-	co	m	Limi	orting				GW-1 Other			0		☐ 1,4-Dioxane		MAD	ō	909	AS iso		Turbic	Mkalir	t Met	1/6	0	Bac C	1	NE S		☐ TCLP SV0C ☐ TCLP Pesticide	oicide	5	
Phone #: 214-406 Invoice to: abo sho Email: 5 Alex 8	eup						Quo	ote#_							☐ VOC 8260 NHDES	U VOC BTEX MtBE, only	15 🗅 1,	☐ V0C 524.2 NH List	☐ DRO 8015 ☐ EPH MADEP ☐ TPH Fingerprint	□ 625.1		3 PFAS isotope dilution	☐ 0&G 1664 ☐ Mineral 0&G 1664	Conductivity of Turbidity O Apparent Color (100	TS OTVS CATKalinity	☐ RCRA Metals ☐ Priority Pollutant Metals	Orfotal Metals-list: (a, Na, Mg, Fe,		Ammonia Cob Cinn Cin Cion Signatura MPN Cintercocci	□ Cyanide □ Sulfide	Witrate Official Conformation of Fluoride Fluoride	/FP)C DTC	□ Herbicides	Form	~
PO #:							_ O N	H Re	imbu	rsem	nent I	Pricing	I		8260	BIE	GRO 8015	524.	8015	☐ 8270ABN	1 Pest	☐ PFAS 533	eral 0	nduct	0	riority	0	st:	J acte	d	3	☐ Ignitibility/FP	☐ TCLP Metals ☐ TCLP VOC	☐ Grain Size	100	or Composite (C)
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Expedited (48 hr)*	current a																																		_	
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QSD-01 Revision 03/09/2020	Relinquished	J.	_				/					SDa	27	17!	ner	, [nec	eive	(a b)	La	bora	LOFY	#		*	_	\	/			5	17	7/2	1 /5	75	
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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
lowa	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

Revision date: 09/29/2020



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 Report: 519815

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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 Date

Client Name: Alpha Analytical

Report #: 519815

Client Name: Alpha Analytical Report #: 519815

Sampling Point: L2128312-01/Finished-SW2 PWS ID: Not Supplied

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 519815

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

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		nS	bcontract (Subcontract Chain of Custody			5198	<u>n</u>
A N A L Y I G A N		Eurofir 110 So South	Eurofins US 110 South Hill St. South Bend, IN 46617		3		Alpha Job Number L2128312	ımber
Client	Client Information	d	Project Information	ation	Regulate	ory Requiremer	Regulatory Requirements/Report Limits	S
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	cal Labs Drive , MA 01581-1019	Project Location: MA Project Manager: Nathalie Lewis Turnaround & Delivera	A athalie Lewis I & Deliverab	t Location: MA t Manager: Nathalie Lewis Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:	rogram: eria:		
Phone: 508.439.5170 Email: nlewis@alphalab.com	0 alab.com	Due Date: Deliverables:						
		Project Specific R	equirements	Project Specific Requirements and/or Report Requirements	uirements			
Refer Additional Comments	Reference following Alpha Job Number on final report/deliverables: L2128312 Additional Comments: Send all results/reports to subreports@alphalab.com	nber on final report/de ubreports@alphalab.c	liverables: L21 om		Report to include Method Blank, LCS/LCSD:	hod Blank, LCS/L	CSD:	
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	S		ш	Batch QC
,	SIMULATED-SW2 - C A OS-SIMULATED-SW2 - C A OS	21 10:45 21 11:15 21 11:15	DW Bron	Bromate 4917423 Bromate 4917424				
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		-				1.3°6.	J	
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Tel: 508-898-92 Client Informatio	20 Tel: 508-822-9300	Project I	Location: 54	e with	wy 2	_	Regi	ılator		uireme	its		_		rmatic	n Req	uirem		Methods
Address: 4 Tec	h Dive		#: Manager: (0	inste	n Rye	^	☐ Yes	No No No No No No	Matrix GW1 NPDE ite /Fed	Spike R Standard S RGP Prograr	equire s (Info	ed on th	is SD	G? (F or Met	als & Ef	for MCPH with	CP Inorg Targets	ganics) ()	
Email: Clob?	HOG-9598 HAD @ Kleinfelle roject Information:	Turn- Ostar Date		RUSH (only	confirmed if pre-ag	aprovedl)	ANALYSIS	SVOC: DABN DS24 DS242	1	EPH. DRanges & DRCRAS		C PEST Ranges Only	DFING	O Precipe Trime				SAMPLE Filtration □ Field □ Lab to	do B
ALPHA Lab ID (Lab Use Only)	Sample ID		Colle	ection	Sample Matrix	Sampler Initials	Voc.	SVOC	METAL	EPH: C	NPH:C	TPH:	18	//		//	$'$ \vdash	Sample Com	E
28312 - 01 -02	Finisled-Su Simulated-Su	いて	5/27	1045	0m 0m	he ne							X						
Container Type P= Plastic A= Amber glass	Preservative A= None B= HCl					ainer Type						PI NP							
V= Vial G= Glass B= Bacteria cup C= Cube O= Other E= Encore D= BOD Bottle	C= HNO ₃ D= H ₃ SO ₄ E= NaOH F= MeOH G= NaHSO ₄ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ CI K= Zn Acetate O= Other	Relin	quished By:		Dat 5/23	te/Time +/ (\72\) z/ 14:40	Att	Mus	Recei	ed By:			5	Date/127 27/21	ime 11:30	Alph See	na's Ter revers	s submitted an ms and Condi e side. 01 (rev. 12-Mar-20	tions.



Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2128312

Client	Information		Project In	formation		Regulatory R	equirements/Report I	Limits
Client: Alpha Analyti Address: Eight Walkup Westborough	ical Labs o Drive n, MA 01581-1019	Project Location Project Manage		wis erables Inform	nation	State/Federal Program Regulatory Criteria:	m:	
Phone: 508.439.5176 Email: nlewis@alpha	0 alab.com	Due Date: Deliverables:						
		Project Specifi	c Requirem	ents and/or Re	eport Require	ements	THE SERVICE WHITES	The state of the s
TO DESCRIPTION OF THE PARTY OF	ence following Alpha Job Nu s: Send all results/reports to			: L2128312	Rep	ort to include Method B	lank, LCS/LCSD:	
Lab ID	Client ID	Collection Date/Time	Sample Matrix		Analysis		14	Batch QC
	FINISHED-SW2 SIMULATED-SW2	05-27-21 10:45 05-27-21 11:15	DW	Bromate Bromate				
			Ŧ.					
	Relinquished	Ву:		Date/Time:		Received By:	Date/Time	8
Form No: AL_subcoc					3			

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57268 4 Technology Dr. Date Received: 6/3/21

Suite 110

Westborough, MA 01581

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

Alex Alterisio Date of Approval: 6/11/2021

Authorized Signature Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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
				-



Job ID: 57268

Sample#: 57268-001 Sample ID: RAW-SW2

Matrix: Water

		Reporting			Instr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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	i



Job ID: 57268

Sample#: 57268-001 Sample ID: RAW-SW2

Matrix: Water

Sampled: 6/3/21 11:10

		Reportir	ng		Instr Dil'r	1	Pre	eр		Anal	ysis
Parameter	Result	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	22:30 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

•		Reporting	1		Instr Dil'r	ı l	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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	ι	umhos/cm	1	SFM		2101638	6/8/21	16:45 SM2510B
рН	6.6 H			рН	1	SFM		2101579	6/4/21	7:13 SM4500H+B
H = Sample was r	eceived beyon	d method ho	lding time	e.						
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

		Reporting			Instr Dil'n	P	rep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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



Job ID: 57268

Sample#: 57268-001 Sample ID: RAW-SW2 Matrix: Water

Mathed Defended F527.4										
Method Reference: E537.1		Reporting	l		Dil'n		Prep		Ana	lysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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.



Job ID: 57268

Sample#: 57268-002 Sample ID: Field Blank Matrix: Water

Sampled: 6/3/21 11:10

Method Reference: E537.1

Method Reference: E537.1		Reportin	g		Dil'n		Prep		Ana	llysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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

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- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limit	ts RPD	RPD Limi
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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 ac (11CLPF3OUDS)	cid	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		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	DUP13948	3 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	cid57290-002	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	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	Lim	its	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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	id	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		Units	Amt Added	%R	Limi	its	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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	cid57286-001	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 An	nt 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 A	mt 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 A	Amt Added	%R	. –	Limits	5	RPD	RP	D Limit
E300.0A	BLK2101597	Bromide		<	0.1	mg/L								
		Chloride Sulfate		<	0.5 0.5	mg/L mg/L								
E300.0A	DUP2101597	Bromide	57269-001	<	0.1	mg/L						0		10
		Chloride Sulfate	57269-001 57269-001		54 13	mg/L mg/L						0 0		10 10
F200 0A	1.000404507						40	00		00	440			
E300.0A	LCS2101597	Bromide Chloride			9.8 99	mg/L mg/L	10 100	98 99		90 90	110 110			
		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	рН				5.94	6.06			
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	рН				3.94	4.06			
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	рН				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 A	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	рН	57205-002		9.4	рН						
SM4500H+B	DUP2101579	рН	57226-001		8.0	рН						
SM4500H+B	DUP2101579	рН	57249-001		7.8	рН						
SM4500H+B	DUP2101579	рН	57268-001		6.6	рН						
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		



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Phone #: 9									eporti	ng (MCP QAPI	P (NHDE: GW-1	S DOE)	28 OOV □		Dioxane	☐ Gases-List	1	CI EDB	☐ 608.3 Pest/PCB					la.	5	NOT [☐ Bacteria MPN	trite 🗆	Sulfate & Bromide		CI TCLP SVOC			
nvoice to: <u>k</u>	<u>Kleinfelde</u> bbishop@		er co	m					mits:		EPA	DW (Other_			DES D	tBE, only	X1.4	1	MADEP	100	2800.0	1664	Turbidity		lutant M	a. N		NTO					O TCLF	☐ Herbicides		
mail:at	овізпорш	- Nicimolat	51.00						uote #		ireon	ment P	ricina			260 NH	U VOC BTEX MtBE	☐ GR0 8015 X1,4-Dioxane	☐ VOC 524.2 NH List			☐ 8081 Pesticides	Minoral ORG 1664	disclivity	DIVS	ority Pol	-e. O		O TKN	☐ Bacteria P/A	O Nitra	☐ Nitrite ★Chloride	oility/FP	P VOC	100	E	(C)
Lab		-	RS		Matri	x	Pres	_				nent P				1 VOC 8	7 VOC	O GRO			□ 8270ABN	18081) Minor	Con	I SI	Price		tals-list	GOO		Sulfide	Itrite 🗸	☐ Ignitibility/FP	O TCL	☐ Grain Size	olifor	Composite (C)
Sample ID (Lab Use Only)		eld D	# CONTAINERS	WATER	SOLID	OTHER	HCI	HNO3	H ₂ SO ₄	NaOH MeOH DATE TIME SAMPLER D VOC 8260				O VPH MADEP	☐ V0C 524.2			□ 8082 PCB	FPAS 537.1	X OH K BOOK Conductivity	Sur X Sar D	D RCRA Metals	Otal Metals-list:	Dissolved Me	□ Ammonia □ COD □	☐ T-Phosphorus	□ Cyanide □ Sulfide	□ Nitrate □ N	☐ Corrosivity	TCLP Metals TCLP VOC	Subcontract:	Total Coliform	Grab (G) or C				
57268-01	Raw-SV	N2	7	X	0,					eserved 13/2(II:10 KZ						3		3		1		3	X	X						X							
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TAT REQU Priority (24 h Expedited (4	nr)* 🗆 8 hr)* 🗅	for samp	le acc	eptar	preceassociates.com prance policy and editation lists. SPECIAL INSTRUCT *use reporting limits.								13 ug/	l for	1,4-	Diox	an	Э														(tr	amp	du	mona	coole	
Standard (10 Busines *Date Neede		REPOR					NS □ E	PDF (e-mail address)) <u>a</u>	bbisho	p@k	leir	nfeld	er.c	com	&	krya	n@	klei	nfe	lder	.co	m		-	1000	CEIV MPE				A		_NO 4°c	
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57268 Sample Receipt Condition Report Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS Lab Courier ☐-Client Drop-off Samples Received from: Yes □-No N/A □-Yes □-No CoC signed: Custody Seals - present & intact: Sampled < 24 hrs ago? Yes □-No O-Yes O-No O-N/A Samples on ice? Receipt Temp: PFAS-only real ice? □-Yes □-No □-N/A No Any signs of freezing? □-Yes Comments: Bottle Size/Type & Quantity Check pH for ALL applicable* Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl HNO₃ 125mL(P) 250mL(P) 500mL(P) 500mL(P) H₂SO₄ 40mL(G) 60mL(P) 125mL(P) 250mL(P) 125mL(P) 250mL(P) **NaOH** 125mL(P) 250mL(P) 60mL(P) (NH₄)₂SO₄ ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G 125mL(P) 250mL (P) Trizma Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625___Pest608_ NaS₂O₃ 40mL(G) 120mL(P) Bacteria ResCl ✓ by analyst MeOH 20mL(G) 40mL(G) PC Dry applicable? Y None (solid) 2oz(G) 4oz(G) 8oz(G) Syringe 500mL(P) 1L(G) 1L (P) 125mL(P) 250mL(P) 40ml (G) 60mL(P) None (water) Mold Bulk Plate Cassette Tape Lift Asbestos Cassette Bulk Lead Wipe Cassette Bulk 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? Less than pea-s. Zed bubble in 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: AUO NO₃, NO₂,o-PO₄, pH, BOD Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Curbidity, 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) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests Inspected and Received By: Date/Time: Peer Review Checklist Analyses in Correctly Sample IDs ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? ☐ Project Name ☐ PO# (if provided) Matrix -references ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected -wastewater methods Notes from CoC in LIMS ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Date: Reviewed By: What was sent? Notes: (continue on back as needed) Initials Date Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice Uploaded / PDF

19 of 19

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57269
4 Technology Dr. Date Received: 6/3/21

Suite 110

Westborough, MA 01581

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/24/2021

Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

Sample Association Table

Drinking Water
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l6251 (subcontract)
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40C
Mg) by SM2340B
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by 365.3
s Analysis
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Job ID: 57269

Sample#: 57269-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

		Reporting			Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ate 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

		Reporting			Instr Dil'n	I	Prep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor F	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	t

Job ID: 57269

Sample#: 57269-001 Sample ID: Finished-SW2

Matrix: Water

		Reportin	Reporting		Instr Dil'r	1	Pre	еp		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

Job ID: 57269

Sample#: 57269-001 Sample ID: Finished-SW2

Matrix: Water

Sampled: 6/3/21 11:45

	Reporting				Instr Dil'n	1	Pre	ep		Anal	ysis	
Parameter	Result	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 fo	r the matrix spi	ke was 44	4%. The	acceptanc	e criteria is	90-110%.	All othe	er associate	ed QC samp	les were	accepta	able.
Nitrate-N	3.3 M	0.1	0.038	mg/L	1	DBV			2101597	6/4/21	13:17	E300.0A
M = The recovery fo	r the matrix spi	ke was 70	0%. The	acceptanc	e criteria is	90-110%.	All othe	r associate	ed QC samp	les were	accepta	able.
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 fo	r the matrix spi	ke was 89	9%. The	acceptanc	e criteria is	90-110%.	All othe	r associate	ed QC samp	les were	accepta	able.
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	U	ımhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
рН	7.3 H			рН	1	SFM			2101579	6/4/21	7:17	SM4500H+B
H = Sample was rec	eived beyond r	nethod ho	olding time	9.								
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

		Reporting			Instr Dil'n	ı P	rep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference	
Total Organic Carbon (TOC)	U	1.0	0.59	ma/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 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst Date** Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 ng/L **ACA** 6/8/21 13948 6/9/21 16:16 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U **ACA** 1.7 0.33 ng/L 1 6/8/21 13948 6/9/21 16:16 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 **ACA** 6/8/21 13948 6/9/21 16:16 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U **ACA** 1.7 0.42 ng/L 1 6/8/21 13948 6/9/21 16:16 **ACA** perfluorodecanoic acid (PFDA) 1.7 U 1.7 0.28 ng/L 1 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 na/L 1 **ACA** 6/8/21 13948 6/9/21 16:16 1.7 U ACA perfluorohexanoic acid (PFHXA) 0.29 1 6/8/21 13948 6/9/21 16:16 1.7 ng/L perfluorononanoic acid (PFNA) 1.7 U 0.37 ng/L 1 **ACA** 6/8/21 13948 6/9/21 16:16 1.7 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 0.11 1 **ACA** 6/8/21 13948 6/9/21 16:16 1.7 ng/L 1.7 U ACA perfluoroundecanoic acid (PFUNA) 1.7 0.27 ng/L 1 6/8/21 13948 6/9/21 16:16 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 **ACA** 6/8/21 13948 6/9/21 1.7 U 1.7 ng/L 1 16:16 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 1.7 0.33 ng/L 1 **ACA** 6/8/21 13948 6/9/21 16:16 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 **ACA** 6/8/21 13948 6/9/21 16:16 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 97 70-130 1 6/8/21 13948 6/9/21 16:16 13C2-PFDA SUR 70-130 % 1 **ACA** 6/8/21 13948 6/9/21 16:16 96 ACA D5-NEtFOSAA SUR 101 70-130 % 1 6/8/21 13948 6/9/21 16:16 % 1 ACA 13C3-HFPO-DA SUR 101 70-130 6/8/21 13948 6/9/21 16:16

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



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

Quality Control Report



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

Absolute Resource



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 -

			- QC Nep	J1 L								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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 A	mt 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		



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 Sulfate		<	0.1 0.5	mg/L							
		Suilate		`	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		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	рН			5.94	6.06		
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	рН			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						
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						



Method	QC ID	Parameter	Associated Sample	Result	Units An	nt Added	%R	Limits	RPD	RPD Limit
SM4500H+B	DUP2101579	pH	57205-002	9.4	рН					
SM4500H+B	DUP2101579	рН	57226-001	8.0	рН					
SM4500H+B	DUP2101579	pH	57249-001	7.8	рН					
SM4500H+B	DUP2101579	рН	57268-001	6.6	рН					
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 As	sociated 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 (NETFOSAA)	acid	<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido aceti acid (NMEFOSAA)	С	<	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-sulfo acid (9CLPF3ONS)	nic	<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADO acid) (ADONA)	NA	<	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 Asso	ciated Sample		Result	Units Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	3 2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57290-002	<	1.9	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic ac (NETFOSAA)	id 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-sulfonio 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 13	0	
		13C2-PFDA SUR	57290-002		103	%		70 13	0	
		D5ETFOSAA SUR	57290-002		95	%		70 13	0	
		HFPODA13C3 SUR	57290-002		99	%		70 13	0	



E537.1	Method	QC ID	Parameter	Associated Sample	Result	Units A	hmt Added	%R	Limits		RPD	RPD Limit
NETFOSAA n-methylperfluorooctane sulfonamido acetic acid (PFBS) 160 ng/L 177 91 70 130 130 130 130 14	E537.1	LCS13948	(heptafluoropropoxy)propanoic aci	d (GenX	170	ng/L	200	87	70	130		
acid (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) perfluorobecanoic acid (PFDA) perfluorodecanoic acid (PFHA) perfluorohexane sulfonic acid (PFHXS) perfluorohexane sulfonic acid (PFHXS) perfluoronexane sulfonic acid (PFHXS) perfluoronexane sulfonic acid (PFHXA) perfluoronexanoic acid (PFNA) perfluorotetradecanoic acid (PFOS) perfluorotetradecanoic acid (PFOA) perfluorotetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluorounexanoic acid (PF			, .	o acetic acid	210	ng/L	200	103	70	130		
perfluorodecanoic acid (PFDA) 200 ng/L 200 102 70 130 perfluorododecanoic acid (PFDA) 210 ng/L 200 104 70 130 perfluoroheptanoic acid (PFHAA) 180 ng/L 200 90 70 130 perfluorohexanoic acid (PFHXA) 180 ng/L 200 90 70 130 perfluorononanoic acid (PFNA) 180 ng/L 200 90 70 130 perfluorocotanoic acid (PFNA) 190 ng/L 200 93 70 130 perfluorocotanoic acid (PFONA) 190 ng/L 200 93 70 130 perfluoroctanoic acid (PFOA) 180 ng/L 200 89 70 130 perfluorotridecanoic acid (PFOA) 180 ng/L 200 100 70 130 perfluorotridecanoic acid (PFTRIA) 200 ng/L 200 102 70 130 perfluorotridecanoic acid (PFUNA) 200 ng/L 20				ido acetic	220	ng/L	200	108	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 perfluoronanoic acid (PFNA) 190 ng/L 200 93 70 130 perfluoroctane sulfonic acid (PFNA) 190 ng/L 200 93 70 130 perfluoroctanoic acid (PFOA) 180 ng/L 192 85 70 130 perfluorotetradecanoic acid (PFOA) 180 ng/L 200 89 70 130 perfluorotridecanoic acid (PFTRA) 200 ng/L 200 100 70 130 perfluoroundecanoic acid (PFUNA) 200 ng/L 200 192 70 130 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (9CLPF3OUS)			perfluorobutane sulfonic acid (PFE	3S)	160	ng/L	177	91	70	130		
perfluoroheptanoic acid (PFHPA) perfluorohexane sulfonic acid (PFHXS) perfluorohexanoic acid (PFHXA) perfluorohexanoic acid (PFHXA) perfluorononanoic acid (PFNA) perfluorononanoic acid (PFNA) perfluoroctane sulfonic acid (PFOS) perfluoroctane sulfonic acid (PFOS) perfluoroctanoic acid (PFOA) perfluoroctanoic acid (PFOA) perfluorotetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTRIA) perfluoroundecanoic acid (PFTRIA) perfluoroundecanoic acid (PFUNA) 180 ng/L 200 100 70 130 perfluoroundecanoic acid (PFUNA) 190 ng/L 200 102 70 130 perfluoroicosafluoro-3-oxaundecane-1- sulfonic acid (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxaundecane-1-sulfonic acid (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA) 13C2-PFHxA SUR 90 % 70 130 13C3-PFDA SUR 99 % 70 130 D5ETFOSAA SUR			perfluorodecanoic acid (PFDA)		200	ng/L	200	102	70	130		
perfluorohexane sulfonic acid (PFHXS) perfluorohexanoic acid (PFHXA) perfluorohexanoic acid (PFHXA) perfluorononanoic acid (PFNA) perfluorononanoic acid (PFNA) perfluorooctane sulfonic acid (PFOS) perfluorooctane sulfonic acid (PFOA) perfluorooctanoic acid (PFOA) perfluorooctanoic acid (PFOA) perfluorootetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluorootetradecanoic acid (PFTRIA) perfluorootetradecanoic acid (PFTRIA) perfluorootetradecanoic acid (PFTRIA) perfluorootedecanoic acid (PFTRIA) perfluorootedecanoic acid (PFUNA) perfluorootetradecanoic acid (PFUNA) perfluorootetrad			perfluorododecanoic acid (PFDOA)	210	ng/L	200	104	70	130		
perfluorohexanoic acid (PFHXA) perfluorononanoic acid (PFNA) perfluorononanoic acid (PFNA) perfluorooctane sulfonic acid (PFOS) perfluorooctane sulfonic acid (PFOS) perfluorooctanoic acid (PFOA) perfluorooctanoic acid (PFOA) perfluorotetradecanoic acid (PFEA) perfluorotetradecanoic acid (PFTEA) perfluorotridecanoic acid (PFTRIA) perfluoroundecanoic acid (PFTRIA) perfluoroundecanoic acid (PFUNA) perfluoronoic acid (PFUNA) perfluoroundecanoic acid (PFUNA) perf			perfluoroheptanoic acid (PFHPA)		180	ng/L	200	90	70	130		
perfluorononanoic acid (PFNA) perfluorooctane sulfonic acid (PFOS) perfluorooctane sulfonic acid (PFOS) perfluorooctanoic acid (PFOS) perfluorooctanoic acid (PFOA) perfluorootetradecanoic acid (PFTEA) perfluorotetradecanoic acid (PFTEA) perfluoroundecanoic acid (PFTEA) perfluoroundecanoic acid (PFTRIA) perfluoroundecanoic acid (PFUNA)			perfluorohexane sulfonic acid (PFI	HXS)	160	ng/L	190	85	70	130		
perfluorooctane sulfonic acid (PFOS) perfluorooctanoic acid (PFOA) perfluorooctanoic acid (PFOA) perfluorotetradecanoic acid (PFTEA) perfluorotridecanoic acid (PFTEA) perfluorotridecanoic acid (PFTRIA) perfluoroundecanoic acid (PFTRIA) perfluoroundecanoic acid (PFUNA) perfluoroundecanoic acid (PF			perfluorohexanoic acid (PFHXA)		180	ng/L	200	90	70	130		
perfluorooctanoic acid (PFOA) perfluorotetradecanoic acid (PFTEA) perfluorotridecanoic acid (PFTEA) perfluorotridecanoic acid (PFTRIA) perfluoroundecanoic acid (PFUNA) perfluoroundecanoic acid (PFUNA) 11-chloroeicosafluoro-3-oxaundecane-1- sulfonic acid (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA) 13C2-PFHxA SUR 13C2-PFDA SUR D5ETFOSAA SUR 180 ng/L 180 ng/L 180 ng/L 180 ng/L 187 95 70 130 130 130 130 130 130 130 130			perfluorononanoic acid (PFNA)		190	ng/L	200	93	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-chloroeicosafluoro-3-oxaundecane-1- sulfonic acid (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA) 170 ng/L 189 89 70 130 acid) (ADONA) 13C2-PFHxA SUR 90 % 70 130 13C2-PFDA SUR 99 % 70 130 D5ETFOSAA SUR			perfluorooctane sulfonic acid (PFC	OS)	160	ng/L	192	85	70	130		
perfluorotridecanoic acid (PFTRIA) 200 ng/L 200 99 70 130 perfluoroundecanoic acid (PFUNA) 200 ng/L 200 102 70 130 11-chloroeicosafluoro-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			perfluorooctanoic acid (PFOA)		180	ng/L	200	89	70	130		
perfluoroundecanoic acid (PFUNA) 200 ng/L 200 102 70 130 11-chloroeicosafluoro-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			perfluorotetradecanoic acid (PFTE	A)	200	ng/L	200	100	70	130		
11-chloroeicosafluoro-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			perfluorotridecanoic acid (PFTRIA)	200	ng/L	200	99	70	130		
sulfonic acid (11CLPF3OUDS) 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			perfluoroundecanoic acid (PFUNA)	200	ng/L	200	102	70	130		
acid (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA 170 ng/L 189 89 70 130 acid) (ADONA) 13C2-PFHxA SUR 90 % 70 130 13C2-PFDA SUR 99 % 70 130 D5ETFOSAA SUR 84 % 70 130				ane-1-	180	ng/L	189	97	70	130		
acid) (ADONA) 13C2-PFHxA SUR 90 % 70 130 13C2-PFDA SUR 99 % 70 130 D5ETFOSAA SUR 84 % 70 130				e-1-sulfonic	180	ng/L	187	95	70	130		
13C2-PFDA SUR 99 % 70 130 D5ETFOSAA SUR 84 % 70 130			•	id (ADONA	170	ng/L	189	89	70	130		
D5ETFOSAA SUR 84 % 70 130			13C2-PFHxA SUR		90	%			70	130		
			13C2-PFDA SUR		99	%			70	130		
HFPODA13C3 SUR 85 % 70 130			D5ETFOSAA SUR		84	%			70	130		
			HFPODA13C3 SUR		85	%			70	130		



Method	QC ID	Parameter Associ	ated Sample	Result	Units	Amt Added	%R	Limit	S	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		



GE	OF

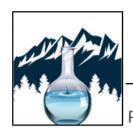
57269 AND ANALYSIS REQUEST Portsmouth, NH 03801 Absolute Resource 603-436-2001 **ANALYSIS REQUEST** absoluteresourceassociates.com Project Name: Barnstable, Company Name: true ☐ TAL Metals 🔀 Hardness Kleinfelder StraightWay2 □ Ferrous Iron ☐ Fluoride TTHMS Project #: □ Ammonia □ COD □TKN □TD □TON ★TOC □ Ferrous II ★T-Phosphorus □ Bacteria P/A □ Bacteria MPN □ Enterococci ☐ Phenols Company Address: ☐ TCLP Pesticide XpH X BOD Conductivity Turbidity X Apparent Color Project Location: NH MA ME VT 4 Technology Drive, Westborough, MA ☐ TPH Fingerprint X Sulfate X Bromide Ca, Mg, Mn, Na, ☐ VOC 8260 MADEP ☐ VOC BTEX MtBE, only ☐ VOC 8021VT ☐ Asbestos Accreditation Required? N/Y: ☐ Cyanide ☐ Sulfide ※Nitrate + Nitrite ※Ortho P Report To: Alex Bishop ☐ 608.3 Pest/PCB SDWA **NPDES RCRA** Protocol: NHDES DOD MCP 914-406-9598 O ED8 CI TCLP SVOC □ Priority Pollutant Metals QAPP Reporting GW-1 S-1 Invoice to: Kleinfelder Limits: EPA DW Other XV0C 524.2 UV0C 524.2 NH List □ 625.1 ☐ Mineral 0&G 1664 abbishop@kleinfelder.com ☐ 8082 PCB ☐ 8081 Pesticides Quote # Corrosivity | | Ignitibility/FP A otal Metals-list: Fe, C ☐ 8270PAH ☐ 8270ABN Total Coliform PO #: ☐ NH Reimbursement Pricing ☐ TPH ☐ DRO 8015 ☐ Nitrite # CONTAINERS Matrix **Preservation Method** Lab Sampling ☐ RCRA Metals HAAs CI VPH MADEP O TSS X TDS XPFAS 537.1 ☐ V0C 624.1 Field ☐ VOC 8260 □ 0&G 1664 Sample □ Nitrate Grab (G) WATER ID SOLID ID NaOH H₂SO₂ HNO 宁 (Lab Use Only) 572691 Finished-SW2 6/3/21 XXX XX Non Preserved X Thio X X 2 Χ X 2 X X 3 NH4CI X X 2 Triz 2 Non Preserved X SPECIAL INSTRUCTIONS TAT REQUESTED See absoluteresourceassociates.com for sample acceptance policy and *use reporting limit of 0.13 ug/l for 1,4-Dioxane Priority (24 hr)* current accreditation lists. Expedited (48 hr)* Standard abbishop@kleinfelder.com & kryan@kleinfelder.com RECEIVED ON ICE - YES REPORTING INSTRUCTIONS PDF (e-mail address)_ □NO (10 Business Days) *Date Needed **TEMPERATURE** °C ☐ HARD COPY REQUIRED □ EDD Relinquished by Sampter: Time Received by: Time 6/3/21 **CUSTODY** 12:30 Date Relinquished by: Time Received by: Date Time RECORD 3/21 G 6'. Date Relinquished by: Received by Laboratory: Time QSD-01 Revision 03/09/2020

124 Heritage Avenue #16

CHAIN-OF-CUSTODY RECORD

41 1 4 D				Sam	Condit	on h			57269		
Absolute Re		socia	UPS [1 17.	lEx □-USI	ne	DI	h C	Job Numb		rop-off \square -
Samples Received Custody Seals		ntoct					بط-L:	ıb Cou	CoC s		
							NI. II N	/ ^			24 hrs ago?
Receipt Temp:		C	Samples o								freezing? \square -Yes \square -No
Comments:			PFAS-oni	y real	ice?	; LJ -1	NO L I-I	1/A	Any si	igns of	ireezingr 🗀-1es 🔟-100
Preservation		13/19			Bottle Size	Type	e & Qua	ntity			Check pH for ALL applicable*
/ Analysis		-									samples and document:
HCl	40mL(G)	2	250mL(P)		500mL(P)		1L(G)				42.10
HNO ₃ H ₂ SO ₄	125mL(P) 40mL(G)	2	250mL(P) 60mL(P)	1	500mL(P)	1	250mL(D)	500mL(P)	1	All Color
NaOH	125mL(P)	_	250mL(P)		125mL(P)	-	2301111	7	300IIIL(I-)		PT) COO
(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:
NaS ₂ O ₃	40mL(G)		120mL(P)								ABN625Pest608 Bacteria ResCl ✓ by analyst
MeOH	20mL(G)		40mL(G)								
None (solid)	2oz(G)	^	4oz(G)	-	8oz(G)		Syringe	1		,	PC Dry applicable? Y (N')
None (water)	40ml (G)	7	60mL(P)	3	125mL(P)	3	250mL(")	500mL(P)		1L(G) 1L (P)
NHUC	60ml(G)	3									
Mold	Cassette		Bulk		Plate		Tape Life				
Asbestos	Cassette		Bulk		VVI						
Lead	Cassette		Bulk		Wipe						
Login Review	7					Ye	s No	N/A	Comments	A CONTRACTOR	
Proper lab sam	ple containers	/enou	igh volume/co	orrect	preservative?	~			PAD is	che	eched off, no bottle
Analyses marke	ed on COC m	atch b	ottles received	1?			/		receive	1	
VOC &TOC W							V		·····	U.	
VOC Solid-MeC					K?	V					
PFAS: Lab spec	cific bottles? (QC rec	ceived, if requi	ired?		-					
Bacteria bottles	provided by	ARA?				V					
Samples within	holding time		410	/		V					
Immediate tests	communicat	ed in v	writing: AD)	DBI		1		Egraph.			
NO3, NO30-PO3 Surfactants, Turbid	H, BOD Colifo	rm/E.	tron Dissolved (), Enter Oxygen	Unpres 624	1					
Date, time & II				7,8,			1./		Partena	bo	He has IN
Rushes commu	-			The L			-	/	Daciona	-10	the has ID 1-SW2"but correct
Subcontract no			0	Otto				~	12016	are (bact is also Simulated
Pesticides EPA		ard.				-			me (2/11) back is also simulated
Compliance san		discre	epancies/requ	ire no	flags?			1	(Or must be	rejecte	d)
Log-in Supervis						0	ME	M.,	Discrepancies	, comp	liance samples (NHDES, MADEP,
0 1				9				IMP	DoD etc.) or u	incomn	non requests.
Inspected and Received By: Da									/Time: <u></u>	3/7	18:40
Peer Review C	Checklist	II S J						2	A SHEET		
☐ Client ID/I	Project Manag	ger	☐ On Ice, T	emper	rature OK?			Sampl	e IDs		☐ Analyses in Correctly
☐ Project Nar	ne		□ PO# (if p	rovide	ed)			Matrix			-references
☐ TAT/rushe	s communica	ted	☐ Sub samp	les ser	nt? Shipping Ch	arge?		Date/	Time collected		-wastewater methods
☐ Received D			☐ Issues not					Short	HTs communi	cated	□ Notes from CoC in LIMS
	,		viewed By:				Dat				
Notes: (conti	nue on ba	ck as	needed)						<u>Initials</u>	Date	What was sent?
							Upload				Report / Data / EDD / Invoice
									Report / Data / EDD / Invoice		
Uploaded / PDF											Report / Data / EDD / Invoice

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #: 06/23/2021 2106-00934

Client Job #:

06/04/2021

Date Received: 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

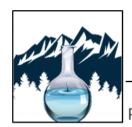
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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 06/04/2021 DATE AND TIME RECEIVED: 12:14PM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

OLIENT IOD #

MORE LOC INFO:					CLIE	NT 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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/15/2021 01:27PM

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

PAGE	OF
PAGE	O

Absolute Resource

associates

Company Name:

Kleinfelder

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57269

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Company Nan	ne:							Pro	ject l	Name	Ba	irns	table			Г		П		П		Т	T			92		\Box	\neg		T	\Box	T	T		T	\Box
Kleinfeld	der							Pro	ject :	#:			htWa						S					Ş		rdnes			lo l	75		ride					
Company Add								1 _{Dra}	ioot	Locat	lion:	ыы Г	ма м	E VT					TTHMS					t Joi		☐ TAL Metals 🔀 Hardness	_		errous	Enterococci	☐ Phenols	☐ Fluoride		side			
4 Techno	ology Driv	e, Westbo	roug	h,M	Α									V		e,	_		F	int				out Co		tals	ı, Zn		- F	Enter	_			Pestic			
Report To:	Alex E	Bishop						Acc	credi				? N/Y			MADE	021V		St.	gerpr		89		ppare	☐ Acidity	AL Me	Sa		700	O z	ho P	Sromic		☐ TCLP Pesticide	sestos		\perp 1
Phone #: 0	14-406-95	-00		_				Pro	toco	12	RCR/ MCP		SDWA		:5	☐ VOC 8260 MADEP	U VOC 8021VT	* 90	☐ Gases-List:	☐ TPH Fingerprint	_	☐ 608.3 Pest/PCB		X	Ö	10	Mg, Mn, Na,		TON XTOC D Ferrous Iron	☐ Bacteria MPN	X Ort	X Sulfate X Bromide			☐ Asbestos		
9								Re	portin	ng	QAP	o	GW-1			700	100	Dioxa	□ Gas	T	O ED8	08.3		bidity	Alkalinity	etals	g,		010	acter	rite	ulfate		0			
Invoice to: _ h								Lin	nits:		EPA I	DW	Other		_	S	only.	H.4-		OEP	10	1000	6.4	TI	Alk	ant M	Σ		Z	_ B	¥	X		TCLP	☐ Herbicides		
Email:ak	obishop@	kleinfelde	r.cor	n				Qu	ote #							NHDE	MtB	2	NH I	CI EPH MADEP	□ 625.1	cides	16.16	Air	V SVT □	Pollut	Ca,		S	a P/A	litrate	oride		0	200		
PO #:									NH R	eimbı	ursen	nent	Pricing	3		8260	BTEX	GRO 8015 XT1,4-Dioxane *	524.	OE	100	Pesti	Solar	nducti	0	□ Priority Pollutant Metals	Fe,	#	O TKN	☐ Bacteria P/A	×	Chloride	ibility/	CI TCLP VOC	Size	=	ite (C)
Lab			SS		Matrix		Pres	serva	tion	Meth	hou		Sa	mpling		0 VOC	J VOC BTEX MtBE,		☐ VOC 524.2 NH List	☐ DRO 8015	☐ 8270ABN	☐ 8081 Pesticides	1 Mineral O.R.G. 1664	00	O TS	D Pr	st	als-lis	000 🗆	0	自	nite	☐ Ignitibility/FP	100	Coliform	3	Composite (C)
Sample	Fi	eld	INE IN				1100	00144	1	1	-			pg	α			OEP	1.2	DRO		8	C. %	, aos	TDS	etals	tals-li	d Met		horus	_ s	O Nitrite	ity	stals	_ C	HAAG	07 70
ID		D	# CONTAINERS	ER	Q	EB		e .	~	I	Ξ		ш	111	SAMPLER	□ V0C 8260	☐ V0C 624.1	H MA	C 52	ORO C HAT C	□ 8270PAH □	82 PC	MPFAS 537.1	X BOD Conductivity X Turbidity X Apparent Color + C.C.	SOTX SET D	☐ RCRA Metals	Xotal Metals-list:	☐ Dissolved Metals-list:	□ Ammonia □ 0	hosp	Cyanide	□ Nitrate □ N	rrosiv	TCLP Metals	Total	Ula L	(9)
(Lab Use Only)			0 #	WATER	SOLID	OTHER	HG	HNO	H ₂ SO ₄	NaOH	МеОН		DATE	TIME	SAN	8	0 0	N D	X	O TP	□ 82	08		X	O TS	5	Ř	10	O An	×	0	Z O	3	010	Subc	-	Grab (G)
5726041	Finish	ed-SW2	8	X			N		_	erve		6	3/21	1145	AR									X		X					×	X					
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Priority (24 h	r)* 🗆	See absolution for sample		eptan	ce po	licy a		SPE					TIONS I limit	of 0.13	ug/l	for	1,4	-Dic	oxai	ne																	
Expedited (4: Standard	8 hr)* 🗆							_	/					و و و و او و و		lala	folo			. 0	Lemie		اماءا	nfol	dor				\neg	DE	251	/ED	ONLI	OF.	-dYE	-	□NO
(10 Busines		REPORT							DF (e-ma	ail ad	dres	s)	abbisho	JWK	ieir	reic	er.c	COII	ΙQ	Krya	ina	Kiei	niei	Jer.	COII	1		- 1						7	5 .	
*Date Neede	d	□ HARD (-/3	_	_	D	ΩE	DD_				_		. ,	-		_	-/			/	7							\perp	TEN	/IPE		URE		<u>_</u>	-	°C
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REC	ORD	16	_	4	1	_						<	/3/	21 /	=			/	2	1		4		>	-			2	=		7					2	1
QSD-01 Revisio	on 03/09/2020	Relinquish	ed by	: _		_		_					0	te I	一型	me		Rec	eive	d by	/ Lat	okat	ory:	F	5	K			J		T	11	Date	21	11	Tim 7:10	e
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57270 4 Technology Dr. Date Received: 6/3/21

Suite 110

Westborough, MA 01581

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

Willie Stone Date of Approval: 6/15/2021

Authorized Signature Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

Sample Association Table

Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM92320B Colliert 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 Magnesie in water by 200.8 Manganese in water by 200.8 Nitrate-N in water (NO2) 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	Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water Bromide in water by 300.0A Calcium 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 SM2130B Turbidity by SM2130B Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2	Simulated-SW2	Water	6/3/2021 11:30	57270-001	
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 (NO3) 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 SM2130B Turbidity Dy SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2					Alkalinity in water by SM2320B
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					Apparent Color by SM2120B
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					Bacteria by SM9223B Colilert in Drinking Water
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 Mitrate-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					Bromide 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 Mitrate-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					Calcium in water by 200.8
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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					Haloacetic acids in water by SM6251 (subcontract)
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					Iron 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					Magnesium in water by 200.8
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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					Nitrite-N in water (NO2) by 300.0A
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					ortho-Phosphate in water (PO4) by 300.0A
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					pH in water by SM4500H+B
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					Sodium in water by 200.8
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					Specific Conductance / Conductivity by SM2510B
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					Sulfate in water (SO4) by 300.0A
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					Total Dissolved Solids by SM2540C
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					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					Total Organic Carbon by 5310C
Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2					Total Phosphorus in water as P by 365.3
Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2					True Color by SM2120B
VOCs Trihalomethanes in water by 524.2					Turbidity by SM2130B
•					Turbidity Check for Direct Metals Analysis
Zinc in water by 200.8					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

		Reporting	J		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Dat	e 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

·		Reportir	ng		Instr Dil'r	1	Pro	ep		Anal	ysis
Parameter	Result	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

Reporting		g		Instr Dil'r	ı Pi	rep		Anal	ysis	
Parameter	Result	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	ι	umhos/cm	1	SFM		2101638	6/8/21	16:45 SM2510B
рН	7.4 H			рН	1	SFM		2101579	6/4/21	7:19 SM4500H+B
H = Sample was	received beyond	method h	olding time	Э.						
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

		Reporting			Instr Dil'n	ı Pi	rep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference	
Total Organic Carbon (TOC)	П	1.0	0.59	ma/l	1	DRV		2101615	6/7/21	13:49 SM5310C	



Quality Control Report



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

Absolute Resource



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	

Matrix Spike/Matrix Spike Duplicate/Duplicate Results
Not requested for this project.

No exceptions noted.

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 A	mt Added	%R	Limits	3	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 A	mt 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 A	Amt Added	%R	Limits	i	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		Amt Added	%R	Limits	3	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	рН			5.94	6.06		
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	рН			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						
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						



Method	QC ID	Parameter	Associated Sample	Result	Units	Amt Added	%R	Limits	RPD	RPD Limit
SM4500H+B	DUP2101579	рН	57205-002	9.4	рŀ	I				
SM4500H+B	DUP2101579	pH	57226-001	8.0	p⊦	ł				
SM4500H+B	DUP2101579	pH	57249-001	7.8	рŀ	ļ				
SM4500H+B	DUP2101579	рН	57268-001	6.6	рŀ	I				
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	



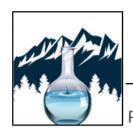
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Absolute Resource																			CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST 57270 ANALYSIS REQUEST																						
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Company Add	dress: ology Drive	e. Westbo	rouc	ıh.M	IA			Pro	ject	Locat	ion:	ин [MA N	1E VT		_				TTHMS					,	Color		☐ TAL Metals ★ Hardness	Zu		□ TKN □ TN □ TON ★TOC □ Ferrous Iron	☐ Bacteria MPN ☐ Enterococci	□ Phenols	□ Fluoride		☐ TCLP Pesticide					
Report To:		Bishop		, ,			-	Ace	credi	tation	Req	uired'	? N/\	/:	Υ		ADEP	21VT			erprint		89		à	parent	dity	Metal	Na,		8	D.E.	O P O	omide		CLP Pe	onic:				
Phone #: a	14-406-95							Pro	otoco		RCR/ MCP		SDW	_	NPDE DOD	ES	8260 M	U VOC 8021VT	au	☐ Gases-List:	☐ TPH Fingerprint		Pest/PC			X	☐ Acidity	D TAI	Mn,		X	ia MPN	*Ortho P	X		C TCLP	1				
Invoice to: _ h						_			porti	ng (QAPI EPA I	9	GW-1	1	S-1		☐ VOC 8260 MADEP	e é	1,4-Dioxane	100		□ EDB	☐ 608.3 Pest/PCB			Turbidity	Ikalinity	Metals	Mg, I		0 1	1 Bacter	+ Nitrite	Sulfate		TCLP SV0C	2000				
	bbishop@		r.cor	m					ote #								HDES	MtBE, o		524.2 NH List	CI EPH MADEP	□ 625.1			G 1664	X A	□ TVS X Alkalinity	☐ Priority Pollutant Metals	Fe, Ca, Mg, Mn, Na,		E 0		trate +	□ Nitrite XChloride XSulfate X Bromide		10]				
PO #:										eimbı	ırsen	nent F	Pricin	g			8260 NHDES	C BTEX	GRO 8015	524.2			■ 8081 Pesticides		☐ Mineral 0&G 1664	nductiv		riority P	Fe,	st:	TX	☐ Bacteria P/A	X.	NC NC	tibility/F	O TCLP VOC	L OIL		site (C)		
Lab			ERS	. 1	Matrix	x	Pre	serva	tion	Meth	od		Sampling				0.00	0 10		000	0 8015	☐ 8270ABN	0 808 □		U Min	S 7	S D TS	Is D P	s-list:	/etals-li	ñ	us D	□ Sulfide Nitrate	Nitrite	Ingi 🗆		J. L.		Сошро		
Sample ID (Lab Use Only)	Use Only)					OTHER	HCI	HNO3	H ₂ SO ₄	NaOH	МеОН	DATE	JAIE		TIME	SAMPLER	□ V0C 8260	☐ V0C 624.1	C VPH MADEP	XV0C 524.2	TPH DR0 8015	☐ 8270PAH	☐ 8082 PCB	* PEAS 697.1	□ 0&G 1664	Conductivity Turbidity Applaient Color	TSS X TDS	C RCRA Metals	Motal Metals-list: Fe	Dissolved I	☐ Ammonia		Cyanide C	□ Nitrate □	☐ Corrosivity ☐ Ignitibility/FP	O TCLP Metals	Total Coliform	HAAc	Grab (G) or Composite (C)		
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TAT REQU Priority (24 h Expedited (4	r)* 🗆 8 hr)* 🗅	See absolute for sample current	e acce	eptan	ice po	olicy a		SPE	ECIA	L IN	STR	UCT	IONS	S																											
Standard (10 Busines		REPORT	ING	INST	RUC	CTIO	NS	91	DF	e-ma	il ad	dress	s)	abbi	shop	o@k	lein	felo	der.	con	n &	kry	an@	@kle	einf	eld	er.c	om			- 1						AYE	S	ONC		
*Date Needed □ HARD COPY REQUIRED □ EDD									_					_	_	7			7								_	TEM	1PE	RATI	_	_	_	_	°C						
CUSTODY Relinguished by Sampler:													Ce/	3/ 2	1		ne Sl	2		d	a R	4	L										(6/3	ate Z	,		Tim	0		
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QSD-01 Revision 03/09/2020 Relinquished by:								1	Date Tin									Time Received by Laboratory: Date Time												e 5											

13 of 14

				Sam	ple Recei	ipt (Condit	ion R			57270
Absolute Re	source Ass	socia	tes					/	Job Numl	er:	31210
Samples Receiv	ved from:		□-UPS □	J-Fed			D-I	ab Cou	rier D -Cli	ent Dr	rop-off D
Custody Seals			□-Yes □	J-No	OKN/A	+				igned:	
Receipt Temp:	_2	°C	Samples o	n ice	□-Yes	1-0	No D-N	I/A	Samp	led < 2	24 hrs ago? □ Yes □-No
			PFAS-onl	y real	ice?	1-0	No DA	V/A	Any s	igns of	freezing? D-Yes DNo
Comments:											
Preservation					Bottle Size/	Type 'Type	& Qua	ntity			Check pH for ALL applicable*
/ Analysis	40mT (C)	1	250ml (D)		500mL(P)		11 (C)		1		samples and document:
HNO ₃	40mL(G) 125mL(P)	2	250mL(P) 250mL(P)	1	500mL(P)		1L(G)				0442
H ₂ SO ₄	40mL(G)	2	60mL(P)	-	125mL(P)	1	250mL	P)	500mL(P)	TO	hospH2
NaOH	125mL(P)		250mL(P)							1	Pir
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)						
ZnAc-NaOH	125mL(P)		250mL(P)								
Trizma	125mL(P)		250mL (P)								*pH ✓ by analyst: VOC, PFAS, TOC,O&C
NH ₄ Ac	125mL(P)		250mL (P)								Residual Cl not present: ABN625 Pest608
NaS ₂ O ₃	40mL(G)		120mL(P)								Bacteria ResCl ✓ by analyst
MeOH	20mL(G)		40mL(G)								
None (solid)	2oz(G)	7	4oz(G)	-	8oz(G)		Syringe	-	The Part of the	-	PC Dry applicable? Y (N)
None (water)	40ml (G)	2	60mL(P)	3	125mL(P)	3	250mL(P)	500mL(P)	1	1L(G) 1L (P)
NULL	60mL(G)	3									
Mold	Cassette		Bulk		Plate		Tape Lif	t			
Asbestos	Cassette		Bulk		WE			_			
Lead	Cassette		Bulk		Wipe						
Login Review	7	1210				Yes	s No	N/A	Comments		
Proper lab sam	ple containers	/enou	gh volume/co	orrect	preservative?	1	-				
Analyses marke			0			1	-				
VOC &TOC W				331			/				
VOC Solid-MeC			ks, Prep Expira	tion C	K?	1					
PFAS: Lab spec	cific bottles? (QC rec	eived, if requi	red?				/			
Bacteria bottles	provided by	ARA?	N. Carlotte			V					
Samples within	holding time?		h-/		1 France	1					
Immediate tests			vriting: NAN	7,40	1,Str						
NO3, NO2 A-PO	H)BOD, Colifo	rm/E.	oli (P/A or MPN	, Enter	ococci, Color	0					
Surfactants, Turbid Date, time & H)xygen	Unpres 624	1	-				
								/		-	
Rushes commu		-	wnuige			+		~			
Subcontract no		pardr				-					
Pesticides EPA	-	1.	. ,		0 >	+	+	V	(0)		n.
Compliance san						+	4	V	(Or must be		liance samples (NHDES, MADEP,
Log-in Supervis	sor notified in	nmedia	itely of follow	ing ite	ems:			/	DoD etc.) or	The state of the s	
					(10			6	121	21 10:20
	Inspected	and l	Received By:			N)	Date,	/Time:	1010	0.02
Peer Review C	Checklist			A FIG							
☐ Client ID/I	Project Manag	ger	☐ On Ice, T	empe	rature OK?			Sample	e IDs		☐ Analyses in Correctly
☐ Project Nar	ne		□ PO# (if p	rovid	ed)			Matrix			-references
	s communica				nt? Shipping Ch	arge?		Date/	Time collected	l	-wastewater methods
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L Received D	ace, Time		viewed By:	cu ab	ove commune	carcui	Da		. 110 commun	Succu	_ 1.0.03 Hom 500 in Limb
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								ded / P	The state of the s		Report / Data / EDD / Invoice

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/17/2021 2106-00936

Client Job #:

06/04/2021

Date Received: 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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

CLIENT ADDRESS: 124 Heritage Avenue, Suite 10

Portsmouth, NH 03801

SAMPLE ID #: 2106-00936-001

SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS:

Simulated-Sw2

MA

Passes

Legend

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 0	6/10/2021 09:07AM					
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/15/2021 02:07PM					
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 02:07PM					
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/15/2021 02:07PM					
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/15/2021 02:07PM					
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	06/15/2021 02:07PM					
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 02:07PM					
2,3-Dibromopropionic Acid	89	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/15/2021 02:07PM					

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

Donald a. L.

OF

Absolute Resource
associates

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57270

associates								absoluteresourceassociates.com							om ANALYSIS REQUEST																						
Company Nam							Pro	oject	Name	Do	arnsta														SS												
Kleinfeld							Pro	oject	#:	St	raigh	itWa	ay2					Ms							ardne			s Iron	C:	S	oride					١	
Company Add		la a va	l. N	4.4			Pro	oject	Loca	tion:	NH N	1A M	IE VT					TTHMS					olor		☐ TAL Metals 🔀 Hardness	Zu		TON X TOC C Ferrous Iron	☐ Enterococci	□ Phenols	□ Fluoride	icide				-	
	logy Drive, Wes	borou	gn,r	ИΑ							_	_	V		d)	7		-	uint				Supplement of the supplement o	7	etals			ō	Ent	ō .	api	Pest	SS			-	
Report To:	Alex Bishop									RCR	uired?	SDW		S) MAD	8021		ist	ingerp		L CB		Apparent Color	☐ Acidity	TALM	Z		₩T00	PN	rtho	Brom	☐ TCLP Pesticide	☐ Asbestos				
Phone #: 91	4-406-9598						Pro	otoco	ol:	MCP		NHDE			8260	U V0C 8021VT	ane	☐ Gases-List:	☐ TPH Fingerprint	8	rest.					돌	1	N N	mia M	2)	X	20	□ As			1	
						_		portin	-	QAPI EPA		GW-1 Other			☐ VOC 8260 MADEP		□ 1,4-Dioxane		2.5	□ EDB	□ 608.3 PestPCB		urbidit	kalinit	Metal	Ca, Mg, Mn, Na,			☐ Bacteria MPN	+ Nitrite Ortho P	Sulfate X Bromide	□ TCLP SV0C	☐ Herbicides			-	
Invoice to: K	deinteider bbishop@kleinfe	doros	m				- -	mis.		EFA	DVV	Other		_	1	BE, only	1,4	List	NADE	10		664	×	W	utant	à,		-				D TCI	Herbi			1	
Email:aL	bishop@kieinie	der.cc)111				_ Qu	iote #						_	8260 NHDES	EX ME		1.2 NF	CI EPH MADEP		sticide	0861	tivity	TVS XAlkalinity	y Polli	0		O TKN	eria P/	Nitrate	Chloride			_		0	
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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
lowa	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

Revision date: 09/29/2020



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 Report: 520326

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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.

Authorized Signature Title 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:	*	۸	!

Client Name: Alpha Analytical Report #: 520326

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

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Container Type P= Plastic A= Amber glass	Preservative A= None B= HCI				Conta	ainer Type							P						
V= Vial G= Glass	C= HNO ₃ D= H ₂ SO ₄				Pre	eservative							-						
B= Bacteria cup C= Cube O= Other	E= NaOH F= MeOH G= NaHSO4	Reling	uished By:		Date	e/Time	1	1	Receiv	ved By:			1	Date/Tir	ne	All sa	moles	submitted are	a subject to
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Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2129644

Cl	ient Information		Project In	formation	Regulatory Re	quirements/Report Limit	s					
Client: Alpha Ai Address: Eight Wa Westbor	nalytical Labs alkup Drive ough, MA 01581-1019	Project Locatio Project Manage Turnare		wis erables Informatio	Regulatory Criteria:	State/Federal Program: Regulatory Criteria:						
Phone: 508.439 Email: nlewis@	.5170 alphalab.com	Due Date Deliverables	: 06/17/21									
		Project Specif	ic Requirem	ents and/or Report	t Requirements							
F	Reference following Alpha Job	Number on final repor	t/deliverables	: L2129644	Report to include Method Bla	ank, LCS/LCSD:						
Additional Comm	nents: Send all results/reports	to subreports@alphala	ab.com									
The same				h mir casa i stampa								
Lab ID	Client ID	Collection Date/Time	Sample Matrix		Analysis	E	Batch QC					
	FINISHED-SW2 SIMULATED-SW2	FINISHED-SW2 06-03-21 11:45 DW										
18463543	Relinquish	ed By:		Date/Time:	Received By:	Date/Time:						
	-C	7		6/7/21								
Form No: AL_sub	coc											

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57362 4 Technology Dr. Date Received: 6/10/21

Suite 110

Westborough, MA 01581

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/23/2021

Total number of pages: 20

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57362

Sample#: 57362-001 Sample ID: Raw-SIM Matrix: Water

	Reporting				Instr Dil'n		Prep		Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e Time	Batch	Date	Time Reference	
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM		2101731	6/15/21	14:39 SW8260Dmod	



Job ID: 57362

Sample#: 57362-001 Sample ID: Raw-SIM Matrix: Water

		Reporting			Instr Dil'r	str Dil'n Prep Analysis					ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
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	ma/L	1	AGN	6/18/21	12:39	13977	6/21/21	SM2340B



Job ID: 57362

Sample#: 57362-001 Sample ID: Raw-SIM Matrix: Water

Sampled: 6/10/21 9:15

		Reporting			Instr Dil'r) F	Prep		Analysis		
Parameter	Result	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	ι	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B	
рН	6.6 H			рН	1	DJM		2101692	6/11/21	5:58 SM4500H+B	
H = Sample was r	eceived beyond	method ho	lding time	e.							
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

		Reporting			Instr Dil'n	Pre	eр		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor Ana	alyst Date	Time	Batch	Date	Time Reference	
Total Organic Carbon (TOC)	U	1.0	0.59	mg/L	1 DE	3V		2101750	6/16/21	10:43 SM5310C	



Job ID: 57362

Sample#: 57362-001 Sample ID: Raw-SIM Matrix: Water

Janipieu. 0/10/21 0.10										
Method Reference: E537.1	Reporting Dil'n Result Limit DL Units Factor A						Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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-chloroeicosafluoro-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		2	101748		

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



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

Job ID: 57362

Sample#: 57362-002 Sample ID: Field Blank Matrix: Water

Sampled: 6/10/21 10:45

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time ng/L 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 WAS 6/16/21 13969 6/16/21 19:49 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.8 U 1.8 0.34 ng/L 1 WAS 6/16/21 13969 6/16/21 19:49 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 WAS 6/16/21 13969 6/16/21 19:49 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U WAS 1.8 0.44 ng/L 1 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 na/L 1 WAS 6/16/21 13969 6/16/21 19:49 ng/L perfluorohexanoic acid (PFHXA) 1.8 U 0.30 1 WAS 6/16/21 13969 6/16/21 1.8 19:49 perfluorononanoic acid (PFNA) 1.8 U ng/L 1 WAS 6/16/21 13969 6/16/21 19:49 1.8 0.40 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 WAS 6/16/21 13969 6/16/21 19:49 ng/L 1 1.8 U 0.28 WAS perfluoroundecanoic acid (PFUNA) 1.8 ng/L 1 6/16/21 13969 6/16/21 19.49 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.35 6/16/21 13969 6/16/21 1.8 ng/L 1 WAS 19:49 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.35 ng/L 1 WAS 6/16/21 13969 6/16/21 19:49 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.16 ng/L 1 WAS 6/16/21 13969 6/16/21 19:49 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 98 70-130 1 6/16/21 13969 6/16/21 19:49 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13969 6/16/21 19:49 107 D5-NEtFOSAA SUR 96 70-130 % 1 WAS 6/16/21 13969 6/16/21 19:49 13C3-HFPO-DA SUR 70-130 % 1 WAS 96 6/16/21 13969 6/16/21 19:49 Sum of MA PFAS6 Analytes (MAPFAS6) 1.8 U 1 2101748 1.8 ng/L

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



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

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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Ar	nt Added	%R	Limits	6	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 Ar	mt 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	5	RPD	RP	D 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			
300.0A	LCSD2101707				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							
100D	DOI 2101070	Tarbiaity	37303 000			1110							
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)			6.01	рН			5.94	6.06			
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06			
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)			4.03	рН			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		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	рН	57362-001		6.5	рН						
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	s RPD	RPD Limit
E537.1	BLK13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	C	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 1	30	
		13C2-PFDA SUR		110			%			70 1	30	
		D5-NEtFOSAA SUR		101			%			70 1	30	
		13C3-HFPO-DA SUR		103			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	ts	RPD	RPD Limit
E537.1	DUP13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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 1	130		
		13C2-PFDA SUR	57299-001	95			%			70 1	130		
		D5-NEtFOSAA SUR	57299-001	91			%			70 1	130		
		13C3-HFPO-DA SUR	57299-001	76			%			70 1	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Lin	nits	RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	MS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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		



*	1/
Absolute Resource	X .
associates	

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57362

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Phone #: 9	14-406-959	98						Protoco	JI.	MCF)	NHD	ES D	OD		☐ VOC 8260 MADEP	☐ V0C 8021VT	xane	☐ Gases-List:	TPH Fingerprint	O E08	.3 Pest			X ≩	ilty 🗆		Ž,		DIKN DIN DION X TOC	teria M	0	ate X		2			
Invoice to:	Kleinfelder							Reporti		QAP EPA	DW	GW- Othe		-1	-			1,4-Dio				□ 608		4	(Turbio	UTVS XAlkalinity	nt Meta	Mg		O Z	☐ Bac	☐ Nitrate + Nitrite	X Sulf		LITCLP SVOC	☐ Herbicides		
Email: al	bbishop@k	deinfelder	.coi	m		DAVABLE CO.		Quote	#							NHDES	MtBE,	X	NH L	LI EPH MADEP	□ 625.1	sides		6 166	X 	X	ollutar	Ca,		_ N		irrate +	vide 🗸			☐ He		
PO #:					1146			_	Reimb	ursei	ment	Pricin	ig			J VOC 8260 NHDES	U VOC BTEX MtBE, only	☐ GR0 8015 X1,4-Dioxane	U VOC 524.2 NH List		ABN	1 Pestio		eral 08	nductiv	F	□ Priority Pollutant Metals	Fe, Ca, Mg, Mn, Na,	st	1 X	Sacteria	O N	XCHIC	tibility/	LI TCLP VOC	Size 1	E	ite (C)
Lab			SHS		Matri	x	Pre	eservation	Meth	nod	Γ	S	amplin	g		00V C	0 \		00/10	3 8015	☐ 8270ABN	□ 808		O Min	S X	S LOTS	S 🗆 P	-list:	etals-li	000 T	IS D	☐ Sulfide	litrite	☐ Ignitibility/FP	DTC	☐ Grair	olifo	sombos
Sample ID (Lab Use Only)	Fiel ID		# CONTAINERS	WATER	SOLID	ОТНЕВ	HCI	HNO ₃	NaOH	МеОН		DATE	TIME		SAMPLER	□ V0C 8260	☐ V0C 624.1	O VPH MADEP	☐ VOC 524.2	☐ TPH ☐ DRO 8015	☐ 8270PAH C	☐ 8082 PCB	X PFAS 537.1	□ 0&6 1664	My □ 800	OTSS XTDS	☐ RCRA Metal	Xotal Metals-list: Fe	☐ Dissolved M	☐ Ammonia ☐ COD	☐ T-Phosphorus ☐ Bacteria P/A	□ Cyanide □	□ Nitrate □ Nitrite XChloride X Sulfate X Bromide	☐ Corrosivity	☐ TCLP Metals	Subcontract: Grain Size	Total Coliform	Grab (G) or Composite (C)
5736201	Raw-SW	SIM	7	Х				Non Pres	erve	d	6	10/21	9:	15	vc										X	X	X						X					
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TAT REQUESTION Priority (24 h Expedited (4 Standard	r)* 🗆	See absolute for sample current	acce	eptar	nce po	olicy		*use r				it of (0.13 u																The second secon									
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57362 Sample Receipt Condition Report Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS □-Lab Courier □-Client Drop-off Samples Received from: 2-Yes □-No D-N/A CoC signed: Custody Seals - present & intact: □-Yes □-No Sampled < 24 hrs ago? ☐-Yes G-Yes O-No O-N/A □-No Receipt Temp: ____O °C Samples on ice? PFAS-only real ice? ☐Yes ☐-No ☐-N/A Any signs of freezing? □-Yes Q-No Comments: Check pH for ALL applicable* Bottle Size/Type & Quantity Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl 125mL(P) 250mL(P) 500mL(P) HNO₃ 60mL(P) 125mL(P) 250mL(P) 500mL(P) 40mL(G) H₂SO₄ 250mL(P) 125mL(P) NaOH 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓ by analyst: VOC, PFAS, TOC,O&G 250mL (P) Trizma 125mL(P) Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625 Pest608 120mL(P) NaS2O3 40mL(G) Bacteria ResCl √by analyst MeOH 40mL(G) 20mL(G) PC Dry applicable? Y None (solid) 2oz(G) 4oz(G) 8oz(G) Syringe 250mL(P) 500mL(P) 1L(G) None (water) 40ml (G) 60mL(P) 125mL(P) Mold Cassette Bulk Plate Tape Lift Asbestos Cassette Bulk Cassette Bulk Wipe Lead 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? less than parsized bubble in -01B 1,4D VOC Solid-McOH covers solid, no leaks, Prep Expiration OK? PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd? Bacteria bottles provided by ARA? Samples within holding time? Immediate tests communicated in writing: NO₃, NO₂,o-PO pH, BOD, Soliform/E. coli (P/A of MPN), Enterococc, Color Surfactante, 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) Discrepancies, compliance samples (NHDES, MADEP, DoD Log-in Supervisor notified immediately of following items: etc.) or uncommon requests. Inspected and Received By: Date/Time: Peer Review Checklist Sample IDs Analyses in Correctly ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? -references ☐ Project Name ☐ PO# (if provided) Matrix -wastewater methods Date/Time collected ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Notes from CoC in LIMS ☐ Issues noted above communicated? Short HTs communicated ☐ Received Date/Time Reviewed By: Date: Initials What was sent? Notes: (continue on back as needed) Date 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 PO Number: None Kleinfelder Job ID: 57363 4 Technology Dr. Date Received: 6/10/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/23/2021

Total number of pages: 21

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57363

Sample#: 57363-001 Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

		Reporting	l		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ite 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

		Reporting	j		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ate 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

		Reporting			Instr Dil'n		Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Dat	e Time	Batch	Date	Time Reference
1.4-dioxane	Ш	0.25	0.12	ua/I	1	LMM		2101731	6/15/21	15:11 SW8260Dmod



Job ID: 57363

Sample#: 57363-001 **Sample ID:** Finished-SIM

Matrix: Water

-		ng		Instr Dil'r	1	Pre	ер		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
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



Job ID: 57363

Sample#: 57363-001 **Sample ID:** Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

	I	Reporting	9		Instr Dil'r	1	Pr	ep		Anal	ysis	
Parameter	Result	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	or the matrix sp	ike was 63	3%. The	acceptano	ce criteria is	90-110%.	All othe	er associat	ed QC sam	ples were	accepta	able.
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	or the matrix sp	ike was 89	9%. The	acceptano	ce criteria is	90-110%.	All othe	er associat	ed QC sam	ples were	accepta	able.
Sulfate	19 M	0.5	0.21	mg/L	1	DBV			2101707	6/11/21	12:03	E300.0A
M = The recovery for	or the matrix sp	ike was 83	3%. The	acceptano	ce criteria is	90-110%.	All othe	er associat	ed QC sam _l	ples were	accepta	able.
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	ι	umhos/cm	1	WAS			2101702	6/11/21	7:35	SM2510B
рН	7.2 H			рН	1	DJM			2101692	6/11/21	6:07	SM4500H+B
H = Sample was red	ceived beyond	method ho	lding time	Э.								
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

		Reporting			Instr Dil'n	ı P	rep		Anal	ysis	
Parameter	Result	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	



Job ID: 57363

Sample#: 57363-001 Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/10/21 10:45

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time ng/L 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 WAS 6/16/21 13969 6/16/21 20:05 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/16/21 13969 6/16/21 20:05 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 WAS 6/16/21 13969 6/16/21 20:05 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U WAS 1.7 0.42 ng/L 1 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 na/L 1 WAS 6/16/21 13969 6/16/21 20:05 1.7 U ng/L perfluorohexanoic acid (PFHXA) 0.29 1 WAS 6/16/21 13969 6/16/21 20:05 1.7 perfluorononanoic acid (PFNA) 1.7 U 0.38 1 WAS 6/16/21 13969 6/16/21 20:05 1.7 ng/L 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 0.11 WAS 6/16/21 13969 6/16/21 20:05 1.7 ng/L 1 1.7 U WAS perfluoroundecanoic acid (PFUNA) 0.27 ng/L 1 6/16/21 13969 6/16/21 20:05 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 6/16/21 13969 6/16/21 1.7 U 1.7 ng/L 1 WAS 20:05 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 WAS 6/16/21 13969 6/16/21 20:05 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 WAS 6/16/21 13969 6/16/21 20:05 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 90 70-130 1 6/16/21 13969 6/16/21 20:05 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13969 6/16/21 20:05 92 D5-NEtFOSAA SUR 87 70-130 % 1 WAS 6/16/21 13969 6/16/21 20:05 13C3-HFPO-DA SUR % 1 WAS 6/16/21 13969 6/16/21 84 70-130 20:05 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 U 1.7 1 2101748 ng/L

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



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

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



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- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits	6	RPD	RPD Limi
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 A	mt 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 Ar	mt 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 A	ımt 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	6	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	рН			5.94	6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)			4.03	рН			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	рН	57362-001		6.5	рН						



Method	QC ID	Parameter	Associated Sample		Result	Units A	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			



- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	s RPD	RPD Limit
E537.1	BLK13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	C	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 1	30	
		13C2-PFDA SUR		110			%			70 1	30	
		D5-NEtFOSAA SUR		101			%			70 1	30	
		13C3-HFPO-DA SUR		103			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13969	9 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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	1	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Lin	nits	RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	MS13969	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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

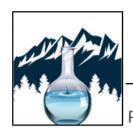
CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

ANALYS ANALYS As s o c i a t e s	□ Priority Pollutant Metals □ TAL Metals ➤ Hardness		i i	0		+ Nitrite X Ortho P Phenols Cultate X Bromide Fluoride		☐ TCLP SV0C ☐ TCLP Pesticide	so			
				X		P or	5	9	os			
				X			~	2	est			
Invoice to: Kleinfelder Reporting QAPP GW-1 S-1 Limits: EPA DW Other Limits: EPA DW Other Reporting QAPP GW-1 S-1 Reporting QAPP GW-1 S-1 Reporting G	utant Metal	Metal Ng.		8	eria MF	+ Nitrite X Ortho P	(000	☐ Asbestos			
S 11 5 5 8 8 8	la d	_ 2	ñ	N	☐ Bacteria MPN	Nitrite	a sulla	SLP SV	☐ Herbicides			
Invoice to: Kleinfelder Email: abbishop@kleinfelder.com Quote #	10 C	Ca,		10	A/A	trate +	D D		□ Herl			
Invoice to: Kleinfelder Email: abbishop@kleinfelder.com PO #:	riority F	Fe.	ੇ - ਖ਼	日	☐ Bacteria P/A	X Nitrate	Janutibility/FP	TCLP VOC	n Size	nu		ite (C)
Lah Sampling	S D P	s UP	etals-li	000 0	St C	□ Suffide	on C		Grain Size	olifo	"	Compos
NATER NATE	C) RCRA Metals	THICKA Metal	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	XT-Phosphorus	☐ Cyanide ☐ Sulfide X Nitrate	Corrosivity	U TCLP Metals	Subcontract	Total Coliform	HAAs	Grab (G) or Composite (C)
573630\ Finished-SW2_ 8 X Non Preserved 46/21 1045 he X X	X	X					X					
1 Thio X		X	,			-				X	-	-
2 X				Х							T	
2 X X											T	
3 NH4Cl X		-			X				-	-	X	
2 Triz X							+		+		+	
→ 2 → Non Preserved X												
-02 Trip Blank X	-		-				ŀ				-	-
TAT REQUESTED Priority (24 hr)* Expedited (48 hr)* 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												
Standard (10 Business Days) *Date Needed HARD OPPY REQUIRED DEDD EDD	com	om				EIVE		N ICE	: 1	ES)	NO _°C
Refinatished by Sampler: CUSTODY Relinquished by: Date Time Received by: Date Time Received by:		_			6/1	10/	21	ate		11:	Time	
RECORD OSD-01 Revision 03/09/2020 Relinquished by: Date Time Received by: Date Time Received by:	fe -)		. '	(Da	ate		1	ime p^	1
6-10 Mythal	~	_	_	_	_	10	1(()	117	1	K	Del	2

Sample Receipt Condition Report 57363 Job Number: Absolute Resource Associates □-Client Drop-off □-UPS □-FedEx □-USPS 2-Lab Courier Samples Received from: □-No **2-**N/A CoC signed: -Yes Custody Seals - present & intact: □-Yes □-No D-Yes O-No O-N/A Sampled < 24 hrs ago? ☐-Yes □-No Samples on ice? Receipt Temp: 6/012 Any signs of freezing? -Yes -No Jamples rec. on the cubes Comments: Check pH for ALL applicable* Bottle Size/Type & Quantity Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl 250mL(P) 500mL(P) 125mL(P) HNO₃ 500mL(P) 125mL(P) 250mL(P) 40mL(G) 60mL(P) H2SO4 NaOH 125mL(P) 250mL(P) 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH √by analyst:VOC, PFAS, TOC,O&G 250mL (P) 125mL(P) Trizma Residual Cl not present: NH₄Ac 125mL(P) 250mL (P) ABN625 Pest608 120mL(P) NaS2O3 40mL(G) Bacteria ResCl ✓by analyst 40mL(G) MeOH 20mL(G) PC Dry applicable? Y 4oz(G) 8oz(G) Syringe None (solid) 2oz(G) 500mL(P) 1L(G) 1L (P) 125mL(P) 250mL(P) 40ml (G) 60mL(P) None (water) NHIYC (M)M (7 Mold Cassette Bulk Plate Tape Lift Bulk Asbestos Cassette Bulk Cassette Wipe Lead NA Yes Login Review No 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? Lot ID#: PB-05 PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd? Bacteria bottles provided by ARA? Samples within holding time? Immediate tests communicated in writing: NO₃, NO₂,o-PO pH, BOIL Coliform/E. coli (P) A or MPN), Enterococct, Color Surfactants, Turbidity Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624 DBV WS AN AU Date, time & ID on samples match CoC? Rushes communicated to analyst in writing? Subcontract note on login board? Pesticides EPA 608 pH5-9? (Or must be rejected) Compliance samples have no discrepancies/require no flags? Discrepancies, compliance samples (NHDES, MADEP, DoD Log-in Supervisor notified immediately of following items: etc.) or uncommon requests. Date/Time: Inspected and Received By: Peer Review Checklist Analyses in Correctly ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Sample IDs ☐ PO# (if provided) Matrix -references ☐ Project Name ☐ Sub samples sent? Shipping Charge? Date/Time collected -wastewater methods ☐ TAT/rushes communicated Notes from CoC in LIMS ☐ Issues noted above communicated? Short HTs communicated ☐ Received Date/Time Date: Reviewed By: Initials What was sent? Notes: (continue on back as needed) Date Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice

Uploaded / PDF 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: Work Order #:

06/18/2021 2106-02505

Client Job #:

06/15/2021

Date Received: 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

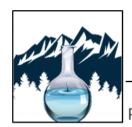
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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 06/15/2021 DATE AND TIME RECEIVED: 11:20AM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

OLIENT IOD #

MORE LOC INFO:					CLIE	NT 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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/17/2021 03:04PM

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

1		-	-
7	and a	0	-

Absolute Resource

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

asso	o c i a t	e s'	M	5			ab	solute		urceasso		om								AN	AL	YS	IS	RE	QU	JES	ST							
Company Name: Kleinfelder Company Address: 4 Technology Drive, Report To: Alex Bis Phone #: 914-406-9598 Invoice to: Kleinfelder Email: abbishop@kle	Westbor shop 8	roug	h,M				Proje Proje Accre Proto Repo Limits	et #: ct Local cditation col: rting s:	Sination: on Reconstruction RCR MCF QAP EPA	P GW-	AY2 S Pond S Pond Y: Y Y: Y VA NPI DES DOI 1 S-1	DES D	SO NHDES CLVOC 8260 MADEP	□ VOC BTEX MtBE, only □ VOC 8021VT	8015 X1,4-Dioxane *		PH MADE	C 8270ABN C 625.1 C EDB		☐ Mineral 0&G 1664	XpH □ B0D X Conductivity X Turbidity X Apparent Color / (10 €	□ TVS X Alkalinity □ Acidity	y Pollutant Metals TAL Meta	Fe, Ca, Mg, Mn, Na, Zn		TN 110N XTO		+ Nitrite X Ortho P	XChloride X Sulfate X Bromide L Fluoride	TIVITY OF COLOUR COLOUR Pesticide	ze U Herbicides U Asbestos	U		(C)
PO #:		S		Motrix		Dros				ment Pricir	-	_	J V0C 82	VOC B	☐ GRO 8015	37.53		13 8270ABN		Minera	Cond	O TS	□ Prio	#	als-list:	000	☐ Bac	Iffide \	≱	☐ TCLP VOC	☐ Grain Size	lifori	ľ	nposite
Lab Sample ID (Lab Use Only) 573/30\ Finished	stm	8 # CONTAINERS 1 2 2 3 1 2	X WATER	//atrix	OTHER	HOI	on Pre Thio X NH40	Hoan	МеОН	Hoop	ampling WE (O45	SAMPLER	□ V0C 8260 □ V			24.5		□ 8270PAH □ 8	X PPEAS 537.1	□ 0&6 1664		X X X X X X X X X X X X X X X X X X X	☐ RCRA Metals	X Xotal Metals-list: Fe		X DAmmonia D COD				☐ Corrosivity ☐ ☐ TCLP Metals ☐	Subcontract: □ €	X Total Coliform	X	Grab (G) or Composite (C)
<i>à</i> , ↓		2	\downarrow			N	on Pre		ed		4				X				^	+														-
TAT REQUESTED Se	Blank ee absolute for sample current	acce	ptan	ce po	licy a					RUCTION		3 ug/l	for	1,4-	Dio	X	ne																	
Standard (10 Business Days) F *Date Needed (10 Business Days)	REPORTII	ŐPY I	REQ	UIRE	D	NS DE		F (e-m	ail ac	ldress)	abbisho					\sim			n@k	lein	feld	er.c	om				REC TEM		RATU	-	<u> </u>	\bigcup	-	O C
CUSTODY	delinquishe	d by:		pler:					2	6/10	ate		0	-	Rece		d by	Kabo	rato	y: \	==	7	6	>	5	-	6/	(0)	21	ate	1/2	1:3 1	ime ime p M	

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57364 4 Technology Dr. Date Received: 6/10/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/23/2021

Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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

		Reporting	l		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ite 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

•		Reportir	ng		Instr Dil'r	1	Pre	ер		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time F	Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	E200.8
Iron	U	0.050	0.0032	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	E200.8
Magnesium	5.7	0.10	0.00066	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	E200.8
Manganese	U	0.010	0.0010	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	E200.8
Sodium	68	0.10	0.021	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	E200.8
Zinc	0.10	0.010	0.0028	mg/L	1	AGN	6/18/21	12:39	13977	6/18/21	16:31 E	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

		Reportin	g		Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B
рН	7.3 H			рН	1	DJM		2101692	6/11/21	6:13 SM4500H+B
H = Sample was i	received beyond	method h	olding time	Э.						
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

		Reporting			Instr Dil'n	I	Prep		Anal	ysis	
Parameter	Result	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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits	6	RPD	RPD Limi
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 A	mt 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		



Chloride 57363-001 84 mg/L 0 0	Method	QC ID	Parameter	Associated Sample		Result	Units A	ımt Added	%R		Limits	3	RPD	RPD	Limit
Nitrale-N Nitr	E300.0A	BLK2101707	Bromide		<	0.1	mg/L								
Nitrite-N					<	0.5	-								
Sulfate					<		-								
E300.0A DUP2101707 Bromide 57363-001					<		-								
E300.0A DUP2101707 Bromide 57363-001 < 0.1 mg/L 0 0 0 0 0 0 0 0 0							-								
Chloride 57363-001 84 mg/L			Sulfate		<	0.5	mg/L								
Nitrate-N Nitr	E300.0A	DUP2101707		57363-001	<	0.1	mg/L								10
Nitrite-N							-								10
Sulfate ST363-001 ST363-							-						0		10
E300.0A LCS2101707 Bromide 99 mg/L 10 99 90 110					<		-								10
E300.0A LCS2101707 Bromide 9.9 mg/L 10 99 90 110 100 mg/L 100 mg/L 100 100 90 110 100 mg/L 100 mg/L 100 100 90 110 100 mg/L 100 mg/L 10 100 90 110 100 mg/L 10 mg/L 10 100 90 110 100 mg/L 10 100 99 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 100 90 110 100 mg/L 100 90 110							-								10
Chloride 100 mg/L 100 100 90 110 100			Sulfate	5/363-001		19	mg/L						1		10
Nitrate-N Nitr	E300.0A	LCS2101707	Bromide			9.9	mg/L	10	99		90	110			
Nitrite-N ortho-phosphate as P 9.4 mg/L 10 94 90 110						100	-				90				
Carbo-phosphate as P 9,4 mg/L 10 94 90 110 1							-								
E300.0A LCSD2101707 Bromide 9.9 mg/L 100 99 90 110							•								
E300.0A LCSD2101707 Bromide 9.9 mg/L 10 99 90 110 110 110 mg/L 100 100 90 110 110 mg/L 10 100 90 110 110 mg/L 10 100 90 110 110 110 mg/L 10 100 90 110 110 110 mg/L 10 100 90 110 110 110 mg/L 15 99 90 110 110 110 110 110 110 110 110 1							-								
Chloride 100 mg/L 100 100 90 110 110			Sulfate			99	mg/L	100	99		90	110			
Nitrate-N Nitr	E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99		90	110		0	10
Nitrite-N 15 mg/L 15 99 90 110							-	100						0	10
Ortho-phosphate as P 9,6 mg/L 10 96 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 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 2.3 mg/L 2.53 92 90 110 ortho-phosphate as P 57363-001 33 mg/L 1.66 89 90 110 Sulfate 57363-001 2.3 mg/L 2.53 92 90 110 ortho-phosphate as P 57363-001 33 mg/L 1.66 89 90 110 Sulfate 57363-001 Sulfate 57363-001 33 mg/L 1.66 89 90 110 Sulfate 57363-001 Sulfate 57363-00							-							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 3.3 mg/L 1.66 89 90 110 Sulfate 57363-001 1.8 mg/L 1.66 89 90 110 Sulfate 57363-001 1.8 mg/L 1.66 89 70 110 Sulfate 57363-001 3.3 mg/L 1.66 89 70 110 Sulfate 57363-001 3.3 mg/L 1.66 89 70 110 Sulfate 57363-001 3.3 mg/L 1.66 89 70 110 Sulfate 57363-001 3.3 mg/L 1.66 89 75 125 Sulfate 57363-001 3.3 mg/L 0.2 96 75 125 Sulfate 57363-002 0.35 mg/L 0.2 97 75 125 Sulfate 57363-002 0.34 mg/L 0.2 99 75 125 Sulfate 57363-002 0.34 mg/L 0.2 97 75 12							-							3	10
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 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 33 mg/L 16 83 90 110 Sulfate 57363-001 Sulfat			Sulfate			99	mg/L	100	99		90	110		0	10
Nitrate-N 57363-001 5.2 mg/L 1.66 63 * 90 110	E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96		90				
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 Sulfate 57363-001 33 mg/L 16 83 * 90 110 Sulfate 57363-001 30 mg/L 16 83 * 90 110 Sulfate 57363-001 30 mg/L 16 83 * 90 110 Sulfate 57363-001							-	16							
ortho-phosphate as P							-			*					
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 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							-								
E365.3 LCS2101720 Total Phosphorus as P										*					
E365.3 LCSD2101720 Total Phosphorus as P			Suirate	5/363-001		33	mg/L	16	83		90	110			
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	E365.3	LCS2101720	Total Phosphorus as P			0.21	mg/L	0.2	103		75	125			
E365.3 MSD2101720 Total Phosphorus as P 57336-002 0.34 mg/L 0.2 97 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 PB2101720 Total Phosphorus as P < 0.01 mg/L	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	6	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	рН			5.94	6.06		
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)			4.03	рН			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	рН	57362-001		6.5	рН						



Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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			



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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

as	socia	tes					abs	solute	ereso	urceas	soc	iates.co	m								A	IA	YS	SIS	RE	EQI	UE	ST								
Phone #: 914-406-99 Invoice to: Kleinfelde Email: abbishop@	Bishop 598 er			ИΑ			Accre Proto Repo Limits Quote	et #: et Local editation col: etting s:	Sination: on Recon RCF MCF QAP	NH MA quired? I RA SC P NH PP GV	MEN/Y: DWA HDES W-1 ther_	Y NPDE	ES	8260 NHDES 🗆 VOC 8260 MADEP	□ VOC BTEX MtBE, only □ VOC 8021VT	☐ GR0 8015 ☐ 1,4-Dioxane	U VOC 524.2 NH List U Gases-List: TTHMS	□ EPH MADEP □ TPH Fingerprint	SN □ 625.1 □ EDB	☐ 8081 Pesticides ☐ 608.3 Pest/PCB	Thinaral OSE 1684	XpH 🗆 B0D 🔀 Conductivity X Turbidity X Apparent Color (710.) @	□ TVS XAlkalinity □ Acidity	☐ Priority Pollutant Metals ☐ TAL Metals 🔀 Hardness	e, Ca, Mg, Mn, Na, Zn		TKN □TN □TON ★T0C □ Ferrous Iron	cteria P/A 🗆 Bacteria MPN 🗀 Enterococci	□ Cyanide □ Sulfide ★ Nitrate + Nitrite ★ Ortho P □ Phenols	Chloride X Sulfate X Bromide □ Fluoride	□ Corrosivity □ ignitibility/FP	≥ V0C ☐ TCLP SV0C ☐ TCLP Pesticide	size U Herbicides U Asbestos	ш	106	e (C)
PO #:		RS	Т	Matr	ix	Pre	servatio	OV-		_	_	npling		3 VOC 8	200 □	□ GR(2000	8015	☐ 8270ABN	1 8081	1 Minor	\(\frac{1}{2}\)	OTS		list:	stals-lis	000	S D B	Sulfide	itrite 🗸	⊐ lgniti	D TCI	J Grain	olifo	ince	водшо
Sample Fi ID (Lab Use Only)	eld ID ted SW2	8 # CONTAINERS	X WATER		OTHER	Ю	on Pre	NaOH	МеОН	C/20/		TIME	SAMPLER		□ V0C 624.1	□ VPH МАDEР	X V0C 524.2	OTPH D DRO	☐ 8270PAH ☐ 8270AB	□ 8082 PCB	X PLAS 537.	X X			X otal Metals-	☐ Dissolved Metals-list:	☐ Ammonia ☐	XT-Phosphorus ☐ Bacteria P/A	X 🗆 Cyanide 🗅		☐ Corrosivity	☐ TCLP Metals	Sut	X Total Coliform	HAAs	Grab (G) or Composite (C)
		1					Х						111111111111111111111111111111111111111												X											
		2			-	_	X		-							ļ				_						-	X									projek e Si
		3	\mathbb{H}	1	-	X	NH40	\ \ \	-	-	4	-	-	-			X			-	-	-	-	-	-	-	-	-		-				-	X	
	↓	1	ļ				X						t															X							_	
TAT REQUESTED Priority (24 hr)* Expedited (48 hr)* Standard (10 Business Days)	See absolut for sample currer	e acc	epta credi	nce p tation	olicy lists.	and				RUCTIO		bbishop	o@k	lein	felo	der.c	com	1 &	krya	n@	klei	nfel	der.	con	n		_	REG	CEIV	/ED	ONI	CE-	→	FS		0
*Date Needed	□ HARD (_	Charles Street, or other Designation of the London	□ E	EDD											-	/									TEN	ИPE	-	URE		(\cup		С
CUSTODY RECORD	Relinquish Relinquish	ed by	y: L	mpler	7					6)	Dat Dat Dat	2/ / Z/ /	Tir 4:	me ne / O		0	eive	d, by	/: (ory:					7	6)	6/10	Date Date Date	7,	1/	Tin Tin 2/	0	7
QSD-01 REVISION 03/09/2020	00	1		1	_	1	2			6.	Dat	0	337	erociti						n	W	7	1	7		又				(1)	(01)	1	1	0:1	5	

Sample Receipt Condition Report

Absolute Re	source Ass	socia	tes							Job Numb	er:	37	50 1	
Samples Receiv	ved from:		□-UPS □]-Fed	IEx D-USI	PS .		Lab Co	ouri	er 🗖-Clie	ent D	rop-off	O	
Custody Seals		ntact:		J-No		1				CoC si			-Yes	□-No
Receipt Temp:			Samples o	n ice	□-Yes	□-N	No 🗆-	N/A	-	Sample	ed <	24 hrs ag	o? D-Yes	□-No
					ice? □-Yes					-		_	? D-Yes	
Comments:														
Preservation			STATE OF THE	178.03	Bottle Size	Type	& Qu	antity			844			applicable*
/ Analysis		-										samples	and docum	nent:
HCl	40mL(G)	2	250mL(P)	1	500mL(P)		1L(G)	-				the	,	
HNO ₃ H ₂ SO ₄	125mL(P) 40mL(G)	0	250mL(P) 60mL(P)		500mL(P) 125mL(P)	1	250ml	(D)		500mL(P)	1	phre	42	
NaOH	125mL(P)	0	250mL(P)		1231111(F)	-	2301111	-(I')		300IIL(I)	10	phos	19700	-W
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)								1	
ZnAc-NaOH	125mL(P)		250mL(P)											
Trizma	125mL(P)		250mL (P)											PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)	,									Cl not pre	
NaS ₂ O ₃	40mL(G)		120mL(P)										Pest6	
MeOH	20mL(G)		40mL(G)									Bacteria	ResCl ✓ by a	naiyst
None (solid)	2oz(G)		4oz(G)		8oz(G)		Syring	e				PC Dry	applicable?	Y(N)
None (water)	40ml (G)		60mL(P)	3	125mL(P)	3	250ml	(P)	1	500mL(P)		1L(G)		1L (P)
NHaa	WMG	3									,			
Mold	Cassette		Bulk		Plate		Tape I.	ift						
Asbestos	Cassette		Bulk	_										
Lead	Cassette	_	Bulk		Wipe									
Login Review	17					Yes	No	NA	C	omments			THE RESERVE	
		e/enoi	ich volume/ce	orrect	preservative?	10	110	1471	-	Omments				
-	Proper lab sample containers/enough volume/correct preservative? Analyses marked on COC match bottles received?													
	VOC Solid-McOH covers solid, no leaks, Prep Expiration OK?													
	PFAS: ARA bottles & samples/FRB same Lot#? QC rec'd, if req'd? Lot ID#:													
	Bacteria bottles provided by ARA? Samples within holding time?													
Immediate test			weiting:		<u></u>	V								
NO3, NO3,0-PO	pH, BOD, Colife	orm/E.	coli (P/A or MPN), Enter	rococci, Color	11	KIRL	120	li	CALL				
Surfactante, Turbid		-		Dxygen	, Unpres 624		DON,	TUA	in	DIMIV	-		_	
Date, time & II						/		-	-					
Rushes commu		-	writing?				-	1						
Subcontract no	te on login bo	pard?				6								
Pesticides EPA	608 pH5-9?							~						
Compliance sar	nples have no	discr	epancies/requ	ire no	flags?			1		or must be re				
Log-in Supervisor notified immediately of following items:								1			2.0		es (NHDES,	, MADEP, DoD
0 1				0					etc	c.) or uncomm	on reg	uests.		
	Inspected	and l	Received By:		(M)	Da	te/	Гіте: <u>///</u>	101	711	7:07	
Peer Review C		and	received by.			+				1/1	101			
		-04	On Ion T		matrice OV3			Sam	nlo '	IDe			nalyses in (Correctly
	Project Manag	500	On Ice, T	The same						1108			The second second	Lorrectly
☐ Project Nar			□ PO# (if p					Mat					eferences	
☐ TAT/rushe	s communica		7		nt? Shipping Ch	1				ime collected			vastewater i	
☐ Received D	Received Date/Time													
	Reviewed By:Date:													
Notes: (conti	nue on bac	ck as	needed)								Date		What wa	
								aded /						EDD / Invoice
								aded /						EDD / Invoice
							Uplo	aded /	PD)F		Report	/ Data / E	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: Work Order #:

06/18/2021 2106-02506

Client Job #:

06/15/2021

Date Received: 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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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

Passes Fails EPA Primary Fails EPA Secondary

Legend

Attention

DATE AND TIME COLLECTED: 06/10/2021 10:15AM 06/15/2021 DATE AND TIME RECEIVED: 11:21AM

Fails State Guideline

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

OLIENT IOD #

MORE LOC INFO:					CLIE	NT 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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/17/2021 03:45PM

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

AGE	OF
1GL	OI

Absolute Resource

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

a s	socia	tes	5				ab	solute	eresc	urceasso	ciates.co	om								A	NA	LYS	SIS	RI	EQ	UE	ST							
Report To: Alex Phone #: 914-406-9 Invoice to: Kleinfeld	Dany Address: Technology Drive, Westborough,MA Int To: Alex Bishop Int					Proje Proje Accre Proto Repo Limit	ct Localitation col: rting s:	ation: On Re RCF MCI QAF	P NHDE	FON J, L	ES	U VOC 8260 NHDES U VOC 8260 MADEP	□ VOC BTEX MtBE, only □ VOC 8021VT	☐ GR0 8015 ☐ 1,4-Dioxane	□ VOC 524.2 NH List □ Gases-List: TTHMS	☐ EPH MADEP ☐ TPH Fingerprint	BN 🗆 625.1 🗆 EDB	☐ 8081 Pesticides ☐ 608.3 Pest/PCB		XoH DRON X Conductivity X Inhighty X Apparent Color (7x , 0	□TVS X Alkalinity □ Acidity		e, Ca, Mg, N		☐ TKN ☐ TN ☐ TON ★TOC ☐ Ferrous Iron	acteria P/A 🗆 Bacteria MPN 🗀 Enterococci	□ Sulfide X Nitrate + Nitrite X Ortho P □ Phenols	□ Nitrate □ Nitrite ★Chloride ★Sulfate ★Bromide □ Fluoride		□ TCLP VOC □ TCLP SVOC □ TCLP Pesticide	nerbicides		e (C)	
Lab	ield	INERS	Γ	Matr	ix	P	reservation	CV-11E		T	mpling	m		3 1333		.2 □ V0C	DRO 8015	H 8270ABN			X	TOS OTS	etals 🗆 Pr	tals-list:	d Metals-lis	000 □ E	norus 🗆 B	□ Sulfide	□ Nitrite		tals DTC	Total Coliform	A OUTION	r Composi
00		# CONTA	WATER	SOLID	OTHER	2	HNO.	NaOH	MeOH	DATE	TIME	SAMPLER	U VOC 8260	☐ V0C 624.1	U VPH MADEP	X VOC 524.2	□ TPH □	☐ 8270PAH ☐ 8270AE	☐ 8082 PCB	XPFAS 337	ממן ומסל	TSS X TDS	J RCRA Me	X otal Met	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	▼T-Phosphorus □ Bacteria P/A	☐ Cyanide	□ Nitrate	☐ Corrosivity	TCLP Metals	Total Coliform	HAAs	Grab (G) or Composite (C)
573640\ Simula		8 1 1 2 2 3 1	X				Non Pre Thio X X NH40	eserv (red	COPI		σ (κα	1			X				*) X	CX	X			X	X	X	1				X	X
TAT REQUESTED Priority (24 hr)* Expedited (48 hr)* Standard (10 Business Days) *Date Needed	REPORT	e acc nt acc	epta	tation	olicy lists.	and ONS	Q PP G				abbisho	p@k	deir	ıfelo	der.	con	n &	krya	an@	kle	nfe	der	.coi	m		-1				ON IO		₹ 	5	⊒NO °C
CUSTODY RECORD 0SD-01 Revision 03/09/2020	Relinquist	led by	y Sa y:	_	All Property lies		I EDD_			(pa	2	Tii 14:	me 70 me 70 me		Rec	eive	ed, b	,		d tery:	X				7				6/10	Date Date Date Date		11 3	Time 2 p	e) e



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
lowa	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

Revision date: 09/29/2020



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 Report: 521472

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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.

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

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 521472

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

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		qns .	contrac	Subcontract Chain of Custody	ody			
ALPHA		Eurofins 110 South Be South Be	Eurofins US 110 South Hill St. South Bend, IN 46617	517	1 2		Alpha Job Number L2131278	ımber
							53147	4
Client	Client Information	Pro	Project Information	rmation	Regul	Regulatory Requirements/Report Limits	nts/Report Limi	ts
Client: Alpha Analytic Address: Eight Walkup Westborough	Alpha Analytical Labs Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Nathalie Lewis Turnaround & Delivera	thalie Lewi & Deliver	t Location: MA t Manager: Nathalie Lewis Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:	ıl Program: riteria:		2
Phone: 508.439.5170 Email: nlewis@alphalab.com	lab.com	Due Date: Deliverables:			4776			
		Project Specific Requirements and/or Report Requirements	quiremer	its and/or Report	Requirements			
Refere	Reference following Alpha Job Number on final report/deliverables: L2131278	nber on final report/deliv	verables: I	2131278	Report to include Method Blank,	1ethod Blank, LCS/LCSD	.CSD:	
Additional Comments:	Additional Comments: Send all results/reports to subreports@alphalab.com	ubreports@alphalab.cor	E			8		(4
Lab ID	Client ID	Collection Sate/Time	Sample Matrix	f	Analysis			Batch QC
16888H	FINISHED-SIM SIMULATED-SIM			Bromate Bromate			2 10 10 10	
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12			**					
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Form No: AL_subcoc					X		1400/1/1/2021	0460
					5) -		

CHAIN OF CUSTODY PAGE						Date Re	oc'd in Lab	LZ131278					
AHALTYICAL		Project Informat	ion			and the same of th	t Informa		Name and Address of the Owner, where the Owner, which is the Own	erables	Billin	g Informati	on
8 Walkup Drive Westboro, MA 0 Tel: 508-898-92		Project Name: Bar		Simmons	Pared HH		THE OWNER OF THE OWNER OWNER OF THE OWNER OWNE	D-EMAIL	- C+ CH			e as Client in	
Client Informatio		Project Location:		21 2	1-		11/2 22/20	uiremen	ts &	Project	Informat	ion Require	ements
Client: Kleinf	elder	Project #:					No MA N					es INO C	T RCP Analytical Methods
		Project Manager:	fler B	Jeho V	2	☐ Yes [No GW1	Standards				EPH with Tan	
Westborough	chrology Drive	ALPHA Quote #:		0	Ne -		No NPD State /Fed					Criteria	
	406-9598	Turn-Around Ti	ne	A COL	NUE S		7 7	1 1	7 7	7	$\neg \neg \neg$	//	/ / /
ACCURAGE MAN	p Okleinfelder.com	Date Due:	3 RUSH (antiyo	ronfirmed if pre-spj	woved!)	Dezeo Deza	METALS: DMCP 13	EPH: DRanges & Tarras DRCRAS UPPA-	D PCB D PEST Ranges Only	B30 cm OFINGERPHIA	. Land		SAMPLE INFO Filtration Field Lab to do Preservation Lab to do
ALPHA Lab ID (Lab Use Only)	Sample ID	Coll Date	ection Time	Sample Matrix	Sampler Initials	NOC.	METAL	EPH: C	D PCB	Ba		1//	Sample Comments S
31278-01	Finished - SIN	6 (10/2)	10:45	water	UC					X			"
02	Finished - SIN Simulated - SIN	6[10[2]	10:15	Water	UC					X			
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Container Type P= Plastic A= Amber glass V= Vlal G= Glass	Preservative A= None B= HCl C= HNO ₃ D= H ₂ SO ₄			90908919539	iner Type servative					O P			
B= Bacteria cup C= Cube O= Other	E= NaOH F= MeOH G= NaHSO4	Relinquished By:		11	/Time	1	Receiv	ved By:		Da	ite/Time	All samo	les submitted are subject to
E= Encore D= BOD Bottle	H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ Cl K= Zn Acetate O= Other	The state of the s		6/10/2	1 1420	a	eur	in		10/2 6/w	21142	Alpha's 1 See reve	Terms and Conditions.



Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2131278

World Class Chemistry	A.							
Client	Information		Project In	formation		Regulatory R	equirements/Report L	imits
Client: Alpha Analy Address: Eight Walku Westborougi	tical Labs p Drive n. MA 01581-1019	Project Location: Project Manager				State/Federal Progra Regulatory Criteria:	m:	-
			ınd & Deliv	erables Informati	ion			
Phone: 508.439.517 Email: nlewis@alph	0 alab.com	Due Date: Deliverables:	130					
在 地方 成本成功性。	MARKET SERVICE	Project Specific	Requirem	ents and/or Repo	rt Require	ments	经 自当员营业10支重	
Refer	rence following Alpha Job Nur	mber on final report/	deliverables	: L2131278	Repo	ort to include Method B	lank, LCS/LCSD:	
Additional Comments	s: Send all results/reports to s	ubreports@alphalat	o.com				343	
		C-VERNERAL VI						
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				v
					/2 12		8	
					(4)			
	Relinquished B	By:		Date/Time:		Received By:	Date/Time:	
	Ciele			6/18/21				
				1/-				
Fame Name At an I								
Form No. Al subcoc				1				

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57433 4 Technology Dr. Date Received: 6/15/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

lucer

Chief Operating Officer Total number of pages: 20

Date of Approval: 7/2/2021

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57433

Sample#: 57433-001 Sample ID: Raw-SIM Matrix: Water

		Reporting			Instr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e Time	Batch	Date	Time Reference	
1,4-dioxane	0.24 J	0.25	0.12	ug/L	1	LMM		2101754	6/16/21	15:27 SW8260Dmod	



Job ID: 57433

Sample#: 57433-001 Sample ID: Raw-SIM Matrix: Water

·		Reporting			Instr Dil'n			ep		Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference			
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	ma/L	1	AGN	6/18/21	12:39	13984	7/1/21	SM2340B			

Job ID: 57433

Sample#: 57433-001 Sample ID: Raw-SIM Matrix: Water

Sampled: 6/15/21 8:45

	Reporting				Instr Dil'n			Prep			Analysis		
Parameter	Result	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 f	or the matrix sp	ike was 81	%. The	acceptan	ce criteria is	90-110%.	. All oth	er associat	ed QC sam _l	oles were	accepta	able.	
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	ι	umhos/cm	1	SFM			2101781	6/18/21	12:20	SM2510B	
рН	6.6 H			рН	1	SFM			2101813	6/16/21	10:58	SM4500H+B	
H = Sample was re	ceived beyond	method ho	lding time	e.									
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

		Reporting			Instr Dil'n	Р	rep	Analysis			
Parameter	Result	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	



Job ID: 57433

Sample#: 57433-001 Sample ID: Raw-SIM Matrix: Water

Method Reference: E537.1	Reporting				Dil'n		Prep		Analysis	
Parameter	Result	Limit	_	Units	Factor	Analyst	Date	Batch	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-chloroeicosafluoro-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		2	101749		

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



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

Job ID: 57433

Sample#: 57433-002 Sample ID: Field Blank Matrix: Water

Method Reference: E537.1	Reporting			Dil'n			Prep		Analysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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-chloroeicosafluoro-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		2	101749		

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



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

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



124 Heritage Avenue Unit 16 Portsmouth, NH 03801

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Am	nt 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 A	mt Added	%R	Limits		RPD	RPD L	imit
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	20
		Iron			0.53	mg/L	0.5	106	85	115		2	20
		Magnesium			0.50	mg/L	0.5	101	85	115		1	20
		Manganese			0.51	mg/L	0.5	102	85	115		1	20
		Sodium			4.9	mg/L	5	99	85	115		1	20
		Zinc			0.51	mg/L	0.5	102	85	115		2	20
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 A	Amt Added	%R	Limits	;	RPD	RPE) 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 Sulfate			100 100	mg/L mg/L	100 100	103 102	90 90	110 110			
5000 OA	1.0000404777												40
E300.0A	LCSD2101776	Bromide Chloride			9.8 98	mg/L mg/L	10 100	98 98	90 90	110 110		4 5	10 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			
2000.071	WOZIOTITO	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	07 100 002		35	CU	35		30	40			20
SM2120B	PB2101741	Apparent Color		<	5	CU			5				
SM2120B	DUP2101742	True Color	57435-002	<	5	CU							20
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)			6.04	рН			5.94	6.06			
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	рН			3.94	4.06			
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	рН			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 A	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	рН	57432-001		7.3	рН						
SM4500H+B	DUP2101813	pH	57476-001		8.0	рН						
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	s RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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		98			%			70 13	30	
		13C2-PFDA SUR		106			%			70 13	30	
		D5-NEtFOSAA SUR		98			%			70 13	30	
		13C3-HFPO-DA SUR		93			%			70 13	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970) 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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		Units	Amt Added	%R	Lin	nits	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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	Lim	nits	RPD	RPD Limit
E537.1	MS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57433

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Report To:	Alex E	Bishop								n Red RCR	quired? N.	-	NPDE	==	□ V0C 8260 MADEP	U VOC 8021VT		ist:	☐ TPH Fingerprint		PCB			Appare	ACIOITY	AL Me	, Na	TOUT	NO NO	Ortho P	Bromic	-	TCLP	☐ Asbestos		
Phone #: 91	14-406-95	598						Protoc	W. 1945	MCF	NHI	DES	DOD		3 8260	J VOC	ane	ases-L	TPH FI	90	3 Pest			X :			M	NO.	V Seria	0	X		00			
Invoice to: K	General De Maria						-	Repor	~	QAP			S-1		0 00		X1,4-Dioxane	U VOC 524.2 NH List U Gases-List:		□ E08	1 608.			fuctivity X lurbidity	AIKailli II	t Metal	Mg,		l Raci	Nitrite	Sulfa		SLP SV	☐ Herbicides		
Little Control	obishop@		er.co	m				Quote	#	•					HDES	MtBE, o		NH Lis	☐ EPH MADEP	1 625.1	ges	007	1004	X)	1	ollutan	ca,	0	7 0/0	rate +	ige 🔨	۵		☐ Herl		
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Lab			SF.		Matri	x	Pre	eservation	-	-		Samp	ling		3 VOC 8	U VOC BTEX MtBE, only	□ GR	J V0C	8015	8270	1 8081	3	J Mine	Z Con	2	2	108	Tals-IIIs		Sulfide	trite	J Igniti	D TC	☐ Grain Size	olifo	isoduio
Sample ID		eld D	# CONTAINERS	WATER	SOLID	ОТНЕВ				МеОН	DATE		TIME	SAMPLER	□ V0C 8260 □	□ V0C 624.1	U VPH MADEP	U VOC 524.2	☐ TPH ☐ DR0 8015	☐ 8270PAH ☐ 8270ABN ☐ 625.1	☐ 8082 PCB ☐ 8081 Pesticides ☐ 608.3 Pest/PCB	X PFAS 537.1	J&G 1664	Sph 1 800 X Conductivity X lurbidity X Apparent Color	SID SUIN CIS	☐ RCRA Metals ☐ Priority Pollutant Metals	X otal Metals-list:	Unissolved metals-list	☐ Ammonia ☐ C00	□ Cvanide □ Sulfide □ Nitrate + Nitrite	□ Nitrate □ Nitrite ★Chloride ★ Sulfate ★ Bromide	☐ Corrosivity ☐ Ignitibility/FP	☐ TCLP Metals ☐ TCLP V0C	Subcontract	Total Coliform	Grab (G) or Composite (C)
(Lab Use Only)	Raw-St	\^ NP⊃	7	X	SS	5	를 모		_	1		1 0		S AS	Ó	Ó	ā	Ó	Ö	ã	õ	X		XXX			X	5	à l'E	ו ב			'n	Sut		- Gre
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-02	Field	Blank	1					Tri	Z				1	V								X														
Priority (24 hr Expedited (48	r)* 🗆	See absolution for samp curre		eptar	nce po	olicy a					RUCTION limit of		ug/l	for 1	ا-4,	Dio	xan	е																		
Standard (10 Business *Date Needed		REPORT	COPY	REC	QUIRE	D		■PDF EDD_	(e-m	ail ac	ldress)	abb	ishop	o@k	lein				V	ch	an@	kle	infe Ø	elde Klei	r.co	om eld	er	Lov	R T		IVED ERA			×(ES	°C
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QSD-01 Revision		Refinquish	ned by			7	7		/			Date		Tin	ne		Rec	eive	V	D	orat	tory:		. (60-6-6							61	Pate	/2	1	180	50

Sample Receipt Condition Report Job Number: **Absolute Resource Associates** Lab Courier □-UPS □-FedEx U-USPS ☐-Client Drop-off Samples Received from: -Yes □-No Custody Seals - present & intact: □-Yes □-No D-N/A CoC signed: Yes O-No O-N/A □-No Receipt Temp: ___ °C Samples on ice? Sampled < 24 hrs ago? ☐ Yes PFAS-only real ice? □-Yes □-No □-N/A Any signs of freezing? □-Yes Comments: Check pH for ALL applicable* Preservation Bottle Size/Type & Quantity samples and document: / Analysis 500mL(P) 1L(G) 40mL(G) 250mL(P) HCl 500mL(P) HNO₃ 125mL(P) 250mL(P) 500mL(P) 125mL(P) 250mL(P) H₂SO₄ 40mL(G) 60mL(P) NaOH 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) 125mL(P) 250mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G 250mL (P) Trizma 125mL(P) Residual Cl not present: NH₄Ac 125mL(P) 250mL (P) ABN625 Pest608 NaS2O3 40mL(G) 120mL(P) Bacteria ResCl √by analyst 20mL(G) 40mL(G) MeOH PC Dry applicable? Y 4oz(G) 8oz(G) Syringe None (solid) 2oz(G)125mL(P) None (water) 40ml (G) 60mL(P) 250mL(P) 500mL(P) Mold Bulk Plate Tape Lift Cassette Bulk Asbestos Cassette Bulk Wipe Lead Cassette 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: NO3, NO2,0-PO3, 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) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests Date/Time: Inspected and Received By: Peer Review Checklist Analyses in Correctly Sample IDs ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Matrix -references ☐ Project Name ☐ PO# (if provided) Date/Time collected -wastewater methods ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Notes from CoC in LIMS Short HTs communicated ☐ Received Date/Time ☐ Issues noted above communicated? Reviewed By: Date: Notes: (continue on back as needed) Initials Date What was sent? Report / Data / EDD / Invoice Uploaded / PDF Uploaded / PDF Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice

OSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57434 4 Technology Dr. Date Received: 6/15/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 7/2/2021

Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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
				•



Job ID: 57434

Sample#: 57434-001 **Sample ID:** Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

		Reporting			Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst D	ate 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

·		Reporting	1		Instr Dil'ı	า	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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



Job ID: 57434

Sample#: 57434-001 Sample ID: Simulated-SIM

Matrix: Water

•		Reportin	ng		Instr Dil'n	1	Pre	ep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
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

Job ID: 57434

Sample#: 57434-001 **Sample ID:** Simulated-SIM

Matrix: Water

Sampled: 6/15/21 10:15

	I	Reporting	J		Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	1	SFM		2101781	6/18/21	12:20 SM2510B
рН	7.0 H			рН	1	SFM		2101813	6/16/21	11:09 SM4500H+B
H = Sample was re	eceived beyond	method hol	lding time	Э.						
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

		Reporting			Instr Dil'n		Prep		Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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 A	mt Added	%R	Limit	S	RPD	RPD Limi	it
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			
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 A	mt Added	%R	Limits		RPD	RPD L	imit
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	20
		Iron			0.53	mg/L	0.5	106	85	115		2	20
		Magnesium			0.50	mg/L	0.5	101	85	115		1	20
		Manganese			0.51	mg/L	0.5	102	85	115		1	20
		Sodium			4.9	mg/L	5	99	85	115		1	20
		Zinc			0.51	mg/L	0.5	102	85	115		2	20
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 A	Amt Added	%R	Limit	S	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 Sulfate		<	0.1 0.5	mg/L mg/L						
		Juliato			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
			07021 001								• •	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			
CNICACCO	DUDO461715	T 0.1	F7.05.00-		-	2						
SM2120B	DUP2101742	True Color	57435-002	<	5	CU						20



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)			6.04	рН			5.94	6.06		
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	рН			3.94	4.06		
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	рН			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	рН	57432-001		7.3	рН						
SM4500H+B	DUP2101813	рН	57476-001		8.0	рН						
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		



124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

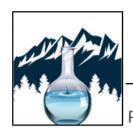
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Absolute	ssocia	tes	-	1							rceassoci	ates.c	om								1A	IAI	YS	SIS	RE	EQI	IJΕ	ST							
	ex Bishop	orou	gh,M	1A			Pro Pro Ac	oject i S∵∾ oject l	#: Location	SII	rnstable, aightway NH MA ME uired? N/Y: SDWA NHDES	Y NPD	DES	U VOC 8260 MADEP	☐ V0C 8021VT	эц	Gases-List: TTHMS	☐ TPH Fingerprint	8	Pest/PCB		XPH □ B0D X Conductivity X Turbidity X Apparent Color	☐ Acidity	☐ TAL Metals 🔀 Hardness	Fe, Ca, Mg, Mn, Na, Zn		□ TON X TOC □ Ferrous Iron	□ Bacteria MPN □ Enterococci	X Ortho P □ Phenols	X Bromide		□ Tour Pesitione □ Asbestos			
Invoice to: Kleinfe								portir	ng C	APP PA D	GW-1	S-1		000 D		☐ 1,4-Dioxane			O E08	608.3		urbidity	kalinity	Metals	Mg, I			Bacter	Nitrite \	Sulfate	000				
	p@kleinfelde	er.co	m				Qu	ote #			ent Pricing			U VOC 8260 NHDES	U VOC BTEX MtBE, only	3015	☐ V0C 524.2 NH List	О ЕРН МАОЕР	BN □ 625.1	☐ 8081 Pesticides ☐ 608.3 Pest/PCB	Mineral O&G 1664	ductivity X	UTVS XAlkalinity	☐ Priority Pollutant Metals	-e, Ca, I	ш	OTKN DTN	acteria P/A	□ Sulfide X Nitrate + Nitrite X Ortho P	Chloride X	bility/FP	Size Derbicides			(C)
Lab		RS		Matri	x	Pre		_	Metho	T		npling		1000	00 N □	O GR	00V□	8015	☐ 8270ABN	1 8081	Mine	\vec{y}{x}	OTS	D Pri	list:	etals-lis		S D B	Sulfide	itrile	J Igniti	G Grain Size	olifo		omposi
Sample ID (Lab Use Only)	Field ID S.M.	# CONTAINERS	WATER	SOLID	OTHER	HG	HNO ₃	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ v0C 8260	□ V0C 624.1	U VPH MADEP	Xv0C 524.2	OTPH CLORO	☐ 8270PAH ☐ 8270ABI	☐ 8082 PCB	XPFAS 537.1		DTSS XTDS		X otal Metals-	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	XT-Phosphorus 🗆 Bacteria P/A			□ Corrosivity □ Ignitibility/FP	Subcontract	Total Coliform	HAAs	Grab (G) or Composite (C)
574340 Sim	ulated-S#2	8	X			N	lon F Th		erved		04/15/21	1015	4	┞	-	-				-		X	X	X					Х	X	_	-	X		
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Standard (10 Business Days) *Date Needed	— HARD	29PY	'REC	UIRE	ED	NS □ E		ÓDF (e-mai	ado	dress) al	bbisho					U C	ha	Uho		klei Ø kl					m	_			RAT	ON IO		XES		NO °C
CUSTOD	Y Relinquish	1	4	npler:			-				6/15/	71	17		1	Rec	//	//	44	1	~	1	m	ر	~			107 2		6/1	0ate 5/2)	12	Time	
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OSD-01 Revision 03/09/2	Relinquish	ed by	y: 0	-				2	>		Date	TU	Tir	me		Rec	eive	7//	Lab	orat	tory:								(Sll	Pave D/Z	PI	B	C)

Absolute Day		ooiot		Sam	ple Recei	pt C	ondit	ion		<i>port</i> Job Numb	or.	57	434	
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Samples Receiv			□-UPS □				W.	ab Co	ourie			rop-off		7.17
Custody Seals -										CoC s			□ Yes	
Receipt Temp:	5	C.C.	Samples o	n ice			No O-N						0	J-No
			PFAS-only	y real	ice? □-Yes	□-N	lo DA	V/A		Any si	gns o	f freezi	ng? □-Yes	9-No
Comments:														
Preservation					Bottle Size/	Type	& Qua	ntity					pH for ALL ap	
/ Analysis		-										sample	es and documen	it:
HCl	40mL(G)	3	250mL(P)	1	500mL(P)		1L(G)					will,	-7	
HNO ₃	125mL(P)	0	250mL(P)	L	500mL(P)	7	050 T	m)		500 T m	door	11/2	5	
H ₂ SO ₄	40mL(G)	1	60mL(P)		125mL(P)		250mL	(P)		500mL(P)	11100	pit		
NaOH	125mL(P) 60mL(P)		250mL(P) 125mL(P)		250mL(P)						1	1		
(NH ₄) ₂ SO ₄ ZnAc-NaOH	125mL(P)		250mL(P)		2301112(1)									
Trizma	125mL(P)		250mL(P)									*pH √h	oy analyst:VOC, PF	AS. TOC.O&G
													ial Cl not presen	
NH ₄ Ac	125mL(P)		250mL (P)	1				-	_				525 Pest608	
NaS ₂ O ₃	40mL(G)		120mL(P)	1				-				The second second second	a ResCl ✓ by anal	
MeOH	20mL(G)		40mL(G)		2 (0)		0 1	-					A-10 A-10 A-10	2
None (solid)	2oz(G)		4oz(G)	1	8oz(G)	1	Syringe		1					Y (N')
None (water)	40ml (G)	2	60mL(P)	6	125mL(P)	3	250mL	(P)		500mL(P)	1	1L(G)	11	(P)
NHUCI	60 nll(b)	3												
Mold	Cassette		Bulk		Plate		Tape Lif	ft						
Asbestos	Cassette		Bulk											
Lead	Cassette		Bulk		Wipe									
Login Review						Yes	No	N/A	1	Comments				
Proper lab samp	ple containers	s/enou	gh volume/co	orrect	preservative?	V								
Analyses marke	ed on COC m	atch be	ottles received	1?		U								
VOC &TOC W	Vater-no headsp	pace?					/		1	- 11			7 1	(11)
VOC Solid-MeC	OH covers solid	, no lea	ks, Prep Expira	tion C	K?	V		1,5	1	ess th	an	dea-	5170d 1	subble in
PFAS: Lab spec	cific bottles?	QC rec	eived, if requi	ired?				1	7				stred (02
Bacteria bottles	provided by	ARA?				:/								00
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Immediate tests			vriting.			V	-0.1	1			•			
NO3, NO6,0-P24, 1	H BOD, Colifo	rm/E. a	oli (P/A) or MPN), Enter	rococci Color	X	TKV	AN.	An	W STI	7			
Surfactants Turbidi				Dxygen	, Unpres 624		7	, "(. (10,1	,			
Date, time & II	on samples	match	CoC?			V								
Rushes commu	nicated to ana	alyst in	writing?					~						
Subcontract not	te on login bo	ard?				1/								
Pesticides EPA	608 pH5-9?					V		-	-					
Compliance san		discre	pancies / requi	ire no	flage?		-	-		(Or must be	rejecte	ed)		
								/		A CONTRACTOR OF THE PARTY OF TH	The state of the s		mples (NHDES,	MADEP
Log-in Supervis	sor notified in	nmedia	tely of follow	ing ite	ems:			/		DoD etc.) or u				
STATE OF THE PARTY						10	1			1	(,,	-10	1170	
	Inspected	and F	Received By:			21		Dat	e/7	Гime:	15	121	16:10	
Peer Review C						W					1	0,	10-67	1000
			7 On Inc T		OV)			C	-l- l	ID.			Analyses in Cou	ractly
☐ Client ID/F			On Ice, To					Samp		IDS			Analyses in Con	recuy
☐ Project Nan	ne		□ PO# (if p	rovide	ed)			Matr	ix				-references	
☐ TAT/rushe	s communica	ted	☐ Sub sampl	les ser	nt? Shipping Cha	arge?		Date	/Ti	ime collected			-wastewater me	thods
☐ Received D	ate/Time	I	☐ Issues not	ed ab	ove communic	ated?		Shor	t H	Ts communi	cated		Notes from Co	C in LIMS
			viewed By:				Da							
Notes: (conti	nue on bar			11/2/2			NE REEL			Initials	Date		What was	sent?
rvotes. (conti	iluc Oli Da	cix as	needed)				Uploa	ded /	PD		Date		rt / Data / ED	ACCUPATION OF THE PARTY OF THE
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14 of 14

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/30/2021 2106-03285

Work Order #: Client Job #:

06/21/2021

Date Received: 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

Donald a. D



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

Passes
Fails EPA Primary
Fails EPA Secondary
Fails State Guideline

Legend

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

CLIENT JOB #:

MORE LOC INFO:					CLIE	NT 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 C	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH C	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 C	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	\checkmark		1	60 ug/L	EPA 552.2	KV-NH C	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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/24/2021 08:52AM

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

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Cal	O

Absolute Resource

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57434

Absolute	e Kesou associa	rce t e s	5 N	15			abso			136-2001 ceassoci	iates.cc	om								AN	IAL	YS	SIS	RE	ΕQI	UE	ST							
Company Name: Kleinfelder Company Address: 4 Technology I Report To: Al Phone #: 914-406 Invoice to: Kleinfe	Drive, Westbo ex Bishop 6-9598	orou	gh,N				Project Accred Protoc Report Limits: Quote	#: Location Ritation Rol: RC MC ing QA	equi CRA CP AD	Instable, Instab	Y NPD	ES	□ VOC 8260 NHDES □ VOC 8260 MADEP	☐ VOC BTEX MtBE, only ☐ VOC 8021VT	☐ GR0 8015 ☐ 1,4-Dioxane	□V0C 524.2 NH List □ Gases-List: TTHMS	☐ EPH MADEP ☐ TPH Fingerprint	ABN C1625.1 C1EDB	SUBSETUB SUGIL RESULTIONS SUGISTIONS SUGISTIONS CONTRACTOR CONTRAC	ral 0&G 1664	XpH □ B00 X Conductivity X Turbidity X Apparent Color	UTVS XAlkalinity DAcidity	☐ RCRA Metals ☐ Priority Pollutant Metals ☐ TAL Metals 🔀 Hardness	Fe, Ca, Mg, Mn, Na, Zn	ıt.	☐ TKN ☐ TN ☐ TON ★TOC ☐ Ferrous Iron	acteria P/A 🗆 Bacteria MPN 🗀 Enterococci	□ Cyanide □ Sulfide ★Nitrate + Nitrite ★Ortho P □ Phenols	□ Nitrate □ Nitrite XChloride XSulfate X Bromide □ Fluoride	bility/FP	LP V0C	Size □ Herbicides □ Asbestos	LJ.	te (C)
Lab Sample ID	Field ID	# CONTAINERS	WATER	Matri			eservation			San	npling	SAMPLER	□ V0C 8260 □ V0C	VOC 624.1 ☐ VOC		VOC 524.2 ☐ VOC	☐ TPH ☐ DRO 8015	C 8270PAH C 8270ABN	■ 8082 Pub ■ 800	□ 0&G 1664 □ Mineral 0&G 1664	DH D BOD X Co	OTSS XTDS OTS	RCRA Metals 🗆 P	Xotal Metals-list: Fe	Dissolved Metals-li	☐ Ammonia ☐ COD	▼T-Phosphorus □ Bacteria P/A	Cyanide D Sulfide	Nitrate O Nitrite	☐ Corrosivity ☐ Ignitibility/FP	☐ TCLP Metals ☐ TCLP V0C	Subcontract:	Total Coliform	HAAS Grab (G) or Composite (C)
(Lab Use Only) 57434 of Sim	ulated-S#Z	8	X		-6	면 1	皇皇 Non Pres Thio	4		06/15/21	1015	w W	jō.		Ö	X		0 (7 >	(-	X		X	X		ð	X	X	X				X	9
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이 이번에 아이에게 되었다. 그런 이 사람이 되었다.	g for samp	le acc	cepta		olicy		SPECIA	AL INST	RU	ICTIONS																								
Standard (10 Business Days) *Date Needed	— HARD	2 9РҮ	Y RE	QUIR	ED			₩DF (e-mail address) abbisho								U C	ha	yha	n@ n@	kleir Kl	nfelo Lin	der. Feid	con	n ·	m	_			VED (ICE =	N.	es 3	□NO °C
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QSD-01 Revision 03/09/		ned by	y: 6							Dat	ne		Rec	eive	d by	Labo	rato	ory:								1		Date 5/2		1	-1	Ö		

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Alex Bishop PO Number: None Kleinfelder Job ID: 57432 4 Technology Dr. Date Received: 6/15/21

Suite 110

Westborough, MA 01581

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

Aaron DeWees

Chief Operating Officer

Date of Approval: 7/2/2021

Total number of pages: 19

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57432

Sample#: 57432-001 **Sample ID:** Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

		Reporting	J		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	te 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

		Reporting			Instr Dil'n		Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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

Job ID: 57432

Sample#: 57432-001 **Sample ID:** Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

		Reportin	ng		Instr Dil'n	1	Pre	ep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
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

Job ID: 57432

Sample#: 57432-001 **Sample ID:** Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

		Reporting)		Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	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	ι	ımhos/cm	1	SFM		2101781	6/18/21	12:20 SM2510B
рН	7.3 H			рН	1	SFM		2101813	6/16/21	10:46 SM4500H+B
H = Sample was r	eceived beyond	method ho	lding time	Э.						
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

		Reporting			Instr Dil'n		Prep		Anal	ysis
Parameter	Result	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



Job ID: 57432

Sample#: 57432-001 Sample ID: Finished-SIM

Matrix: Water

Sampled: 6/15/21 11:45

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 ng/L WAS 6/16/21 13970 6/17/21 3:32 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.8 U 1.8 0.34 ng/L 1 WAS 6/16/21 13970 6/17/21 3:32 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 WAS 6/16/21 13970 6/17/21 3:32 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U WAS 1.8 0.44 ng/L 1 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 na/L 1 WAS 6/16/21 13970 6/17/21 3:32 ng/L perfluorohexanoic acid (PFHXA) 1.8 U 0.30 1 WAS 6/16/21 13970 6/17/21 3:32 1.8 perfluorononanoic acid (PFNA) 1.8 U 0.39 ng/L 1 WAS 6/16/21 13970 6/17/21 3:32 1.8 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 WAS 6/16/21 13970 6/17/21 3:32 ng/L 1 1.8 U WAS 3:32 perfluoroundecanoic acid (PFUNA) 1.8 0.28 ng/L 1 6/16/21 13970 6/17/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.34 6/16/21 13970 6/17/21 3:32 1.8 ng/L 1 WAS (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.35 ng/L 1 WAS 6/16/21 13970 6/17/21 3:32 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.16 ng/L 1 WAS 6/16/21 13970 6/17/21 3:32 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 3:32 93 70-130 1 6/16/21 13970 6/17/21 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/17/21 3:32 99 D5-NEtFOSAA SUR 100 70-130 % 1 WAS 6/16/21 13970 6/17/21 3:32 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/17/21 3:32 90 Sum of MA PFAS6 Analytes (MAPFAS6) 1.8 U 1.8 1 2101749 ng/L

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



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

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

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- QC Report -

			- QC Nepi	J1 C								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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		
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 A	mt Added	%R	Limits		RPD	RPD L	imit
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	20
		Iron			0.53	mg/L	0.5	106	85	115		2	20
		Magnesium			0.50	mg/L	0.5	101	85	115		1	20
		Manganese			0.51	mg/L	0.5	102	85	115		1	20
		Sodium			4.9	mg/L	5	99	85	115		1	20
		Zinc			0.51	mg/L	0.5	102	85	115		2	20
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 A	Amt Added	%R	Limit	S	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 Sulfate		<	0.1 0.5	mg/L mg/L						
		Juliato			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 *		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
			07021 001			,					• •	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			
CMOACOD	DUDGGGGG	T. 0.1	F7.40F.600		-	011						25
SM2120B	DUP2101742	True Color	57435-002	<	5	CU						20



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limits		RPD	RPD	Limit
SM2320B	CCVB2101762	Alkalinity, Total (as CaCO3)			6.04	рН			5.94	6.06			
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	рН			3.94	4.06			
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	рН			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	рН	57432-001		7.3	рН							
SM4500H+B	DUP2101813	рН	57476-001		8.0	рН							
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	s RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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		98			%			70 13	30	
		13C2-PFDA SUR		106			%			70 13	30	
		D5-NEtFOSAA SUR		98			%			70 13	30	
		13C3-HFPO-DA SUR		93			%			70 13	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13970) 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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)propanoid acid (GenX acid) (HFPODA)	c 57432-001	3.3	1.7	0.26	ng/L	3.48	95	50 15	50	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	57432-001	3.5	1.7	0.34	ng/L	3.48	100	50 15	50	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	57432-001	3.5	1.7	0.28	ng/L	3.48	101	50 15	50	
		perfluorobutane sulfonic acid (PFBS)	57432-001	2.7	1.7	0.44	ng/L	3.08	89	50 15	50	
		perfluorodecanoic acid (PFDA)	57432-001	3.7	1.7	0.30	ng/L	3.48	107	50 15	50	
		perfluorododecanoic acid (PFDOA)	57432-001	3.9	1.7	0.37	ng/L	3.48	111	50 15	50	
		perfluoroheptanoic acid (PFHPA)	57432-001	3.6	1.7	0.29	ng/L	3.48	102	50 15	50	
		perfluorohexane sulfonic acid (PFHXS)	57432-001	2.9	1.7	0.34	ng/L	3.31	89	50 15	50	
		perfluorohexanoic acid (PFHXA)	57432-001	3.4	1.7	0.30	ng/L	3.48	97	50 15	50	
		perfluorononanoic acid (PFNA)	57432-001	3.6	1.7	0.39	ng/L	3.48	103	50 15	50	
		perfluorooctane sulfonic acid (PFOS)	57432-001	3.1	1.7	0.35	ng/L	3.34	92	50 15	50	
		perfluorooctanoic acid (PFOA)	57432-001	3.3	1.7	0.29	ng/L	3.48	96	50 15	50	
		perfluorotetradecanoic acid (PFTEA)	57432-001	4.1	1.7	0.43	ng/L	3.48	117	50 15	50	
		perfluorotridecanoic acid (PFTRIA)	57432-001	3.7	1.7	0.11	ng/L	3.48	107	50 15	50	
		perfluoroundecanoic acid (PFUNA)	57432-001	3.8	1.7	0.28	ng/L	3.48	109	50 15	50	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	57432-001	3.0	1.7	0.34	ng/L	3.29	90	50 15	50	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	57432-001	2.9	1.7	0.35	ng/L	3.25	90	50 15	50	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)) 57432-001	3.3	1.7	0.16	ng/L	3.29	102	50 15	50	
		13C2-PFHxA SUR	57432-001	94			%			70 13	30	
		13C2-PFDA SUR	57432-001	100			%			70 13	30	
		D5-NEtFOSAA SUR	57432-001	95			%			70 13	30	
		13C3-HFPO-DA SUR	57432-001	92			%			70 13	30	



Absolute Resource

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57432

as	sociat	es	-	1			abs	olute	ereso	urceasso	ciates.	com								AN	IAL	YS	IS	RE	QL	JE	ST				100		
Company Name: Kleinfelder Company Address: 4 Technology Driv	ve, Westbo Bishop						Projec Projec	t #: t Loca ditatio	S sation:	NHDI	ME VT _ Y A NF	PDES	11 	1 VOC 8021VT	oxane*	Gases-List: TTHMS	☐ TPH Fingerprint	O E08	Doo's resurce		XpH 🗆 B00 🔀 Conductivity X Turbidity X Apparent Color	☐ Acidity	als UTAL Metals X Hardness	Ca, Mg, Mn, Na, Zn			3000000		X Sulfate X Bromide D Fluoride	WOC	ss Asbestos		
Invoice to: Kleinfelde Email: abbishop@ PO #:	William Dies auf habit	r.co	m				Limits	#	EPA		r	•	II - John Oaco	C	X 2108	24.2 NH List	J EPH MADEP	N 🗆 625	restroides 🗖 bud	☐ Mineral 0&G 1664	nductivity X Turbi	S UTVS X Alkalinity	□ Priority Pollutant Metals	an'		U TKN	□ Bacteria P/A □ Ba	XNitrate + Nitri	Chloride	□ Ignitability/FP □ TCLP V0C □ TCLP SV0C		orm	Olympia (V)
ID (Lab Use Only)	eld ID SIM ned-SW2	8 1 1 2 2 3 1 2 2	X WATER	Matri	ОТНЕВ	오 N	Non Pre Thio X X	HOBN Serve	HO ₉ W ed	Sa 3140 6 (15/2)	ampling		SAMPLER	,	X X	X XV0C 524.2		☐ 8270ABH ☐ 8270ABN ☐ 625.		X Trias 357.1	X X X X	X X X X X X	☐ RCRA Metals	X X Otal Metals-list: Fe		X DAmmonia D COD		□ Sulfid	Vitrite	☐ Corrosivity ☐ Ign		X Total Coliform	X HAAS
TAT REQUESTED Priority (24 hr)* Expedited (48 hr)* Standard (10 Business Days) *Date Needed CUSTODY RECORD 0SD-01 Revision 03/09/2020	-	ING OPY ed by	INST REC	nce po tation TRUC	olicy a lists. CTIO	and NS	*	use r	repo	4 (15)	abbish	10p@	52 	nfe	lder.	con	n & UC	hau	ha						con	- 1	REC	1PEF	RATU O /jo	DN ICE		17 17 2	ime ov ime pn

Sample Receipt Condition Report

Absolute Re	source Ass	ocia		Jaili	pic Recei	pre	Jona			Job Numb	er:	3/43	2	
Samples Receive	ved from:		□-UPS □	J-Fed	Ex D-UST	S		Lab C	Cour	ier D-Clie	ent D	rop-off	D	
Custody Seals	- present & i	ntact:	□-Yes □]-No	D-N/	1				CoC s	igned		D-Yes	□-No
Receipt Temp:		C	Samples o	n ice	□ Yes	□-N	No U-	N/A		Sample	ed <	24 hrs ago?	2-Yes	□-No
			PFAS-onl	y real	ice? D-Yes	□-N	No D	N/A		Any si	gns o	f freezing?	□-Yes	D-No
Comments:														
Preservation	Na Nava				Bottle Size/	Туре	& Qu	antity	7					applicable*
/ Analysis		1										samples an	d docum	ent:
HCl	40mL(G)	1	250mL(P)	1	500mL(P)		1L(G)					110		
HNO ₃	125mL(P)	2	250mL(P)	1	500mL(P)	-	2501	(D)	-	500mL(P)	1	DIANT	11 =)
H ₂ SO ₄ NaOH	40mL(G) 125mL(P)	1	60mL(P) 250mL(P)		125mL(P)	-	250ml	(P)		300mL(1²)		phos p	HV	
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)							1		
ZnAc-NaOH	125mL(P)		250mL(P)											PARTIE NAME OF
Trizma	125mL(P)		250mL (P)	2										PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)									Residual C		
NaS ₂ O ₃	40mL(G)		120mL(P)	1								ABN625_		
MeOH	20mL(G)		40mL(G)	,								Bacteria Res	Cl ✓ by ar	nalyst
None (solid)	2oz(G)	_	4oz(G)		8oz(G)		Syring	e	1		,	PC Dry ap	plicable?	Y N
None (water)	40ml (G)	2	60mL(P)(3	X	125mL(P)	3	250ml	(P)	1	500mL(P)	1	1L(G)		1L (P)
NfuCl	Work	3		J	54661151	21								
Mold	Cassette		Bulk		Plate		Tape I.	ift		-				
Asbestos	Cassette		Bulk											
Lead	Cassette		Bulk		Wipe									
													HILLIAM	
						1	1			Via de la companya de				
Login Review						Yes	No	N/	A	Comments	1			
Proper lab sam					preservative?	-	/							
Analyses marke		the second	ottles received	1?		/								MITTER TOWN
VOC &TOC W						/	-			*				
VOC Solid-MeC					K?	-	-	-	-	00 00				
PFAS: Lab spec				rea?		/	-	-	_1	10.02				
Bacteria bottles						/	-	-	-					
Samples within						1		1						
Immediate test	BOD Colifo	ed in v	writing:	Enter	ococci Color	X	100	V	SI	MAN	1			
Surfactants, Turbid						27	CC		01	1)1/05)			
Date, time & II	O on samples	match	CoC?			/								
Rushes commu	nicated to ana	lyst in	writing?				/	1	/					
Subcontract no	te on login bo	ard?		D. J.	A STATE OF A	1					To se			
Pesticides EPA								1						
Compliance sar		discre	pancies/requi	ire no	flags?	1		-		(Or must be	rejecte	ed)		
	•							-		Discrepancies			NHDE	S, MADEP,
Log-in Supervis	sor notified in	media	itely of follow	ing ite	ms:			/		DoD etc.) or u				
						N,	1			()	141.	1111	7	
	Inspected and Received By: Date/Time: 10/15/1 16/15													
Peer Review C	Checklist											- 10		
☐ Client ID/I	Project Manag	er	On Ice, T	emper	ature OK?			San	nple	IDs		☐ Anal	yses in C	orrectly
☐ Project Nar	ne		□ PO# (if p	rovide	ed)			Ma	trix			-refe	rences	
☐ TAT/rushe	s communica	ted	☐ Sub sampl	les ser	t? Shipping Ch	arge?		Dat	te/T	ime collected		-was	tewater n	nethods
☐ Received D			-		ove communic					ITs communic	cated			CoC in LIMS
_ Keccived D	ate, Thie	Re	viewed By:	La abl	, c commune	arcu:	114	ate:	11	. 10 Commun	carea		J. Hom C	
Notes: (conti	nue on ba							and the		Initials	Date	v	Vhat wa	s sent?
Tyotes. (com	riuc on bac	LK dS	needed)				Uplo	haba	/ DE		Date			DD / Invoice
							Uplo			ACCES OF THE PARTY				DD / Invoice
							Uplo							DD / 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: Work Order #:

06/30/2021 2106-03287

Client Job #:

Date Received: Sample collected in:

06/21/2021 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

Donald a. D



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

Fails EPA Primary
Fails EPA Secondary
Fails State Guideline
Attention

DATE AND TIME COLLECTED: 06/15/2021

Passes

 DATE AND TIME COLLECTED:
 06/15/2021
 11:45AM

 DATE AND TIME RECEIVED:
 06/21/2021
 10:02AM

Legend

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

MORE LOC INFO: CLIENT JOB #:

MORE EGO IIII O.					OLIL	11 00D #.			
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/24/2021 09:32AM

AGE	OF

Absolute Resource

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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57432

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Company Name: Kleinfelder Company Address: 4 Technology Dri Report To: Alex Phone #: 914-406-9	ive, Westbo Bishop 9598	orouç	gh,N				Project Name: Barnstable, Project #: StraightWay2 Simmons Pond, L/L 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 #					260 NHDES DIVOC 8260 MADEP	BTEX MIRE only 11 VOC 8021VT	GR0 8015 X1,4-Dioxane *		□ TPH Fingerprin	BN □ 625.1 □ EDB	Pesticides 🗆 608.3 Pest/PCB		1	ductivity X Turbidity	☐ TVS XAlkalinity ☐ Acidity		Fe, Ca, Mg, Mn, Na, Zn		DIKN DIN DION X 100 D Ferrous Iron			□ Nitrite XChloride XSulfate X Bromide □ Fluoride	00000	C D TCLP SV0	Size Herbicides Asbestos		(C)	
Lab Sample F	Field ID	CONTAINERS	WATER	Matrix	ОТНЕВ		servation	Meth	МеОН	DATE	ampling	SAMPLER	1 VOC 8260 1 VOC	OVOC 6241 OVOC	1	XV0C 524.2 □ V0C	☐ TPH ☐ DRO 8015	□ 8270PAH □ 8270ABN □ 625.1	□ 8082 PCB □ 8081 Pesticides	XPFAS 537.1	0&G 1664 🗆 Mine	DH B00 X Col	UTSS X TDS UTS	RCRA Metals I Pr	X otal Metals-list:	→ Dissolved Metals-list	☐ Ammonia ☐ COD		☐ Cyanide ☐ Sulfide	☐ Nitrate ☐ Nitrite	☐ Corrosivity ☐ Ignit	so I	Subcontract. Grain Size	I otal Colliderin	HAAS Grab (G) or Composite (C)
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CUSTODY RECORD 0SD-01 Revision 03/09/202	Relinquish	ed by	San d.			~~				6/19	ate, 5/7(ate 1/2)	14	ime oo		Re	ceiv	ed b	lei	=	Tory N	2	m e		E		2	_	-	T	6/1	Date Date		16	Tim Z	ne ne ne



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
lowa	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

Revision date: 09/29/2020



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 Report: 521470

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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.

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

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 521470

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

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Client Information	-	Project Information	rmation		Regulatory Requi	Regulatory Requirements/Report Limits	iits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Nathalie Lewis Turnaround & Delivera	IA Jathalie Lew d & Delive	t Location: MA tt Manager: Nathalie Lewis Turnaround & Deliverables Information	tion	State/Federal Program: Regulatory Criteria:	-	
Phone: 508.439.5170 Email: nlewis@alphalab.com	Due Date: 06/29/21 Deliverables:	/29/21					
Project Specific Requirements and/o	Project Specific Requirements and/or Report Requirements	Requireme	nts and/or Rep	ort Require	uirements Report to include Method Blank 1 CS/I CSD:	I CS/I CSD.	
Additional Comments: Send all results/reports to subreports@alphalab.com	subreports@alphalab.c	om	00775	day.			IS
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Container Type	Preservative			Γ	Conta	iner Type						P	\Box							
P= Plastic A= Amber glass V= Vial	A= None B= HCI C= HNO ₂			-	2,000,000	eservative						A				+				
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Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2132280

World Class Che	mistry						
CI	ient Information		Project In	formation	Regulatory Red	quirements/Report Lim	nits
Client: Alpha A Address: Eight W Westbor	nalytical Labs alkup Drive ough, MA 01581-1019	Project Location Project Manage		wis erables Informatio	State/Federal Program Regulatory Criteria:	:	
Phone: 508.439 Email: nlewis@	.5170 alphalab.com	Due Date Deliverables		erables informatio			
		Project Specif	ic Requirem	ents and/or Repor	t Requirements	ATT COMPANY OF THE PARTY OF THE	and the same
F	Reference following Alpha Job I	Number on final repor	t/deliverables	: L2132280	Report to include Method Bla	nk, LCS/LCSD:	
Additional Comm	nents: Send all results/reports t	o subreports@alphala	ab.com				
Lab ID	Client ID	Collection Date/Time	Sample Matrix		Analysis		Batch QC
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Form No: AL_sub	осос						



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)."

<u>Degradation of 1,4-Dioxane:</u>

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 μ g/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 μ g/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 Steet 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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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 μ g/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 μ g/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 Steet 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.

RESEARCH : INVESTIGATE : EXPERIMENT : SOLVE : AUDIT : ANALYZE : EXPLORE : INSPECT : EVALUATE : CHARACTERIZE : DEMONSTRATE : PILOT

PILOT STUDY REPORT FOR

PFAS REMOVAL
BY GAC ADSORPTION AND
1,4 DIOXANE TREATMENT WITH UVAOP
WITH PRETREATMENT FOR
IRON AND MANGANESE REMOVAL
BY GREENSANDPLUSTM
PRESSURE FILTRATION

STRAIGHTWAY 1 AND 2, SIMMONS POND AND HYANNISPORT WELLS BARNSTABLE, MASSACHUSETTS

MARCH - JUNE 2021

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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	g the Pilot Study	1
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Source	Total Fe (mg/L)	Total Mn (mg/L)	1,4 Dioxane (μg/L)	PFAS6 (ng/L)
Straightway 1 Well	<0.30 mg/L	<mark>0.112</mark>	<0.30	<mark>44</mark>
Straightway 2 Well	0.42 – 0.46	0.765 - 0.961	<mark>0.66 – 1.0</mark>	<mark>85 - 93</mark>
Simmons Pond Well	<0.30 mg/L	0.129 - 0.148	0.15 - <mark>0.40</mark>	<mark>79 - 80</mark>
Hyannisport Well	<0.30 mg/L	<mark>0.126</mark>	<0.30	<mark>45</mark>

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 μ g/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.

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page iii

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.

TABLE OF CONTENTS

SUMMARY		i
TABLE OF CO	ONTENTS	iv
LIST OF TABL	_ES	vii
LIST OF FIGU	JRES	ix
LIMITATIONS	S	xi
RESPONSIBIL	LITIES	xii
	ONS	
	DUCTION	
	ckground	
	-	
	gulatory Requirements	
1.2.1	Iron and Manganese	
1.2.2 1.2.3	PFAS	
_	ot Study Goals	
	eatment Approach	
1.4.1	Iron and Manganese Treatment by Adsorptive Media Filtration	
1.4.2	Advanced Oxidation Process	
1.4.3	PFAS Treatment by GAC Filtration	
	DDS AND MATERIALS	
2.1 Pil	ot Systems	6
2.1.1	Raw Water Supply	7
2.1.2	Greensand Filtration	_
2.1.3	Advanced Oxidation Process with UV	
2.1.4	GAC Contactor	
2.1.5	Field Laboratory and Analytical Testing Equipment	
2.2 Pr	etreatment	34
2.2.1	Dose Calculation for NaOCI	35
2.2.2	Dose Calculation for NaOH	36
2.2.3	Dose Calculation for H ₂ O ₂	36
2.3 Fie	eld Analytical Methods	37
2.3.1	Chlorine, Free and Total	37
2.3.2	Iron - FerroVer	
2.3.3	Manganese – PAN Method (Field Method)	37
2.3.4	Alkalinity	37
2.3.5	Carbon Dioxide	38
2.3.6	pH Measurements	38

2.3	3.7 Turbidity	38
2.3	3.8 Hydrogen Peroxide	38
2.3	3.9 UV Transmittance	39
2.4	Statistical Methods	40
2.4	1.1 Paired t-test	40
2.4	4.2 Analysis Of Variance (ANOVA)	40
2.4	1.3 Boxplots	42
3 RE	SULTS	44
3.1	Raw Water Quality	44
3.2	Pretreatment Conditions	49
3.2	Pretreatment for Iron and Manganese Removal	49
3.2	Pretreatment for 1,4-Dioxane Removal	53
3.2	2.3 Pretreatment for PFOS/PFOA Removal	53
3.3	Treated Water Quality	54
3.3	Performance of Greensand Filtration for Iron and Manganese Removal	54
3.3	Performance of Advanced Oxidation Process (AOP) for 1,4-Dioxane Removal	75
3.3		
3.4	Maher Treatment Plant Water Quality	90
4 DA	ATA ANALYSIS AND DISCUSSION	94
4.1	Raw Water Quality	94
4.1	1.1 Comparison of Raw Water Quality to Historical Data	94
4.2	Iron and Manganese Removal with Greensand Filtration	101
4.2	2.1 Effectiveness of Adsorptive Media Filtration for Mn Removal	101
4.2	2.2 Filter Surface Loading Rates versus Filter Runtimes	106
4.2	2.3 Supernatant Recycle Performance	109
4.3	EFfectiveness of Advanced Oxidation Process for 1,4-Dioxane Removal	114
4.3	3.1 Lamp Fouling Observations	116
4.4	PFAS Removal with GAC Contactors	117
4.4	1.1 Was GAC Adsorption Effective for PFAS Removal	117
4.4	Was GAC and Ion Exchange Hydraulic Performance Acceptable	120
4.5	Maher Treatment Plant Data and Observations	121
5 CC	ONCLUSIONS	123
5.1	Raw Water	123
5.2	Removal of Iron and Manganese by Adsorption with Greensand Filtration	124
5.3	Removal of 1-4 Dioxane with UV AOP	124
5.4	Removal of PFAS with Adsorption by GAC Contactors	125
5.5	Maher Treatment Plant Data and Observations	125

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page vi

APPENDIX A – Field Water Quality – Greensand Trials

APPENDIX B – Field Water Quality –UV AOP Trials

APPENDIX C – Absolute Resource Associates - Laboratory Reports

APPENDIX D – Alpha Analytical - Laboratory Reports

APPENDIX E – Greensand Filter Performance Figures

APPENDIX F – GreensandPlus™ and Calgon Filtrasorb 400 GAC Product Data Sheets

APPENDIX G – Trojan Technologies™ – Sleeve Fouling Test Results

LIST OF TABLES

Table 0.01: Raw Water Contaminants as Measured During the Pilot Study	i
Table 1.01: Historical Raw Water Quality from Pilot Study Protocol	2
Table 2.01: Pilot Filter Configurations	15
Table 2.02: Pilot Contactor Configuration	30
Table 2.03: Pretreatment Chemical Properties	34
Table 2.04: Example of One-Way ANOVA Response versus Factor with Two Levels	41
Table 3.01: Raw Water Quality by Field Analyses	45
Table 3.02: Raw Water Quality by Laboratory Analyses – General Analyses	47
Table 3.03: Raw Water Quality by Laboratory Analyses – PFAS Compounds	48
Table 3.04: Pretreatment Sodium Hypochlorite Doses- Greensand Filtration	49
Table 3.05: Pretreated Water Quality Data for Low pH (6.8) Conditions (POX AB) from Field Analyses	52
Table 3.06: Pretreated Water Quality Data for High pH (7.4) Conditions (POX CD) from Field Analyses	52
Table 3.07: 1,4-Dioxane Removal Pretreatment Doses	53
Table 3.08: Filter A Performance Data (Low FSLR – Low pH Filter)	56
Table 3.09: Filter B Performance Data (High FSLR – Low pH Filter)	56
Table 3.10: Filter C Performance Data (Low FSLR – High pH Filter)	
Table 3.11: Filter D Performance Data (High FSLR – High pH Filter)	57
Table 3.12: Filter 21-1 and 21-2 Performance Data	58
Table 3.13: Greensand Filtered Water Quality (Low pH – Low FSLR) - Filter A, Field Analyses	63
Table 3.14: Greensand Filtered Water Quality (Low pH – High FSLR) - Filter B, Field Analyses	64
Table 3.15: Greensand Filtered Water Quality (High pH – Low FSLR) - Filter C, Field Analyses	65
Table 3.16: Greensand Filtered Water Quality (High pH – High FSLR) - Filter D, Field Analyses	66
Table 3.17: Greensand Filtered Water Quality – High-Capacity Trials by Field Analyses	67
Table 3.18: Greensand Filtered Water Quality by Laboratory Analyses – Initial Greensand Trials	68
Table 3.19: Greensand Filtered Water Quality by Laboratory Analyses – High Capacity Trials	69
Table 3.20: Greensand Filtered Water Quality by Laboratory Analyses – Disinfection Byproducts – Hig	;h
Capacity Trials	70
Table 3.21: Spent Backwash Water Quality by Laboratory Analyses – General Analyses	72
Table 3.22: Spent Backwash Water Quality by Laboratory Analyses – PFAS Compounds	73
Table 3.23: UV AOP Effluent – Operating Conditions and Field Analyses	76
Table 3.24: UV AOP Treated Water Quality by Field Analyses	76
Table 3.25: UV AOP Treated Water Quality by Laboratory Analyses – General Analyses	77
Table 3.26: UV AOP Treated Water Quality by Laboratory Analyses – Disinfection Byproducts	78
Table 3.27: GAC Contactor Operating Conditions	80
Table 3.28: GAC Contactor Flows, EBCTs, and Bed Volumes For Initial Greensand Filtration Trials at	
Hyannisport Well	82
Table 3.29: GAC Contactor Flows, EBCTs, and Bed Volumes for UV AOP Trials at Straightway 2 and	
Simmons Pond Wells	83
Table 3.30: PFAS Contactor Pressures and Differential Pressures	85
Table 3.31: GAC Contactor Treated Water Quality by Field Analyses	86

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page viii

Table 3.32: GAC Contactor Treated Water Quality by Laboratory Analyses – General Analyses	87
Table 3.33: GAC Contactor Treated Water Quality by Laboratory Analyses – Disinfection Byprodu	cts88
Table 3.34: GAC Contactor Treated Water Quality by Laboratory Analyses – General Analyses	89
Table 3.35: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses	91
Table 3.36: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses	92
Table 3.37: Maher Treatment Plant Water Quality by Laboratory Analyses – General Analyses	93
Table 4.01: Results of t-test for Effluent Fe (HACH FerroVer® Method) versus SMCL	101
Table 4.02: Results of t-test for Effluent Mn (PAN Method) versus Project Goal	102
Table 4.03: ANOVA of Greensand Filtered Mn by Operating Condition	105
Table 4.04: One-way ANOVA: Mn versus Recycle Period for Hyannisport Well	112
Table 4.05: One-way ANOVA: Mn versus Recycle Period for Straightway 2 Well	112

LIST OF FIGURES

Figure 4.12:	Raw and Treated PFAS Concentrations at Straightway 2 and Simmons Pond Wel	ls During
		118
	Raw and Treated PFAS Concentrations at Hyannisport Well During Initial Greens	
_	Final Observation for Lamp Sleeve Fouling and Comparison to Unused Sleeve	
_	Raw and UV AOP Treated 1,4-Dioxane Data	
	Greensand Effluent Mn (PAN) During the Supernatant Recycle Trials	
	Filter Surface Loading Rate versus Runtimes	
_	Box Plot of Effluent Manganese Concentrations by Operating Conditions	
_	Raw PFAS6 Concentrations Compared to Historical Data	
•	Raw 1,4-Dioxane Concentrations Compared to Historical Data	
	Raw Manganese Concentrations Compared to Historical Data	
_		
_	Backwash Settled Solids vs Settling Time	
_	Example Filter Performance Figure - Filter D, Trial 3	
_	Raw Water NaOH Titrations with and without Aeration (5 min)	
	Boxplot Example	
-	Chemical Day Tanks	
_	Greensand Pilot Trailer Field Laboratory	
_	PFAS Contactor Flow Control Assembly	
_	Contactor Outlet	
•	Contactor Inlet	
_	GAC Contactors Setup Inside Shipping Container	
	GAC Contactor at Hyannisport Station	
-	Trojan UV Pilot System Layout Drawing	
_	Trojan Pilot UV System Photo	
· ·	UV Pilot Skid Installed in Shipping Container	
_	Comprehensive Flow Diagram of Greensand, UV AOP and GAC Pilot Systems	
	21-inch High-Capacity Greensand Filters	
	Hach 1720E Low Range Turbidimeters	
_	Pilot Trailer Sample Sink	
-	Pilot Filter with Flow Control Panel	
_	Sodium Hypochlorite and Potassium Hydroxide Feed Pumps	
_	Pilot Trailer Chemical Feed Area	
_	Process Flow Diagram of Greensand Pilot Filtration System	
•	Interior of Pilot Filtration Trailer	
_	Greensand Pilot Trailer at Hyannisport Station	
· ·	Raw Water Break Tank	
_	Simmons Pond and Hyannisport Wells Connection	
_	Straightway Wells 1 and 2 Connection	

Blueleaf Pilot Study Report
Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA
March - June 2021, Page x
Figure 4.13: Differential Pressures for PFAS Contactors During Pilot Study

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

KMnO₄ 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 nephalometric 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

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page xv

SM Standard Methods

SMCL Secondary Maximum Contaminant Limit

SSN Settled supernatant (backwash decant sample)

TSS Total Suspended Solids

UV Ultraviolet

 $\begin{array}{ll} \text{UV AOP} & \text{Advanced Oxidation Process with UV} \\ \mu\text{g/L} & \text{Micrograms per Liter (equivalent to ppb)} \end{array}$

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)
Level of Concern	0.3	0.05	0.3	20
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 μ g/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 μ g/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)

$$\label{eq:total_pfase_concentration} \begin{split} \textit{Total PFAS6 Concentration} \left(\frac{ng}{L}\right) &= \text{PFHpA} + \text{PFHxS} + \text{PFOA} + \text{PFNA} + \text{PFOS} + \text{PFDA} \\ \textit{Total PFAS6 Concentration} \left(\frac{ng}{L}\right) &= 5.09 + 2.97 + 13.5 + 0 + 5.70 + 0 \\ \textit{Total PFAS6 Concentration} \left(\frac{ng}{L}\right) &= 27.26 \ \frac{ng}{L} \end{split}$$

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

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 5

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.





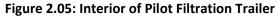
2.1.2 Greensand Filtration

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

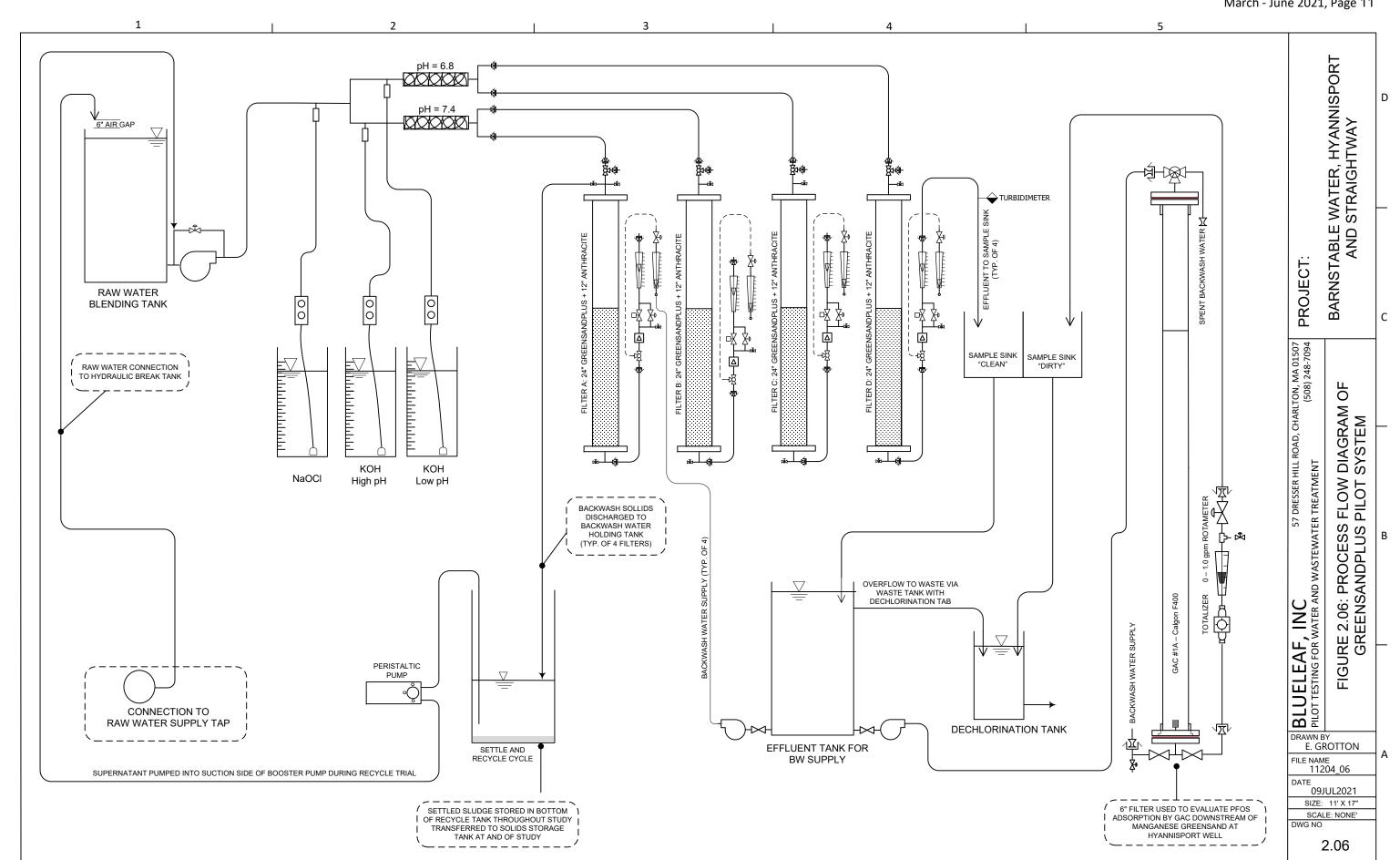


Figure 2.05 shows the interior of the greensand pilot trailer.





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.



2.1.2.1 Chemical Pretreatment

The greensand pilot system influent was pretreated using sodium hypochlorite (NaOCI) 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

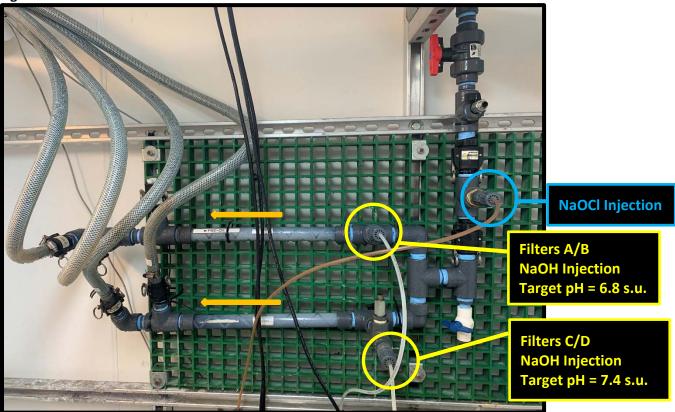


Figure 2.08 shows the sodium hypochlorite (NaOCI) feed pump as well as the two NaOH feed pumps. The chemical feed pumps were Grundfos DDA diaphragm pumps. The suction tubing from the pumps withdrew diluted NaOCI and NaOH stock stored in 55-liter day tanks located below the pumps.

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 in 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 ft³ (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)

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 16

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 GreensandPlusTM (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

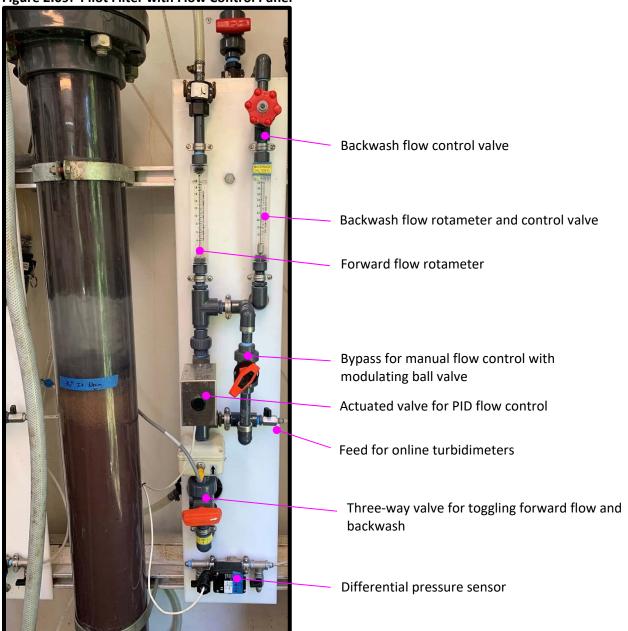


Figure 2.10 shows the sample sink, with $\frac{1}{2}$ " hoses for pilot filter effluent, $\frac{3}{8}$ " lines for discharge from the four Hach 1720e flow-through turbidimeters, and the $\frac{1}{4}$ " sample lines for untreated raw water, and pretreated filter influent. The pretreated filter influent 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.





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.

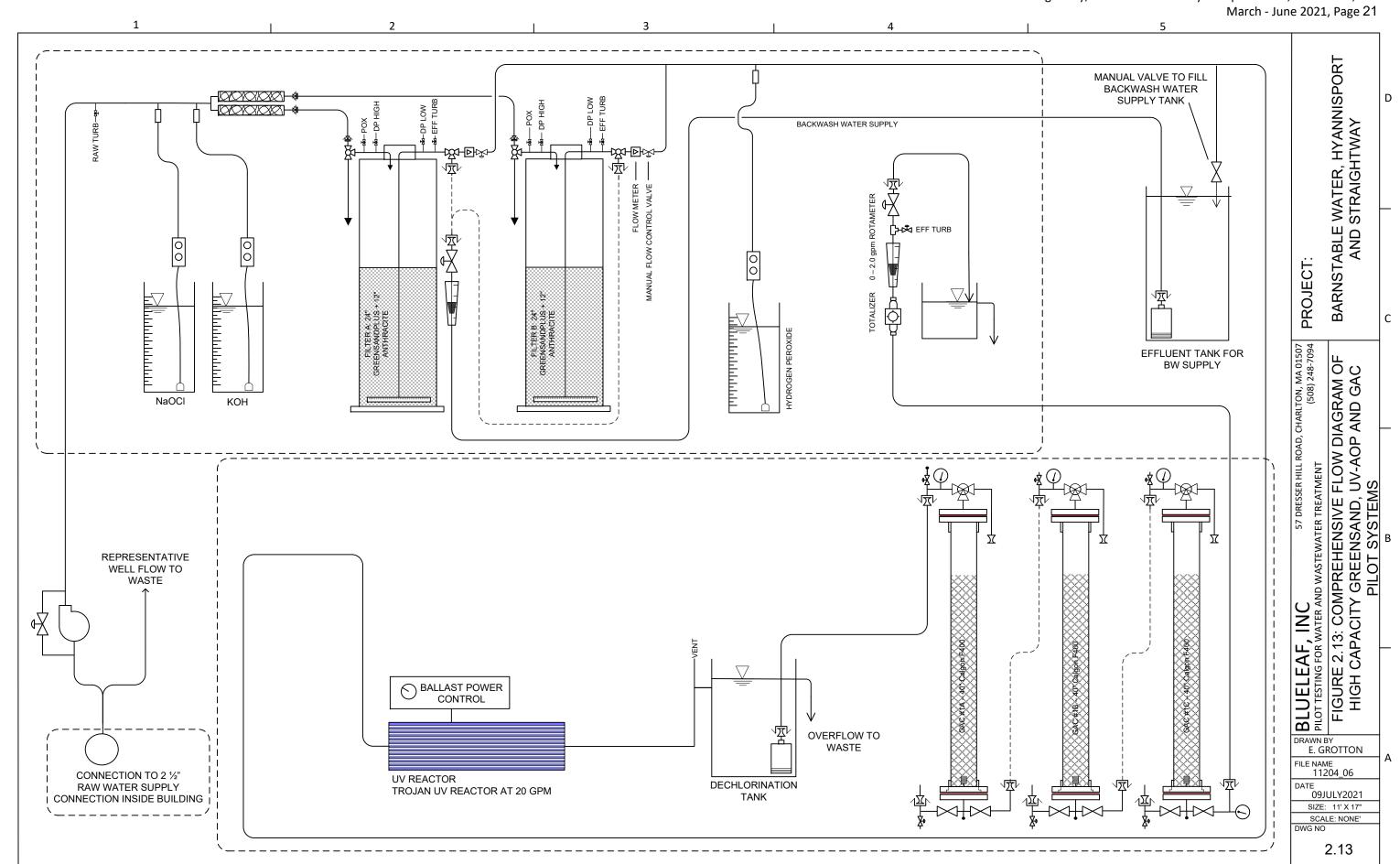
- 1. Replaced ½ HP pilot feed booster pump with 1 HP booster pump in order to pressurize the Greensand filtration system and the downstream UV pilot system.
- 2. Fed neat undiluted NaOCl instead of 1/10 dilution.
- 3. Replaced the four 6-inch diameter pilot filters with two 21-inch diameter filters. 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.



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 1/2" 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.

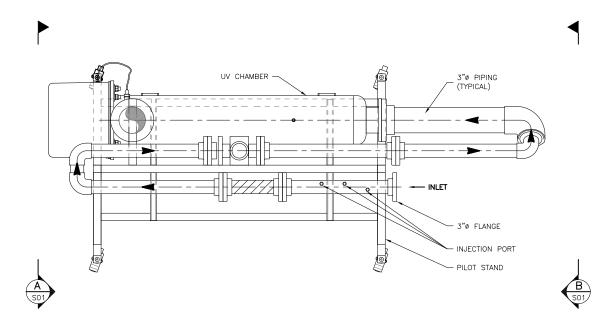




The pilot skid had sample taps to provide continuous pre-UV and post-UV samples which flowed into a sample sink. A separate sample tap provided continuous flow of UV influent to the OptiView™ UVT analyzer.

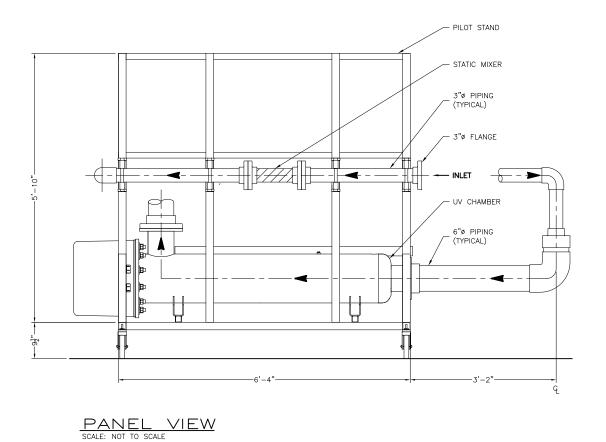
Figure 2.16 provides layout drawings for the Trojan UV pilot system.

Figure 2.16: Trojan UV Pilot System Layout Drawing

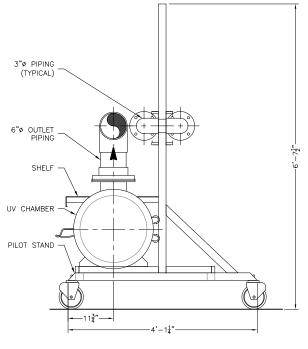


PLAN VIEW

SCALE: NOT TO SCALE
NOTE: SCC, OPTIVIEW™, HYDROGEN PEROXIDE TANK & PUMP, AND SHELF NOT SHOWN FOR CLARITY.

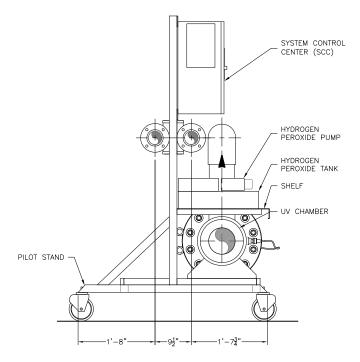


Straightway, Simmons Pond and Hyannisport Wells Pilot Study, Page 25

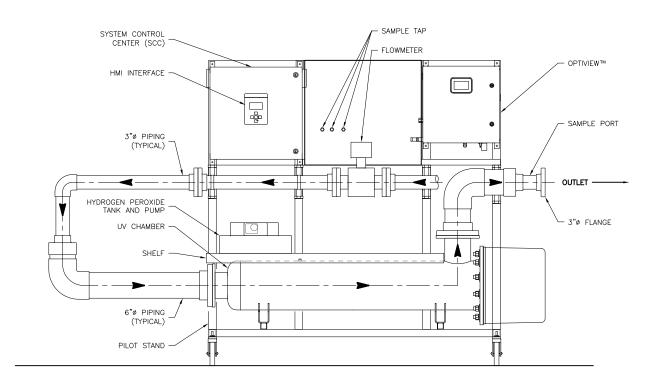


SIDE VIEW A

SCALE: NOT TO SCALE
NOTE: SCC, OPTIVIEW AND HYDROGEN PEROXIDE TANK &
PUMP NOT SHOWN FOR CLARITY.



SIDE VIEW B



UV CHAMBER VIEW SCALE: NOT TO SCALE

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written permission of Trojan Technologies.	SCAL

DESCRIPTION:		QUOTE NO. N	/A
		PROJECT NO.	
RAWN BY: MVW	DATE : 16SE07	N/	/^
CHECKED BY: SPM	DATE : 16SE08		
PPROVED BY: RAH	DATE : 16SE08		REV.
SCALE $(11x17) : 1/2" = 1'-0"$	LOG NUMBER : N/A	S01	В

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

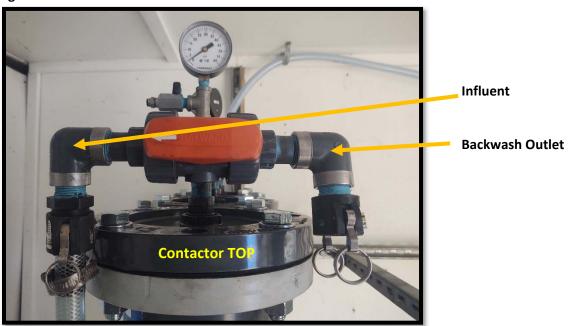
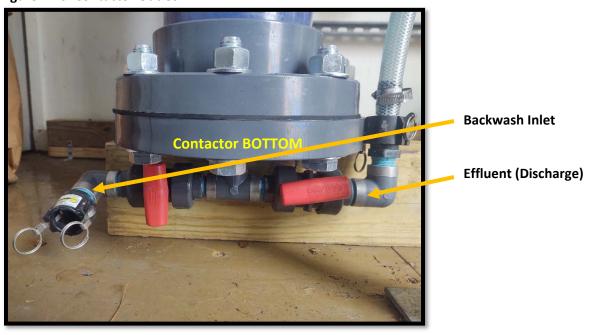


Figure 2.20: Contactor Outlet



Blueleaf Pilot Study Report BFDWD Wells 2 and 5, Barnstable, MA February - March 2021, Page 29

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

	GAC Contactor								
Parameter	Vessel 1	Total							
Media Type		Calgon Filt	rasorb 400						
Adsorptive media depth		40" (3'4")		120" (10')					
Adsorptive media volume		14.7 gal							
Freeboard above filter surface		60" (5')							
Contactor vessel diameter		6"							
Contactor surface area	0.2 ft ² 0.2 f			0.2 ft ²					
Contactor vessel height	5′ 15			15′					
Filter vessel empty volume	7.34 gal 22 ga								

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 $\frac{1}{2}$ " 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.

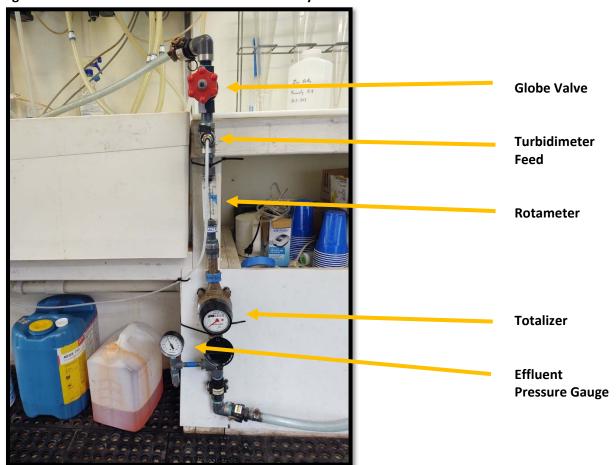


Figure 2.21: PFAS Contactor Flow Control Assembly

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.





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 (NaOCI) 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.





2.2.1 Dose Calculation for NaOCl

NaOCI 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 NaOCI dose based on volume of product was determined using the following formula:

$$Cl_2 \ Dose \ (ppm) = \left[\frac{(R)(D)(10^6 \ ppm)}{(Q)(3,785 \ mL/gal)(60 \ min/hr)} \right]$$

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 dank (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:

$$Cl_2 \ Dose \ (mg/L) = \left[\frac{(R)(D)(1.10)(7.5\%)(10^6 \ mg/L)}{(Q)(3,785 \ mL/gal)(60 \ min/hr)} \right]$$

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 dank (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 Dose
$$(mg/L) = \left[\frac{(R)(D)(1.53)(50\%)(10^6 \ mg/L)}{(Q)(3,785 \ mL/gal)(60 \ min/hr)} \right]$$

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 dank (dimensionless ratio)

2.2.3 Dose Calculation for H₂O₂

 H_2O_2 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 H_2O_2 . The product had a weight percentage of 35%, and a specific gravity of 1.13. Doses were calculated as:

$$H202 \ Dose \ (mg/L) = \left[\frac{(R)(D)(1.13)(35\%)(10^6 \ mg/L)}{(Q)(3,785 \ mL/gal)(60 \ min/hr)} \right]$$

Where: R = chemical feed rate (mL/hour) per day tank drawdown measurements

Q = process water flow rate (gpm)

1.45 = specific gravity of the product (dimensionless) 35% = weight percentage of the product (% H_2O_2)

D = dilution factor of chemical in day dank (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. Te 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 Napthol) 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 $0.020N\ H_2SO_4$. 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:

$$Total~Alkalinity~(mg/L~CaCO_3) = \frac{A~\times~N~\times~50,000}{mL~Sample}$$

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:

$$Total \ Alkalinity \ (mg/L \ CaCO_3) = \frac{(2B-C) \times N \times 50{,}000}{mL \ Sample}$$

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 continously 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:

$$\frac{mg\ CO_2}{L} = \frac{Volume\ of\ Titrant\ (mL)\ x\ 0.02\ N\ NaOH\ x\ 44,000}{100\ mL}$$

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

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 39

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 OptiviewTM 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_{\circ} (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_o 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
Trial 1 0.071783 0.071783 234.91 0.000
Error
      30 0.009167 0.000306
     31 0.080950
Total
S = 0.01748  R-Sq = 88.68\%  R-Sq(adj) = 88.30\%
                      Individual 90% CIs For Mean Based on
                      Pooled StDev
               StDev -----+----
Level N
         Mean
     22 0.12318 0.02009
     10 0.02100 0.00876 (--*--)
                      ----+----
                        0.030 0.060 0.090
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 (Ho) states that all population means are equal.
- The Alternative Hypothesis (H₁) 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< α), 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.

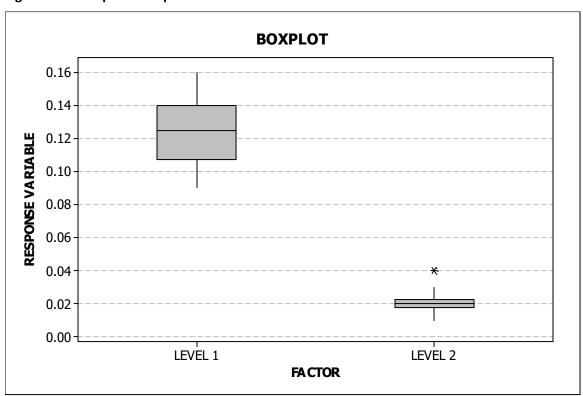


Figure 2.24: Boxplot Example

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.

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 43

- 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

	Straightway 1 Straightway 2 Well Well		Simmor W	Hyannisport Well		
Parameter	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]	<mark>0.42</mark> (0.37-0.71) [17]	<mark>0.46</mark> (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]	<mark>0.39</mark> (0.34-0.53) [14]	<mark>0.42</mark> (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	<mark>0.112</mark> (0.084-0.206) [16]	<mark>0.961</mark> (0.882-1.32) [16]	<mark>0.765</mark> (0.300-0.788) [27]	<mark>0.129</mark> (0.078-0.148) [12]	<mark>0.148</mark> (0.143-0.189) [14]	<mark>0.126</mark> (0.115-0.136) [15]
Dissolved Manganese, mg/L	<mark>0.110</mark> (0.076-0.189) [16]	<mark>0.962</mark> (0.900-1.27) [13]	<mark>0.743</mark> (0.308-0.771) [26]	<mark>0.121</mark> (0.089-0.142) [12]	<mark>0.143</mark> (0.131-0.158) [14]	<mark>0.122</mark> (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]

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 46 Table 3.02: Raw Water Quality by Laboratory Analyses – General Analyses

Table 3.02: Raw Water Quality by	y Laboratory Anal	yses – General <i>I</i>	es – General Analyses 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
Analysis	Units			<u> </u>		<u>l</u>	Sam	ple Date and Ti	me	<u>l</u>	l	<u> </u>	<u>l</u>	
		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		I	STRAIG	HTWAY 2	1			l	SIMMONS POND		1	Hyannisport
1,4 Dioxane	μg/l	<0.25	0.98	<mark>0.81</mark>	<mark>0.66</mark>	0.92	0.89	1.0	<mark>0.40</mark>	0.23	0.31	0.20	0.15	<0.25
PFAS6	ng/L	<mark>44.0</mark>	*		<mark>93.0</mark>			<mark>84.6</mark>	<mark>80.3</mark>			<mark>80.1</mark>	<mark>79.4</mark>	<mark>45.4</mark>
Total Iron	mg/L	<0.050	<mark>0.56</mark>		<mark>0.68</mark>			<mark>0.81</mark>	<0.050				0.044	<0.050
Dissolved Iron	mg/L	<0.050	<mark>0.49</mark>		<mark>0.41</mark>			0.43	<0.050				0.023	<0.050
Total Manganese	mg/L	<mark>0.096</mark>	<mark>1.20</mark>		<mark>1.00</mark>			<mark>0.97</mark>	0.140				0.150	<mark>0.120</mark>
Dissolved Manganese	mg/L	<mark>0.097</mark>	<mark>1.20</mark>		<mark>1.00</mark>			<mark>0.98</mark>	0.140				0.140	<mark>0.120</mark>
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
рН	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

			Laboratory Report # (Absolute#/Alpha#)											
		56226 L2113238	56580 L2118928	57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	56696 L2120551	57365 L2131271	57382	57407 L2132035	57435 L2132277	56792 L2122099
Analysis	Units			l	l	l	Samı	ple Date and	Time	<u> </u>		<u> </u>	l	
		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			Straigi	HTWAY 2					SIMMONS PONI)		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-Chloroeicosafluoro-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	<mark>44.0</mark>	<1.7#		<mark>93.0</mark>			<mark>84.6</mark>	<mark>80.3</mark>			80.1	<mark>79.4</mark>	<mark>45.4</mark>

^{*} 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 (NaOCI) 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%.

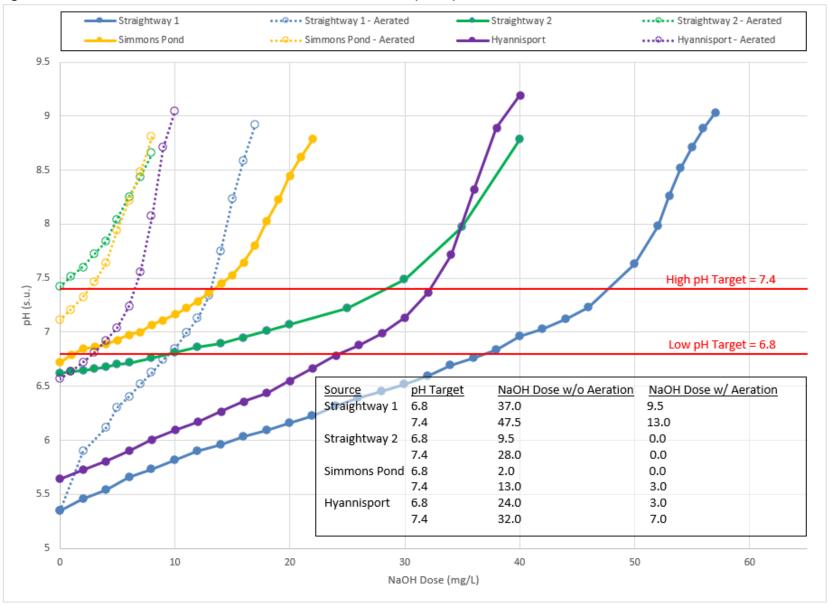
3.2.1.2 Bench Scale pH Titrations

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 (H_2O_2) 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 H₂O₂ Dose (ppm)	Measured H ₂ O ₂ Concentration In UV Influent (mg/L)
	High/High	100%	10	9.0 (6.5-9.0) [5]
Straightway 2	Low/High	60%	10	9.0 (8.0-9.0) [4]
Straightway 2	High/Low	100%	5	3.5 (3.5-4.5) [3]
	Low/Low	60%	5	4.5 (3.5-6.0) [5]
	High/High	100%	8	7.0 (6.0-8.0) [5]
Simmons	Low/High	60%	8	7.0 (6.5-7.0) [3]
Pond	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 ± 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 ± 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).
 - \Rightarrow "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: Runtime (hours) = $(10 \text{ psi} \text{b}) \div \text{m}$.
- "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 ± 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 ± 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)

	Fig.				Trial Duration	FSLR	Clean Bed	to Termina	l Headloss	Runtime to Break-	All	Representative Turbidity Data
Trial	No.	Description	Start Time	End Time	(hours)	(gpm/sf)	Clean Bed Headloss (psid)	Slope (psi/hr)	Runtime to 10 psi (hrs)	through (hours)	Turbidity Data (NTU)	Turbidity Data (NTU)
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]
		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]
A.2	E-5	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]
		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]
	- 47	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]
A.5	E-17	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)

	Fig.				Trial Duration	FSLR	Clean Bed	to Termina	l Headloss	Runtime to Break-	All	Representative Turbidity Data (NTU)
Trial	No.	Description	Start Time	End Time	(hours)	(gpm/sf)	Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)	through (hours)	Turbidity Data (NTU)	
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]
		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]
	F 40	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]
B.3	E-10	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]
		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]
D.C	F 24	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]
B.6 E-21	E-21	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)

	Fig.				Trial Duration	FSLR	Clean Bed	to Termina	l Headloss	Runtime to Break-	All	Representative
Trial	No.	Description	Start Time	End Time	(hours)	(gpm/sf)	Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)	through (hours)	Turbidity Data (NTU)	Turbidity Data (NTU)
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]
		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]
C.2	E-7	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]
		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]
C.5 E-:		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]
	E-19	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)

	Fig.				Trial Duration	FSLR	Clean Bed	to Termina	Headloss	Runtime to Break-	All	Representative Turbidity Data (NTU)
Trial	No.	Description	Start Time	End Time	(hours)	(gpm/sf)	Clean Bed Headloss (psi)	Slope (psi/hr)	Runtime to 10 psi (hrs)	through (hours)	Turbidity Data (NTU)	
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]
		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]
D 2	E-12	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]
D.3	D.3	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]
		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]
D.7	E-23	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]
D.7	-	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

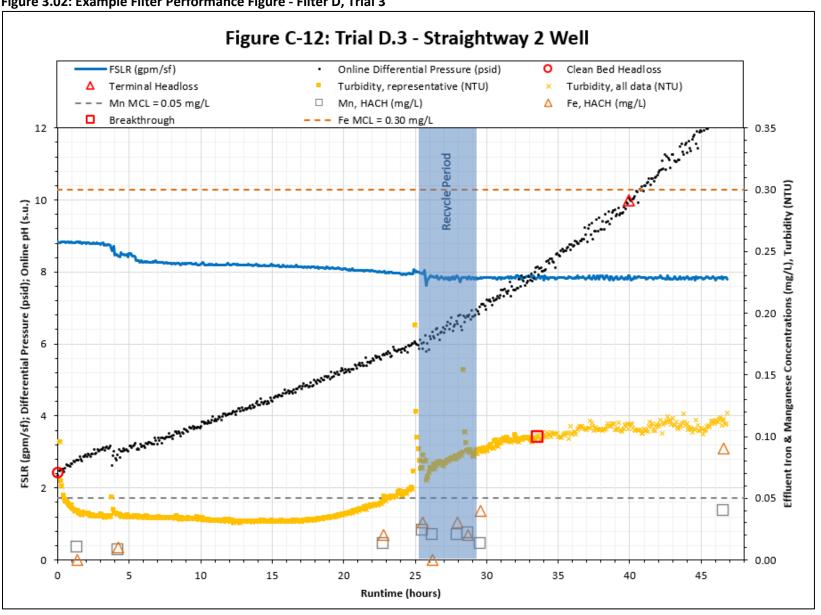
Filter	Well Source Start Time End		End Time	FSLR (gpm/sf)	All Turbidity Data (NTU)	Representative Turbidity Data (NTU)
21-1	STRAIGHTWAY 2	05/24/21 11:03	6/7/21 08:42	4.07 ± 0.43 [6673]	0.026 ± 0.078 [6674]	0.024 ± 0.009 [6657]
21-1	SIMMONS POND	6/7/21 13:51	6/15/21 15:15	3.81 ± 0.32 [3869]	0.028 ± 0.018 [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]
21-2	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 FLSR 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. KMnO4 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)	CI2 (f) (mg/L)	CI2 (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]		
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- <mark>0.068</mark>) [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]	<mark>0.067</mark> (0.040- <mark>0.068</mark>) [3]	6.59-6.60 [2]	24 . 0.2 [7000]	667 . 125 [7005]
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]	3.1 +- 0.2 [7909]	667 +- 125 [7995]
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]		
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]	4.4 +- 0.4 [6893]	825 +- 59 [6948]
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)	CI2 (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)	CI2 (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)	CI2 (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]
21-1	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]
24.2	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]
21-2	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

Table 3.10. Greensand Filtere	u water Qua	Quality by Laboratory Analyses – Initial Greensand Trials Laboratory Report # (Absolute#/Alpha#)								
		56226 L2113238	56580	56696	56792 L2122099					
Analysis	Units		Sample Dat	e and Time						
Analysis	Units	03/17/21	04/14/21	04/22/21	04/29/21					
		10:00	10:00	9:30	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	<mark>0.062</mark>	<0.010	<0.010					
Dissolved Manganese	mg/L	<0.010	<mark>0.065</mark>	<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					
рН	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 Qu	uality by Laboratory Analys	es – High Capacity Tr	ials						
			ı	1	Laboratory Report #	(Absolute#/Alpha#)	1	1	1
		57189 L2128319	57190 L2128315	57224 L2128998	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277
Analysis	Units			l	Sample Dat	te and Time	l	l	
		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
			Straigh	ntway 2			Simmo	ns Pond	
1,4 Dioxane	μg/l	<mark>0.59</mark>	<mark>0.91</mark>	0.83	<mark>0.85</mark>	<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
рН	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

Table 5.20. Greensand Filtered Water Quanty by			Todaets Tilgii capaci	ty mais	Labaratan Danas H	/ A la a a la ata 44 / A la a la a 44)				
			1	1	Laboratory Report #	(Absolute#/Alpha#)		1	1	
		57189 L2128319	57190 L2128315	57224 L2128998	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277	
Analysis	Units				Sample Dat	e 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	
			Straigh	tway 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.

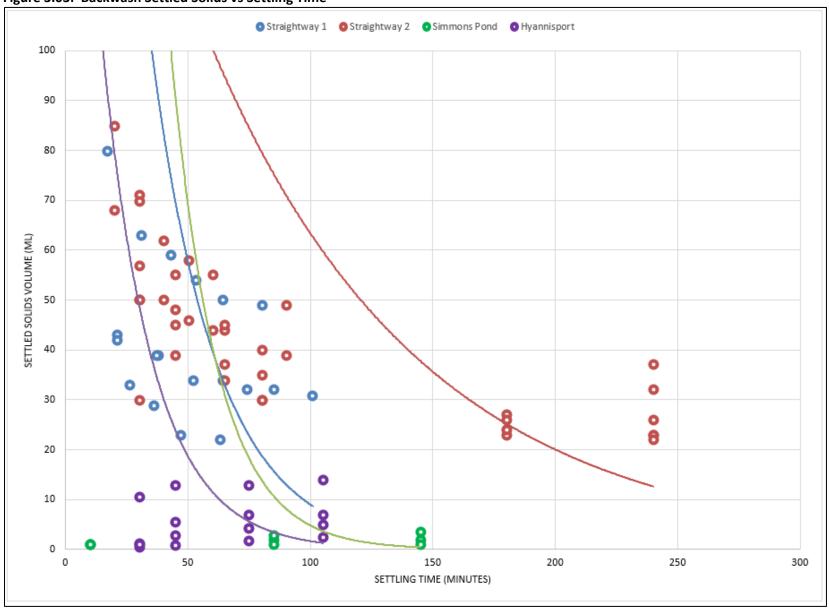
Table 3.21: Spent Backwash Water Quality by Laboratory Analyses – General Analyses

Table 5.21. Spelit Backwasii			., , mai, ses	Conc. ai / iliai y			Li	aboratory Repor	t				Laboratory Report											
		L2114524		56580	56700	57190	57224	57383		56792		57382	57465	56824										
Analysis				Sample Date and Time																				
		03/23/21	04/	14/21	04/19/21	05/26/21	06/01/21	06/04/21	04/26/21 06/			06/11/21	06/15/21	05/03/21										
		9:10	g	9:30	9:30	12:30	9:00	9:45		14:00		9:00	10:00	10:35										
		STRAIGHTWAY 1	STRAIGHTWAY 1 STRAIGHTWAY 2					SIMMONS POND					Hyannisport											
Pilot Trials		Initial GSP	Initi	al GSP	Initial GSP	High Capacity	High Capacity	High Capacity		Initial GSP		High Capacity	High Capacity	Initial GSP										
Filter		В	В	D	D	21-Inch	21-Inch	21-Inch	А	В	D	21-Inch	21-Inch	В										
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		<mark>0.82</mark>	<mark>0.77</mark>	<mark>0.74</mark>	<mark>0.53</mark>	<mark>0.46</mark>		<0.25	<mark>0.37</mark>	<mark>0.34</mark>	<0.12	<0.12											
PFAS6	ng/L		<mark>83.4</mark>	<mark>84.4</mark>	<mark>78.0</mark>	<mark>88.3</mark>	<mark>90.0</mark>	<mark>79.7</mark>	<mark>75.9</mark>	<mark>78.6</mark>	<mark>75.6</mark>	<mark>63.0</mark>	<mark>80.7</mark>											

Table 3.22: Spent Backwash Water Quality by Laboratory Analyses – PFAS Comp	ounas						Lab	oratory Rep	ort					
			Ī		İ		I) 			ĺ	i i	I
		L2114524	08		56700	57190	57224	57383		56792		57382	57465	56824
Analysis	Units		Sample Date and Time					1	<u> </u>					
		03/23/21 9:10	04/1 9:	4/21 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			STRAIG	SHTWAY 2				S	immons Poi	ND		Hyannis- port
Pilot Trials		Initial GSP	Initia	l GSP	Initial GSP	High Capacity	High Capacity	High Capacity		Initial GSP		High Capacity	High Capacity	Initial GSP
Filter	_	В	В	D	D	21-Inch	21-Inch	21-Inch	Α	В	D	21-Inch	21-Inch	В
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-Chloroeicosafluoro-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		<mark>83.4</mark>	<mark>84.4</mark>	<mark>78.0</mark>	88.3	90.0	<mark>79.7</mark>	<mark>75.9</mark>	<mark>78.6</mark>	<mark>75.6</mark>	<mark>63.0</mark>	<mark>80.7</mark>	

^{*} 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 UV AOP Operations Summary Table

Table 3.23: UV AOP Effluent – Operating Conditions and Field Analyses

Well	O	F I =	Trial	UV Ballast	Target	H2O2 Concentration b	by Field Analyses (ppm)	Influent	Effluent	
weii	Start Time	End Time	Conditions BPL/ H ₂ O ₂ Dose	Power Level (BPL)	H ₂ O ₂ Dose (mg/L)	Pre-UV	Post-UV	UVT (%)	Turbidity (NTU)	
	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]		
Straightway 2	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]	0.033 ± 0.018 [6483]	
Straightway 2	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]		
	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]		
Simmons	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]	0.020 ± 0.007 [3458]	
Pond	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 UV AOP 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 Qu	ality by Laboratory Ana	alyses – General Ana	alyses							
			1	1	Laborator	y Report # (Absolute	#/Alpha#)	ı	1	1
		57189	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277
Analysis	Units				S	Sample Date and Tim	e			
		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				Simmo	ns 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
рН	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

Table 3.26: UV AOP Treated Water Quality by	<i>,</i> <u>Laboratory</u> Ana	aiyses – Disintection	Byproducts							
					Laborator	y Report # (Absolute	#/Alpha#)			
		57189 L2128319	57190 L2128315	57224 L2128998	57271 No Alpha	57271 L2129637	57365 L2131271	57382 L2131616	57407 L2132035	57435 L2132277
Analysis	Units				S	ample Date and Tim	e			
		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				Simmo	ns 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		
Straightway 2	5/24/2021	6/07/2021	14	Greensand Filtration	1.5	10
Simmons Pond	6/07/2021	6/15/2021	7	and UV AOP		

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 Fee	d Pump Tripped Pow	er Over Weekend. O	ff 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 Rate	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	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

	Inlet	Recorded Pressures (PSI) Calibration Corrected			Differential Pressure (PSI)							
Date/Time		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]

	by Laboratory A	7000	,			Laboratory R	eport # (Absolu	ite#/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
Units						Sam	ple Date and T	ime					
	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			Hyann	NISPORT
μg/l													
ng/L				6.1		<1.7			<1.7	<1.7	<1.7	<1.8	<1.7
mg/L													<0.050
mg/L													<0.050
mg/L													<0.010
mg/L													<0.010
mg/L				18							21		8.8
mg/L				5.4							5.4		3.4
mg/L				43							56		99
mg/L				<0.010							<0.010		<0.010
mg/L				68							74		36
mg/L				71							60		58
s.u.													
s.u.													
mg/L				51							82		100
mg/L				22							20		18
mg/L				190							250		270
mg/L													
mg/L													
Col/100mL													
Col/100mL													
umhos/cm				350							460		540
s.u.				7.9							7.1		7.3
NTU													
mg/L				<0.59							<0.59		<1.0
mg/L				200							210		
mg/L				3.4							4.5		
mV				340							350		
mg/L				<0.02							<0.02		
mg/L				<0.20							<0.05		
μg/L				<1.0							<1.0		
	μg/l ng/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L m	Units 03/17/21 10:00 STRAIGHTWAY 1 µg/l ng/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L m	Units 03/17/21	Units 03/17/21	Units 03/17/21	Units 03/17/21	Units Un	Units Sample Date and T Strakehttway 1 Strakehttway 2 Strakehttway 2 Strakehttway 2 Strakehttway 1 Strakehttway 2 Strakehttway 1 Strakehttway 2 Strakehttway 2 Strakehttway 1 Strakehttway 2 Strakehttwa	Units	Units Units Second Secon	Units Sample Date and Time Sample Date Sample Dat	Units Units	Units

Table 3.33: GAC Contactor Treated Water Quality by Laboratory Analyses – Disinfection Byproducts

Table 3.33: GAC Contactor Treated V	valer Quality	by Laboratory A	ilalyses – Disil	nection bypro	uucis									1			
					Laboratory Report # (Absolute#/Alpha#) 68												
		56226	56580	57189	57190	57224	57			57382	57407	57435	56824	56792			
Analysis	Units						Sam	ple Date and Ti	me								
		03/17/21	04/14/21	05/25/21	05/27/21	06/01/21	06/03/21	04/22/21	06/10/21	06/11/21	06/14/21	06/15/21	04/28/21	04/29/21			
		10:00	10:00	12:15	10:00	11:00	10:00	9:30	9:00	8:30	11:00	10:00	12:00	9:30			
		STRAIGHTWAY 1			STRAIGHTWAY 2					SIMMONS POND			Hyann	IISPORT			
Chloroform	μg/L				<0.50												
Dibromodichloromethane	μg/L				<0.50												
Bromodichloromethane	μg/L				<0.50												
Bromoform	μg/L				<0.50												
Total THMs	μg/L				<0.50												
Dibromoacetic Acid	μg/L				<1												
Dichloroacetic Acid	μg/L				<1												
Monobromoacetic Acid	μg/L				<1												
Monochloroacetic Acid	μg/L				<1												
Total HAAs	μg/L				<1												

Table 3.34: GAC Contactor Treated Water Quality by Laboratory Analyses – General Analyses

Table 3.34: GAC Contactor Treated Water Quality by Laboratory Analyses	– General	Analyses					horatory Re	nort # (Ahso	olute#/Alpha	#)				
			I	l	l	L.C	l	 	//accii/ //ipila 	<i>"',</i> 	l	l	Ī	
		56226	56580	57189	57190	57224	57271	56696	57365	57382	57407	57435	56824	56792
Analysis	Units						Samp	le Date and	Time					
		03/17/21	04/14/21	05/25/21	05/27/21	06/01/21	06/03/21	04/22/21	06/10/21	06/11/21	06/14/21	06/15/21	04/28/21	04/29/21
		10:00	10:00	12:15	10:00	11:00	10:00	9:30	9:00	8:30	11:00	10:00	12:00	9:30
		STRAIGHT- WAY 1			Straightway 2					I Simmons Poni)		Hyani	NISPORT
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-Chloroeicosafluoro-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

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 90

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 Pla	nt Water Quality	by Laboratory A	Analyses – Gene	ral Analyses											
						Lab	oratory Report #	(Absolute#/Alp	ha#)						
			57190/L	2128315			57271/L	2129637			57365/L	2131271			
Analysis	Units						Sample Dat	te and Time							
Alidiysis	Offics		05/27/2	21 10:00			06/03/2	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		<mark>0.43</mark>	<mark>0.37</mark>	<0.12		0.23	0.25	<0.12			
PFAS6	ng/L	<mark>153.0</mark>	142.5	145.3	<1.8	<mark>154.2</mark>	131.3	133.4		<mark>142.8</mark>	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	<mark>0.065</mark>	0.035	0.035	0.0039	<mark>0.080</mark>	0.026	0.024	0.0023	<mark>0.075</mark>	<mark>0.062</mark>	<mark>0.059</mark>			
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		
рН	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

Table 5.56: Mailer Treatment Plai	in water quanty i	by Laboratory A	analyses delic	rai Allaiyses									
						Lab	oratory Report #	(Absolute#/Alp	ha#)				
			57190	L2128315			57271	L2129637			57365	L2131271	
Analysis	Units						Sample Dat	te and Time					
			05/27/2	21 10:00			06/03/2	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

Table 3.37: Maher Treatment Plant Water Quality by Laboratory Analyses	– Generai	Analyses				1.	aboratory Rep	ort # (Abcolute	2#/Λlph2#\				
						Li	aboratory kep	ort # (Absolute	:#/AIPNa#)	1			
			57190				57271	L2129637		57365 L2131271			
Analysis	Units				•		Sample	Date and Tim	ne				
			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-Chloroeicosafluoro-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	<mark>153.0</mark>	<mark>142.5</mark>	<mark>145.3</mark>	<1.8	154.2	131.3	133.4		<mark>142.8</mark>	145.8	143.2	

^{*} Estimated Concentrations Below Reporting Limit Not Counted Toward Total PFAS6 Calculation Based on MADEP Met

4 DATA ANALYSIS AND DISCUSSION

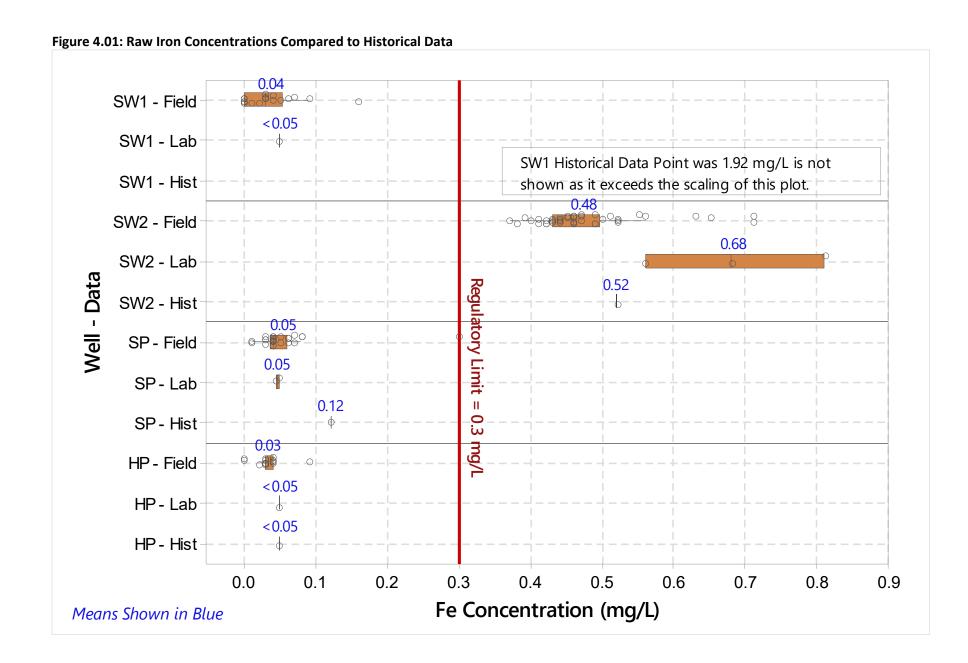
Section 4 – Data Analysis provides analysis and discussion of the data presented in Section 3. This Section contains comparisons of Filter Trials and discussion of data from separate parts of Section 3. Issues and questions that are addressed in this Section were developed by the pilot operators to answer questions that are generally of interest when testing PFAS, 1,4 dioxane, and iron and manganese removal in general.

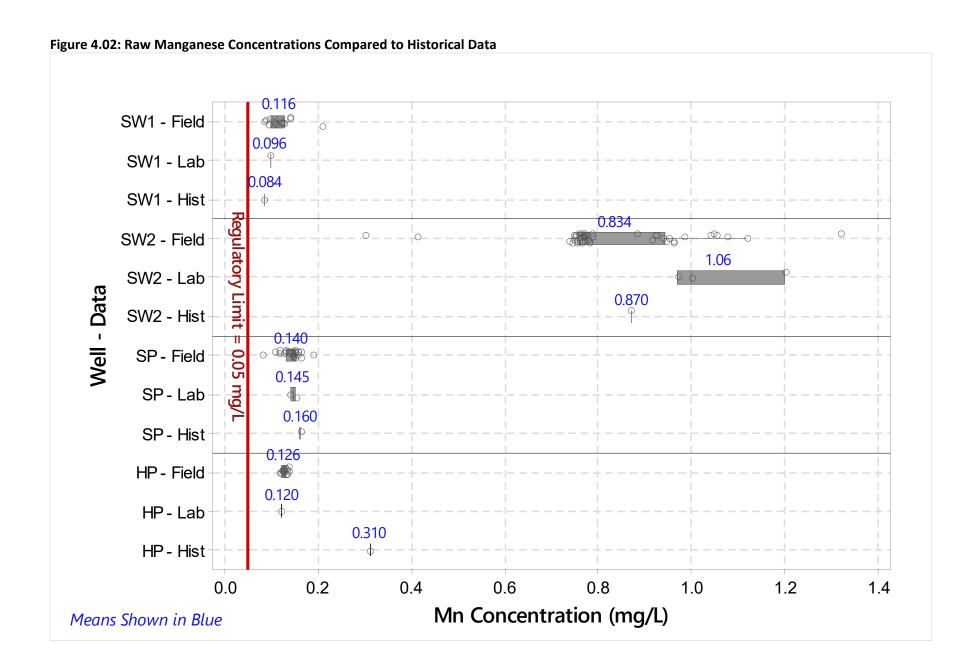
4.1 RAW WATER QUALITY

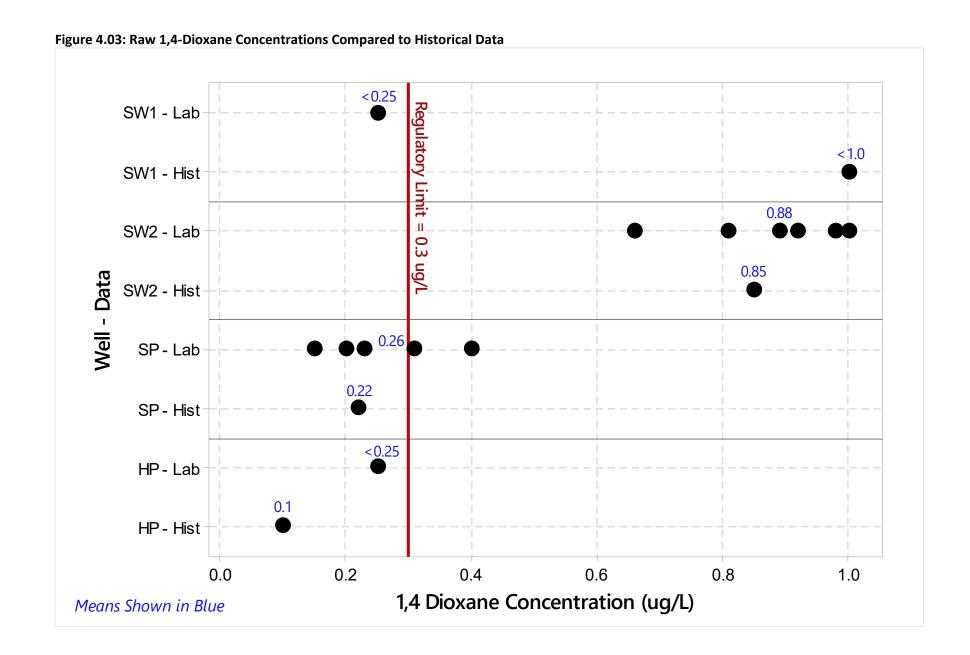
4.1.1 Comparison of Raw Water Quality to Historical Data

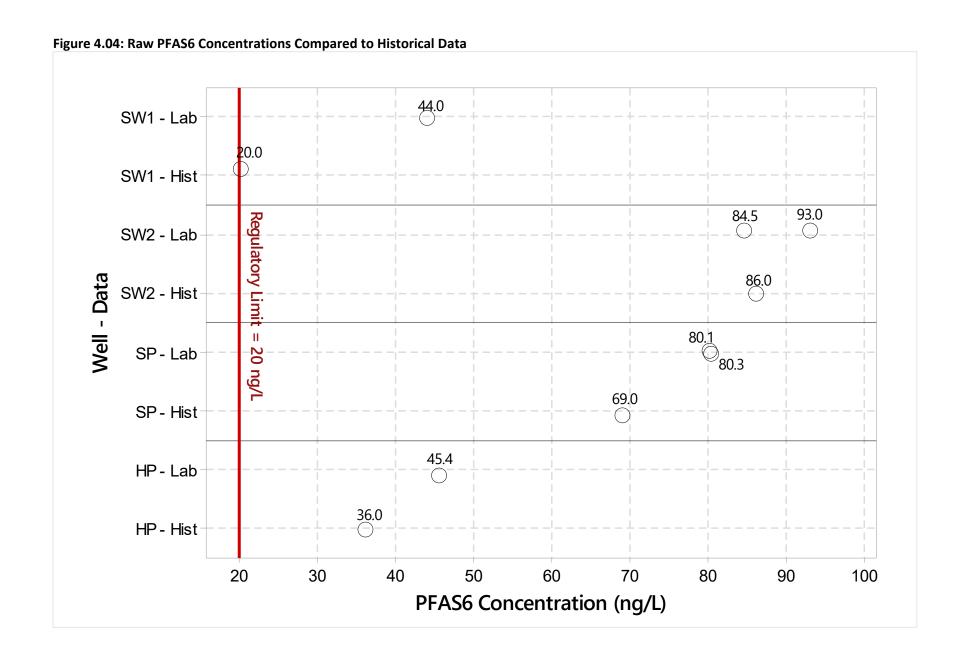
Raw water iron and manganese concentrations collected during the pilot study, and analyzed by field methods, were compared to the historical data provided by Kleinfelder. Similarly, raw water 1,4-dioxane and PFAS6 concentrations for samples collected during the pilot study and measured by a certified 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 ORSGL for 1,4-dioxane and the MCL for PFAS6 are also displayed on the figures.









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 μ g/L. The reporting limit for the historical data point exceeds the ORGSL of 0.3 μ g/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 $\mu g/L$ compared with the historical data point of 0.1 $\mu g/L$. 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

Tubic 4.01. Nesa	163 01	t test for E	macine i e (iii	ACITICITO	ei Wiethou, versus	JIVICE	
Test of $\mu = 0$.	3 vs	< 0.3					
Well-FSLR-pH	N	Mean	StDev	SE Mean	95% Upper Bound	Т	P
HP - 4 - 6.8	14	0.000000	0.000000	0.000000	0.000000	*	<mark>*</mark>
HP - 4 - 7.4	14	0.000000	0.000000	0.000000	0.00000	*	<mark>*</mark>
HP - 8 - 6.8	14	0.000000	0.000000	0.000000	0.000000	*	<mark>*</mark>
HP - 8 - 7.4	14	0.000000	0.000000	0.000000	0.00000	*	<mark>*</mark>
SP - 4 - 6.8	12	0.000000	0.000000	0.000000	0.00000	*	<mark>*</mark>
SP - 4 - 7.4	12	0.000000	0.000000	0.000000	0.000000	*	<mark>*</mark>
SP - 8 - 6.8	12	0.000000	0.000000	0.000000	0.00000	*	<mark>*</mark>
SP - 8 - 7.4	12	0.000000	0.000000	0.000000	0.00000	*	<mark>*</mark>
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	<mark>0.000</mark>
SW1 - 8 - 6.8	13	0.01385	0.01981	0.00549	0.02364	-52.09	<mark>0.000</mark>
SW1 - 8 - 7.4	15	0.00600	0.01056	0.00273	0.01080	-107.87	<mark>0.000</mark>
SW2 - 4 - 6.8	13	0.01538	0.02145	0.00595	0.02599	-47.83	<mark>0.000</mark>
SW2 - 4 - 7.4	13	0.00769	0.01166	0.00323	0.01345	-90.41	<mark>0.000</mark>
SW2 - 6 - 6.8	6	0.000000	0.000000	0.000000	0.00000	*	*
SW2 - 6 - 7.4	6	0.00333	0.00516	0.00211	0.00758	-140.72	<mark>0.00</mark> 0
SW2 - 8 - 6.8	12	0.01500	0.01679	0.00485	0.02370	-58.81	<mark>0.000</mark>
SW2 - 8 - 7.4	12	0.01250	0.01485	0.00429	0.02020	-67.08	<mark>0.000</mark>

^{*} 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.

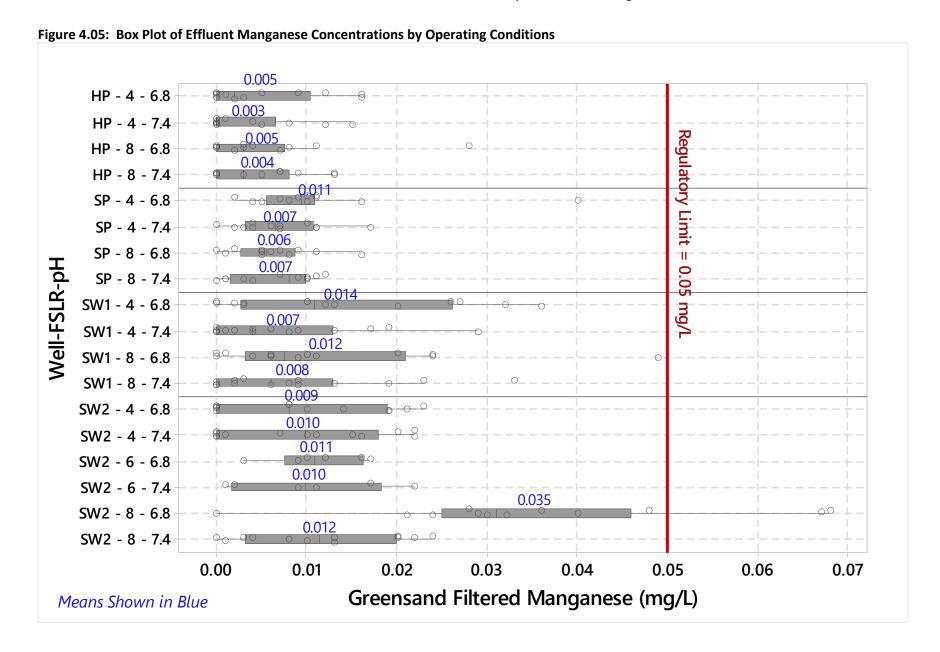
Table 4.02: Results of t-test for Effluent Mn (PAN Method) versus Project Goal

Test of $\mu = 0$.				(17111111111111111111111111111111111111	, 10	oject cou.		
Variable	N	Mean	StDev	SE Mean	95% Upper Bo	ound T	P	
HP - 4 - 6.8	13	0.00492	0.00620	0.00172	0.0	0 <mark>0799</mark> -26.22	0.000	
HP - 4 - 7.4	13	0.00346	0.00516	0.00143	0.0	0 <mark>0601</mark> -32.53	0.000	
HP - 8 - 6.8	13	0.00508	0.00775	0.00215	<mark>0.0</mark>	<mark>00891</mark> -20.90	0.000	
HP - 8 - 7.4	13	0.00438	0.00501	0.00139	<mark>0.0</mark>	<mark>0686</mark> -32.83	0.000	
SP - 4 - 6.8	12	0.01108	0.00983	0.00284	<mark>0.0</mark>	<mark>1618</mark> -13.71	0.000	
SP - 4 - 7.4	12	0.00683	0.00476	0.00138	<mark>0.0</mark>	0 <mark>0930 -31.</mark> 39	0.000	
SP - 8 - 6.8	12	0.00625	0.00445	0.00129	<mark>0.0</mark>	0 <mark>0856</mark> -34.02	0.000	
SP - 8 - 7.4	12	0.00650	0.00442	0.00128	<mark>0.0</mark>	0 <mark>0879</mark> -34.08	0.000	
SW1 - 4 - 6.8	14	0.01386	0.01232	0.00329	<mark>0.0</mark>	<mark>)1969</mark> -10.98	0.000	
SW1 - 4 - 7.4	15	0.00747	0.00863	0.00223	<mark>0.0</mark>	1139 -19.10	0.000	
SW1 - 8 - 6.8	14	0.01214	0.01335	0.00357	<mark>0.0</mark>	1846 -10.61	0.000	
SW1 - 8 - 7.4	15	0.00847	0.00983	0.00254	0.0	1294 -16.37	0.000	
SW2 - 4 - 6.8	13	0.00938	0.00900	0.00249	0.0	1383 -16.28	0.000	
SW2 - 4 - 7.4	13	0.00954	0.00884	0.00245	0.0	1391 -16.51	<mark>0.000</mark>	
SW2 - 6 - 6.8	6	0.01117	0.00512	0.00209	0.0	1537 -18.60	<mark>0.000</mark>	
SW2 - 6 - 7.4	6	0.01033	0.00824	0.00336	0.0	1711 -11.79	<mark>0.000</mark>	
SW2 - 8 - 6.8	12	0.03527	0.01899	0.00548	0.0	4511 -2.69	0.011	
SW2 - 8 - 7.4	12	0.01150	0.00853	0.00246		1592 -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.



Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 104

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

```
Adj MS F-Value P-Value
Source
              DF
                   Adj SS
Well-FSLR-pH
                  0.01016
                           0.000598
                                      6.95
             17
                                               0.000
             202
                  0.01738
                           0.000086
Error
Total
             219
                  0.02753
            R-sq R-sq(adj) R-sq(pred)
0.0092745 36.89%
                     31.58%
                                 25.53%
Means
Well-FSLR-pH
                             StDev
                                          95% CI
              N
                     Mean
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
                  0.00625 0.00445
                                   ( 0.00097, 0.01153)
              12
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)
             14
SW1 - 8 - 6.8
                                   (0.00726, 0.01703)
                  0.01214
                          0.01335
SW1 - 8 - 7.4
                  0.00847
                                   (0.00374, 0.01319)
              15
                           0.00983
SW2 - 4 - 6.8 13
                                   ( 0.00431, 0.01446)
                  0.00938 0.00900
SW2 - 4 - 7.4 13
                                   ( 0.00447, 0.01461)
                  0.00954 0.00884
SW2 - 6 - 6.8
                  0.01117
                           0.00512
                                   (0.00370, 0.01863)
              6
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
               Ν
                     Mean
                           Grouping
SW2 - 8 - 6.8
             12
                  0.03527
                           Α
SW1 - 4 - 6.8
              14
                  0.01386
SW1 - 8 - 6.8
              14
                  0.01214
SW2 - 8 - 7.4
             12
                  0.01150
SW2 - 6 - 6.8
                  0.01117
              6
SP - 4 - 6.8
              12
                  0.01108
SW2 - 6 - 7.4
              6
                  0.01033
SW2 - 4 - 7.4 13 0.00954
SW2 - 4 - 6.8 13 0.00938
SW1 - 8 - 7.4 15
                  0.00847
SW1 - 4 - 7.4 15
                  0.00747
SP - 4 - 7.4
              12
                  0.00683
SP - 8 - 7.4
              12
                  0.00650
SP - 8 - 6.8
              12
                  0.00625
HP - 8 - 6.8
              13
                  0.00508
HP - 4 - 6.8
              13
                  0.00492
HP - 8 - 7.4
              13
                  0.00438
HP - 4 - 7.4
              13 0.00346
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 $\frac{0.000}{0.000}$ 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.

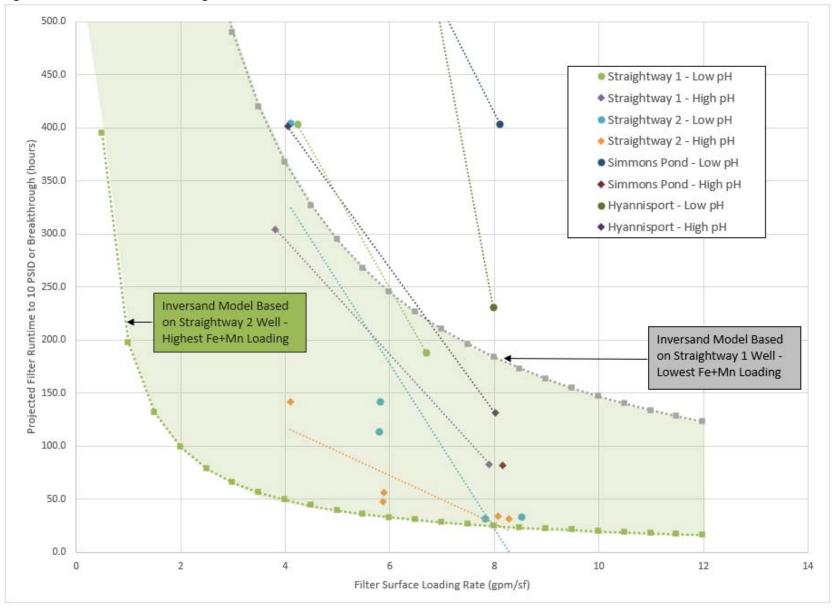
The Straightway 2 well has an elevated raw manganese concentration near 1.0 mg/L. Greensand filtration appears to be challenged to provide full manganese removal when operating at a loading rate 8 gpm/sf and the lower pH of 6.8. It appears that operating at the higher pH of 7.4 provides a more suitable 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



Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 108

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.

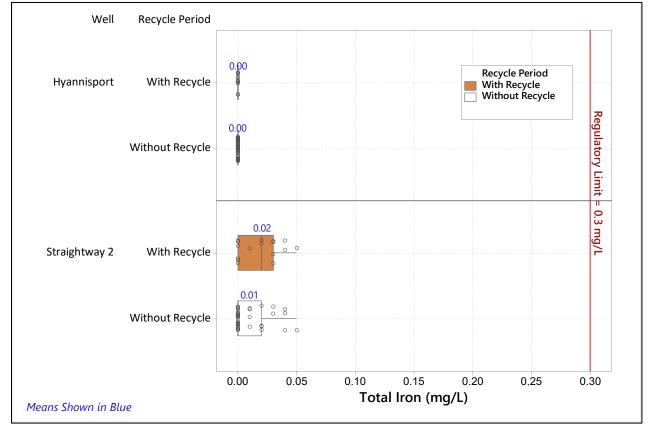


Figure 4.07: Greensand Effluent Fe During the Supernatant Recycle Trials

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.

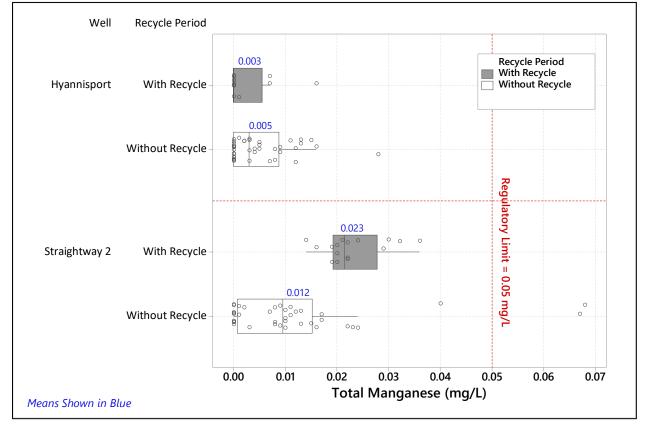


Figure 4.08: Greensand Effluent Mn (PAN) During the Supernatant Recycle Trials

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

```
Alternative hypothesis At least one mean is different
Significance level
                    \alpha = 0.05
Rows unused
Equal variances were assumed for the analysis.
            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

```
All means are equal
Null hypothesis
Alternative hypothesis At least one mean is different
Significance level \alpha = 0.05
Rows unused
                       14
Equal variances were assumed for the analysis.
              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:

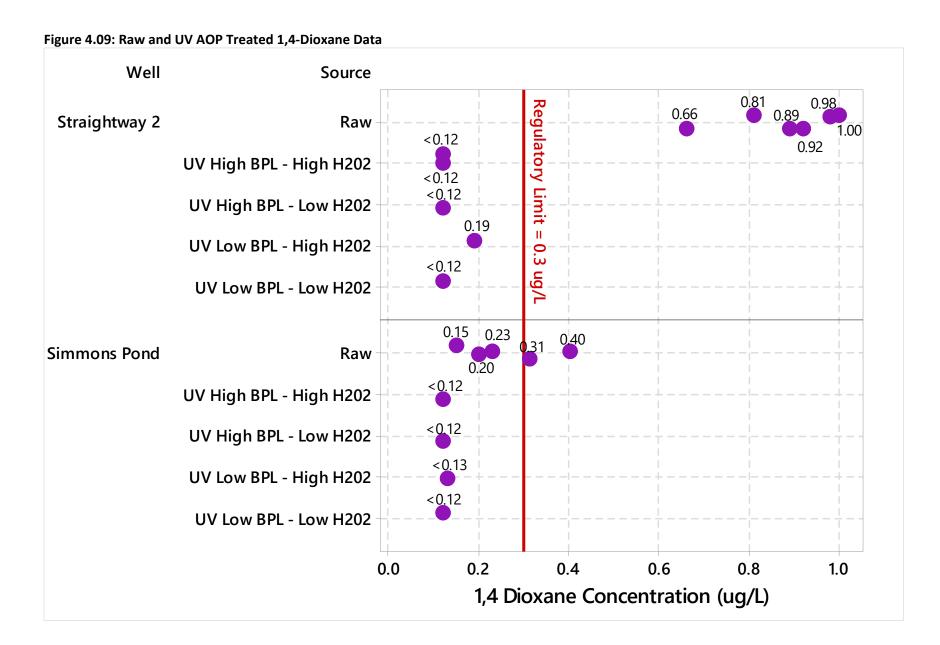
- 1. High Ballast Power Level/High Hydrogen Peroxide Dose
- 2. Low Ballast Power Level/High Hydrogen Peroxide Dose
- 3. High Ballast Power Level/Low Hydrogen Peroxide Dose
- 4. Low Ballast Power Level/Low Hydrogen Peroxide Dose

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 H_2O_2 at Straightway 2 and 8 and 3.5 mg/L H_2O_2 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 μ g/L and for Simmons Pond Well ranged from 0.15 to 0.40 μ g/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 H_2O_2 condition while treating Straightway 2 Well, which resulted in 0.19 μ g/L of 1,4 dioxane in the UV effluent. This result was lower than the Massachusetts ORGSL of 0.3 μ g/L. The UVAOP effluent for the Low/Low condition was reported as below detection limits.



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

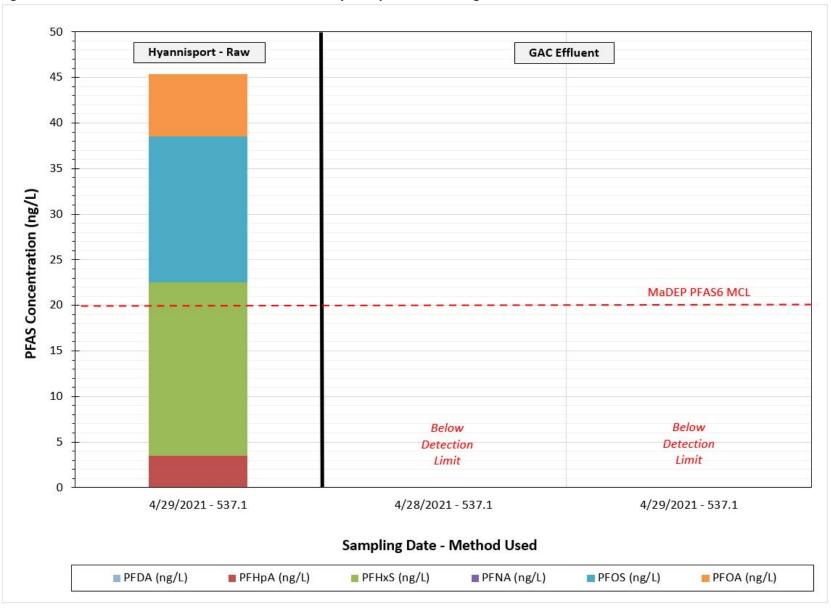
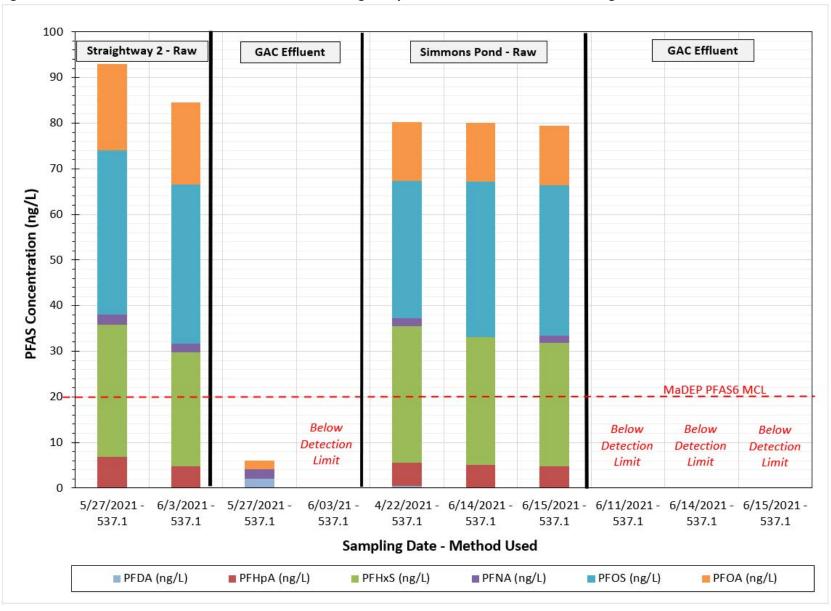


Figure 4.12: Raw and Treated PFAS Concentrations at Straightway 2 and Simmons Pond Wells During UVAOP Trials



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.

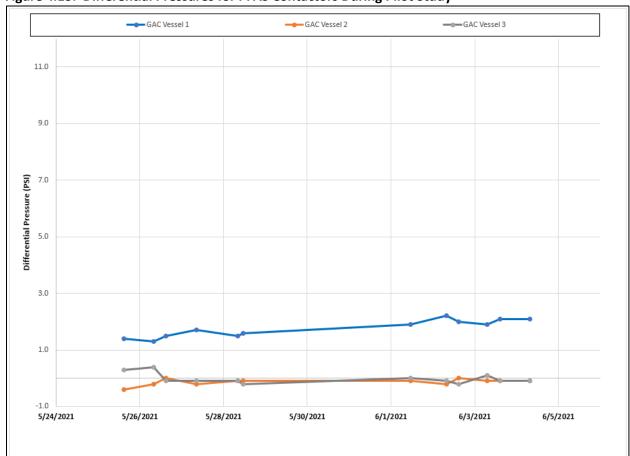


Figure 4.13: Differential Pressures for PFAS Contactors During Pilot Study

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 offgas 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, thought 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 the 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 μ g/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 μ g/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 (H_2O_2) dose combinations at Straightway 2 Well; (1) 100% BPL and 10 mg/L H_2O_2 , (2) 60% BPL and 10 mg/L H_2O_2 , (3) 100% BPL and 5 mg/L H_2O_2 , and (4) 60% BPL and 5 mg/L H_2O_2 60% BPL. 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 H_2O_2 condition, which resulted in 0.19 μ g/L of 1,4 dioxane in the UV effluent. This result was lower than the Massachusetts ORGSL of 0.3 μ g/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 (H_2O_2) dose combinations at Simmons Pond Well; (1) 100% BPL and 8 mg/L H_2O_2 , (2) 60% BPL and 8 mg/L H_2O_2 , (3) 100% BPL and 3.5 mg/L H_2O_2 , and (4) 60% BPL and 3.5 mg/L H_2O_2 60% BPL. 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

Blueleaf Pilot Study Report Straightway, Simmons Pond & Hyannisport Wells, Barnstable, MA March - June 2021, Page 126

- is due to the removal of carbon dioxide during aeration. Aeration strips CO_2 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 CO_2 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 (CIO2,NaOH) and upstream of the filters.
12 POX CD	Filters C/D Post-oxidation sample, collected downstream of chemical addition (ClO2,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

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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										
	Add 20L of NaOCl (1/10) to day										
3/16/21 12:35	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	
	Increase NaOCl feed from 250										
3/16/21 14:02	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	

		CI2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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 NaOCI feed from 300 to										
3/17/21 8:53	21 FILTER A	1.94									
3/17/21 8:53	24 FILTER D	2.23									
	Decrease NaOCl feed from 270 to										
3/17/21 8:56	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									
	Increase NaOCl feed from 230										
3/17/21 9:36	mL/h to 250										
3/17/21 10:23	22 FILTER B	1.95									
3/17/21 10:23	24 FILTER D	2.04									
	Decrease NaOCI feed from 250 to										
3/17/21 10:25	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									
	NaOH Titration (1L Raw Water,										
3/17/21 12:22	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	

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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	
	Increase NaOCI feed from 240 to										
3/18/21 8:03	245 mL/hr										
	Aeration Raw Titration (0.02N)										
3/18/21 8:25	(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										.
	NaOH feed @ 91.7+211.7 mL/hr V										.
3/18/21 14:52	= 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	

		CI2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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	
	Add 6L mixed NaOH, V1=18.5L,										
3/19/21 9:04	V2=24.5										
	Add 6L mixed NaOCl, V1=17.0L,										
3/19/21 9:04	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									
	Lower NaOCl feed from 245 to 230										
3/19/21 10:07	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	

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
3/22/21 8:30	01 RAW			0.04	0.03	0.105	0.126	5.23	5.35	13.0	
3/22/21 8:30	11 POX AB	0.28	1.28		0.04		0.107	6.85	6.72	13.0	
3/22/21 8:30	12 POX CD	0.30	0.48		0.05		0.089	7.31	7.16	13.3	
3/22/21 8:30	21 FILTER A	0.05	0.12	0.04		0.027		6.94	6.81	13.2	
3/22/21 8:30	22 FILTER B	0.07	0.23	0.06		0.024		6.96	6.84	13.1	
3/22/21 8:30	23 FILTER C	0.19	0.16	0.01		0.013		7.54	7.34	13.1	
3/22/21 8:30	24 FILTER D	0.42	0.19	0.01		0.023		7.62	7.44	13.4	
	Add 9L of NaOH (1/3) @ 208.3										
3/22/21 9:30	mL/hr, V1 = 10L, V2 = 19L,										
	Add 20L of NaOCl (1/10) @ 230										
3/22/21 9:40	mL/hr, V1 = 9.5L, V2 = 29.5L,										
3/22/21 11:28	01 RAW			0.06	0.04	0.085	0.076	5.47	5.44	13.1	
3/22/21 11:28	21 FILTER A			0.03		0.000		6.95	6.65	13.8	
3/22/21 11:28	22 FILTER B			0.04		0.000		6.99	6.75	13.7	
3/22/21 11:28	23 FILTER C			0.01		0.000		7.47	7.22	14.0	
3/22/21 11:28	24 FILTER D			0.01		0.000		7.59	7.37	14.0	
	Install ORP & DO sensors.										
3/22/21 12:00	Calibrate ORP										
	Start recording Filter B effluent DO										
3/22/21 12:00	& ORP										
3/22/21 12:05	21 FILTER A	1.19									
3/22/21 12:05	22 FILTER B	1.12									
3/22/21 12:05	23 FILTER C	0.83									
3/22/21 12:05	24 FILTER D	1.07									
3/22/21 12:55	23 FILTER C	1.34									
3/22/21 15:35	01 RAW			0.01	0.05	0.091	0.097	5.32	5.39	13.2	
3/22/21 15:35	11 POX AB	1.32	1.91		0.01		0.076	7.10	6.91	14.2	-
3/22/21 15:35	12 POX CD	0.12	1.68		0.00		0.074	7.82	7.56	14.6	
3/22/21 15:35	21 FILTER A	1.01	1.31	0.02		0.020		7.03	6.91	14.4	
3/22/21 15:35	22 FILTER B	1.07	1.27	0.00		0.010		7.03	6.93	14.3	
3/22/21 15:35	23 FILTER C	1.16	1.33	0.00		0.017		7.67	7.48	14.6	
3/22/21 15:35	24 FILTER D	1.22	1.34	0.00		0.013		7.66	7.50	14.6	
3/22/21 15:40	Transfer ORP & DO probes to RAW										
	NaOCl feed @ 230 mL/hr, V =										
3/22/21 16:04	26.3L, NaOH @ 215 mL/hr, V = 17L										

		CI2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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										
	Shut off raw feed pump and filters										
3/23/21 8:30	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		

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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		

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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		
	NaOCl feed @ 600 mL/hr, V =										
	23.1L, NaOH @ 0.0 mL/hr AB, 59.1										
4/14/21 14:55	mL/hr CD, V = 23.9L										
	NaOCl feed @ 600 mL/hr, V =										
	12.9L, NaOH @ 0.0 mL/hr AB, 59.1										
4/15/21 7:55	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				

		Cl2/C)	GI2(I)	5 (1)	5 (I)	24 (1)	24 (1)	/			
Data and Time	CANADIE LOCATION	Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)	Tames (Ca)	603
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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		
	NaOCl feed @ 600 mL/hr, V =										
	17.2L, NaOH @ 0.0 mL/hr AB, 55.7										
4/15/21 15:30	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					
	NaOCl feed @ 600 mL/hr, V = 7.2L,										
	NaOH @ 0.0 mL/hr AB, 55.7 mL/hr										
4/16/21 8:00	CD, V = 21.7L										
4/16/21 8:10	End of Trial; Backwash										
	Start All Filters @ 6 gpm/sf for										
4/16/21 8:40	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	1	
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		

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
	Lower NaOCl feed from to 550										
4/16/21 9:50	mL/hr										
4/16/21 10:15	21 FILTER A	1.69									
4/16/21 10:15	22 FILTER B	1.42									
4/16/21 10:15	23 FILTER C	1.53									
4/16/21 10:15	24 FILTER D	1.29									
	Lower NaOCI feed from to 500										
4/16/21 10:20	mL/hr										
4/16/21 10:40	01 RAW			0.38	0.36	0.960	0.932				
4/16/21 10:40	21 FILTER A	1.46		0.00		0.012					
4/16/21 10:40	22 FILTER B	1.24		0.00		0.010					
4/16/21 10:40	23 FILTER C	1.36		0.00		0.009					
4/16/21 10:40	24 FILTER D	1.14		0.00		0.002					
	NaOCl feed @ 500 mL/hr, V =										
	52.5L, NaOH @ 0.0 mL/hr AB, 53.9										
4/16/21 11:00	mL/hr CD, V = 21.5L										
	NaOCl feed @ 500 mL/hr, V =										
	17.5L, NaOH @ 0.0 mL/hr AB, 64.3										
4/19/21 8:40	mL/hr CD, V = 17.7L										
4/19/21 8:45	01 RAW			0.37	0.34	0.944	0.900	6.56	6.43		
4/19/21 8:45	01 RAW										
4/19/21 8:45	11 POX AB	1.41	1.96		0.02		0.778	6.59	6.60		
4/19/21 8:45	12 POX CD	1.91	2.18		0.01		0.694	7.81	7.62		
4/19/21 8:45	21 FILTER A	0.86	1.30	0.00		0.017		6.55	6.55		
4/19/21 8:45	22 FILTER B	0.88	1.15	0.00		0.003		6.55	6.55		
4/19/21 8:45	22 FILTER B										
4/19/21 8:45	23 FILTER C	0.90	1.04	0.00		0.017		7.60	7.48		
4/19/21 8:45	24 FILTER D	0.81	1.10	0.00		0.022					
4/19/21 8:45	24 FILTER D										
4/19/21 9:25	Backwash Filters										
	Move Site Location (Simmons										
4/19/21 12:00	Pond)										
	Start Flow to All Filters A: 4										-
4/19/21 14:30	gpm/sf, B: 8 gpm/sf, C: 4, D:8										
4/19/21 14:55	Move DO + ORP probes to RAW										

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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		
1	NaOCl feed @ 400 mL/hr, V =										
	15.6L, NaOH @ 0.0 mL/hr AB, 57.4										
4/19/21 17:00	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		
	NaOCl feed @ 400 mL/hr, V = 9.2L,										
	NaOH @ 10.0 mL/hr AB, 62.6										
4/20/21 8:30	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		

		Cl2/f)	Cl2(+)	Γο/ + \	Fo/d)	N4m/+)	Ma(d)	mll (cu)	nll (su)		
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, 7	0.005	(0, 1	6.63	6.60	- 1 (/	
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			0.00		0.020		7110	7.02		
,, = 0, = = = = : :	NaOCl feed @ 375 mL/hr, V =										
	34.7L, NaOH @ 8.3 mL/hr AB, 60.9										
4/20/21 14:00	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										
	NaOCl feed @ 375 mL/hr, V =										
	27.1L, NaOH @ 8.3 mL/hr AB, 62.6										
4/21/21 8:30	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		

		Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
4/21/21 13:30	24 FILTER D	1.38	1.41	0.00		0.007					
	NaOCl feed @ 375 mL/hr, V =										
	14.8L, NaOH @ 11.7 mL/hr AB,										
4/21/21 14:00	66.1 mL/hr CD, V = 25.0L										
4/21/21 14:30	Move DO + ORP probes to Filter B										
	NaOCl feed @ 375 mL/hr, V =										
	18.9L, NaOH @ 16.7 mL/hr AB, 6.3										
4/22/21 7:30	mL/hr CD, V = 17.4L										
4/22/21 7:38	Move DO + ORP probes to RAW										
4/22/21 8:00	01 RAW			0.01	0.01	0.143	0.137	6.49	6.48	11.9	
4/22/21 8:00	11 POX AB	1.43	1.73		9.00		0.110	6.63	6.60	12.3	
4/22/21 8:00	12 POX CD	1.38	1.62		0.00		0.102	7.77	7.71	12.5	
4/22/21 8:00	21 FILTER A	1.09	1.23	0.00		0.011		6.69	6.67		
4/22/21 8:00	22 FILTER B	1.21	1.37	0.00		0.007		6.69	6.67		
4/22/21 8:00	23 FILTER C	1.17	1.32	0.00		0.006		7.66	7.61		
4/22/21 8:00	24 FILTER D	1.28	1.42	0.00		0.011		7.58	7.60		
4/22/21 13:25	01 RAW			0.04	0.02	0.134	0.124				
4/22/21 13:25	21 FILTER A			0.00		0.004					
4/22/21 13:25	22 FILTER B			0.00		0.000					
4/22/21 13:25	23 FILTER C			0.00		0.003					
4/22/21 13:25	24 FILTER D			0.00		0.000					
4/22/21 13:40	Stock chlorine: 6%										
4/22/21 14:40	01 RAW			0.03	0.03	0.135	0.127	6.48	6.52	12.4	
4/22/21 14:40	11 POX AB	1.65	1.79		0.00		0.120	6.64	6.64	12.4	
4/22/21 14:40	12 POX CD	1.47	1.70		0.00		0.107	7.47	7.40	12.5	
4/22/21 14:40	21 FILTER A	1.19	1.25	0.00		0.011		6.67	6.66		
4/22/21 14:40	22 FILTER B	1.26	1.42	0.00		0.008		6.68	6.67		
4/22/21 14:40	23 FILTER C	1.15	1.36	0.00		0.011		7.47	7.40		
4/22/21 14:40	24 FILTER D	1.35	1.45	0.00		0.003		7.48	7.42		
4/22/21 14:55	Lower NaOCl feed to 350 mL/hr										
4/22/21 15:25	Move DO + ORP probes to Filter B										
	NaOCl feed @ 350 mL/hr, V =										
	15.7L, NaOH @ 13.3 mL/hr AB,										
4/22/21 15:30	66.1 mL/hr CD, V = 12.8L										
4/22/21 15:30	11 POX AB	1.57									

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Data and Time	CANADI E I OCATIONI	Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)	Tames (Ca)	CO2
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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									
	NaOCI feed @ 350 mL/hr, V = 9.9L,										
	NaOH @ 16.7 mL/hr AB, 67.8										
4/23/21 8:00	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										
	Operator turned Hyannisport well										
4/23/21 10:55	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 NaOCI (1/10)										
	NaOCI feed @ 350 mL/hr, V =										
	35.2L, NaOH @ 15.0 mL/hr AB,										
4/23/21 12:15	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										

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
4/26/21 14:08	Backwash Filters A and B w/ raw wa										
4/26/21 14:18	Backwash Filters C and D w/ raw wa	ater									
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								
	NaOCl feed @ 350 mL/hr, V =										
	22.2L, NaOH @ 90 mL/hr AB, 172										
4/26/21 17:30	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					

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Data and Time	CANADIE I OCATIONI	Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)	T (C-)	602
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
	NaOH @ 80 mL/hr AB, 103 mL/hr										
	CD, V = 29.5L, NaOCl feed @ 350										
4/27/21 16:15	mL/hr, V = 15.4L										
4/28/21 7:45	01 RAW			0.03	0.13	0.127		5.42	5.41	12.6	
4/28/21 7:45	11 POX AB	1.38	1.62		0.00		0.100				
4/28/21 7:45	12 POX CD	1.47	1.68		0.00		0.052				
4/28/21 7:45	21 FILTER A	1.05	1.17	0.00		0.001					
4/28/21 7:45	22 FILTER B	1.00	1.13	0.00		0.003					
4/28/21 7:45	23 FILTER C	1.12	1.23	0.00		0.004					
4/28/21 7:45	24 FILTER D	1.16	1.34	0.00		0.005					
	NaOCI feed @ 350 mL/hr, V =										
4/28/21 8:00	10.0L										
4/28/21 8:45	Well Flow = 207 gpm										
4/28/21 13:15	01 RAW			0.02	0.01	0.118	0.122				51.48
4/28/21 13:15	21 FILTER A			0.00	0.00						
4/28/21 13:15	22 FILTER B			0.00	0.01						18.48
4/28/21 13:15	23 FILTER C			0.00	0.01						
4/28/21 13:15	24 FILTER D			0.00	0.01						
4/28/21 14:15	Flow lost to pilot										
4/28/21 14:35	Start filters back up										
4/28/21 14:49	Start GAC filters										
4/28/21 15:30	01 RAW			0.00	0.00	0.124	0.124	5.46	5.65	12.9	
4/28/21 15:30	11 POX AB	1.62	1.75		0.00		0.105	6.84	6.75	12.8	
4/28/21 15:30	12 POX CD	1.62	1.74		0.00		0.083	7.30	7.19	13.0	
4/28/21 15:30	21 FILTER A	1.13	1.35	0.00		0.005		6.91	6.84		
4/28/21 15:30	22 FILTER B	1.16	1.29	0.00		0.004		6.92	6.85		
4/28/21 15:30	23 FILTER C	1.29	1.37	0.00		0.005		7.32	7.19		
4/28/21 15:30	24 FILTER D	1.36	1.49	0.00		0.009		7.28	7.21		
	NaOH @ 87.5 mL/hr AB, 95.7										
	mL/hr CD, V = 25.9L, NaOCl feed										
4/28/21 16:00	@ 350 mL/hr, V = 25.4L										
	NaOH @ 87.5 mL/hr AB, 95.7										
	mL/hr CD, V = 23.5L, NaOCl feed										
4/29/21 7:30	@ 350 mL/hr, V = 20.1L										
4/29/21 7:35	Well Flow = 207 gpm										

		Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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					

		Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
4/29/21 16:45	End SSN Recycle										
	NaOH @ 82.8 mL/hr AB, 95.7										
	mL/hr CD, V = 22.0L, NaOCl feed										
4/29/21 17:15	@ 300 mL/hr, V = 16.8L										
4/30/21 7:40	01 RAW			0.03	0.03	0.115	0.113	5.43	5.44	12.6	
4/30/21 7:40	11 POX AB	0.99	1.43		0.00		0.079	6.85	6.76	12.6	
4/30/21 7:40	12 POX CD	1.29	1.44		0.00		0.076	7.31	7.29	12.7	
4/30/21 7:40	21 FILTER A	1.11	1.20	0.00		0.000		6.88	6.79		
4/30/21 7:40	22 FILTER B	1.16	1.23	0.00		0.000		6.87	6.80		
4/30/21 7:40	23 FILTER C	1.17	1.23	0.00		0.000		7.36	7.32		
4/30/21 7:40	24 FILTER D	1.20	1.32	0.00		0.003					
4/30/21 7:41	Move DO + ORP probes to RAW										
	NaOH @ 81.3 mL/hr AB, 95.7										
	mL/hr CD, V = 19.8L, NaOCl feed										
4/30/21 8:00	@ 300 mL/hr, V = 12.3L										
4/30/21 8:40	Well Flow = 209 gpm										
4/30/21 9:30	01 RAW			0.04	0.03	0.132	0.123				
4/30/21 9:30	21 FILTER A			0.00		0.003					
4/30/21 9:30	22 FILTER B			0.00		0.011					
4/30/21 9:30	23 FILTER C			0.00		0.000					
4/30/21 9:30	24 FILTER D			0.00		0.000					
4/30/21 10:30	01 RAW			0.04	0.03	0.131	0.117	5.41	5.43	13.0	
4/30/21 10:30	11 POX AB	1.46	1.60		0.00		0.075	6.80	6.70	12.9	
4/30/21 10:30	12 POX CD	1.30	1.53		0.00		0.078	7.29	7.19	13.2	
4/30/21 10:30	21 FILTER A	1.10	1.22	0.00		0.000		6.82	6.72		
4/30/21 10:30	22 FILTER B	1.17	1.26	0.00		0.000		6.87	6.79		
4/30/21 10:30	23 FILTER C	1.19	1.22	0.00		0.000		7.30	7.20		
4/30/21 10:30	24 FILTER D	1.27	1.33	0.00		0.000		7.31	7.20		
	NaOH @ 81.3 mL/hr AB, 95.7										
	mL/hr CD, V = 19.2L, NaOCl feed										
4/30/21 11:00	@ 300 mL/hr, V = 24.9L										
4/30/21 11:10	Move DO + ORP probes to Filter B										
	NaOH @ 76.1 mL/hr AB, 162										
	mL/hr CD, V = 9.3L, NaOCl feed @										
5/3/21 8:05	300 mL/hr, V = 4.5L										

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
5/3/21 8:15	01 RAW			0.00	0.00	0.134	0.122	6.31	6.45	12.9	29
5/3/21 8:15	11 POX AB	1.27	1.54		0.00		0.098	6.77	6.73	13.0	
5/3/21 8:15	12 POX CD	1.32	1.52		0.00		0.087	8.06	8.13	13.0	
5/3/21 8:15	21 FILTER A	1.03	1.28	0.00		0.016		6.87	6.93	13.0	
5/3/21 8:15	22 FILTER B	1.25	1.41	0.00		0.028		6.92	7.02		
5/3/21 8:15	23 FILTER C	1.19	1.28	0.00		0.015		7.13	7.21		
5/3/21 8:15	24 FILTER D	1.34	1.43	0.00		0.013		7.09	7.07		
5/3/21 8:15	25 GAC EFF			0.00	0.00	0.003	0.013				
5/3/21 9:10	Move DO + ORP probes to RAW										
5/3/21 9:00	25 GAC EFF			0.00	0.00	0.015	0.018				
5/3/21 10:00	25 GAC EFF			0.00	0.00	0.009	0.035				
5/3/21 10:30	25 GAC EFF			0.00	0.00	0.015	0.024				
5/3/21 10:23	Shutdown and BW Filter B										
5/3/21 10:50	Provide DO + ORP probes to Kleinfe	elder for sim	ulated wate	er							
5/3/21 10:48	Shutdown and BW Filter D										
5/3/21 11:06	Shutdown and BW Filter C										
5/3/21 11:06	Shutdown and BW Filter A										

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 (ClO2,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

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#55478	Temp (Ce)	CO2
5/17/21 13:45	Start Flow to GSP Filters										
5/18/21 13:45	01 RAW			0.47	0.55	0.300	0.308				
5/18/21 13:45	11 POX			0.51	0.02	0.410	0.044	6.35	6.28		
5/18/21 13:45	21 GSP FILTER 21-1			0.02		0.047					
5/19/21 9:35	01 RAW			0.52		0.410					
5/19/21 9:35	11 POX						0.896				
5/19/21 10:15	11 POX					1.348					
5/19/21 12:30	Shutdown KMnO4 feed										
5/19/21 12:34	Start NaOCI feed										
5/19/21 13:05	01 RAW			0.44	0.34	0.770	0.642				
5/19/21 13:05	11 POX				0.00		0.548	7.32	7.52		
5/19/21 13:05	21 GSP FILTER 21-1			0.00		0.004					
5/20/21 11:00	21 GSP FILTER 21-1	0.02	0.12								
5/20/21 11:00	22 GSP FILTER 21-2	0.01	0.02								
5/20/21 11:00	11 POX	0.45	1.45								
5/20/21 11:00	Backwash 21-1										
5/20/21 11:20	Backwash 21-2										
5/20/21 12:00	01 RAW			0.49	0.42	0.739	0.745	6.31	6.42	12.6	
5/20/21 12:00	11 POX	1.90	2.20		0.16		0.701	7.36	7.41	12.6	
5/20/21 12:00	21 GSP FILTER 21-1	0.05	0.05	0.00		0.000		7.10	7.30		
5/20/21 12:00	22 GSP FILTER 21-2	0.11	0.22	0.00		0.000		7.13	7.33		
5/24/21 11:15	Startup GSP Filters @ 10 gpm (Trial	s Start)									
5/24/21 14:30	01 RAW			0.43	0.40	0.778	0.744	6.53	6.51	12.1	
5/24/21 14:30	11 POX	1.88	2.20		0.04		0.676	7.07	7.02	12.5	
5/24/21 14:30	21 GSP FILTER 21-1	0.18	0.29	0.00		0.000					
5/24/21 14:30	22 GSP FILTER 21-2	0.16	0.23	0.00		0.001					
5/25/21 8:00	01 RAW			0.43	0.40	0.772	0.769	6.53	6.52	12.1	
5/25/21 8:00	11 POX	2.20	2.20		0.02		0.635	7.52	7.53		
5/25/21 8:00	21 GSP FILTER 21-1	1.55	1.94	0.00		0.013		7.53	7.52		
5/25/21 8:00	22 GSP FILTER 21-2	1.36	1.52	0.00		0.007		7.50	7.48		
5/25/21 8:00	41 UV Effluent	0.00	0.24	0.00		0.011		7.49	7.48		
5/25/21 8:00	51 GAC Effluent			0.00		0.049		7.41	7.41		
5/25/21 10:45	01 RAW										33.88
5/25/21 10:50	21 GSP FILTER 21-1										7.48

		-1-(6)	-1-(-)	- ()	_ , , ,	()	(1)				
Data and Time	CANADIE LOCATION	Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)	Tames (Ca)	CO2
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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		

		CI2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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 oper	ator divertir	ng flow to fi	ll 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 f	for sampling	3								
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 pov	ver off UV s	kid								
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										

		Cl2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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 H2	02								
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 (T	arget: 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		

		CI2(f)	Cla/u)	F . (1)	E . (.1)	24.(1)	D. 4 . / .)	.11.7.	.11 ()		
Date and Time	SAMPLE LOCATION	CI2(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
					(IIIg/L)		(IIIg/L)			Terrip (Ce)	COZ
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	0.44	0.008	0.700	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	1		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	0.13	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	

		Cl2(f)	CI2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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 Pon	d									
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					

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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	

		CI2(f)	Cl2(t)	Fe(t)	Fe(d)	Mn(t)	Mn(d)	pH (su)	pH (su)		
Date and Time	SAMPLE LOCATION	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	#57212	#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 PO Number: 11204
Blueleaf, Inc. Job ID: 56226
57 Dresser Hill Road Date Received: 3/17/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer Total number of pages: 23

Date of Approval: 3/29/2021

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

Sample Association Table

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 by SM2130B Turbidity Check for Direct Metals Analysis
				· · · · · · · · · · · · · · · · · · ·
				Zinc in water by 200.8
	Water	3/17/2021 10:00	56226-003	
FIELD BLANK				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



Job ID: 56226

Sample#: 56226-001 Sample ID: RAW

Matrix: Water

Sampled: 3/17/21 10:00 Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Analyst Date Batch Date Time Units Factor Reference 1,4-dioxane < 0.25 0.25 ug/L LMM 2100638 3/18/21 7:22 SW8260Dmod



Job ID: 56226

Sample#: 56226-001 Sample ID: RAW Matrix: Water

Sampled: 3/17/21 10:00 Reporting Prep **Analysis** Instr Dil'n Limit **Parameter** Result Units Factor Analyst Date Batch Date Time Reference Calcium 9.3 0.50 AGN 3/18/21 13702 3/18/21 E200.8 mg/L 19:47 Iron < 0.050 0.050 mg/L 1 AGN 3/18/21 13702 3/18/21 19:47 E200.8 13702 3/18/21 E200.8 Magnesium 4.0 0.10 mg/L 1 AGN 3/18/21 19:47 Manganese 0.096 0.010 mg/L AGN 3/18/21 13702 3/18/21 E200.8 1 19:47 Sodium 53 0.10 AGN 3/18/21 13702 3/18/21 19:47 E200.8 mg/L 1 Zinc 0.013 0.010 mg/L 1 AGN 3/18/21 13702 3/18/21 19:47 E200.8 13702 3/19/21 40 AGN 3/18/21 SM2340B Hardness (as CaCO3) 3 mg/L 1

Sample#: 56226-002 Sample ID: FILTER B

Matrix: Water

Sampled: 3/17/21 10:00		Reporting	1	Instr Dil'n	Prep		Anal	ysis	
Parameter	Result	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		Reporting		Instr Dil'n	Prep		Anal	ysis	
Parameter	Result	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 Reporting **Analysis** Instr Dil'n Prep **Parameter** Result Limit Units Factor Analyst Date **Batch** Date Time Reference 0.050 AGN 3/18/21 Iron < 0.050 mg/L 1 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



Job ID: 56226

Sample#: 56226-001
Sample ID: RAW
Matrix: Water

Sampled: 3/17/21 10:00		Reporting	li	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	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 ι	umhos/cn	n 1	SFM		2100705	3/25/21	11:25	SM2510B
рН	5.5 H		рН	1	WAS		2100631	3/17/21	16:12	SM4500H+B
H = Sample was receive	ed beyond me	ethod hold	ing 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		Reporting	lı	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	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 u	mhos/cm	n 1	SFM		2100705	3/25/21	11:25	SM2510B
рН	6.4 H		рН	1	WAS		2100631	3/17/21	16:18	SM4500H+B
H = Sample was received	l beyond me	ethod holdi	ng time.							
Turbidity	< 1.0	1.0	NTU	1	AGN		2100637	3/17/21	15:44	SM2130B



Job ID: 56226

Sample#: 56226-001 Sample ID: RAW Matrix: Water

Sampled: 3/17/21 10:00 Reporting Prep **Analysis** Instr Dil'n Analyst Date Date Limit Time **Parameter** Result Units Factor Batch Reference Total Organic Carbon (TOC) < 1.0 1.0 DBV 2100673 3/22/21 mg/L 14:50 SM5310C

Sample#: 56226-002 Sample ID: FILTER B Matrix: Water

Sampled: 3/17/21 10:00 Reporting **Analysis** Instr Dil'n Prep Limit Date Date Time **Parameter** Batch Result Units Factor Analyst Reference Total Organic Carbon (TOC) < 1.0 1.0 DBV 2100673 3/22/21 mg/L 15:26 SM5310C

Job ID: 56226

Sample#: 56226-001 Sample ID: RAW Matrix: Water

Sampled: 3/17/21 10:00

Method Reference: E537.1		Reporting	,		Dil'n		Prep		Anal	veic
Parameter	Result	Limit	, DL	Units		Analyst	Date	Batch		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



Job ID: 56226

Sample#: 56226-003 Sample ID: FIELD BLANK

Matrix: Water

Sampled: 3/17/21 10:00

Method Reference: E537.1		Reporting	ו		Dil'n		Prep		Ana	lysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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		
Calibration		
No exceptions noted.		
Method Blank		
No exceptions noted.		
Surrogate Recoveries		
No exceptions noted.		
1		

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



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- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Am	nt 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 A	mt 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 A	Amt Added	%R	L	imits		RPD	RPD Limi
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	Ç	90	110		
		Chloride			97	mg/L	100	97	Ç	90	110		
		Sulfate			100	mg/L	100	102	Ģ	90	110		
E300.0A	LCSD2100632	Bromide			10	mg/L	10	104	Ç	90	110		3 10
		Chloride			97	mg/L	100	97	Ç	90	110		0 10
		Sulfate			100	mg/L	100	103	Ç	90	110		1 10
E300.0A	MS2100632	Chloride	56206-001		56	mg/L	16	54	* 9	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		4	15	55		
SM2120B	PB2100642	Apparent Color		<	5	CU				5			
SM2130B	DUP2100637	Turbidity	56226-002	<	1.0	NTU							20



Method	QC ID	Parameter	Associated Sample	ı	Result	Units A	mt Added	%R	Limits		RPD	RPI) Limit
SM2320B	CCVB2100652	Alkalinity, Total (as CaCO3)			6.05	рН			5.94	6.06			
SM2320B	CCVE2100652	Alkalinity, Total (as CaCO3)			4.04	рН			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	рН			5.94	6.06			
SM2320B	CCVE2100700	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06			
SM2320B	CCVM2100700	Alkalinity, Total (as CaCO3)			4.04	рН			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	рН							
SM4500H+B	DUP2100631	рН	56190-016		7.5	рН							
SM4500H+B	DUP2100631	рН	56218-001		8.1	рН							
SM4500H+B	DUP2100631	рН	56226-001		5.5	рН							



Method	QC ID	Parameter	Associated Sample		Result	Units /	Amt Added	%R	Limits	5	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	20
SM5310C	MS2100673	Total Organic Carbon (TOC)	56226-002		10	mg/L	10	102	75	125			



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	d	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		121			%			70 13	0	
		13C2-PFDA SUR		117			%			70 13	0	
		D5-NEtFOSAA SUR		125			%			70 13	0	
		13C3-HFPO-DA SUR		109			%			70 13	0	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Lim	its	RPD	RPD Limit
E537.1	LCS13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	i	32	2.0	0.40	ng/L	37	85	70	130		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	30	2.0	0.18	ng/L	37	80	70	130		
		13C2-PFHxA SUR		101			%			70	130		
		13C2-PFDA SUR		117			%			70	130		
		D5-NEtFOSAA SUR		111			%			70	130		
		13C3-HFPO-DA SUR		100			%			70	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Lim	its	RPD	RPD Limit
E537.1	MS13719	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-NEtFOSAA SUR	56226-001	112			%			70	130		
		13C3-HFPO-DA SUR	56226-001	116			%			70	130		



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Lin	nits	RPD	RPD Limit
E537.1	MSD13719)	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-NEtFOSAA SUR	56226-001	112			%			70	130			
			13C3-HFPO-DA SUR	56226-001	107			%			70	130		



Ahso	duta Raso	urc	7	W		/					rtsm	tage Aven outh, NH 3-436-200	03801							US IS I					OR	D		I	56	2.	26)				
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Invoice to:	ice to: Enils Grotton iii: egrotton & blyeleatwater. ii: Lab mple Field Matrix							- R	eport	ing	QAF	DW Othe			0,0		4-Dio	0		U EDB			Turbid	Ikalini	Meta	1 mz	Z	0) Bact	Nitrite	Sulfa	1	☐ TCLP SV0C ☐ TCLP Pesticide	icides		
Fmail: PC/	ort To: Aaron Davis ne #: 774 Z00 80Z9 ice to: Enila Grotton iil: egrotton a blyeleatwater #: Lab Imple ID Use Only) Field ID Use Only) RAW OZ FILTER B IZ X							2	uote	#					HDES	AtBE, o	×	NH List	MADE	1625.1		1664	N A	SXA	ollutant	In	6.	0	P/A	rate +	ide		010	Herb Herb		
PO #:	ort To: Aaron Davis ne #: 774 Z00 8029 ice to: Enile Grotten il: egotton & blyelectwater t: Lab mple ID Use Only) RALL RALL										ourse	ment Pricin	g		U VOC 8260 NHDES	☐ VOC BTEX MtBE, only	10 8015	☐ VOC 524.2 NH List		ABN 🗆		☐ Mineral 0&G 1664	nductivi	5	iority Pc	-e, n	st: F	O TKN	acteria	S S	Chlor	ibility/Fi	□ TCLP V0C	☐ Grain Size ☐ Herbicides ☐ Asbestos		ite (C)
Lab		0	2	N	/latri	x	Pre	serv	ation	Met	hod	Sa	ampling		J V0C	000	- GF	000	8015	9270		Mine	S	TO:	3 OP	-list:	etals-li	000 E	S	Sulfide	litrite	lgnit	5	☐ Grain		sodwo
Sample		A PI	NIAIN	e:	۵	EB		9	0,4	_	I			SAMPLER	□ V0C 8260	□ V0C 624.1	□ VPH MADEP □ GRO 8015 🕱 1,4-Dioxane	☐ VOC 524.2	□ TPH □ DRO 8015 □ EPH MADEP □ TPH Fingerprint	□ 8270PAH □ 8270ABN □ 625.1 □ EDB	D PFAS 537.1	☐ 0&G 1664	Врн 🗆 ВОВ 🕱 Conductivity 🕱 Turbidity 🛪 Apparent Color 🛪 Тилс	X TDS	3A Metal:	Il Metals	solved M	Commonia □ COD □ TKN □ TN □ TON ★TOC □ Ferrous Iron	☐ T-Phosphorus A Bacteria P/A ☐ Bacteria MPN ☐ Enterococci) alide	□ Nitrate □ Nitrite ♥ Chloride ♥ Sulfate □ Bromide □ Fluoride	☐ Corrosivity ☐ Ignitibility/FP	☐ TCLP Metals	Subcontract: (Grab (G) or Composite (C)
(Lab Use Only)		(3	WATI	SOLI	OTHER	豆	HNO	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAM	0 \(\text{O} \)	0 00	I VP	0 00	1 T	827	PFA	08	H	O TSS	□ RCF	□ Tota	O Dis	□ Am	0.T-P	□ Cya	Nit.	Š	LD TOL	Subco		Grab (
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QSD-01 Revision	Revision 03/09/2020 Relinquished by:										Da	ate '	Tir	ne		Rece	eivec	J/py	Labo	reto	y:/	_	X			/			1	SP	ate,	21	1 /	Time	9/	

Sample Receipt Condition Report 56226 **Absolute Resource Associates** Job Number: □-UPS □-FedEx □-USPS 1 -Lab Courier □-Client Drop-off Samples Received from: Yes Custody Seals - present & intact: □-Yes □-No □-No UN/A CoC signed: Receipt Temp: _____ °C -Yes O-No O-N/A Sampled < 24 hrs ago? ☐-Yes Samples on ice? □-No PFAS-only real ice? ☑-Yes □-No □N/A Any signs of freezing? □-Yes 1-No JOHE 3/17/21 Comments: Bottle Size/Type & Quantity Check pH for ALL applicable* Preservation samples and document: / Analysis **HCl** 40mL(G) 250mL(P) 500mL(P) 1L(G) HNO₃ 125mL(P) 250mL(P) 500mL(P) H₂SO₄ 40mL(G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 125mL(P) 250mL(P) NaOH (NH₄)₂SO₄ 60mL(P) 125mL(P) 250mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G Trizma 125mL(P) 250mL (P) Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625____Pest608_ NaS2O3 40mL(G) 120mL(P) Bacteria ResCl √by analyst 20mL(G) 40mL(G) MeOH None (solid) PC Dry applicable? 2oz(G) 4oz(G) 8oz(G) Syringe 4 1L(G) 250mL(P) 500mL(P) 1L (P) None (water) 40ml (G) 60mL(P) 125mL(P) Mold Cassette Bulk Plate Tape Lift Cassette Bulk Asbestos Cassette Bulk Wipe Lead Login Review N/A Yes No Comments Proper lab sample containers/enough volume/correct preservative? Bact bottles reckut not marked on Coc so Analyses marked on COC match bottles received? Row Toc Vials-A has I pea sized by bble B has > peasized by bble Filter B-one vial has peasized by bble 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: NO₃, NO₂,o-PO₄, pH, BOD, Coliform/E. coli Q/A of MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Perrous Iron, Dissolved Oxygen, Unpres 624 Date, time & ID on samples match CoC? Rushes communicated to analyst in writing? faron Davis Subcontract note on login board? Fund 7/12 Pesticides EPA 608 pH5-9? Compliance samples have no discrepancies/require no flags? (Or must be rejected) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. Inspected and Received By: Date/Time: Peer Review Checklist ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Sample IDs Analyses in Correctly ☐ Project Name ☐ PO# (if provided) Matrix -references ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected -wastewater methods ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated 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 Report / Data / EDD / Invoice Uploaded / PDF Uploaded / PDF Report / Data / EDD / Invoice

23 of 23

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 56580
57 Dresser Hill Road Date Received: 4/14/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 4/27/2021

Total number of pages: 23

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 56580

Sample#: 56580-001 Sample ID: RAW

Matrix: Water

Sampled: 4/14/21 10:00 Reporting Prep **Analysis** Instr Dil'n Limit Date Time **Parameter** Result Units Factor Analyst Batch Date Reference 0.25 2101049 4/23/21 1,4-dioxane 0.98 ug/L LMM 4:06 SW8260Dmod

Sample#: 56580-004 Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30 Reporting **Analysis** Instr Dil'n Prep Date Time **Parameter** Result Limit Units Factor Analyst Date **Batch** Reference 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 Reporting Instr Dil'n Prep **Analysis** Limit Date **Parameter** Result Analyst Batch Date Time Units Factor Reference 1.4-dioxane 0.77 0.25 ug/L LMM 2101069 4/23/21 14:29 SW8260Dmod

Job ID: 56580

Sample#: 56580-001 Sample ID: RAW Matrix: Water

Sampled: 4/14/21 10:00		Reporting	1	Instr Dil'n	Prep		Analysis	
Parameter	Result	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 Reporting Instr Dil'n Prep **Analysis Parameter** Limit Analyst Date **Batch** Date Time Result Units Factor Reference Calcium 18 0.50 mg/L 1 AGN 4/15/21 13793 4/15/21 18:05 E200.8 < 0.050 0.050 AGN 4/15/21 13793 4/15/21 18:05 E200.8 Iron mg/L 1 Magnesium 13793 4/15/21 E200.8 4.8 0.10 mg/L 1 AGN 4/15/21 18:05 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 AGN 4/15/21 13793 4/16/21 16:07 E200.8 mg/L 1 Hardness (as CaCO3) 3 AGN 4/15/21 13793 4/16/21 SM2340B 64 mg/L

Sample#: 56580-006 Sample ID: RAW-DISS Matrix: Water

Sampled: 4/14/21 10:00 Reporting Instr Dil'n Prep **Analysis** Date Time **Parameter** Result Limit Units Factor Analyst Date Batch Reference 0.49 0.050 mg/L 1 AGN 4/15/21 13793 4/15/21 18:26 E200.8 Iron 1.2 0.010 1 AGN 4/15/21 13793 4/15/21 18:26 E200.8 Manganese mg/L

Sample#: 56580-007 Sample ID: FILTER B-DISS

Matrix: Water

Sampled: 4/14/21 11:00 Reporting **Analysis** Instr Dil'n Prep **Parameter** Result 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



Job ID: 56580

Sample#: 56580-001 Sample ID: RAW Matrix: Water

Sampled: 4/14/21 10:00		Reporting	lı	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	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 u	mhos/cn	n 1	SFM		2101000	4/20/21	13:40	SM2510B
pH	6.8 H		рΗ	1	SFM		2100982	4/14/21	16:51	SM4500H+B
H = Sample was received	d beyond me	ethod holdi	ng 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		Reporting	lı	nstr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Alkalinity, Total (as CaCO3)	42	5	mg/L	1	SFM		2100957 4	1/15/21	15:45	SM2320B
Apparent Color	< 5.0	5.0	CU	1	SFM		2100951 4	1/15/21	15:45	SM2120B
Chloride	49	0.5	mg/L	1	DBV		2100984 4	1/16/21	13:52	E300.0A
Sulfate	21	0.5	mg/L	1	DBV		2100984 4	1/16/21	13:52	E300.0A
Total Dissolved Solids (TDS)	170	20	mg/L	1	SFM		2100969 4	1/15/21	13:45	SM2540C
True Color	< 5.0	5.0	CU	1	SFM		2100952 4	1/15/21	15:45	SM2120B
Total Coliform Bacteria	absent			1	DBV		2100955 4	1/14/21	16:40	SM9223BColilert
E. coli Bacteria	absent			1	DBV		2100955 4	1/14/21	16:40	SM9223BColilert
Conductivity	290	5 ι	umhos/cn	n 1	SFM		2101000 4	1/20/21	13:40	SM2510B
рН	6.9 H		рН	1	SFM		2100982 4	1/14/21	16:53	SM4500H+B
H = Sample was received	l beyond me	ethod hold	ing time.							
Turbidity	< 1.0	1.0	NTU	1	EB		2100947 4	1/15/21	11:56	SM2130B

Sample#: 56580-004 Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30 Reporting Instr Dil'n Prep **Analysis** Date **Parameter** Limit Units Factor Analyst Date Batch Time Result Reference Total Suspended Solids (TSS) 180 89 mg/L SFM 2100988 4/16/21 15:15 SM2540D



Job ID: 56580

Sample#: 56580-001 Sample ID: RAW Matrix: Water

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Sampled: 4/14/21 10:00 Reporting Prep **Analysis** Instr Dil'n Analyst Date Date Limit Time **Parameter** Result Units Factor Batch Reference Total Organic Carbon (TOC) < 1.0 1.0 DBV 2100960 4/15/21 mg/L 16:08 SM5310C

Sample#: 56580-002 Sample ID: FILTER B Matrix: Water

Sampled: 4/14/21 11:00 Reporting **Analysis** Instr Dil'n Prep Limit Date Date Time **Parameter** Batch Result Units Factor Analyst Reference Total Organic Carbon (TOC) < 1.0 1.0 DBV 2100960 4/15/21 mg/L 16:45 SM5310C



Job ID: 56580

Sample#: 56580-001 Sample ID: RAW Matrix: Water

Sampled: 4/14/21 10:00

Method Reference: E537.1	Reporting		Dil'n			Prep	Prep Analys		vsis	
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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

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



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

Job ID: 56580

Sample#: 56580-004
Sample ID: FILTER B CBW

Matrix: Water

Sampled: 4/14/21 9:30

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.9 U 1.9 0.29 ng/L **ACA** 4/15/21 13792 4/15/21 10:49 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 4/15/21 13792 4/15/21 0.63 J 1.9 0.37 ng/L 1 **ACA** 10:49 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 0.56 J 1.9 0.31 ng/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 4.4 1.9 0.48 ng/L 1 4/15/21 13792 4/15/21 10:49 **ACA** perfluorodecanoic acid (PFDA) 0.53 J 1.9 0.33 ng/L 1 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 na/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 ng/L perfluorohexanoic acid (PFHXA) 0.33 1 **ACA** 4/15/21 13792 4/15/21 10:49 11 1.9 perfluorononanoic acid (PFNA) 1.8 J 0.43 ng/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 1.9 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) 1.9 0.32 ng/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 17 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 0.12 1 **ACA** 4/15/21 13792 4/15/21 10:49 19 ng/L 0.33 J ng/L ACA perfluoroundecanoic acid (PFUNA) 1.9 0.31 1 4/15/21 13792 4/15/21 10:49 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.9 U 0.37 **ACA** 4/15/21 13792 4/15/21 1.9 ng/L 1 10:49 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.9 U 1.9 0.38 ng/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.9 U 1.9 0.17 ng/L 1 **ACA** 4/15/21 13792 4/15/21 10:49 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 94 70-130 1 4/15/21 13792 4/15/21 10:49 13C2-PFDA SUR 70-130 % 1 **ACA** 4/15/21 13792 4/15/21 10:49 112 D5-NEtFOSAA SUR 83 70-130 % 1 **ACA** 4/15/21 13792 4/15/21 10:49 13C3-HFPO-DA SUR % 1 **ACA** 70-130 4/15/21 13792 4/15/21 10:49 81

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



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

Job ID: 56580

Sample#: 56580-005 Sample ID: FILTER D CBW

. **Matrix:** Water

Sampled: 4/14/21 9:30

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.9 U 1.9 0.29 ng/L **ACA** 4/15/21 13792 4/15/21 11:05 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 4/15/21 13792 4/15/21 1.9 U 1.9 0.38 ng/L 1 **ACA** 11:05 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.9 U 1.9 0.31 ng/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 4.0 1.9 0.48 ng/L 1 4/15/21 13792 4/15/21 11:05 **ACA** perfluorodecanoic acid (PFDA) 1.9 U 1.9 0.33 ng/L 1 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 na/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 ng/L perfluorohexanoic acid (PFHXA) 0.33 1 **ACA** 4/15/21 13792 4/15/21 11:05 12 1.9 perfluorononanoic acid (PFNA) 1.9 0.43 ng/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 1.9 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) 1.9 0.32 ng/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 17 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 0.13 1 **ACA** 4/15/21 13792 4/15/21 11:05 19 ng/L 1.9 U ng/L ACA perfluoroundecanoic acid (PFUNA) 1.9 0.31 1 4/15/21 13792 4/15/21 11:05 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.38 **ACA** 4/15/21 13792 4/15/21 1.9 U 1.9 ng/L 1 11:05 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.9 U 1.9 0.38 ng/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.9 U 1.9 0.18 ng/L 1 **ACA** 4/15/21 13792 4/15/21 11:05 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 104 70-130 1 4/15/21 13792 4/15/21 11:05 13C2-PFDA SUR 70-130 % 1 **ACA** 4/15/21 13792 4/15/21 11:05 117 D5-NEtFOSAA SUR 87 70-130 % 1 **ACA** 4/15/21 13792 4/15/21 11:05 13C3-HFPO-DA SUR % 1 **ACA** 106 70-130 4/15/21 13792 4/15/21 11:05

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



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

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.		
C		
Surrogate Recoveries		
No exceptions noted.		
Laboratory Control Sample Results		
NT 1		

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 A	mt 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 A	mt Added	%R	Limits		RPD	RPD Li	mit
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 A	Amt Added	%R	!	Limits		RPD	RPI) Limit
E300.0A	BLK2100984	Chloride Sulfate		< <	0.5 0.5	mg/L mg/L								
E300.0A	LCS2100984	Chloride Sulfate			95 100	mg/L mg/L	100 100	95 101		90 90	110 110			
E300.0A	LCSD2100984	Chloride Sulfate			92 98	mg/L mg/L	100 100	92 98		90 90	110 110		3	10 10
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 A	mt 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	pН	56534-001		8.0	рН						
SM4500H+B	DUP2100982	рН	56580-001		6.8	рН						
SM4500H+B	DUP2100982	рН	56582-001		7.9	рН						
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		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propancacid (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)	d	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA aci (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		96			%			70 13	30	
		13C2-PFDA SUR		94			%			70 13	30	
		D5-NEtFOSAA SUR		82			%			70 13	30	
		13C3-HFPO-DA SUR		103			%			70 13	30	



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limi	its	RPD	RPD Limit
E537.1	DUP13792		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-NEtFOSAA SUR	56561-001	77			%			70	130		
			13C3-HFPO-DA SUR	56561-001	111			%			70	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	ts	RPD	RPD Limit
E537.1	LCS13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	C	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 1	130		
		perfluorododecanoic acid (PFDOA)		37	2.0	0.43	ng/L	40	93	70 1	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 1	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 acic (ADONA)	i)	38	2.0	0.18	ng/L	37	101	70	130		
		13C2-PFHxA SUR		92			%			70	130		
		13C2-PFDA SUR		96			%			70	130		
		D5-NEtFOSAA 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	Lim	its	RPD	RPD Limit
E537.1	MS13792	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-NEtFOSAA SUR	56562-001	73			%			70	130		
		13C3-HFPO-DA SUR	56562-001	88			%			70	130		



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Sample Receipt Condition Report 56580 Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS 2-Lab Courier □-Client Drop-off Samples Received from: Yes D-N/A □-No Custody Seals - present & intact: □-Yes □-No CoC signed: Sampled < 24 hrs ago? U-Yes Samples on ice? D-Yes O-No O-N/A □-No Receipt Temp: PFAS-only real ice? □-Yes □-No □-N/A Comments: Check pH for ALL applicable* Bottle Size/Type & Quantity Preservation samples and document: / Analysis HCl 40mL(G) 250mL(P) 500mL(P) 1L(G) HNO₃ 125mL(P) 250mL(P) 500mL(P) 40mL(G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) H₂SO₄ 250mL(P) 125mL(P) NaOH 60mL(P) 125mL(P) 250mL(P) (NH₄)₂SO₄ ZnAc-NaOH 125mL(P) 250mL(P) *pH √by analyst:VOC, PFAS, TOC,O&G 250mL (P) Trizma 125mL(P) Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625___Pest608 NaS2O3 40mL(G) 120mL(P) Bacteria ResCl ✓ by analyst MeOH 20mL(G) 40mL(G) PC Dry applicable? None (solid) 2oz(G) 4oz(G) 8oz(G) Syringe 40ml (G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 1L(G) None (water) Bulk Mold Plate Cassette Tape Lift Bulk Asbestos Cassette Cassette Bulk Wipe Lead 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: NO3, NO2,0-PO4, AL BOD, Coliform/E. soli (P/) or MPN), Enterococci, Color Surfactants, Turbidity Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624 SFM, EB, AN, DBU 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) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. Date/Time: Inspected and Received By: Peer Review Checklist ☐ Client ID/Project Manager Sample IDs Analyses in Correctly ☐ On Ice, Temperature OK? -references ☐ Project Name ☐ PO# (if provided) Matrix ☐ TAT/rushes communicated Date/Time collected -wastewater methods ☐ Sub samples sent? Shipping Charge? Notes from CoC in LIMS ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Date: Reviewed By: Notes: (continue on back as needed) **Initials** What was sent? Date Uploaded / PDF Report / Data / EDD / Invoice Uploaded / PDF Report / Data / EDD / Invoice

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Report / Data / EDD / Invoice

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 56700
57 Dresser Hill Road Date Received: 4/22/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 4/28/2021

Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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 Reporting Instr Dil'n Prep **Analysis** Limit **Parameter** Result Analyst Date Batch Date Time Units Factor Reference 1,4-dioxane 0.74 0.25 ug/L 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 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 2.0 U 2.0 0.30 ng/L WAS 4/26/21 13816 4/26/21 14:52 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 2.0 U 2.0 0.39 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 2.0 U 2.0 0.32 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 4/26/21 13816 4/26/21 4.1 2.0 0.49 ng/L 1 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 na/L 1 WAS 4/26/21 13816 4/26/21 14:52 ng/L perfluorohexanoic acid (PFHXA) 0.34 1 WAS 4/26/21 13816 4/26/21 14:52 10.0 2.0 perfluorononanoic acid (PFNA) 1.4 J 2.0 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 0.44 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) 2.0 0.33 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 17 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 WAS 4/26/21 13816 4/26/21 14:52 ng/L 1 2.0 U WAS 4/26/21 13816 4/26/21 14:52 perfluoroundecanoic acid (PFUNA) 2.0 0.32 ng/L 1 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 2.0 U 0.39 WAS 4/26/21 13816 4/26/21 2.0 ng/L 1 14:52 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 2.0 U 20 0.39 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 2.0 U 2.0 0.18 ng/L 1 WAS 4/26/21 13816 4/26/21 14:52 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 4/26/21 13816 4/26/21 89 70-130 1 14:52 13C2-PFDA SUR 70-130 % 1 WAS 4/26/21 13816 4/26/21 14:52 116 D5-NEtFOSAA SUR 77 70-130 % 1 WAS 4/26/21 13816 4/26/21 14:52 % 1 13C3-HFPO-DA SUR 92 70-130 WAS 4/26/21 13816 4/26/21 14:52

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



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

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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Ar	nt 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	l DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	t	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		85			%			70 130		
		13C2-PFDA SUR		91			%			70 130		
		D5-NEtFOSAA SUR		88			%			70 130		
		13C3-HFPO-DA SUR		97			%			70 130		



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limi	its	RPD	RPD Limit
E537.1	DUP13816		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-NEtFOSAA 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	Limi	ts	RPD	RPD Limit
E537.1	LCS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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)	1)	190	2.0	0.18	ng/L	189	98	70	130		
		13C2-PFHxA SUR		97			%			70	130		
		13C2-PFDA SUR		100			%			70	130		
		D5-NEtFOSAA SUR		78			%			70	130		
		13C3-HFPO-DA SUR		107			%			70	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	s F	RPD	RPD Limit
E537.1	MS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio acid (GenX acid) (HFPODA)	56563-001	31	1.7	0.26	ng/L	34	90	70 1	30		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	56563-001	33	1.7	0.34	ng/L	34	95	70 1	30		
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	56563-001	34	1.7	0.28	ng/L	34	98	70 1	30		
		perfluorobutane sulfonic acid (PFBS)	56563-001	27	1.7	0.43	ng/L	30	88	70 1	30		
		perfluorodecanoic acid (PFDA)	56563-001	34	1.7	0.30	ng/L	34	97	70 1	30		
		perfluorododecanoic acid (PFDOA)	56563-001	28	1.7	0.37	ng/L	34	82	70 1	30		
		perfluoroheptanoic acid (PFHPA)	56563-001	39	1.7	0.29	ng/L	34	113	70 1	30		
		perfluorohexane sulfonic acid (PFHXS)	56563-001	32	1.7	0.34	ng/L	34	93	70 1	30		
		perfluorohexanoic acid (PFHXA)	56563-001	31	1.7	0.30	ng/L	34	89	70 1	30		
		perfluorononanoic acid (PFNA)	56563-001	34	1.7	0.39	ng/L	34	97	70 1	30		
		perfluorooctane sulfonic acid (PFOS)	56563-001	29	1.7	0.35	ng/L	34	85	70 1	30		
		perfluorooctanoic acid (PFOA)	56563-001	37	1.7	0.29	ng/L	34	106	70 1	30		
		perfluorotetradecanoic acid (PFTEA)	56563-001	27	1.7	0.43	ng/L	34	78	70 1	30		
		perfluorotridecanoic acid (PFTRIA)	56563-001	29	1.7	0.11	ng/L	34	84	70 1	30		
		perfluoroundecanoic acid (PFUNA)	56563-001	31	1.7	0.28	ng/L	34	89	70 1	30		
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	56563-001	27	1.7	0.34	ng/L	32	81	70 1	30		
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	56563-001	29	1.7	0.35	ng/L	32	90	70 1	30		
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) (ADONA)	56563-001	33	1.7	0.16	ng/L	32	100	70 1	30		
		13C2-PFHxA SUR	56563-001	86			%			70 1	30		
		13C2-PFDA SUR	56563-001	93			%			70 1	30		
		D5-NEtFOSAA SUR	56563-001	78			%			70 1	30		
		13C3-HFPO-DA SUR	56563-001	87			%			70 1	30		



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CHAIN-OF-CUSTODY RECORD

Sample Receipt Condition Report 56700 Job Number: Absolute Resource Associates □-UPS □-FedEx □-USPS Lab Courier □-Client Drop-off Samples Received from: Custody Seals - present & intact: □-Yes □-No EN/A Yes □-No CoC signed: Sampled < 24 hrs ago? □-Yes No Receipt Temp: __ Samples on ice? Yes O-No O-N/A PFAS-only real ice? □-Yes □-No □-N/A No. Any signs of freezing? □-Yes Comments: Bottle Size/Type & Quantity Check pH for ALL applicable Preservation samples and document: / Analysis 500mL(P) HCl 40mL(G) 250mL(P) 1L(G) 250mL(P) 125mL(P) 500mL(P) HNO3 60mL(P) 125mL(P) 250mL(P) 500mL(P) 40mL(G) H₂SO₄ **NaOH** 125mL(P) 250mL(P) (NH₄)₂SO₄ 60mL(P) 125mL(P) 250mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G Trizma 125mL(P) 250mL (P) Residual Cl not present: NH₄Ac 125mL(P) 250mL (P) ABN625 Pest608 40mL(G) 120mL(P) NaS₂O₃ Bacteria ResCl √by analyst MeOH 20mL(G) 40mL(G) PC Dry applicable? Y 4oz(G) 8oz(G) None (solid) 2oz(G) Syringe 500mL(P) 1L(G) 1L (P) None (water) 40ml (G) 60mL(P) 125mL(P) 250mL(P) Mold Bulk Plate Cassette Tape Lift Bulk Asbestos Cassette Bulk Wipe Lead Cassette Login Review No N/AComments X Proper lab sample containers/enough volume/correct preservative? \times Analyses marked on COC match bottles received? VOC &TOC Water-no headspace? VOC Solid-McOH 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: NO3, NO2,0-PO4, 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? -pic to proceed 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) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. Peteut ab Inspected and Received By: Date/Time: Peer Review Checklist Sample IDs Analyses in Correctly ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? ☐ Project Name ☐ PO# (if provided) Matrix -references -wastewater methods ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Notes from CoC in LIMS Reviewed By: Date:

InitialsDateWhat was sent?Uploaded / PDFReport / Data / EDD / InvoiceUploaded / PDFReport / Data / EDD / InvoiceUploaded / PDFReport / Data / EDD / Invoice

Notes: (continue on back as needed)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 56696
57 Dresser Hill Road Date Received: 4/22/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer Total number of pages: 22

Date of Approval: 5/6/2021

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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	
DIOO	vvator	1, 22, 2021 3.00	55555-00 -	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



Job ID: 56696

Sample#: 56696-001 Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30 Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Analyst Date Batch Date Time Units Factor Reference 1,4-dioxane 0.40 0.25 ug/L LMM 2101069 4/23/21 13:26 SW8260Dmod



Job ID: 56696

Sample#: 56696-001 Sample ID: RAW

Matrix: Water

Sampled: 4/22/21 9:30		Reporting		Instr Dil'n	Prep		Analy	/sis	
Parameter	Result	Limit	Units	Factor	Analyst Date	Batch	Date	Time	Reference
Calcium	21	0.50	mg/L	1	AGN 4/27/21	13825 4	1/27/21	19:47	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN 4/27/21	13825 4	1/27/21	19:47	E200.8
Magnesium	5.8	0.10	mg/L	1	AGN 4/27/21	13825 4	1/27/21	19:47	E200.8
Manganese	0.14	0.010	mg/L	1	AGN 4/27/21	13825 4	4/27/21	19:47	E200.8
Sodium	47	0.10	mg/L	1	AGN 4/27/21	13825 4	1/27/21	19:47	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN 4/27/21	13825 4	1/27/21	19:47	E200.8
Hardness (as CaCO3)	75	3	mg/L	1	AGN 4/27/21	13825 4	1/28/21		SM2340B

Sample#: 56696-002 Sample ID: FILTER B

Matrix: Water

Sampled: 4/22/21 10:00		Reporting	I	nstr Dil'n	Prep	Ar	alysis	
Parameter	Result	Limit	Units	Factor	Analyst Date	Batch Date	Time	Reference
Calcium	21	0.50	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Iron	< 0.050	0.050	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Magnesium	5.6	0.10	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Manganese	< 0.010	0.010	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Sodium	51	0.10	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Zinc	< 0.010	0.010	mg/L	1	AGN 4/27/21	13825 4/27/2	1 19:55	E200.8
Hardness (as CaCO3)	74	3	mg/L	1	AGN 4/27/21	13825 4/28/2	1	SM2340B

Sample#: 56696-004 Sample ID: RAW-DISS

Matrix: Water

Sampled: 4/22/21 9:30		Reporting	I	nstr Dil'n	Prep		Anal	ysis	
Parameter	Result	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		Reporting	1	nstr Dil'n		Prep		Anal	ysis	
Parameter		Result	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



Job ID: 56696

Sample#: 56696-001 Sample ID: RAW Matrix: Water

Sampled: 4/22/21 9:30	F	Reporting	lı	nstr Dil'n		Prep	Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch Date	Time	Reference
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	22 M	0.5	mg/L	1	DBV		2101048 4/22/21	18:48	E300.0A
M = The recovery for the m samples were acceptable.	atrix spike	was 78%.	. The ac	ceptance	criteria is	90-11	0%. All other asso	ociated C	C
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 u	mhos/cn	n 1	SFM		2101051 4/23/21	12:20	SM2510B
рН	6.6 H		рН	1	SFM		2101060 4/22/21	16:49	SM4500H+B
H = Sample was received b	eyond met	thod holdii	ng 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		Reporting	I	nstr Dil'n		Prep	Ana	lysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch Date	Time	Reference
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 u	ımhos/cr	n 1	SFM		2101051 4/23/21	12:20	SM2510B
рН	7.1 H		рН	1	SFM		2101060 4/22/21	17:01	SM4500H+B
H = Sample was receive	d beyond m	ethod holdi	ng time.						
Turbidity	< 1.0	1.0	NTU	1	DJM		2101052 4/23/21	13:06	SM2130B

Job ID: 56696

Sample#: 56696-001 Sample ID: RAW Matrix: Water

Sampled: 4/22/21 9:30 Reporting Instr Dil'n Prep Analysis

Limit Analyst Date Batch Date Time **Parameter** Result Units Factor Reference Total Organic Carbon (TOC) < 1.0 DBV 2101189 5/4/21 14:33 1.0 mg/L 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		Reporting	Instr Dil'n			Prep Analysi			ysis	
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
Total Organic Carbon (TOC)	< 1.0	1.0	mg/L	1	DBV		2101110	4/28/21	16:05	SM5310C



Job ID: 56696

Sample#: 56696-001 Sample ID: RAW Matrix: Water

Sampled: 4/22/21 9:30

Mathed Defended FE27.4										
Method Reference: E537.1	Reporting		Dil'n		Prep		Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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

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



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

Job ID: 56696

Sample#: 56696-003 Sample ID: FIELD BLANK

Matrix: Water

Sampled: 4/22/21 10:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 ng/L WAS 4/26/21 13816 4/26/21 14:36 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.8 U 1.8 0.34 ng/L 1 WAS 4/26/21 13816 4/26/21 14:36 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 WAS 4/26/21 13816 4/26/21 14:36 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U WAS 4/26/21 13816 4/26/21 1.8 0.44 ng/L 1 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 na/L 1 WAS 4/26/21 13816 4/26/21 14:36 ng/L perfluorohexanoic acid (PFHXA) 1.8 U 0.30 1 WAS 4/26/21 13816 4/26/21 14:36 1.8 perfluorononanoic acid (PFNA) 1.8 U 0.39 ng/L 1 WAS 4/26/21 13816 4/26/21 14:36 1.8 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 WAS 4/26/21 13816 4/26/21 14:36 ng/L 1 1.8 U 0.28 WAS 4/26/21 13816 4/26/21 perfluoroundecanoic acid (PFUNA) 1.8 ng/L 1 14:36 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.34 WAS 4/26/21 13816 4/26/21 1.8 ng/L 1 14:36 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.35 ng/L 1 WAS 4/26/21 13816 4/26/21 14:36 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.16 ng/L 1 WAS 4/26/21 13816 4/26/21 14:36 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 4/26/21 13816 4/26/21 99 70-130 1 14:36 13C2-PFDA SUR 70-130 % 1 WAS 4/26/21 13816 4/26/21 14:36 98 D5-NEtFOSAA SUR 84 70-130 % 1 WAS 4/26/21 13816 4/26/21 14:36 % 1 13C3-HFPO-DA SUR 97 70-130 WAS 4/26/21 13816 4/26/21 14:36

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



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

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



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- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units Ar	mt 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 A	mt 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	i	RPD	RP	D Limit
E300.0A	BLK2101048	Chloride Sulfate		< <	0.5 0.5	mg/L mg/L								
E300.0A	DUP2101048	Chloride	56621-001		100	mg/L						1		10
E300.0A	LCS2101048	Chloride Sulfate			95 100	mg/L mg/L	100 100	95 100		90 90	110 110			
E300.0A	LCSD2101048	Chloride Sulfate			93 99	mg/L mg/L	100 100	93 99		90 90	110 110		2	10 10
E300.0A	MS2101048	Chloride	56621-001		170	mg/L	83.3	79	*	90	110			
E300.0A	MS2101048	Chloride Sulfate	56696-001 56696-001		85 35	mg/L mg/L	16 16	12 78	*	90 90	110 110			
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	10
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	t l	Units Amt Added	%R	Limits		RPD	RPD	Limit
SM4500H+B	DUP2101060	рН	56621-001	8.2	2	pH						
SM4500H+B	DUP2101060	рН	56666-001	6.8	3	рН						
SM4500H+B	DUP2101060	рН	56683-001	7.5	5	рН						
SM5310C	BLK2101110	Total Organic Carbon (TOC)		< 1	1	mg/L						
SM5310C	LCS2101110	Total Organic Carbon (TOC)		10)	mg/L 10	102	85	115			
SM5310C	LCSD2101110	Total Organic Carbon (TOC)		11	l	mg/L 10	106	85	115		4	20
SM5310C	MS2101110	Total Organic Carbon (TOC)	56696-002	10)	mg/L 10	103	75	125			
SM5310C	BLK2101189	Total Organic Carbon (TOC)		< 1	1	mg/L						
SM5310C	DUP2101189	Total Organic Carbon (TOC)	56821-001	< 1	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	1	mg/L 10	108	75	125			



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	BLK13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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 acic (9CLPF3ONS)	I	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	i)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		85			%			70 130)	
		13C2-PFDA SUR		91			%			70 130)	
		D5-NEtFOSAA SUR		88			%			70 130)	
		13C3-HFPO-DA SUR		97			%			70 130)	



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limi	its	RPD	RPD Limit
E537.1	DUP13816		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-NEtFOSAA SUR	56659-001	82			%			70	130		
			13C3-HFPO-DA SUR	56659-001	97			%			70	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Lim	its	RPD	RPD Limit
E537.1	LCS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanolacid (GenX acid) (HFPODA)	С	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)	1)	190	2.0	0.18	ng/L	189	98	70	130		
		13C2-PFHxA SUR		97			%			70	130		
		13C2-PFDA SUR		100			%			70	130		
		D5-NEtFOSAA 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	Limi	ts	RPD	RPD Limit
E537.1	MS13816	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-NEtFOSAA SUR	56563-001	78			%			70	130		
		13C3-HFPO-DA SUR	56563-001	87			%			70	130		



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124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

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Sample Receipt Condition Report Job Number: **Absolute Resource Associates** □-UPS □-FedEx □-USPS Lab Courier □-Client Drop-off Samples Received from: Yes □-No Custody Seals - present & intact: □-Yes □-No DON/A CoC signed: Sampled < 24 hrs ago? Yes □-No Yes D-No D-N/A Receipt Temp: Samples on ice? PFAS-only real ice? ✓-Yes □-No □-N/A Any signs of freezing? □-Yes D-No Comments: Bottle Size/Type & Quantity Check pH for ALL applicable Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl 125mL(P) 250mL(P) 500mL(P) HNO3 125mL(P) 250mL(P) 500mL(P) H2SO4 40mL(G) 60mL(P) 125mL(P) 250mL(P) NaOH. 60mL(P) 125mL(P) 250mL(P) (NH₄)₂SO₄ 125mL(P) 250mL(P) ZnAc-NaOH *pH ✓ by analyst: VOC, PFAS, TOC,O&G 3 Trizma 125mL(P) 250mL (P) Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625 Pest608 40mL(G) NaS2O3 120mL(P) Bacteria ResCl √by analyst MeOH 20mL(G) 40mL(G) PC Dry applicable? Y 4oz(G) 8oz(G) Syringe None (solid) 2oz(G) 2 1L (P) 250mL(P) 500mL(P) 1L(G) None (water) 40ml (G) 60mL(P) 125mL(P) Mold Bulk Plate Cassette Tape Lift Asbestos Cassette Bulk Lead Cassette Bulk Wipe Login Review Yes N/A Comments No Proper lab sample containers/enough volume/correct preservative? Analyses marked on COC match bottles received? VOC &TOC Water-no headspace? V VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK? PFAS: Lab specific bottles? QC received, if required? V Bacteria bottles provided by ARA? V Samples within holding time? Immediate tests communicated in writing: NO₃, NO₂,o-PO₄, OH) 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? V Subcontract note on login board? Pesticides EPA 608 pH5-9? Compliance samples have no discrepancies/require no flags? (Or must be rejected) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. 4/22/21 Inspected and Received By: Date/Time: Peer Review Checklist ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Sample IDs Analyses in Correctly ☐ Project Name ☐ PO# (if provided) Matrix -references ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected -wastewater methods Notes from CoC in LIMS □ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Reviewed By: Date:

InitialsDateWhat was sent?Uploaded / PDFReport / Data / EDD / InvoiceUploaded / PDFReport / Data / EDD / InvoiceUploaded / PDFReport / Data / EDD / Invoice

Notes: (continue on back as needed)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 56792
57 Dresser Hill Road Date Received: 4/29/21

Charlton, MA 01507

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

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Aaron DeWees

Chief Operating Officer

Date of Approval: 5/11/2021

Total number of pages: 29

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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	•
raw.	Water	172072021 0.00	00702 000	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 SM3510B
				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



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	
			22.02 000	PFAS in Water by EPA 537.1
D DIOC	147 1	4/00/0004 0 00	50700 040	
Raw-DISS	Water	4/29/2021 9:30	56792-010	D: 1 1 D (10 D) ()
				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
				Manganese in water by 200.8



Sample#: 56792-001 Sample ID: Filter A CBW

Matrix: Water

Sampled: 4/26/21 14:00 Reporting **Analysis** Instr Dil'n Prep Limit Date Time **Parameter** Result Units Factor Analyst Batch Date Reference 2101197 5/5/21 1,4-dioxane < 0.25 0.25 ug/L LMM 7:57 SW8260Dmod

Sample#: 56792-002 Sample ID: Filter B CBW

Matrix: Water

Sampled: 4/26/21 14:00 Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Units Factor Analyst Date Batch Date Time Reference 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 Reporting Prep **Analysis** Instr Dil'n Limit **Parameter** Result Analyst Date **Batch** Date Time Units Factor Reference 1.4-dioxane 0.34 0.25 ug/L LMM 2101197 5/5/21 8:59 SW8260Dmod

Sample#: 56792-006

Sample ID: Raw Matrix: Water

Water Water

Sampled: 4/29/21 9:30 Reporting Instr Dil'n Prep **Analysis** Limit Date Time Analyst Date **Parameter** Result Units Factor Batch Reference 1.4-dioxane < 0.25 0.25 ug/L 1 LMM 2101197 5/5/21 9:30 SW8260Dmod



> Sample#: 56792-006 Sample ID: Raw

Matrix: Water

Sampled: 4/29/21 9:30		Reporting		Instr Dil'n	Prep	Analysis			
Parameter	Result	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 Reporting Instr Dil'n Prep **Analysis Parameter** Limit Analyst Date **Batch** Date Time Result Units Factor Reference Calcium 8.6 0.50 mg/L AGN 5/3/21 13839 5/5/21 16:52 E200.8 1 < 0.050 0.050 EEB 5/3/21 13839 5/3/21 20:29 E200.8 Iron mg/L 1 Magnesium EEB 5/3/21 3.4 0.10 mg/L 1 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 < 0.010 0.010 13839 5/3/21 20:29 Zinc mg/L 1 EEB 5/3/21 E200.8 Hardness (as CaCO3) 3 35 mg/L AGN 5/3/21 13839 5/6/21 SM2340B

Sample#: 56792-008 Sample ID: GAC Matrix: Water

Sampled: 4/29/21 9:30 Reporting Prep **Analysis** Instr Dil'n Date Time **Parameter** Result Limit Units Factor Analyst Date Batch Reference Calcium 8.8 0.50 mg/L 1 AGN 5/3/21 13839 5/5/21 16:59 E200.8 < 0.050 0.050 20:36 E200.8 Iron mg/L 1 EEB 5/3/21 13839 5/3/21 Magnesium 3.4 0.10 mg/L EEB 5/3/21 13839 5/3/21 20:36 E200.8 Manganese < 0.010 0.010 mg/L EEB 5/3/21 13839 5/3/21 20:36 E200.8 1 99 Sodium 0.10 mg/L EEB 5/3/21 13839 5/3/21 20:36 E200.8 1 0.010 EEB 5/3/21 Zinc < 0.010 mg/L 1 13839 5/3/21 20:36 E200.8 Hardness (as CaCO3) 36 3 AGN 5/3/21 13839 5/6/21 SM2340B mg/L

Sample#: 56792-010 Sample ID: Raw-DISS Matrix: Water

Sampled: 4/29/21 9:30 Reporting Prep **Analysis** Instr Dil'n **Parameter** Limit Units Factor Analyst Date Batch Date Time Result Reference < 0.050 0.050 1 EEB 5/3/21 13839 5/3/21 20:42 E200.8 Iron mg/L 0.010 1 13839 5/3/21 20:42 E200.8 Manganese 0.12 mg/L EEB 5/3/21



Sample#: 56792-011 **Sample ID:** Filter B-DISS

Matrix: Water

Sampled: 4/29/21 9:30 Reporting Analysis Instr Dil'n Prep **Parameter** Result Limit Units Factor Analyst Date Batch Date Time Reference < 0.050 0.050 mg/L 1 EEB 5/3/21 13839 5/3/21 20:49 E200.8 Iron Manganese < 0.010 0.010 mg/L 1 EEB 5/3/21 13839 5/3/21 20:49 E200.8



Sample#: 56792-002 **Sample ID:** Filter B CBW

Matrix: Water

Sampled: 4/26/21 14:00 Reporting Prep **Analysis** Instr Dil'n **Parameter** Limit Analyst Date Batch Date Time Result Units Factor Reference Total Suspended Solids (TSS) < 50 50 mg/L SFM 2101166 4/30/21 17:15 SM2540D

Sample#: 56792-006

Sample ID: Raw Matrix: Water

Sampled: 4/29/21 9:30		Reporting Instr				Prep		Anal	Analysis			
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference		
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 ι	umhos/cn	n 1	SFM		2101137	4/30/21	12:30	SM2510B		
рН	6.1 H		рН	1	SFM		2101180	4/29/21	18:39	SM4500H+B		
H = Sample was received	d beyond m	ethod hold	ing 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	Reporting Instr Dil'n					Prep				
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference
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	100 M	2.5	mg/L	5	DBV		2101192	5/4/21	15:51	E300.0A
M = The recovery for the m samples were acceptable.	ıatrix spike	was 83%	. The ac	ceptance	criteria is	90-11	0%. All o	ther asso	ciated Q	C
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 u	mhos/cm	n 1	SFM		2101137	4/30/21	12:30	SM2510B
рН	7.4 H		рН	1	SFM		2101180	4/29/21	18:49	SM4500H+B
H = Sample was received I	peyond me	thod holdi	ng time.							
Turbidity	< 1.0	1.0	NTU	1	EB		2101143	4/30/21	11:48	SM2130B



> Sample#: 56792-008 Sample ID: GAC

> > Matrix: Water

Sampled: 4/29/21 9:30		Reporting	li	nstr Dil'n		Prep		Anal	lysis		
Parameter	Result	Limit	Units	Factor	Analyst	Date	Batch	Date	Time	Reference	
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 ι	ımhos/cn	n 1	SFM		2101137	4/30/21	12:30	SM2510B	
pН	7.3 H		рН	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 Reporting Instr Dil'n Prep **Analysis** Limit Date Date **Parameter** Analyst Batch Time Result Units Factor Reference Total Organic Carbon (TOC) < 1.0 DBV 2101189 5/4/21 15:28 SM5310C 1.0 mg/L 1

Sample#: 56792-007 Sample ID: Filter B

Matrix: Water

Sampled: 4/29/21 9:30 Reporting Instr Dil'n Prep **Analysis** Limit Date **Batch** Date Time **Parameter** Result Units Factor Analyst Reference DBV Total Organic Carbon (TOC) < 1.0 1.0 2101189 5/4/21 mg/L 1 15:47 SM5310C

Sample#: 56792-008

Sample ID: GAC

Matrix: Water

Sampled: 4/29/21 9:30 Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Batch Date Time Result Units Reference Total Organic Carbon (TOC) < 1.0 1.0 mg/L DBV 2101189 5/4/21 16:05 SM5310C



> Sample#: 56792-001 Sample ID: Filter A CBW

> > Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 ng/L **ACA** 5/5/21 13842 5/5/21 13:20 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.8 U 1.8 0.35 ng/L 1 5/5/21 13842 5/5/21 13:20 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 13:20 5.0 1.8 0.45 ng/L 1 5/5/21 13842 5/5/21 **ACA** perfluorodecanoic acid (PFDA) 1.8 U 1.8 0.31 ng/L 1 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 na/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 ACA perfluorohexanoic acid (PFHXA) 1 5/5/21 13842 5/5/21 13:20 12 1.8 0.31 ng/L perfluorononanoic acid (PFNA) 1.7 J 0.41 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 1.8 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) 1.8 0.30 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 14 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 1 **ACA** 5/5/21 13842 5/5/21 13:20 ng/L 1.8 U 0.29 ACA 13:20 perfluoroundecanoic acid (PFUNA) 1.8 ng/L 1 5/5/21 13842 5/5/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.36 **ACA** 5/5/21 13842 5/5/21 13:20 1.8 ng/L 1 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.36 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.17 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:20 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 5/5/21 13:20 97 70-130 1 13842 5/5/21 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13842 5/5/21 13:20 108 ACA D5-NEtFOSAA SUR 80 70-130 % 1 5/5/21 13842 5/5/21 13:20 13C3-HFPO-DA SUR % 1 ACA 112 70-130 5/5/21 13842 5/5/21 13:20

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



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

> Sample#: 56792-002 Sample ID: Filter B CBW

> > Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.28 ng/L **ACA** 5/5/21 13842 5/5/21 13:36 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.8 U 1.8 0.36 ng/L 1 5/5/21 13842 5/5/21 13:36 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.30 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 5.1 1.8 0.46 ng/L 1 5/5/21 13842 5/5/21 13:36 **ACA** perfluorodecanoic acid (PFDA) 1.8 U 1.8 0.31 ng/L 1 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 na/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 ACA perfluorohexanoic acid (PFHXA) 0.32 1 5/5/21 13842 5/5/21 13:36 12 1.8 ng/L perfluorononanoic acid (PFNA) 1.9 0.41 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 1.8 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) 1.8 0.30 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 14 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 1 **ACA** 5/5/21 13842 5/5/21 13:36 ng/L 1.8 U ACA 13:36 perfluoroundecanoic acid (PFUNA) 1.8 0.30 ng/L 1 5/5/21 13842 5/5/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.36 **ACA** 5/5/21 13842 5/5/21 1.8 ng/L 1 13:36 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.36 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.17 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:36 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 5/5/21 96 70-130 1 13842 5/5/21 13:36 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13842 5/5/21 13:36 99 ACA D5-NEtFOSAA SUR 81 70-130 % 1 5/5/21 13842 5/5/21 13:36 13C3-HFPO-DA SUR % 1 ACA 112 70-130 5/5/21 13842 5/5/21 13:36

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



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

Sample#: 56792-003 **Sample ID:** Filter D CBW

Matrix: Water

Sampled: 4/26/21 14:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.9 U 1.9 0.29 ng/L **ACA** 5/5/21 13842 5/5/21 13:52 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.9 U **ACA** 1.9 0.37 ng/L 1 5/5/21 13842 5/5/21 13:52 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.9 U 1.9 0.31 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 5/5/21 13:52 5.0 1.9 0.48 ng/L 1 13842 5/5/21 **ACA** perfluorodecanoic acid (PFDA) 1.9 U 1.9 0.32 ng/L 1 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 na/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 ng/L ACA perfluorohexanoic acid (PFHXA) 0.33 1 5/5/21 13842 5/5/21 13:52 12 1.9 perfluorononanoic acid (PFNA) 1.7 J 0.43 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 1.9 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) 1.9 0.32 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 13 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 0.12 1 **ACA** 5/5/21 13842 5/5/21 13:52 1.9 ng/L 1.9 U ACA 13:52 perfluoroundecanoic acid (PFUNA) 1.9 0.31 ng/L 1 5/5/21 13842 5/5/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.37 **ACA** 5/5/21 13842 5/5/21 13:52 1.9 U 1.9 ng/L 1 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.9 U 1.9 0.38 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.9 U 1.9 0.17 ng/L 1 **ACA** 5/5/21 13842 5/5/21 13:52 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 5/5/21 13:52 97 70-130 1 13842 5/5/21 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13842 5/5/21 13:52 98 ACA D5-NEtFOSAA SUR 75 70-130 % 1 5/5/21 13842 5/5/21 13:52 13C3-HFPO-DA SUR % 1 ACA 13:52 104 70-130 5/5/21 13842 5/5/21

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



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

Sample#: 56792-004 Sample ID: GAC Matrix: Water

Sampled: 4/28/21 12:00

Method Reference: E537.1		Reporting		Dil'n			Prep		Ana	lysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch	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

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



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

> Sample#: 56792-005 Sample ID: Field Blank Matrix: Water

Sampled: 4/28/21 12:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst** Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L **ACA** 5/5/21 13842 5/5/21 14:24 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U **ACA** 1.7 0.33 ng/L 1 5/5/21 13842 5/5/21 14:24 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 **ACA** 5/5/21 13842 5/5/21 14:24 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U ACA 5/5/21 14:24 1.7 0.42 ng/L 1 13842 5/5/21 0.29 **ACA** perfluorodecanoic acid (PFDA) 1.7 U 1.7 ng/L 1 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 na/L 1 **ACA** 5/5/21 13842 5/5/21 14:24 1.7 U ng/L ACA perfluorohexanoic acid (PFHXA) 1.7 0.29 1 5/5/21 13842 5/5/21 14:24 perfluorononanoic acid (PFNA) 1.7 U 0.38 ng/L 1 **ACA** 5/5/21 13842 5/5/21 14:24 1.7 1.7 U perfluorooctane sulfonic acid (PFOS) 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 0.11 1 **ACA** 5/5/21 13842 5/5/21 14:24 1.7 ng/L 1.7 U 0.27 ACA 14:24 perfluoroundecanoic acid (PFUNA) 1.7 ng/L 1 5/5/21 13842 5/5/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 **ACA** 5/5/21 13842 5/5/21 1.7 U 1.7 ng/L 1 14:24 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 **ACA** 5/5/21 13842 5/5/21 14:24 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 **ACA** 5/5/21 13842 5/5/21 14:24 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 5/5/21 14:24 94 70-130 1 13842 5/5/21 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13842 5/5/21 14:24 99 ACA 14:24 D5-NEtFOSAA SUR 85 70-130 % 1 5/5/21 13842 5/5/21 13C3-HFPO-DA SUR % 1 ACA 14:24 70-130 5/5/21 13842 5/5/21 104

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



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

> Sample#: 56792-006 Sample ID: Raw

> > Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1

Method Reference: E537.1		Reporting			Dil'n				Analysis		
Parameter	Result	Limit	-	Units	Factor	Analyst	Date	Batch	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	

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



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

> Sample#: 56792-008 Sample ID: GAC Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1		Reporting		Dil'n			Prep		Analy	ysis
Parameter	Result	Limit	_	Units	Factor	Analyst	Date	Batch	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

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



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

13C3-HFPO-DA SUR

Sample#: 56792-009 Sample ID: Field Blank Matrix: Water

Sampled: 4/29/21 9:30

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 ng/L **ACA** 5/5/21 13842 5/5/21 15:12 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.8 U 1.8 0.35 ng/L 1 5/5/21 13842 5/5/21 15:12 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 **ACA** 5/5/21 13842 5/5/21 15:12 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U ACA 5/5/21 1.8 0.45 ng/L 1 13842 5/5/21 15:12 **ACA** perfluorodecanoic acid (PFDA) 1.8 U 1.8 0.31 ng/L 1 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 na/L 1 **ACA** 5/5/21 13842 5/5/21 15:12 ACA perfluorohexanoic acid (PFHXA) 1.8 U 1 5/5/21 13842 5/5/21 15:12 1.8 0.31 ng/L perfluorononanoic acid (PFNA) 1.8 U 0.40 ng/L 1 **ACA** 5/5/21 13842 5/5/21 15:12 1.8 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 1 **ACA** 5/5/21 13842 5/5/21 15:12 ng/L 1.8 U 0.29 ACA 15:12 perfluoroundecanoic acid (PFUNA) 1.8 ng/L 1 5/5/21 13842 5/5/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.35 **ACA** 5/5/21 13842 5/5/21 15:12 1.8 ng/L 1 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.36 ng/L 1 **ACA** 5/5/21 13842 5/5/21 15:12 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.16 ng/L 1 **ACA** 5/5/21 13842 5/5/21 15:12 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % **ACA** 5/5/21 97 70-130 1 13842 5/5/21 15:12 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13842 5/5/21 15:12 99 ACA D5-NEtFOSAA SUR 83 70-130 % 1 5/5/21 13842 5/5/21 15:12

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

- QC Report -

Method	QC ID	Parameter	Associated Sample		Result	Units An	nt Added	dded %R			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



E200.8 BLK13839 Calcium	RPD	RPD Limi
Magnesium		
Manganese		
Sodium		
E200.8 DUP13839 Calcium 56792-006 8.7 mg/L mg/		
E200.8 DUP13839 Calcium 56792-006		
Iron 56792-006 3.3 mg/L Magnesium 56792-006 3.3 mg/L Magnesee 56792-006 0.12 mg/L Sodium 56792-006 68 mg/L Zinc 56792-006 < 0.010 mg/L		
Magnesium 56792-006 3.3 mg/L Manganese 56792-006 0.12 mg/L Sodium 56792-006 68 mg/L Zinc 56792-006 < 0.010 mg/L	0	20
Manganese 56792-006 0.12 mg/L Sodium 56792-006 68 mg/L Zinc 56792-006 < 0.010 mg/L		20
Sodium 56792-006 68 mg/L Zinc 56792-006 < 0.010 mg/L	1	20
E200.8 LCS13839 Calcium 2.7 mg/L 2.5 109 85 100 105 105 85 105 85 105 85 105	1	20
E200.8 LCS13839 Calcium 2.7 mg/L 2.5 109 85 Iron 0.52 mg/L 0.5 105 85 Magnesium 0.48 mg/L 0.5 97 85 Manganese 0.51 mg/L 0.5 101 85 Sodium 5.0 mg/L 0.5 100 85 Zinc 0.50 mg/L 0.5 100 85 Iron 0.53 mg/L 0.5 100 85 Iron 0.53 mg/L 0.5 106 85 Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 0.5 104 85 Sodium 5.0 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Sodium 5.0 mg/L 5 101 85 Sodium 5.0 mg/L 5 101 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	0	20
Iron		20
Magnesium 0.48 mg/L 0.5 97 85 Manganese 0.51 mg/L 0.5 101 85 Sodium 5.0 mg/L 5 100 85 Zinc 0.50 mg/L 0.5 100 85 E200.8 LCSD13839 Calcium 2.7 mg/L 2.5 110 85 Iron 0.53 mg/L 0.5 106 85 Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	
Manganese	115	
Sodium Sodium 5.0 mg/L 5 100 85 Zinc 0.50 mg/L 0.5 100 85 E200.8 E200.8 LCSD13839 Calcium Iron 0.53 mg/L 0.5 106 85 Magnesium Manganese Manganese Sodium 5.0 mg/L 0.5 106 85 Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	
Zinc 0.50 mg/L 0.5 100 85 E200.8 LCSD13839 Calcium 2.7 mg/L 2.5 110 85 Iron 0.53 mg/L 0.5 106 85 Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	
E200.8 LCSD13839 Calcium	115	
Iron 0.53 mg/L 0.5 106 85 Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	
Magnesium 0.49 mg/L 0.5 97 85 Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	0 20
Manganese 0.52 mg/L 0.5 104 85 Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	1 20
Sodium 5.0 mg/L 5 101 85 Zinc 0.51 mg/L 0.5 102 85	115	1 20
Zinc 0.51 mg/L 0.5 102 85	115	3 20
· · · · · · · · · · · · · · · · · · ·	115	1 20
	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 A	Amt Added	%R		Limits		RPD	RPI	D Limit
E300.0A	BLK2101156	Sulfate		<	0.5	mg/L								
E300.0A	LCS2101156	Sulfate			100	mg/L	100	100		90	110			
E300.0A	LCSD2101156	Sulfate			100	mg/L	100	100		90	110		0	10
E300.0A	BLK2101192	Chloride		<	0.5	mg/L								
E300.0A	LCS2101192	Chloride			96	mg/L	100	96		90	110			
E300.0A	LCSD2101192	Chloride			95	mg/L	100	95		90	110		1	10
E300.0A	MS2101192	Chloride	56792-007		170	mg/L	83.3	83	*	90	110			
E300.0A	BLK2101210	Bromide		<	0.1	mg/L								
E300.0A	LCS2101210	Bromide			10	mg/L	10	101		90	110			
E300.0A	LCSD2101210	Bromide			10.0	mg/L	10	100		90	110		1	10
E300.0A	MS2101210	Bromide	56813-002		85	mg/L	100	85	*	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				
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	101		90	110			
SM2320B	LCSD2101167	Alkalinity, Total (as CaCO3)			26	mg/L	25	103		90	110		1	10
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	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								



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limit	S	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	рН	56796-002		5.4	рН						
SM4500H+B	DUP2101180	рН	56823-001		5.5	рН						
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		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1 BLK13842	BLK13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propano acid (GenX acid) (HFPODA)	ic	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)	ł	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		90			%			70 130)	
		13C2-PFDA SUR		95			%			70 130)	
		D5-NEtFOSAA SUR		81			%			70 130)	
		13C3-HFPO-DA SUR		94			%			70 130)	



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1 DUP138	DUP13842		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-NEtFOSAA 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	Limi	its	RPD	RPD Limit
E537.1 LCS	LCS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-NEtFOSAA 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	Lim	its	RPD	RPD Limit
E537.1	MS13842	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoidacid (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-NEtFOSAA SUR	56787-001	80			%			70	130		
		13C3-HFPO-DA SUR	56787-001	104			%			70	130		



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

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

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				Sam	ple Recei	ipt (Condit	ion I				56	792	
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Custody Seals]-No	EKN/A		<u> </u>			CoC si	100		Yes	
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Comments:			PFAS-onl	y real	ice? A-Yes	1-0	No -1	N/A		Any si	gns o	f freez	ing? □-Yes	₫ -No
Preservation					Bottle Size	Type	& Qua	ntity				Chec	k pH for ALI	applicable*
/ Analysis						71						samp	les and docum	ment:
HCl	40mL(G)		250mL(P)		500mL(P)		1L(G)						210.	
HNO ₃	125mL(P)	1	250mL(P)	5	500mL(P)		050 T	(Tax)		500 T m		BAC	2500	
H ₂ SO ₄	40mL(G)	6	60mL(P)		125mL(P)		250mL	(P)		500mL(P)				
NaOH (NH ₄) ₂ SO ₄	125mL(P) 60mL(P)		250mL(P) 125mL(P)		250mL(P)			-						
ZnAc-NaOH	125mL(P)		250mL(P)		2501115(1)									
Trizma	125mL(P)		250mL (P)	14								*pH ✓	by analyst:VOC,	PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)										lual Cl not pro	
NaS ₂ O ₃	40mL(G)		120mL(P)	2									625Pest	
МеОН	20mL(G)		40mL(G)									Bacter	ria ResCl ✓ by	analyst
None (solid)	2oz(G)		4oz(G)	6	8oz(G)		Syringe					PC D	ry applicable	YN
None (water)	40ml (G)	8	60mL(P)	3	125mL(P)	8	250mL	-	3	500mL(P)	Z	1L(G)	1L (P)
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QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 56824
57 Dresser Hill Road Date Received: 5/3/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 5/11/2021

Total number of pages: 14

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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 Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Analyst Date Batch Date Time Units Factor Reference Total Suspended Solids (TSS) 70 50 mg/L 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		Reportin	a		Dil'n		Prep		Ana	lysis
Parameter	Result	Limit	•	Units		Analyst	Date	Batch		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

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



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

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 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.28 ng/L **ACA** 5/5/21 13843 5/5/21 20:01 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.8 U 1.8 0.36 ng/L 1 5/5/21 13843 5/5/21 20:01 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.30 ng/L 1 **ACA** 5/5/21 13843 5/5/21 20:01 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U **ACA** 1.8 0.46 ng/L 1 5/5/21 13843 5/5/21 20:01 **ACA** perfluorodecanoic acid (PFDA) 1.8 U 1.8 0.32 ng/L 1 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 na/L 1 **ACA** 5/5/21 13843 5/5/21 20:01 ACA perfluorohexanoic acid (PFHXA) 1.8 U 0.32 1 5/5/21 13843 5/5/21 20:01 1.8 ng/L perfluorononanoic acid (PFNA) 1.8 U 0.41 ng/L 1 **ACA** 5/5/21 13843 5/5/21 20:01 1.8 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 1 **ACA** 5/5/21 13843 5/5/21 20:01 ng/L 1.8 U ACA perfluoroundecanoic acid (PFUNA) 1.8 0.30 ng/L 1 5/5/21 13843 5/5/21 20:01 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.36 **ACA** 5/5/21 13843 5/5/21 1.8 ng/L 1 20:01 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.37 ng/L 1 **ACA** 5/5/21 13843 5/5/21 20:01 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.17 ng/L 1 **ACA** 5/5/21 13843 5/5/21 20:01 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR ACA 95 70-130 % 1 5/5/21 13843 5/5/21 20:01 13C2-PFDA SUR 70-130 % 1 **ACA** 5/5/21 13843 5/5/21 20:01 92 ACA D5-NEtFOSAA SUR 79 70-130 % 1 5/5/21 13843 5/5/21 20:01 % 1 ACA 13C3-HFPO-DA SUR 70-130 5/5/21 13843 5/5/21 20:01 94

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



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

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.

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)propano acid (GenX acid) (HFPODA)	ic	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)	ł	2.0 U	2.0	0.40	ng/L					
		4,8-dioxa-3h-perfluorononanoic acid (ADONA acid (ADONA)	d)	2.0 U	2.0	0.18	ng/L					
		13C2-PFHxA SUR		93			%			70 13	30	
		13C2-PFDA SUR		99			%			70 13	30	
		D5-NEtFOSAA SUR		79			%			70 13	30	
		13C3-HFPO-DA SUR		101			%			70 13	30	



Method	QC ID	Pa	arameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13843		2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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 13	30	
			13C2-PFDA SUR	56817-002	93			%			70 13	30	
			D5-NEtFOSAA SUR	56817-002	76			%			70 13	30	
			13C3-HFPO-DA SUR	56817-002	99			%			70 13	30	



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)propanc acid (GenX acid) (HFPODA)	ic	39	2.0	0.30	ng/L	40	98	70 13	80	
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)		37	2.0	0.39	ng/L	40	92	70 13	30	
		n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)		38	2.0	0.33	ng/L	40	95	70 13	30	
		perfluorobutane sulfonic acid (PFBS)		33	2.0	0.50	ng/L	35	92	70 13	30	
		perfluorodecanoic acid (PFDA)		37	2.0	0.34	ng/L	40	93	70 13	30	
		perfluorododecanoic acid (PFDOA)		36	2.0	0.43	ng/L	40	89	70 13	30	
		perfluoroheptanoic acid (PFHPA)		39	2.0	0.33	ng/L	40	97	70 13	30	
		perfluorohexane sulfonic acid (PFHXS)		36	2.0	0.40	ng/L	38	94	70 13	30	
		perfluorohexanoic acid (PFHXA)		36	2.0	0.35	ng/L	40	90	70 13	30	
		perfluorononanoic acid (PFNA)		39	2.0	0.45	ng/L	40	96	70 13	30	
		perfluorooctane sulfonic acid (PFOS)		31	2.0	0.40	ng/L	38	80	70 13	30	
		perfluorooctanoic acid (PFOA)		39	2.0	0.33	ng/L	40	98	70 13	30	
		perfluorotetradecanoic acid (PFTEA)		32	2.0	0.50	ng/L	40	81	70 13	30	
		perfluorotridecanoic acid (PFTRIA)		36	2.0	0.13	ng/L	40	90	70 13	30	
		perfluoroundecanoic acid (PFUNA)		34	2.0	0.32	ng/L	40	86	70 13	30	
		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)		28	2.0	0.39	ng/L	37	75	70 13	30	
		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CLPF3ONS)	d	31	2.0	0.40	ng/L	37	83	70 13	30	
		4,8-dioxa-3h-perfluorononanoic acid (ADONA aci (ADONA)	d)	36	2.0	0.18	ng/L	37	95	70 13	80	
		13C2-PFHxA SUR		93			%			70 13	30	
		13C2-PFDA SUR		104			%			70 13	30	
		D5-NEtFOSAA SUR		78			%			70 13	30	
		13C3-HFPO-DA SUR		101			%			70 13	30	



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)propanoid 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	1	
		perfluorobutane sulfonic acid (PFBS)	56821-001	2.3	1.7	0.42 ng/L	2.97	76	50 150	1	
		perfluorodecanoic acid (PFDA)	56821-001	2.4	1.7	0.29 ng/L	3.35	72	50 150	1	
		perfluorododecanoic acid (PFDOA)	56821-001	2.3	1.7	0.36 ng/L	3.35	69	50 150	1	
		perfluoroheptanoic acid (PFHPA)	56821-001	2.9	1.7	0.28 ng/L	3.35	86	50 150	1	
		perfluorohexane sulfonic acid (PFHXS)	56821-001	2.5	1.7	0.33 ng/L	3.18	78	50 150	1	
		perfluorohexanoic acid (PFHXA)	56821-001	2.6	1.7	0.29 ng/L	3.35	79	50 150	1	
		perfluorononanoic acid (PFNA)	56821-001	2.7	1.7	0.38 ng/L	3.35	81	50 150	1	
		perfluorooctane sulfonic acid (PFOS)	56821-001	2.3	1.7	0.34 ng/L	3.22	70	50 150	1	
		perfluorooctanoic acid (PFOA)	56821-001	2.6	1.7	0.28 ng/L	3.35	79	50 150	1	
		perfluorotetradecanoic acid (PFTEA)	56821-001	2.2	1.7	0.42 ng/L	3.35	67	50 150	1	
		perfluorotridecanoic acid (PFTRIA)	56821-001	2.4	1.7	0.11 ng/L	3.35	71	50 150	1	
		perfluoroundecanoic acid (PFUNA)	56821-001	2.3	1.7	0.27 ng/L	3.35	67	50 150	1	
		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	1	
		D5-NEtFOSAA SUR	56821-001	80		%			70 130)	
		13C3-HFPO-DA SUR	56821-001	91		%			70 130)	
SM2540	DUP210124	44 Total Suspended Solids (TSS) (SS)	56893-001	43	25	12 mg/L				13	5
SM2540	LCS210124	14 Total Suspended Solids (TSS) (SS)		320	50	24 mg/L	323	101	75 125	i	
SM2540	PB2101244	Total Suspended Solids (TSS) (SS)		2.5 U	2.5	1.2 mg/L					



Absolute	F	3	e	S	— С	U	ır	C	e
а	S	S	0	C	i	а	t	е	5

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

56824

Project Location: NH MA ME VI Accreditation Required? N/N: Phone #: Project Location: NH MA ME VI Accreditation Required? N/N: Protocol: RCRA SDWA NPDES MCP NHDES DOD Reporting QAPP GW-1 S-1 Limits: EPA DW Other Limits: EPA DW Other Limits: EPA DW Other Limits: EPA DW Other	☐ Grain Size ☐ Herbicides ☐ Asbestos Composite (C)
Project #: Zoy Company Address: 57 Drossor H	1 Herbicides
PO #: NH Reimbursement Pricing NH Rei	J Grain Size
	D Grai
PO #: NH Reimbursement Pricing Sampling	114 1 127
# CONTAINERS WATER BOLID OTHER OTHER ONOC 8260 NOC 8260 NHDES O WOR 8260 NHDES	Subcontract: [Grab (G) or C
5682401 GAC ZX 4/3 10:00 AD X	G
-oz Field Blank z X	
5682401 GAC Z X 4/3 10:00 AD X X 10:00 AD X X 10:00 AD X X 10:00 X X 10:00 X X X 10:00 X X X 10:35 V X X 10:35 V X X X X X X X X X X X X X X X X X X	C
TAT REQUESTED Priority (24 hr)* Expedited (48 hr)* See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists. Standard (10 Business Days) See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists. REPORTING INSTRUCTIONS PDF (e-mail address) Address bucleafuate.com RECEIVED ON ICE	
*Date Needed HARD COPY REQUIRED DEDD	
Relinquished by Sampler: Received by: Relinquished by: Received by Laboratory: Received by	Time 14.00 Time Time 7.3

13 of 14

Sample Receipt Condition Report Job Number: **Absolute Resource Associates** □-UPS □-FedEx Lab Courier ☐-Client Drop-off Samples Received from: □-USPS V-N/A CoC signed: Yes □-No Custody Seals - present & intact: □-Yes □-No Samples on ice? ☑-Yes □-No □-N/A Sampled < 24 hrs ago? Wes □-No Receipt Temp: ___ PFAS-only real ice? ☐-Yes ☐-No ☐-N/A Any signs of freezing? □-Yes No Comments: Bottle Size/Type & Quantity Check pH for ALL applicable* Preservation samples and document: / Analysis 250mL(P) 500mL(P) 1L(G) **HCl** 40mL(G) 125mL(P) 250mL(P) 500mL(P) HNO₃ 250mL(P) 500mL(P) 40mL(G) 60mL(P) 125mL(P) H₂SO₄ 125mL(P) 250mL(P) NaOH 250mL(P) 125mL(P) (NH₄)₂SO₄ 60mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓ by analyst: VOC, PFAS, TOC,O&G 125mL(P) 250mL (P) Trizma Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN 625_ Pest608 120mL(P) NaS2O3 40mL(G) Bacteria ResCl √by analyst **MeOH** 20mL(G) 40mL(G) PC Dry applicable? Y None (solid) 2oz(G)4oz(G) 8oz(G)Syringe 40ml (G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 1L (P) None (water) Bulk Plate Mold Cassette Tape Lift Asbestos Cassette Bulk Lead Cassette Bulk Wipe N/A Login Review Yes No 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: NO3, NO2,0-PO4, pH, BOD, Coliform/E. coli (P/A or MPN), Enterococci, Color Surfactants, Turbidity, Odor, CrVI, Ferrous Iron, Dissolved Oxygen, Unpres 624 Chah 543 5 sampled Date, time & ID on samples match CoC? Rushes communicated to analyst in writing? Subcontract note on login board? Pesticides EPA 608 pH5-9? (Or must be rejected) Compliance samples have no discrepancies/require no flags? Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. Date/Time: 5-3-2 Inspected and Received By: Peer Review Checklist Analyses in Correctly Sample IDs ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? -references ☐ PO# (if provided) Matrix ☐ Project Name

-wastewater methods ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected Notes from CoC in LIMS ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Reviewed By: Date: Initials Date What was sent?

Notes: (continue on back as needed)

Report / Data / EDD / Invoice Uploaded / PDF Uploaded / PDF Report / Data / EDD / Invoice Report / Data / EDD / Invoice Uploaded / PDF



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: Work Order #:

06/08/2021 2106-00283

Client Job #:

Date Received: Sample collected in:

06/02/2021 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

Donald a. D



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 #:

SAMPLED BY:

Absolute Resource Associates

SAMPLE ADDRESS: GSP Filter

MA

2106-00283-001

DATE AND TIME COLLECTED: DATE AND TIME RECEIVED:

ANALYSIS PACKAGE:

RECEIPT TEMPERATURE:

Legend

Passes Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention



05/25/2021 12:15PM

06/02/2021 HAA GSA

09:00AM

ON ICE 3.1° CELSIUS

MORE LOC INFO: **CLIENT JOB #:**

MONE LOO IIII O.					OLIL	11 000 ".			
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH (06/05/2021 03:34AM



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

2106-00283-002 **SAMPLE ID #:**

SAMPLED BY: Absolute Resource Associates

UV Effluent **SAMPLE ADDRESS:**

MA

Attention **DATE AND TIME COLLECTED:**

05/25/2021 **DATE AND TIME RECEIVED:** 06/02/2021

Passes

Fails EPA Primary

Fails EPA Secondary

Fails State Guideline

Legend

12:15PM

09:00AM

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

CLIENT JOB #:

MORE LOC INFO: **Test Units** RL Date - Time **Test Description** Result **Pass** DQ Limit Method **Analyst** /Fail Flag Analyzed Date Extracted No Limit EPA 552.2 GQ-NH 06/04/2021 08:50AM Dibromoacetic Acid* <1 ug/L 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 <2 ug/L No Limit EPA 552.2 KV-NH 06/05/2021 04:14AM Total Haloacetic Acids* 1 <1 ug/L 60 ug/L EPA 552.2 KV-NH 06/05/2021 04:14AM Trichloroacetic Acid* <1 1 No Limit EPA 552.2 KV-NH 06/05/2021 04:14AM uq/L % 70-130% 2,3-Dibromopropionic Acid 82 EPA 552.2 - SS KV-NH 06/05/2021 04:14AM

> Donald a. D. Donald A. D'Anjou, Ph. D. **Laboratory Director**

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PAGE	OF /

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Sample	0.000										E	097	24.1	ADEP	24.2		AH C		37.1	964	800		Metal	etals	N Da	phoru		ō	vity	etals	Ct.	H.S	0 70				
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57189
57 Dresser Hill Road Date Received: 5/27/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/9/2021

Total number of pages: 12

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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

		Reporting	l		Instr Dil'n	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	te Time	Batch	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

·		Reporting	1		Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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

Matilia. Water

Sampled: 5/25/21 12:15

Reporting **Analysis** Instr Dil'n Prep **Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1,4-dioxane 0.81 0.25 0.12 ug/L LMM 2101602 6/4/21 13:19 SW8260Dmod

Sample#: 57189-002 Sample ID: GSP FILTER

Matrix: Water

Sampled: 5/25/21 12:15

Analysis Reporting Instr Dil'n Prep **Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1,4-dioxane 0.59 0.25 0.12 ug/L LMM 2101602 6/4/21 13:50 SW8260Dmod

Sample#: 57189-003 Sample ID: UV EFFLUENT

Matrix: Water

Sampled: 5/25/21 12:15

		Reporting			Instr Dil'n	ļ	Prep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor F	Analyst Date	Time	Batch	Date	Time Reference	
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM		2101602	6/4/21	14:22 SW8260Dmod	t

Project ID: BW-Straightway 11204

Job ID: 57189

Sample#: 57189-001 Sample ID: RAW

Matrix: Water

Sampled: 5/25/21 12:15

Reporting Instr Dil'n Prep **Analysis** Date Time Reference Parameter Limit Factor Analyst Date Time Batch Result DL Units Bromide U 0.1 0.021 mg/L DBV 2101520 5/28/21 21:19 E300.0A

Sample#: 57189-003 Sample ID: UV EFFLUENT

Matrix: Water

Sampled: 5/25/21 12:15

		Reporting	J		Instr Dil'r	ı l	Prep		Anal	ysis
Parameter	Result	0.5 H 0.1 0.038 mg/L				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	d method ho	lding time	e and ana	alyzed at cus	tomer's request.				
Nitrite-N	UH	0.1	0.019	mg/L	1	DBV		2101519	5/28/21	10:34 E300.0A
	H = Sample was received beyond	d method ho	ldina tim	e and ana	alvzed at cus	tomer'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

- QC Report -

=======================================			- QC Nepi									
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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)									
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 A	Amt Added	%R	Limits	6	RPD	RPD L	imit
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		0	10
		Nitrite-N			15	mg/L	15	97	90	110		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			



Abso	lute F	Resou s o c i a	rce	(e	P					Por		outh, NH (3-436-200			AI	ν <i>D</i>	Ar	VA.	LY:	SIS	R	EG	UE	SI					5/	1	8	9	10.110			
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Company Nar	me:							Pr	oject	Nam	e: 131	W-STrc	ightur	27											□ Hardness			Iron			de					
Company Add	dress:	100.																	¥					_	Hard			l sno.	cocci	nols	☐ Fluoride		9			
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		00 807						Re	porti		QAP!				U VOC 8260 MADER	0 /(охапе	Gases-List:		O EDB	8.3 Pe	otope			-			TON	teria	9	ate		200		5	
Invoice to:	email: egrotton @bluelectuctor.com											DW Othe			ĵ	only	1,4-Di	st 🗆	H MA	0	09 🗖	AS is	4	C Iuroionty	tant Metals		1	NOT C NT C	□ Bacteria MPN	¥ Nitrite	☐ Sulfate X Bromide		CLPS	picide	HAA	
Email: 64	ماد		Qu	uote #	#					HDES	MtBE,	×	NHC	EP I	1 625.	ides	O P	3 166		ollitar C						ge		5	☐ Herbicides	エ						
PO #:				0	NH F	leimb	urser	nent Pricin	0		8260 NHDES	☐ VOC BTEX MtBE, only	☐ GR0 8015 X 1,4-Dioxane	☐ VOC 524.2 NH List	☐ TPH 8100 ☐ DRO 8015 ☐ EPH MADEP	☐ 8270ABN ☐ 625.1	☐ 8082 PCB ☐ 8081 Pesticides ☐ 608.3 Pest/PCB	☐ PFAS 537.1 ☐ PFAS 533 ☐ PFAS isotope dilution	☐ 0&G 1664 ☐ Mineral 0&G 1664	Conductivity	D Priority Pollutant Metals			O TKN	☐ Bacteria P/A	☐ Sulfide X Nitrate	Chloride	☐ Ignitibility/FP	9	- 1		0				
Lab			S		Matri	_	Dro	serva		-					□ V0C 8	V0C	GRC	VOC	3RO 8	270A	3081	PFAS	Miner	Con	Pric		☐ Dissolved Metals-list:	00	□ Ba	fide		gnitib	TCL	☐ Grain Size	+	Composite (C)
Sample	Fi	ield	# CONTAINERS		I	1	FIE	Serve	illon	Meti	iou	58	mpling	~			10000	2	0	ő	õ	-	0	2 8		sil-lis	Meta	0		ns 🗆	□ Nitrite	0	co		5	Com
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(Lab Use Only)			00 #	WATER	SOLID	OTHER	豆	HNO3	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260	□ V0C 624.1	☐ VPH MADEP	☐ V0C 524.2	FT.	☐ 8270PAH	□ 808	□ PFA	080	מבים שבים	D RCRA Metals	Total Metals-list	Diss	☐ Ammonia ☐ COD	☐ T-Phosphorus	Cyanide	☐ Nitrate	Corrosivity	O TCLP Metals	Subcontract:	+	Grab (G)
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124 Heritage Avenue #16

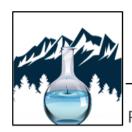
CHAIN-OF-CUSTODY RECORD

Sample Receipt Condition Report 57189 **Absolute Resource Associates** Job Number: □-UPS □-FedEx □-USPS-Lab Courier □-Client Drop-off Samples Received from: D-Yes □-No DN/A_ Custody Seals - present & intact: □-Yes □-No CoC signed: Sampled < 24 hrs ago? □-Yes 1-No □-Yes □-No □-N/A Samples on ice? Receipt Temp: PFAS-only real ice? □-Yes □-No □-N/A Any signs of freezing? □-Yes U-No Comments: Check pH for ALL applicable* Bottle Size/Type & Quantity Preservation samples and document: / Analysis 40mL(G) 250mL(P) 500mL(P) 1L(G) HCl HNO₃ 125mL(P) 250mL(P) 500mL(P) H₂SO₄ 40mL(G) 60mL(P) 125mL(P) 250mL(P) 500mL(P) 125mL(P) 250mL(P) NaOH 60mL(P) 250mL(P) 125mL(P) (NH₄)₂SO₄ ZnAc-NaOH 250mL(P) 125mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G 125mL(P) 250mL (P) Trizma Residual Cl not present: 250mL (P) NH₄Ac 125mL(P) ABN625____Pest608_ 120mL(P) NaS2O3 40mL(G) Bacteria ResCl √by analyst MeOH 20mL(G) 40mL(G) PC Dry applicable? Y None (solid) 2oz(G) 4oz(G) 8oz(G) Syringe 1L(G) 1L (P) 500mL(P) 125mL(P) 250mL(P) None (water) 40ml (G) 60mL(P) 60m L G 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: NO3, NO2,0-PO4, 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? (Or must be rejected) Compliance samples have no discrepancies/require no flags? Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests Inspected and Received By: Date/Time: Peer Review Checklist Analyses in Correctly ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Sample IDs ☐ Project Name ☐ PO# (if provided) Matrix -references ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected -wastewater methods Notes from CoC in LIMS ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Date: Reviewed By: What was sent? Notes: (continue on back as needed) Initials Date Uploaded / PDF Report / Data / EDD / Invoice Report / Data / EDD / Invoice Uploaded / PDF

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Report / Data / EDD / Invoice

Uploaded / PDF



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: Work Order #:

06/08/2021 2106-00285

Client Job #:

06/02/2021

Date Received: 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

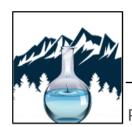
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

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

DATE AND TIME RECEIVED:

Passes

Attention

Fails EPA Primary

Fails EPA Secondary

Fails State Guideline

RECEIPT TEMPERATURE:

ANALYSIS PACKAGE:

DATE AND TIME COLLECTED: 05/27/2021

Legend

09:00AM 06/02/2021

10:00AM

HAA GSA

ON ICE 3.1° CELSIUS

MORE LOC INFO: **CLIENT JOB #:**

MORE EGO INI O.	CLIENT GOD #.								
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 04:55AM



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

Passes Fails EPA Primary

Legend

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 IOR #

MURE LUC INFU:	CLIENT JUB #:								
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 05:36AM

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

Donald a. D.



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 06/02/2021

10:00AM 09:00AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE:

RECEIPT TEMPERATURE:

HAA GSA

ON ICE 3.1° CELSIUS

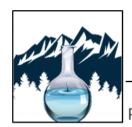
MORE LOC INFO:

CLIENT IOR #.

MUKE LUC INFU.					CLIE	NI JUD#.			
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/05/2021 06:16AM

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

Donald a. D.



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

Attention DATE AND TIME COLLECTED:

05/27/2021 **DATE AND TIME RECEIVED:** 06/02/2021

Fails EPA Primary

Fails EPA Secondary

Fails State Guideline

Legend

09:00AM

09:00AM

ANALYSIS PACKAGE: HAA GSA

Passes

RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	6/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/05/2021 06:57AM
2.3-Dibromopropionic Acid	94	%	√			70-130%	FPA 552.2 - SS	KV-NH 0	6/05/2021 06:57AM

Donald a. D 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

Fails State Guideline Attention

DATE AND TIME COLLECTED: 05/27/2021 **DATE AND TIME RECEIVED:** 06/02/2021

Passes

ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.1° CELSIUS

Fails EPA Primary

Fails EPA Secondary

Legend

09:00AM

09:00AM

MORE LOC INFO:					CLIE	NT 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 0	06/04/2021 08:50AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/05/2021 07:38AM
2,3-Dibromopropionic Acid	80	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	06/05/2021 07:38AM

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

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Invoice to:									porti nits:		QAPI EPA		GW-1 Other	S-1		SAMPLER SAMPLER OVOC 8260 OVOC 8260 NHDES OVOC 8260 MADEP OVOC 624.1 OVOC BTEX MRB., only OVOC 8021VT OVPH MADEP GRO 8015 A 1.4-Dioxane OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVOC 524.2 OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVOC 524.2 NH List Gases-List: OVERANDER OVERANDER OVOC 524.2 NH AND STATES OVOC 50. NM AND S							Na C	icides	9	.										
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Lab			3S		Matrix	x	Pre	serva	-		_			npling	-	\forall	☐ VOC 8260 NHDES	□ VOC BTEX MtBE,	E 64	☐ VOC 524.2 NH LIST	□ 8270ABN	☐ 8081 Pesticides	PFAS 537.1 \square PFAS 533 \square PFAS isotope dilution	□ Mineral 0&G 1664	pp H 🗆 BOD (Conductivity (Turbidity Apparent Color	STO		☐ Dissolved Metals-list:	☐ Ammonia ☐ C0D	☐ T-Phosphorus A Bacteria P/A	□ Sulfide Witrate	Nitrate Wiltrite A Chloride			1	+ mpos
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 57190
57 Dresser Hill Road Date Received: 5/27/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/10/2021

Total number of pages: 44

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

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



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
IV 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



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
				Zine in water by 200.6



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



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	,
Taw-DIOO	v v alti	512112021 10.00	J7 190-010	Direct Analysis Prep for Drinking Water
				Iron in water by 200.8
				-
OOD EIL DIGG	\A.	F10710004 40 00	F7400 044	Manganese in water by 200.8
GSP Filter-DISS	Water	5/27/2021 10:00	57190-011	B. (A.) B. (B.)
				Direct Analysis Prep for Drinking Water
				Iron in water by 200.8 Manganese in water by 200.8



Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Field Blank	Water	5/27/2021 0:00	57190-012	MA DEACC and the comment in Material EDA 507.4
				MA PFAS6 analyte summation in Water by EPA 537.1
				PFAS in Water by EPA 537.1



Job ID: 57190

Sample#: 57190-003
Sample ID: GSP Filter
Matrix: Water

Sampled: 5/27/21 10:00

		Reporting	J		Instr Dil'n	n F	rep		Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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

-		Reporting		Instr Dil'n Prep		rep	Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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

	Reporting				Instr Dil'n		Prep		Analysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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



Job ID: 57190

Sample#: 57190-007 Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

		Reporting			Instr Dil'r	1	Prep	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e Time	Batch	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

•		Reporting		Instr Dil'n Prep		Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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

Job ID: 57190

Sample#: 57190-001 Sample ID: GSP CBW

Matrix: Water

Sampled: 5/26/21 12:30

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date Time Time Reference **Parameter** Result Limit DL Units Batch Date 1,4-dioxane 0.53 0.25 0.12 ug/L LMM 2101601 6/5/21 8:35 SW8260Dmod

Sample#: 57190-002 Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Date Time Reference **Parameter** Result Units Time Batch DL 1.4-dioxane 0.66 0.25 0.12 LMM 2101601 6/5/21 9:07 SW8260Dmod ug/L

Sample#: 57190-003 Sample ID: GSP Filter Matrix: Water

Sampled: 5/27/21 10:00

Reporting Prep **Analysis** Instr Dil'n Factor Analyst Date **Parameter** Result Limit DL Units Time Batch Date Time Reference 1,4-dioxane 0.91 0.25 0.12 ug/L LMM 2101601 6/5/21 9:38 SW8260Dmod

Sample#: 57190-004 Sample ID: UV Effluent Matrix: Water

Sampled: 5/27/21 10:00

Reporting **Analysis** Prep Instr Dil'n Time Reference Limit Factor Analyst Date Time Date **Parameter** Result DL Units Batch U 0.25 1,4-dioxane 0.12 ug/L LMM 2101601 6/5/21 10:10 SW8260Dmod

Sample#: 57190-006 Sample ID: Maher Raw Matrix: Water

Sampled: 5/27/21 9:00

Reporting Prep **Analysis** Instr Dil'n **Parameter** Result Limit DL Units Factor Analyst Date Time Batch Date Time Reference U 0.25 0.12 2101601 6/5/21 10:41 SW8260Dmod 1,4-dioxane ug/L LMM



Job ID: 57190

Sample#: 57190-007 Sample ID: Maher GSP Matrix: Water

Sampled: 5/27/21 9:00

Reporting Instr Dil'n Prep **Analysis** Date Time Reference Parameter Limit DL Units Factor Analyst Date Time Batch Result 1,4-dioxane U 0.25 0.12 ug/L LMM 2101601 6/5/21 11:13 SW8260Dmod

Sample#: 57190-008 Sample ID: Maher UV Matrix: Water

		Reporting			Instr Dil'n	F	rep	Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference	
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM		2101601	6/5/21	11:45 SW8260Dmod	1



Job ID: 57190

Sample#: 57190-002

Sample ID: Raw Matrix: Water

Sampled: 5/27/21 10:00

		Reporting			Instr Dil'n Prep			Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	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

		Reporting			Instr Dil'r	1	Pre	ep	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n	ì	Pre	е р	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	Date	Time Reference
Calcium	19	0.50	0.013	mg/L	1	AGN	6/7/21	16:37	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



Job ID: 57190

Sample#: 57190-005 Sample ID: GAC

Matrix: Water

Sampled: 5/27/21 10:00

		Reporting				1	Pre	eр	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'r	1	Pre	ер	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'r	1	Pre	ep	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

Job ID: 57190

Sample#: 57190-008
Sample ID: Maher UV
Matrix: Water

Sampled: 5/27/21 9:00

		Reporting			Instr Dil'r	1	Pre	еp	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n Prep			Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n	n Prep			Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n	1	Pre	ep	Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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



Job ID: 57190

Sample#: 57190-001 Sample ID: GSP CBW Matrix: Water

Sampled: 5/26/21 12:30

Reporting Instr Dil'n Prep **Analysis** Parameter Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units Total Dissolved Solids (TDS) 95 20 7.5 mg/L SFM 2101566 6/2/21 14:25 SM2540C 2101504 5/28/21 12:15 SM2540D Total Suspended Solids (TSS) 220 110 52 mg/L SFM

Sample#: 57190-002

Sample ID: Raw Matrix: Water

		Reporting		Instr Dil'r	ı F	Prep		Anal	ysis	
Parameter	Result	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	ι	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	6.8 H			рН	1	SFM		2101511	5/28/21	10:33 SM4500H+B
H = Sample was r	eceived beyond	method ho	lding time	e.						
Turbidity	U	1.0	0.40	NTU	1	AGN		2101503	5/28/21	11:44 SM2130B

Job ID: 57190

Sample#: 57190-003
Sample ID: GSP Filter
Matrix: Water

Sampled: 5/27/21 10:00

	l	Reporting		Instr Dil'r	ı F	rep		Anal	ysis	
Parameter	Result	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	ı	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	7.5 H			рН	1	SFM		2101511	5/28/21	10:38 SM4500H+B
H = Sample was re	eceived beyond	method ho	lding tim	e.						
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

		Reporting			Instr Dil'n	•		Analysis		
Parameter	Result	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	l	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	7.6 H			рН	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

		! "			Instr Dil'n Prep			Analysis			
Parameter	Result	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	ι	umhos/cm	1	SFM			2101528	6/1/21	14:00 SM2510B
рН	7.9 H			рН	1	SFM			2101511	5/28/21	11:03 SM4500H+B

H = Sample was received beyond method holding time.



Job ID: 57190

Sample#: 57190-006 Sample ID: Maher Raw

Matrix: Water

Sampled: 5/27/21 9:00

	I	Reporting					rep	Anal		ysis
Parameter	Result	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	ι	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	6.1 H			рН	1	SFM		2101511	5/28/21	11:13 SM4500H+B
H = Sample was	received beyond	method ho	lding time	e.						
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

		Reporting	! ·		Instr Dil'r	ı F	Prep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	6.4 H			рН	1	SFM		2101511	5/28/21	11:24 SM4500H+B
H = Sample was	s received beyond	method hold	ding time	e.						
Turbidity	U	1.0	0.40	NTU	1	AGN		2101503	5/28/21	11:46 SM2130B

Job ID: 57190

Sample#: 57190-008
Sample ID: Maher UV
Matrix: Water

Sampled: 5/27/21 9:00

	F	Reporting	J		Instr Dil'n	1	Pr	e p		Anal	ysis	
Parameter	Result	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 fo	r the matrix sp	ike was 77	%. The	acceptano	ce criteria is	90-110%	All othe	er associat	ed QC sam	oles were	accepta	able.
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	ι	ımhos/cm	1	SFM			2101528	6/1/21	14:00	SM2510B
рН	7.3 H			рН	1	SFM			2101511	5/28/21	11:32	SM4500H+B
H = Sample was rec	eived beyond ı	method ho	lding time	Э.								
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

		Reporting			Instr Dil'n			Analysis		
Parameter	Result	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	l	umhos/cm	1	SFM		2101528	6/1/21	14:00 SM2510B
рН	7.5 H			рН	1	SFM		2101511	5/28/21	11:44 SM4500H+B

H = Sample was received beyond method holding time.

Job ID: 57190

Sample#: 57190-002

Sample ID: Raw Matrix: Water

Sampled: 5/27/21 10:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Time Reference Result DL Units Batch Date Total Organic Carbon (TOC) 0.63 J 1.0 0.59 mg/L DBV 2101548 6/2/21 14:57 SM5310C

Sample#: 57190-003
Sample ID: GSP Filter
Matrix: Water

Sampled: 5/27/21 10:00

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date **Parameter** Result Limit DL Units Time Batch Date Time Reference Total Organic Carbon (TOC) 1.0 0.59 DBV 2101548 6/2/21 15:15 SM5310C 1.1 mg/L

Sample#: 57190-004
Sample ID: UV Effluent
Matrix: Water

Sampled: 5/27/21 10:00

Reporting **Analysis** Instr Dil'n Prep Limit Factor Analyst Date Time Reference **Parameter** Result DL Units Time Batch Date Total Organic Carbon (TOC) 1.0 1.0 0.59 DBV 2101548 6/2/21 15:33 SM5310C mg/L

Sample#: 57190-005 Sample ID: GAC Matrix: Water

Sampled: 5/27/21 10:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Time Date Time Reference **Parameter** Result DL Units Batch Total Organic Carbon (TOC) U 1.0 0.59 mg/L DBV 2101548 6/2/21 15:52 SM5310C

Sample#: 57190-006
Sample ID: Maher Raw
Matrix: Water

Sampled: 5/27/21 9:00

Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit DL Units Factor Analyst Date Time Batch Date Time Reference Total Organic Carbon (TOC) 1.0 1.0 0.59 DBV 2101548 6/2/21 16:10 SM5310C mg/L

Sample#: 57190-007 Sample ID: Maher GSP Matrix: Water

		Reporting			Instr Dil'r	ı P	rep		Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference		
Total Organic Carbon (TOC)	0.62 J	1.0	0.59	ma/l	1	DBV		2101548	6/2/21	16:29 SM5310C		



Job ID: 57190

Sample#: 57190-001 Sample ID: GSP CBW Matrix: Water

Sampled: 5/26/21 12:30

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst** Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.9 U 1.9 0.30 ng/L **ACA** 6/8/21 13948 6/9/21 14:08 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.9 U 1.9 0.38 ng/L 1 6/8/21 13948 6/9/21 14:08 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.9 U 1.9 0.32 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 3.6 1.9 0.49 ng/L 1 6/8/21 13948 6/9/21 14:08 **ACA** perfluorodecanoic acid (PFDA) 0.44 J 1.9 0.33 ng/L 1 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 na/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 ng/L ACA perfluorohexanoic acid (PFHXA) 1 6/8/21 13948 6/9/21 14:08 12 1.9 0.34 perfluorononanoic acid (PFNA) 2.1 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 1.9 0.44 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) 1.9 0.32 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 19 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 0.13 1 **ACA** 6/8/21 13948 6/9/21 14:08 1.9 ng/L 1.9 U ACA perfluoroundecanoic acid (PFUNA) 1.9 0.31 ng/L 1 6/8/21 13948 6/9/21 14:08 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.38 **ACA** 13948 6/9/21 1.9 U 1.9 ng/L 1 6/8/21 14:08 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.9 U 1.9 0.39 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.9 U 1.9 0.18 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:08 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR ACA 95 70-130 % 1 6/8/21 13948 6/9/21 14:08 13C2-PFDA SUR 70-130 % 1 **ACA** 6/8/21 13948 6/9/21 14:08 111 ACA D5-NEtFOSAA SUR 100 70-130 % 1 6/8/21 13948 6/9/21 14:08 13C3-HFPO-DA SUR 70-130 % 1 ACA 91 6/8/21 13948 6/9/21 14:08 1 Sum of MA PFAS6 Analytes (MAPFAS6) 1.9 2101663 88 ng/L

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



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

Job ID: 57190

Sample#: 57190-002 Sample ID: Raw

Matrix: Water

Sampled: 5/27/21 10:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L WAS 6/1/21 13921 6/1/21 18:44 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid WAS 1.7 U 1.7 0.34 ng/L 1 6/1/21 13921 6/1/21 18:44 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 3.8 1.7 0.43 ng/L 1 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 0.34 na/L 1 WAS 6/1/21 13921 6/1/21 18:44 1.7 ng/L WAS perfluorohexanoic acid (PFHXA) 1 6/1/21 13921 6/1/21 18:44 11 1.7 0.30 perfluorononanoic acid (PFNA) 2.2 0.39 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 1.7 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) 1.7 0.29 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 19 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 0.11 WAS 6/1/21 13921 6/1/21 18:44 17 ng/L 1 0.66 J 0.28 WAS perfluoroundecanoic acid (PFUNA) ng/L 1 6/1/21 13921 6/1/21 18:44 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.7 U 0.34 1.7 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.16 ng/L 1 WAS 6/1/21 13921 6/1/21 18:44 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR WAS 109 70-130 % 1 6/1/21 13921 6/1/21 18:44 13C2-PFDA SUR 70-130 % 1 WAS 6/1/21 13921 6/1/21 18:44 114 WAS D5-NEtFOSAA SUR 96 70-130 % 1 6/1/21 13921 6/1/21 18:44 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/1/21 13921 6/1/21 109 18:44 Sum of MA PFAS6 Analytes (MAPFAS6) 92 1.7 1 2101532 ng/L

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



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

Job ID: 57190

Sample#: 57190-005 Sample ID: GAC Matrix: Water

Method Reference: E537.1		Reporting	n		Dil'n		Prep	Α	nalysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch Date	,
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 6/1/2	1 18:59
n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921 6/1/2	l 18:59
n-methylperfluorooctane sulfonamido acetic acid (NMEFOSAA)	1.7 U	1.7	0.28	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorobutane sulfonic acid (PFBS)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorodecanoic acid (PFDA)	2.0	1.7	0.30	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorododecanoic acid (PFDOA)	0.95 J	1.7	0.37	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluoroheptanoic acid (PFHPA)	1.6 J	1.7	0.29	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorohexane sulfonic acid (PFHXS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorohexanoic acid (PFHXA)	0.84 J	1.7	0.30	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorononanoic acid (PFNA)	2.2	1.7	0.39	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorooctane sulfonic acid (PFOS)	1.7 U	1.7	0.35	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorooctanoic acid (PFOA)	1.9	1.7	0.29	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorotetradecanoic acid (PFTEA)	1.7 U	1.7	0.43	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluorotridecanoic acid (PFTRIA)	1.7 U	1.7	0.11	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
perfluoroundecanoic acid (PFUNA)	1.4 J	1.7	0.28	ng/L	1	WAS	6/1/21	13921 6/1/2	18:59
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CLPF3OUDS)	1.7 U	1.7	0.34	ng/L	1	WAS	6/1/21	13921 6/1/2	l 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 6/1/2	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 6/1/2	l 18:59
Surrogate Recovery		Limits							
13C2-PFHxA SUR	102	70-130)	%	1	WAS	6/1/21	13921 6/1/2	l 18:59
13C2-PFDA SUR	119	70-130)	%	1	WAS	6/1/21	13921 6/1/2	l 18:59
D5-NEtFOSAA SUR	96	70-130)	%	1	WAS	6/1/21	13921 6/1/2	18:59
13C3-HFPO-DA SUR	108	70-130)	%	1	WAS	6/1/21	13921 6/1/2	18:59
Sum of MA PFAS6 Analytes (MAPFAS6)	6.1	1.7		ng/L	1		2	2101663	

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



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

Job ID: 57190

Sample#: 57190-006 Sample ID: Maher Raw Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1

Method Reference: E537.1		Reportin	g		Dil'n		Prep	An	alysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch 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		2	2101532	

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



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

Job ID: 57190

Sample#: 57190-007 Sample ID: Maher GSP

Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst** Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L **ACA** 6/8/21 13948 6/9/21 14:24 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.7 U 1.7 0.34 ng/L 1 6/8/21 13948 6/9/21 14:24 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) ACA 14:24 1.9 1.7 0.43 ng/L 1 6/8/21 13948 6/9/21 **ACA** perfluorodecanoic acid (PFDA) 0.41 J 1.7 0.29 ng/L 1 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 0.34 na/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 1.7 ng/L ACA perfluorohexanoic acid (PFHXA) 27 1 6/8/21 13948 6/9/21 14:24 1.7 0.30 perfluorononanoic acid (PFNA) 7.5 0.39 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 1.7 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) 1.7 0.29 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 15 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 0.11 1 **ACA** 6/8/21 13948 6/9/21 14:24 1.7 ng/L 1.7 U 0.28 ACA 14:24 perfluoroundecanoic acid (PFUNA) ng/L 1 6/8/21 13948 6/9/21 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.34 **ACA** 6/8/21 13948 6/9/21 1.7 U 1.7 ng/L 1 14:24 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.16 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:24 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR ACA 14:24 94 70-130 % 1 6/8/21 13948 6/9/21 13C2-PFDA SUR 70-130 % 1 **ACA** 6/8/21 13948 6/9/21 14:24 98 ACA 14:24 D5-NEtFOSAA SUR 97 70-130 % 1 6/8/21 13948 6/9/21 13C3-HFPO-DA SUR 70-130 % 1 ACA 14:24 89 6/8/21 13948 6/9/21 1 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 2101663 140 ng/L

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



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

Job ID: 57190

Sample#: 57190-008 Sample ID: Maher UV Matrix: Water

Sampled: 5/27/21 9:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis** Limit **Parameter** Result **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.27 ng/L WAS 6/1/21 13921 6/2/21 6:20 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.8 U 1.8 0.34 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.29 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 6:20 2.0 1.8 0.44 ng/L 1 6/1/21 13921 6/2/21 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 na/L 1 WAS 6/1/21 13921 6/2/21 6:20 ng/L WAS perfluorohexanoic acid (PFHXA) 27 1 6/1/21 13921 6/2/21 6:20 1.8 0.30 perfluorononanoic acid (PFNA) 7.3 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 1.8 0.40 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) 1.8 0.29 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 14 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 0.11 WAS 6/1/21 13921 6/2/21 6:20 1.8 ng/L 1 1.8 U WAS 6:20 perfluoroundecanoic acid (PFUNA) 1.8 0.28 ng/L 1 6/1/21 13921 6/2/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.35 13921 6/2/21 6:20 1.8 U 1.8 ng/L 1 WAS 6/1/21 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.35 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.16 ng/L 1 WAS 6/1/21 13921 6/2/21 6:20 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR WAS 6:20 104 70-130 % 1 6/1/21 13921 6/2/21 13C2-PFDA SUR 70-130 % 1 WAS 6/1/21 13921 6/2/21 6:20 125 WAS D5-NEtFOSAA SUR 96 70-130 % 1 6/1/21 13921 6/2/21 6:20 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/1/21 13921 6/2/21 6:20 112 Sum of MA PFAS6 Analytes (MAPFAS6) 1 2101532 140 1.8 ng/L

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



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

Job ID: 57190

Sample#: 57190-012 Sample ID: Field Blank Matrix: Water

Sampled: 5/27/21 0:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis** Limit **Parameter** Result **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.8 U 1.8 0.28 ng/L WAS 6/1/21 13921 6/2/21 6:36 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.8 U 1.8 0.36 ng/L 1 WAS 6/1/21 13921 6/2/21 6:36 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.8 U 1.8 0.30 ng/L 1 WAS 6/1/21 13921 6/2/21 6:36 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.8 U WAS 6:36 1.8 0.46 ng/L 1 6/1/21 13921 6/2/21 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 na/L 1 WAS 6/1/21 13921 6/2/21 6:36 WAS perfluorohexanoic acid (PFHXA) 1.8 U 1 6/1/21 13921 6/2/21 6:36 1.8 0.32 ng/L perfluorononanoic acid (PFNA) 1.8 U 0.41 ng/L 1 WAS 6/1/21 13921 6/2/21 6:36 1.8 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 WAS 6/1/21 13921 6/2/21 6:36 ng/L 1 1.8 U WAS 6:36 perfluoroundecanoic acid (PFUNA) 1.8 0.30 ng/L 1 6/1/21 13921 6/2/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 1.8 U 0.36 13921 6/2/21 6:36 1.8 ng/L 1 WAS 6/1/21 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.8 U 1.8 0.37 ng/L 1 WAS 6/1/21 13921 6/2/21 6:36 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.8 U 1.8 0.17 ng/L 1 WAS 6/1/21 13921 6/2/21 6:36 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR WAS 6:36 115 70-130 % 1 6/1/21 13921 6/2/21 13C2-PFDA SUR 70-130 % 1 WAS 6/1/21 13921 6/2/21 6:36 127 WAS D5-NEtFOSAA SUR 104 70-130 % 1 6/1/21 13921 6/2/21 6:36 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/1/21 13921 6/2/21 121 6:36 Sum of MA PFAS6 Analytes (MAPFAS6) 1.8 U 1.8 1 2101532 ng/L

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



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

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

- QC Report -

			- QC Nepi	J1 t								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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)									
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 A	mt Added	%R	Limits		RPD	RPD I	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 A	mt Added	%R	Limits		RPD	RPD Lin
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	1
		Nitrite-N	57189-003	<	0.1	mg/L						1
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	LCSD2101519	Bromide			9.5	mg/L	10	95	90	110		0 1
		Chloride			98	mg/L	100	98	90	110		1 1
		Nitrate-N			9.9	mg/L	10	99	90	110		0 1
		Nitrite-N			15	mg/L	15	97	90	110		0 1
		Sulfate			97	mg/L	100	97	90	110		0 1
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 1
SM2120B	DUP2101509	Apparent Color	57139-001		8	CU					0	2
SM2120B	DUP2101509	Apparent Color	57139-005		8	CU					0	2
SM2120B	LCS2101509	Apparent Color			35	CU	35		30	40		
CM2120D	PB2101509	Apparent Color			E	CII			E			
SM2120B	F DZ 101309	Apparent Color		<	5	CU			5			
SM2120B	BLK2101510	True Color		<	5	CU			5			
SM2120B	DUP2101510	True Color	57187-001	<	5	CU						2
SM2120B	LCS2101510	True Color			35	CU	35		30	40		



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limits	i	RPD	RPD	Limit
SM2320B	CCVB2101535	Alkalinity, Total (as CaCO3)			6.04	рН			5.94	6.06			
SM2320B	CCVE2101535	Alkalinity, Total (as CaCO3)			4.06	рН			3.94	4.06			
SM2320B	CCVM2101535	Alkalinity, Total (as CaCO3)			4.06	рН			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	5)		300	mg/L	323	93	75	125			
SM2540D	LCSD2101504	Total Suspended Solids (TSS	5)		310	mg/L	323	97	75	125		4	20
SM2540D	PB2101504	Total Suspended Solids (TSS	5)	<	2.5	mg/L							
SM4500H+B	DUP2101511	рН	57136-001		8.3	рН							
SM4500H+B	DUP2101511	рН	57179-001		8.1	рН							
SM4500H+B	DUP2101511	рН	57186-001		7.3	рН							
SM4500H+B	DUP2101511	рН	57190-009		7.4	рН							



Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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	Limit	s RPD	RPD Limit
E537.1	BLK13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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 1	30	
		13C2-PFDA SUR		117			%			70 1	30	
		D5-NEtFOSAA SUR		104			%			70 1	30	
		13C3-HFPO-DA SUR		110			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limit	ts	RPD	RPD Limit
E537.1	DUP13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	LCS13921	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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		Units	Amt Added	%R	Limit	ts	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-chloroeicosafluoro-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)propanoid 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	3 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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	Lim	nits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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		



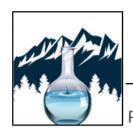
Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57286-001	35	1.8	0.28	ng/L	36	95	70	130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	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-chloroeicosafluoro-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		



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H ₂ SO ₄	40mL(G)	12	60mL(P)	10	125mL(P)		250mL(D)	500mL(P)	-	price	01)
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(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)							
ZnAc-NaOH	125mL(P)		250mL(P)									
Trizma	125mL(P)		250mL (P)	13							*pH ✓ by analyst	:VOC, PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)								Residual Cl no	ot present:
NaS ₂ O ₃	40mL(G)		120mL(P)	5							ABN625	
MeOH	20mL(G)		40mL(G)			Bacteria ResCl	✓by analyst					
None (solid)	20z(G) 1 1	W511	4oz(G)				PC Dry applie	cable? Y N 2				
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QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/17/2021 2106-00933

Client Job #:

06/04/2021

Date Received: 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

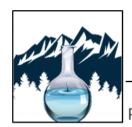
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

06/01/2021 11:00AM

DATE AND TIME RECEIVED: 06/04/2021 12:14PM

ANALYSIS PACKAGE: HAA GSA

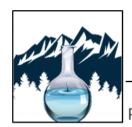
DATE AND TIME COLLECTED:

RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

MORE LOC INFO: CLIENT JOB #:

MORE LOC INFO:					CLIE	NI 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 C	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 C	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	\checkmark		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



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

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

DATE AND TIME COLLECTED:

06/01/2021

11:00AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE: 06/04/2021 12:14PM

HAA GSA

RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

CLIENT JOB #:

MORE LOC INFO:					CLIE	NI 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 0	6/10/2021 09:07AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/15/2021 12:46PM
2,3-Dibromopropionic Acid	82	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/15/2021 12:46PM

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

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124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

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Company Nan								Pro	ject N	lame:	BW	STALA	16HTW	44											SS										
Company Add 57 D/ess Report To: A Phone #: 7- Invoice to: Email: CSP PO #:	ress: e/ Hill Grow 74 Z	Devisor 800	<u> </u>					Pro Pro Acc Pro Rep Lim	ject # ject L credita tocol: corting its:	ation F N g C	on: N Requirement of the term	NH MA M uired? N/N SDW. NHDE GW-1	A NPDE S DOD S-1	_	8260 NHDES ON VOC 8260 MADEP	□ VOC BTEX MtBE, only □ VOC 8021VT	☐ GRO 8015 🗡 1,4-Dioxane	□ VOC 524.2 NH List □ Gases-List:	O EPH	0 625	DPAS 533 DPAS isotope dilution	☐ Mineral 0&G 1664	☐ Conductivity ☐ Turbidity ☐ Apparent Color	☐ TVS ☐ Alkalinity ☐ Acidity	☐ Priority Pollutant Metals ☐ TAL Metals ☐ Hardness			OT CO NOT CO NT	orus — Bacteria P/A — Bacteria MPN — Enterococci Sulfide — Virtrate — Virtite — Ortho P — Phenols	□ Sulfate □ Bromid		C LTCLP SVO	size 🗆 Herbicides 🗆 Asbestos	H445	(C)
					_	□ V0C 8	1 VOC I	□ GRC	1 VOC	☐ DRO 8015	8270A	□ PFAS 533	Miner	L Con	O TS	□ Pri	st:	als-list	000		Tite		□ TCLP V0C	Grain	+	mposit									
Sample ID (Lab Use Only)	I	eld D	# CONTAINERS	WATER	SOLID	ОТНЕВ	HCI	NNO.	PATE DATE MOOH				SAMPLER	□ V0C 8260 □	□ V0C 624.1 □	O VPH MADEP	□ V0C 524.2 □	□ TPH 8100		D 8002 PUB U	□ 0&6 1664 □	008 🗆 Hd 🗅	SOT D SST D	☐ RCRA Metals	☐ Total Metals-list:	☐ Dissolved Metals-list:	□ Ammonia □ C0D	☐ T-Phosphorus		· (2)	☐ TCLP Metals	Subcontract:	TTIM	Grab (G) or Composite (C)	
5722401	Raw		2	X							1	+/6	11:00	AT			X																		
02	GSP F	:Iter	7	X					20 6	er ho	HIE	1	1	-			X												1			10000		X	
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709	GSP C	2(3/U	4	*								V	9:50				Х				×														
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Erik Grotton PO Number: 11204
Blueleaf, Inc. Job ID: 57224
57 Dresser Hill Road Date Received: 6/1/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/11/2021

Total number of pages: 7

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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

Job ID: 57224

Sample#: 57224-002
Sample ID: GSP Filter
Matrix: Water

Sampled: 6/1/21 11:00

		Reporting	l		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ate Time	Batch	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

•		Reporting]		Instr Dil'r	n P	rep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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

Job ID: 57224

Sample#: 57224-001 Sample ID: Raw

Matrix: Water

Sampled: 6/1/21 11:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Time Time Reference **Parameter** Result DL Units Batch Date 1,4-dioxane 0.92 0.25 0.12 ug/L LMM 2101601 6/5/21 12:16 SW8260Dmod

Sample#: 57224-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/1/21 11:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result Units DL 1.4-dioxane 0.83 0.25 0.12 ug/L LMM 2101601 6/5/21 12:47 SW8260Dmod

Sample#: 57224-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/1/21 11:00

Analysis Reporting Instr Dil'n Prep Factor Analyst Date **Parameter** Result Limit DL Units Time Batch Date Time Reference 1,4-dioxane 0.19 J 0.25 0.12 ug/L LMM 2101601 6/5/21 13:19 SW8260Dmod

Sample#: 57224-004
Sample ID: GSP CBW
Matrix: Water

Sampled: 6/1/21 9:00

Prep Reporting **Analysis** Instr Dil'n Time Reference Limit Factor Analyst Date Time Batch Date **Parameter** Result DL Units 0.25 0.12 6/5/21 13:50 SW8260Dmod 1,4-dioxane 0.46 ug/L LMM 2101601



Job ID: 57224

Sample#: 57224-003 Sample ID: UV Effluent

Matrix: Water

Sampled: 6/1/21 11:00

		Reporting			Instr Dil'n	ı Pı	ер		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	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



Job ID: 57224

Sample#: 57224-004 Sample ID: GSP CBW Matrix: Water

Sampled: 6/1/21 9:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst** Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 2.0 U 2.0 0.31 ng/L **ACA** 6/8/21 13948 6/9/21 14:40 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 2.0 U **ACA** 2.0 0.40 ng/L 1 6/8/21 13948 6/9/21 14:40 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 2.0 U 2.0 0.33 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:40 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 3.6 2.0 0.51 ng/L 1 6/8/21 13948 6/9/21 14:40 **ACA** perfluorodecanoic acid (PFDA) 0.43 J 2.0 0.35 ng/L 1 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 na/L 1 **ACA** 6/8/21 13948 6/9/21 14:40 ng/L ACA perfluorohexanoic acid (PFHXA) 0.35 1 6/8/21 13948 6/9/21 14:40 12 2.0 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) 2.0 0.34 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:40 18 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 1 **ACA** 6/8/21 13948 6/9/21 14:40 ng/L 2.0 U ACA perfluoroundecanoic acid (PFUNA) 2.0 0.33 ng/L 1 6/8/21 13948 6/9/21 14:40 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 2.0 U **ACA** 6/8/21 13948 6/9/21 2.0 0.40 ng/L 1 14:40 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 2.0 U 20 0.40 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:40 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 2.0 U 2.0 0.19 ng/L 1 **ACA** 6/8/21 13948 6/9/21 14:40 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % ACA 92 70-130 1 6/8/21 13948 6/9/21 14:40 13C2-PFDA SUR 70-130 % 1 **ACA** 6/8/21 13948 6/9/21 14:40 104 ACA D5-NEtFOSAA SUR 109 70-130 % 1 6/8/21 13948 6/9/21 14:40 13C3-HFPO-DA SUR 70-130 % 1 ACA 88 6/8/21 13948 6/9/21 14:40 2 1 Sum of MA PFAS6 Analytes (MAPFAS6) 2101663 91 ng/L

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



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

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

- QC Report -

			- QC Rep	JIL	_							
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits		RPD	RPD Lim
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 A	mt Added	%R	Limits	6	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	10
		Nitrite-N			15	mg/L	15	97	90	110		0	10



- QC Report -

Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limit	s RI	PD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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 1	130		
		13C2-PFDA SUR		112			%			70 1	130		
		D5-NEtFOSAA SUR		97			%			70 1	130		
		13C3-HFPO-DA SUR		95			%			70 1	130		



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13948	3 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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	Lim	nits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	C	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-chloroeicosafluoro-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		Units	Amt Added	%R	Lim	its	RPD	RPD Limit
E537.1	MS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid 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-chloroeicosafluoro-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		



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Absolute Resourc	e W
associate	SCHOOL

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57224

associates.com							n								AN	IAL	YS	IS	RE	QI	JE	ST														
Company Nan	ne:							Pro	oject	Name	9:13L	V STA	AGHTW A	4											SS											
Blucleat, Inc. Company Address: 57 Diesser Hill Rd. Charlton, MA Report To: Acron Davis Phone #: 774 Zoo 8029 Invoice to: Exil Grotton Email: egrotton & bluelectuatar.com PO #: Lab Sample Field Field Matrix Pres							Property Pro	Project #: \\ ZO\\ Project Location: NH MA ME VT						☐ VOC 8260 NHDES ☐ VOC 8260 MADEP		GRO 8015 X 1,4	□ V0C 524.2 NH List □ Gase	□ DR0 8015 □ EPH I	□ 8270ABN □ 625.1 □ EDB	G 8082 Pub G 8081 Pesticides G 808.3 resyrup	□ Mineral 0&G 1664	☐ pH ☐ BOD ☐ Conductivity ☐ Turbidity ☐ Apparent Color	S OTS OTVS OAlkalinity OAcidity	☐ RCRA Metals ☐ Priority Pollutant Metals ☐ TAL Metals ☐ Hardness	s-list:	Aetals-list:	COD TKN TIN TON DIOC Derrous Iron	☐ Bacteria MPN ☐	Nitrate - Nitrite Ortho P	Minite □ Chloride □ Sulfate □ Bromide □ Fluoride		□ TCLP Metals □ TCLP V0C □ TCLP SV0C □ TCLP Pesticide Subcontract* □ Grain Size □ Herhicides □ Ashestos		1 + HA45	Grab (G) or Composite (C)	
Sample ID (Lab Use Only)		eld D	# CONTAINERS	WATER	SOLID	OTHER	HG.	HNO ₃	H ₂ SO₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260	□ V0C 624.1	O VPH MADEP	☐ VOC 524.2	☐ TPH 8100	□ 8270PAH	E SUSZ PUB	D 0&G 1664	10H □ B00	SOT D SST D	I RCRA Meta	☐ Total Metals-list:	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	☐ T-Phosphorus	Cyanide C	DeNitrate Confrite	Corrosivity	TCLP Metal	Ubcomman.	MILLE	rab (G) or
5722401	GSP F UV EX GSP (See absolut	7 8 4	XXX					8	per h	21 ·	1/6	11:00 4:00	AD V			×××××××××××××××××××××××××××××××××××××××				>									k	×			>	(C)	
Priority (24 h Expedited (4 Standard	r)* 🗆	for sample curren	e acce	eptan redita	nce po ation I	olicy a lists.	and			97			repo	<u> </u>	ر،	7 1		- ^ ^ C	.010		-	_	-	(56									CE G			INO
(10 Business Days) *Date Needed □ HARD COPY REQUIRED □									PDF	(e-ma	all ad	dress)																	TEM				_	3	<u> </u>	_°C
CUSTODY RECORD OSD-01 Revision 03/09/2020 Relinquished by Sampler: Relinquished by Sampler: Relinquished by:									0	Date	Tim Jim Jim Tim	0 }{	F	Rece	ived	by by	Lab	_	ory:						-)	_	(ate ate		_	Time)			
			_											-	_		-	1	5 Ν		A)			-			-	<u> </u>	110	1		D- C	4

Absolute Resource Associates Sample Receipt Condition Report Job Number:													
Absolute Re	source Ass	ocia	tes						Job Numb	er:		/	
Samples Receive	ved from:	Hy li	□-UPS □	J-Fed	IEx □-USI	PS	Lab	Cou	rier D-Clie	ent Dr	op-off		ALEXYALD STA
Custody Seals	present & i	ntact:	□-Yes □	J-No	D-N/A	A			CoC s	igned:		₽-Yes	□-No
Receipt Temp:				n ice	□-Yes	□-N	No D-N/	A	Sampl	ed < 2	24 hrs	ago? -Yes	□-No
					ice? Yes							ng? □-Yes	D-No
Comments:										0		0	
Preservation					Bottle Size/	Type	& Quant	ity		-173	Check	pH for ALL	applicable*
/ Analysis											sampl	es and docun	nent:
HCl	40mL(G)	4	250mL(P)		500mL(P)		1L(G)						
HNO ₃	125mL(P)		250mL(P)		500mL(P)		250 T m		500 F 700				
H ₂ SO ₄	40mL(G)	-	60mL(P)		125mL(P)		250mL(P)		500mL(P)	-			
NaOH	125mL(P) 60mL(P)		250mL(P)		250mL(P)								
(NH ₄) ₂ SO ₄ ZnAc-NaOH	125mL(P)		125mL(P) 250mL(P)		230IIL(F)								
Trizma	125mL(P)		250mL (P)	2							*pH ✓1	by analyst:VOC,	PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)									ual Cl not pre	
NaS ₂ O ₃			120mL(P)					-				525 Pest	
MeOH	40mL(G)							-			Bacteri	ia ResCl √by a	nalyst
	20mL(G)		40mL(G)		9(C)		Comingan				DC D	ry applicable?	Y (N)
None (solid)	2oz(G)	8	4oz(G)	1	8oz(G)		Syringe	-	500I (D)				1L (P)
None (water)	40ml (G)		60mL(P)	1	125mL(P)		250mL(P)		500mL(P)		1L(G)		IL (r)
NHUCI	60m(G)	6						+					
Mold	Cassette		Bulk		Plate		Tape Lift	-					
Asbestos	Cassette		Bulk Bulk	_	Wipe			+-					
Lead	Cassette		Buik		wipe			+					
Login Review	7		SEA			Yes	No 1	N/A	Comments	No. 1			
Proper lab sam		/enoi	igh volume/co	orrect	preservative?	V	0.0	-17	114500		1/2/1	in COSP Til	berhacon
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VOC &TOC W			ottles received	1:		0		-	GPF filt	Lia	other	1,4 vial	ler bag say both VOCY 'CBW Filter'
VOC Solid-MeC			ks Prep Expira	tion C	K?			/	ancian	MAY	trial	is says	CRM HITEL
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Bacteria bottles							,		0				
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Surfactants, Turbid	ity, Odor, CrVI,	errous	Iron, Dissolved (V	DBI	/					
Date, time & II						V							
Rushes commu	nicated to ana	lyst in	writing?					V					
Subcontract no	te on login bo	ard?				~							
Pesticides EPA	608 pH5-9?					ALL A	aron ban's	1					
Compliance san	nples have no	discre	epancies/requ	ire no	flags?	MON	001113	/	(Or must be	rejecte	d)		
Log-in Supervis	or notified in	medi	ately of follow	ing ite	eme:	I	1					imples (NHDI	S, MADEP,
Log-in Supervis	sor nouncd in	medi	atery of follow	ing ne	.1115.	U			DoD etc.) or u	incomn	non requ	uests.	
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		and	Received By:			04		Date,	/Time: 0/1	10			
Peer Review C					22.500						-		
☐ Client ID/I	Project Manag	er	On Ice, T	empe	rature OK?			Sampl	e IDs			Analyses in (Correctly
☐ Project Nar	ne		□ PO# (if p	rovide	ed)			Matrix				-references	
☐ TAT/rushe	s communica	ted	☐ Sub samp	les ser	nt? Shipping Ch	arge?		Date/	Time collected			-wastewater	methods
☐ Received D					ove communic				HTs communi				CoC in LIMS
Reviewed By: Date:													
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Notes: (continue on back as needed) Initials Date What was sent?													
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17 of 17

QSD-04 Rev8 01/06/21 JVG (Page 1 of 1)



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: Work Order #:

06/23/2021 2106-00937

Client Job #:

06/04/2021

Date Received: 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

Donald a. D



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

MORE LOC INFO:

Maher GSP

MA

Legend

Passes
Fails EPA Primary
Fails EPA Secondary
Fails State Guideline

Attention

06/03/2021 09:00AM 06/04/2021 12:14PM

ANALYSIS PACKAGE: HAA GSA

DATE AND TIME COLLECTED:

DATE AND TIME RECEIVED:

RECEIPT TEMPERATURE: ON ICE 5.8° CELSIUS

CLIENT JOB #:

MONE LOO IIII O.					OLIL	111 OOD #.			
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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 04:09PM

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

Donald a. D.



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

MORE LOC INFO:

MA

Legend

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 1:

12:14PM

ANALYSIS PACKAGE: RECEIPT TEMPERATURE: HAA GSA

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	\checkmark		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	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH	06/15/2021 04:50PM

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

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	5 5						5	mil.	2)	
ompany Name:								CALCULATION .		

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57271

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	Email: egr			ful	T	eric	-61-	_	lo.	uote #	#					HDES			¥ Lis	ц ерн марер		I PR		☐ Conductivity X Turbidity		☐ Priority Pollutant Metals	A	+	-	P/A	Cyanide C Sulfide Nitrate + Nitrite C	an d	TCLP VOC TCLP SVOC TCLP Pesticide	☐ Herbicides	7	-1
	PO #:											ursar	nent Pricin	ın.		260 N	VOC BTEX MtBE,	☐ GRO 8015	ed t	2007	3 8270ABN 3 625	☐ PFAS 533	al 0&(ductiv	SVT	ority P	+		D TKN	A Bacteria P/A	N Chio	Indice Canoni	P V00		5	Composite (C)
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	Sample	Fi	eld	# CONTAINERS	-			710	30140	20011	IVICLI	iou	- 0	Impling	Œ	8	1.1	DEP		100		7.1	12		₩TDS	etals	☐ Total Metals-list:	d Met	☐ Ammonia ☐ COD	□ T-Phosphorus	□ Sulfide	1 2	etals	15	The same	* 3 2
	ID		D	TNO	WATER	9	OTHER		်	o"	Ŧ	H	щ	ш	SAMPLER	C 826	□ V0C 624.1	U VPH MADEP	J ¥06 524.2	O TPH 8100	☐ 82270PAH	M PFAS 537.1	3 086 1664	008 □ Hd □	SS	☐ RCRA Metals	otal Me	ssolve	nomm	Phosp	Cyanide Nitrate	Corrosivity	TCLP Metals	Subcontract:	0 50	Grab (G)
	(Lab Use Only)			Ŭ #	WA	SOLID	OT	HCI	HNO3	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAN	□ V0C	0		7			×	8	u u	O TSS	O.	ם	0	O.A.	5	0 0		5	Sub	7	Grat
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57271
57 Dresser Hill Road Date Received: 6/3/21

Charlton, MA 01507

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

Alex Alterisio

Authorized Signature

Date of Approval: 6/15/2021

Total number of pages: 35

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

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
JV 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	,
		0/0/2021 10:00	0.2	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
IV / Efflue = *	\^/_4==	6/3/3034 40:00	E7074 00F	raididity Officer for Differ Metals Affailysis
UV Effluent	Water	6/3/2021 10:00	57271-005	Low lovel 1.4 diayana in water by 9260 SIM
				Low level 1,4-dioxane in water by 8260 SIM Total Organic Carbon by 5310C
CAC	/A/-1-	0/0/0004 40:00	E7074 000	Total Organic Carbon by 33 100
GAC	Water	6/3/2021 10:00	57271-006	MA DEASS analyte summetion in Water by EDA 527.4
				MA PFAS6 analyte summation in Water by EPA 537.1 PFAS in Water by EPA 537.1



Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher Raw	Water	6/3/2021 9:00	57271-007	All III II II A A CAMOOOD
				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
//aher 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 by SM2130B Turbidity Check for Direct Metals Analysis
				Turbidity by SM2130B Turbidity Check for Direct Metals Analysis VOCs Trihalomethanes in water by 524.2



Field ID	Matrix	Date-Time Sampled	Lab#	Analysis
Maher UV	Water	6/3/2021 9:00	Lab# 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
GSP Filter-DISS	Water	6/3/2021 10:00	57271-012	Manganese in water by 200.8 Direct Analysis Prep for Drinking Water Iron in water by 200.8 Manganese in water by 200.8



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



Job ID: 57271

Sample#: 57271-008 Sample ID: Maher GSP Matrix: Water

Sampled: 6/3/21 9:00

		Reporting			Instr Dil'n	1	Pr	ер		Anal	ysis
Parameter	Result	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

·		Reporting	I		Instr Dil'r	1	Pr	ер		Anal	ysis
Parameter	Result	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

Job ID: 57271

Sample#: 57271-001 Sample ID: Raw Matrix: Water

Sampled: 6/2/21 10:00

Analysis Reporting Instr Dil'n Prep Time Reference Limit Factor Analyst Date Time Batch Date **Parameter** Result DL Units 0.25 1,4-dioxane 0.89 0.12 LMM 2101643 6/8/21 12:16 SW8260Dmod ug/L

Sample#: 57271-002 Sample ID: UV Effluent Matrix: Water

Sampled: 6/2/21 10:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit **Factor Analyst Date** Time Batch Date Time Reference Result DL Units U 0.25 1,4-dioxane 0.12 ug/L LMM 2101643 6/8/21 12:48 SW8260Dmod

Sample#: 57271-003
Sample ID: Raw
Matrix: Water

Sampled: 6/3/21 10:00

Reporting **Analysis** Instr Dil'n Prep **Parameter** Result Limit Units **Factor Analyst Date** Time Batch Date Time Reference DL 0.25 0.12 2101643 6/8/21 13:20 SW8260Dmod 1,4-dioxane 1.0 ug/L LMM

Sample#: 57271-004
Sample ID: GSP Filter
Matrix: Water

Sampled: 6/3/21 10:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Time Reference **Parameter** Time **Batch** Date Result DL Units 1,4-dioxane 0.85 0.25 0.12 ug/L LMM 2101643 6/8/21 13:52 SW8260Dmod

Sample#: 57271-005 Sample ID: UV Effluent Matrix: Water

Sampled: 6/3/21 10:00

Reporting **Analysis** Instr Dil'n Prep **Parameter** Limit Factor Analyst Date Time Date Time Reference Result DL Units Batch U 0.25 2101643 6/8/21 14:24 SW8260Dmod 1.4-dioxane 0.12 ug/L LMM



Job ID: 57271

Sample#: 57271-007 Sample ID: Maher Raw Matrix: Water

Sampled: 6/3/21 9:00

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date Date Time Reference **Parameter** Limit DL Units Time **Batch** Result 0.43 0.25 0.12 2101643 6/8/21 14:56 SW8260Dmod 1,4-dioxane ug/L LMM

Sample#: 57271-008 Sample ID: Maher GSP Matrix: Water

Sampled: 6/3/21 9:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit DL Units Factor Analyst Date Time **Batch** Date Time Reference Result 1,4-dioxane 0.37 0.25 0.12 LMM 2101643 6/8/21 15:28 SW8260Dmod ug/L

Sample#: 57271-009
Sample ID: Maher UV
Matrix: Water

Sampled: 6/3/21 9:00

		Reporting			Instr Dil'n	P	rep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor A	Analyst Date	Time	Batch	Date	Time Reference	
1.4-dioxane	U	0.25	0.12	ua/L	1	LMM		2101643	6/8/21	16:00 SW8260Dmo	d



Job ID: 57271

Sample#: 57271-003
Sample ID: Raw

Matrix: Water

Sampled: 6/3/21 10:00

		Reporting	g	Instr Dil'n			Prep			Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n)	Pre	₽p		Analysis				
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Instr Dil'n			Pre	eр		Anal	ysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

	Reporting				Instr Dil'n			eр		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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



Job ID: 57271

Sample#: 57271-009 Sample ID: Maher UV Matrix: Water

Sampled: 6/3/21 9:00

		Instr Dil'n			Pre	eр		Anal	ysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

-		Reporting				Instr Dil'n				Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reportin	g		Instr Dil'r	1	Pre	₽p		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting	g		Instr Dil'n			ер		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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	ma/L	1	AGN	6/7/21	16:47	13946	6/7/21	23:56 E200.8



Job ID: 57271

Sample#: 57271-013 **Sample ID:** Maher GAC

Matrix: Water

Sampled: 6/3/21 9:00

		Reporting	g		Instr Dil'n		Pre	∍p		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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



Job ID: 57271

Sample#: 57271-003

Sample ID: Raw Matrix: Water

Sampled: 6/3/21 10:00

	Rep				Instr Dil'r	า	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ate Time	Batch	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
pН	6.8 H			рН	1	SFM		2101579	6/4/21	7:25 SM4500H+B
H = Sample was	s received beyond	method hol	ding 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

•	Reporting				Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ite Time	Batch	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
рН	7.4 H			рΗ	1	SFM		2101579	6/4/21	7:28 SM4500H+B
H = Sample wa	s received beyond	method hol	ding time).						
Turbidity	U	1.0	0.40	NTU	1	AGN		2101590	6/4/21	16:21 SM2130B

Job ID: 57271

Sample#: 57271-007 Sample ID: Maher Raw Matrix: Water

Sampled: 6/3/21 9:00

	Reporting			Instr Dil'n		Prep		Anal	ysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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	ı	umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	6.5 H			рН	1	WAS			2101645	6/4/21	7:31	SM4500H+B
H = Sample was re	eceived beyond	method hole	ding 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

		Reporting	ng Instr Dil'n			Prep Analysis						
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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	ı	umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	6.4 H			pН	1	WAS			2101645	6/4/21	7:33	SM4500H+B
H = Sample was r	eceived beyon	d method holdi	ng time) .								
Turbidity	U	1.0	0.40	NTU	1	AGN			2101590	6/4/21	16:22	SM2130B

Job ID: 57271

Sample#: 57271-009 Sample ID: Maher UV Matrix: Water

Sampled: 6/3/21 9:00

	Reporting			Instr Dil'n		Prep			Anal	ysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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	ι	umhos/cm	1	SFM			2101638	6/8/21	16:45	SM2510B
pH	7.2 H			рН	1	WAS			2101645	6/4/21	7:37	SM4500H+B
H = Sample was r	eceived beyond	method hold	ding 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

		Reporting			Instr Dil'n		Pr	ер		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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 th	e sample dupl	icate, run as ir	nternal	QC, was o	utside the 5	% accepta	nce ranç	ge. The du	olicate result	is 120 mg	g/L.
Conductivity	180	5	ı	umhos/cm	1	SFM			2101638	6/8/21	16:45 SM2510B
рН	7.4 H			рН	1	WAS			2101645	6/4/21	7:39 SM4500H+B

H = Sample was received beyond method holding time.



Job ID: 57271

Sample#: 57271-003

Sample ID: Raw Matrix: Water

Sampled: 6/3/21 10:00

Reporting Prep **Analysis** Instr Dil'n Time Reference **Parameter** Limit Factor Analyst Date Time Batch Date Result DL Units 0.84 J 1.0 0.59 DBV Total Organic Carbon (TOC) 2101615 6/7/21 14:07 SM5310C mg/L

Sample#: 57271-005 Sample ID: UV Effluent Matrix: Water

Sampled: 6/3/21 10:00

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date Time **Parameter** Result Limit DL Units Batch Date Time Reference 1.0 DBV Total Organic Carbon (TOC) 1.3 0.59 mg/L 2101615 6/7/21 14:26 SM5310C

Sample#: 57271-007 Sample ID: Maher Raw Matrix: Water

Sampled: 6/3/21 9:00

Reporting **Analysis** Instr Dil'n Prep Limit Factor Analyst Date Time Reference **Parameter** Result DL Units Time Batch Date Total Organic Carbon (TOC) 0.82 J 1.0 0.59 mg/L DBV 2101615 6/7/21 14:44 SM5310C

Sample#: 57271-008 Sample ID: Maher GSP Matrix: Water

Sampled: 6/3/21 9:00

Reporting **Analysis** Instr Dil'n Prep Limit Factor Analyst Date Time Date Time Reference **Parameter** Result DL Units **Batch** Total Organic Carbon (TOC) 1.2 1.0 0.59 DBV 2101615 6/7/21 15:03 SM5310C mg/L

Job ID: 57271

Sample#: 57271-003

Sample ID: Raw Matrix: Water

10:00 **Sampled:** 6/3/21

Method Reference: E537.1		Reporting	מ		Dil'n		Prep		Ana	ılysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch	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		2	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.



Job ID: 57271

Sample#: 57271-006 Sample ID: GAC Matrix: Water

10:00 **Sampled:** 6/3/21

Method Reference: E537.1		Reporting	α		Dil'n		Prep	Ana	alysis
Parameter	Result	Limit	-	Units		Analyst	Date	Batch 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		2	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.



Job ID: 57271

Sample#: 57271-007 Sample ID: Maher Raw Matrix: Water

Sampled: 6/3/21 9:00

Method Reference: E537.1

Method Reference: E557.1		Reporting	g		Dil'n		Prep		Ana	lysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch		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-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	17:35
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		2	2101663		

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



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

Job ID: 57271

Sample#: 57271-008 Sample ID: Maher GSP

Matrix: Water

Sampled: 6/3/21 9:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst** Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 ng/L **ACA** 6/8/21 13948 6/9/21 17:51 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid **ACA** 1.7 U 1.7 0.33 ng/L 1 6/8/21 13948 6/9/21 17:51 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) **ACA** 2.3 1.7 0.42 ng/L 1 6/8/21 13948 6/9/21 17:51 0.42 J ACA perfluorodecanoic acid (PFDA) 1.7 0.29 ng/L 1 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 na/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 perfluorohexane sulfonic acid (PFHXS) 32 1.7 0.33 na/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 ng/L ACA perfluorohexanoic acid (PFHXA) 0.29 1 6/8/21 13948 6/9/21 17:51 28 1.7 perfluorononanoic acid (PFNA) 0.38 ng/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 6.3 1.7 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) 1.7 0.28 ng/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 14 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 0.11 1 **ACA** 6/8/21 13948 6/9/21 17:51 1.7 ng/L 1.7 U ACA 17:51 perfluoroundecanoic acid (PFUNA) 0.27 ng/L 1 6/8/21 13948 6/9/21 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 **ACA** 6/8/21 13948 6/9/21 1.7 U 1.7 ng/L 1 17:51 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 **ACA** 6/8/21 13948 6/9/21 17:51 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % ACA 92 70-130 1 6/8/21 13948 6/9/21 17:51 13C2-PFDA SUR 70-130 % 1 **ACA** 6/8/21 13948 6/9/21 17:51 100 ACA D5-NEtFOSAA SUR 108 70-130 % 1 6/8/21 13948 6/9/21 17:51 13C3-HFPO-DA SUR 70-130 % 1 ACA 90 6/8/21 13948 6/9/21 17:51 1 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 2101663 130 ng/L

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



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

Job ID: 57271

Sample#: 57271-009 Sample ID: Maher UV Matrix: Water

Sampled: 6/3/21 9:00

Sampled: 0/0/21 0.00										
Method Reference: E537.1		Reporting)		Dil'n		Prep		Anal	lysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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		2	2101663		

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



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

Job ID: 57271

Sample#: 57271-014

Sample ID: Field Reagent Blank

Matrix: Water

Sampled: 6/3/21 10:00

Method Reference: E537.1		Reporting	q		Dil'n		Prep		Ana	llysis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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-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	18:23
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		2	2101663		

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



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

Quality Control Report



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

Absolute Resource



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

- QC Report -

			- QU Nep	<u> </u>								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits		RPD	RPD Limi
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 A	mt 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 A	mt Added	%R		Limits	5	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 10
		Nitrate-N			9.9	mg/L	10	99		90	110		1 10
		Nitrite-N			15	mg/L	15	99		90	110		0 10
		Sulfate			98	mg/L	100	98		90	110		0 10
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 10
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 A	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	рН			5.94	6.06		
SM2320B	CCVE2101588	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVM2101588	Alkalinity, Total (as CaCO3)			4.04	рН			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						
SM2320B	CCVB2101594	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06		
SM2320B	CCVE2101594	Alkalinity, Total (as CaCO3)			3.98	рН			3.94	4.06		
SM2320B	CCVM2101594	Alkalinity, Total (as CaCO3)			3.97	рН			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		0 10
SM2320B	PB2101594	Alkalinity, Total (as CaCO3)		<	5	mg/L						



Method	QC ID	Parameter	Associated Sample		Result	Units A	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	рН	57205-002		9.4	рН						
SM4500H+B	DUP2101579	pH	57226-001		8.0	рН						
SM4500H+B	DUP2101579	pH	57249-001		7.8	рН						
SM4500H+B	DUP2101579	pH	57268-001		6.6	рН						
SM4500H+B	DUP2101645	рН	57280-001		6.3	рН						
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	s RPD	RPD Limit
E537.1	BLK13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid acid (GenX acid) (HFPODA)	С	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 ad (11CLPF3OUDS)	cid	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 1	30	
		13C2-PFDA SUR		112			%			70 1	30	
		D5-NEtFOSAA SUR		97			%			70 1	30	
		13C3-HFPO-DA SUR		95			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	DUP13948	3 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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	cid57290-002	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	Lin	nits	RPD	RPD Limit
E537.1	LCS13948	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid acid (GenX acid) (HFPODA)	2	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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	cid	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		Units	Amt Added	%R	Lim	its	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-chloroeicosafluoro-3-oxaundecane-1-sulfonic ac (11CLPF3OUDS)	cid57286-001	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		



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124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57271

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	Invoice to: 🛭								Limits: EPA DW Other									₩ 1,4-Dioxane	7	C EPH MADEP	090	☐ PFAS isotope dilution	Z	Turbi	☐ Alkalinity	nt Met		Mh	Z	□ Ba	+ Nitri	A Sullate	CLP S	☐ Herbicides		t	1
			bluelect	Ew	CTE	eric	سائ	_	Quote #								BTEX MtBE,		1		sapic		6-166	/ity	US/	☐ Priority Pollutant Metals	An	+	S OTA	A/A E	itrate -	2	□ TCLP VOC □ TCLP SVOC □ TCLP Pesticide	유	1	7	
	PO #:											□ NH Reimbursement Pricing								8015	Pestic	S 533	ral 08	nductiv	SVT	iority F	w		5	acteria	× 5	A chiloride	LP VO	Size	5	1 K	1
ı	Lab			RS -	1	Vlatrix	x	Pre	serva	ation	Meth	od	Sa	Sampling			1 VOC	☐ GRO 8015	904	C DRO 8015	☐ 8081 Pesticides	₩ PFAS 537.1 □ PFAS 533 □	CJ Mineral 0&G 1664	☐ Conductivity > Turbidity > Apparent Color	O TS	2000	ist:	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	☐ T-Phosphorus ★ Bacteria P/A	Cyanide C Sulfide Nitrate + Nitrite	U Nitrite X Chioric			3	Composite (C)	
	Sample	Fi	eld	AINE											Œ	09	1.4.1	ADEP	1	28	88	37.1	149	800	MTDS.	Netals	etals-	ed Me	nia 🗅	phorus		5 €	fetals		3	6	5
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57271 Sample Receipt Condition Report Job Number: Absolute Resource Associates 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: Check pH for ALL applicable* Bottle Size/Type & Quantity Preservation samples and document: / Analysis 250mL(P) 500mL(P) 1L(G) HCl 40mL(G) 250mL(P) HNO₃ 125mL(P) 500mL(P) 250mL(P) 500mL(P) H₂SO₄ 40mL(G) 60mL(P) 125mL(P) NaOH 125mL(P) 250mL(P) 125mL(P) (NH₄)₂SO₄ 60mL(P) 250mL(P) ZnAc-NaOH 125mL(P) 250mL(P) *pH ✓by analyst:VOC, PFAS, TOC,O&G Trizma 125mL(P) 250mL (P) Residual Cl not present: NH₄Ac 125mL(P) 250mL (P) ABN625___Pest608 NaS2O3 40mL(G) 120mL(P) Bacteria ResCl √by analyst MEOH NIMC 20mL(G) 40mL(G) 60ml6 PC Dry applicable? Y 4oz(G) 8oz(G) None (solid) 2oz(G)Syringe 1L(G) 125mL(P) 250mL(P) 500mL(P) None (water) 40ml (G) 60mL(P) phosphoric acid 40ml Mold Bulk Plate Cassette Tape Lift Bulk Asbestos Cassette Lead Bulk Wipe Cassette or per AJO Login Review Comments Yes No N/A 196321 05 TOC rec. pres w/phosphonic acid Proper lab sample containers/enough volume/correct preservative? PFAS checked off on-05, but no Analyses marked on COC match bottles received? VOC &TOC Water-no headspace? -05 PFAS rec. PFAS recon-06 but VOC Solid-MeOH covers solid, no leaks, Prep Expiration OK? is not checked off on Col un PFAS: Lab specific bottles? QC received, if required? Bacteria bottles provided by ARA? Samples within holding time? Immediate tests communicated in writing: NO₃, NO₂, 9-PO₂, pH BOD, Soliform/E. coli (PD) or MPN), Enterococci (Color Surfactano, 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) Discrepancies, compliance samples (NHDES, MADEP, Log-in Supervisor notified immediately of following items: DoD etc.) or uncommon requests. HE 613121 Date/Time: Inspected and Received By: Peer Review Checklist Analyses in Correctly ☐ Client ID/Project Manager ☐ On Ice, Temperature OK? Sample IDs -references ☐ PO# (if provided) ☐ Project Name Matrix -wastewater methods ☐ TAT/rushes communicated ☐ Sub samples sent? Shipping Charge? Date/Time collected Notes from CoC in LIMS ☐ Received Date/Time ☐ Issues noted above communicated? Short HTs communicated Date: **Initials** What was sent? Notes: (continue on back as needed) Date Report / Data / EDD / Invoice Uploaded / PDF Uploaded / PDF Report / Data / EDD / Invoice Report / Data / EDD / Invoice Uploaded / PDF

OSD-04 Rev8 01/06/21 JVG (Page 1 of 1)

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57365
57 Dresser Hill Road Date Received: 6/10/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/23/2021

Total number of pages: 30

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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	, ,
O V Elliuelli	water	0/10/2021 9.00	37303-003	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

ield 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
laher 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
ield 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
		0/40/0004 40 00	E700E 000	
1aher GAC-DISS	Water	6/10/2021 10:00	<u> </u>	
laher GAC-DISS	Water	6/10/2021 10:00	57365-009	Direct Analysis Prep for Drinking Water
Maher GAC-DISS	Water	6/10/2021 10:00	57305-009	Direct Analysis Prep for Drinking Water Iron in water by 200.8



Job ID: 57365

Sample#: 57365-002
Sample ID: GSP Filter
Matrix: Water

Sampled: 6/10/21 9:00

		Reporting	J		Instr Dil'r	1	Pre	р		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst D	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

		Reporting	J		Instr Dil'r	1	Pre	p		Anal	ysis
Parameter	Result	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

		Reporting	J		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst D	ate 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



Job ID: 57365

Sample#: 57365-006 Sample ID: Maher UV Matrix: Water

-		Reporting	j		Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	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

Job ID: 57365

Sample#: 57365-001 Sample ID: RAW Matrix: Water

Sampled: 6/10/21 9:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Time Reference **Parameter** Result DL Units Time Batch Date 1,4-dioxane 0.23 J 0.25 0.12 ug/L LMM 2101731 6/15/21 15:42 SW8260Dmod

Sample#: 57365-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/10/21 9:00

Reporting Instr Dil'n Prep **Analysis** Limit Factor Analyst Date Time Reference **Parameter** Units Time Batch Date Result DL 1.4-dioxane U 0.25 0.12 LMM 2101731 6/15/21 16:14 SW8260Dmod ug/L

Sample#: 57365-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/10/21 9:00

Reporting Prep **Analysis** Instr Dil'n Factor Analyst Date **Parameter** Result Limit DL Units Time Batch Date Time Reference 1,4-dioxane U 0.25 0.12 ug/L LMM 2101731 6/15/21 16:45 SW8260Dmod

Sample#: 57365-004
Sample ID: Maher Raw
Matrix: Water

Sampled: 6/10/21 10:00

Reporting **Analysis** Prep Instr Dil'n Time Reference Limit Factor Analyst Date Time Date **Parameter** Result DL Units Batch 0.25 2101731 6/15/21 17:16 SW8260Dmod 1,4-dioxane 0.23 J 0.12 ug/L LMM

Sample#: 57365-005 Sample ID: Maher GSP Matrix: Water

Sampled: 6/10/21 10:00

Reporting Prep **Analysis** Instr Dil'n Result **Parameter** Limit DL Units Factor Analyst Date Time Batch Date Time Reference 0.25 0.25 0.12 2101731 6/15/21 17:47 SW8260Dmod 1,4-dioxane ug/L LMM



Job ID: 57365

Sample#: 57365-006 Sample ID: Maher UV Matrix: Water

		Reporting	ing Instr Dil'n Prep Ai				Anal	ysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e Time	Batch	Date	Time Reference	
1,4-dioxane	U	0.25	0.12	ug/L	1	LMM		2101731	6/15/21	18:18 SW8260Dmod	



Job ID: 57365

Sample#: 57365-004 Sample ID: Maher Raw Matrix: Water

Sampled: 6/10/21 10:00

		Reportir	ng		Instr Dil'n	1	Pre	ep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'r	า	•		Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

·		Reporting			Instr Dil'r	Prep			Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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



Job ID: 57365

Sample#: 57365-007 Sample ID: Maher GAC

Matrix: Water

Sampled: 6/10/21 10:00

		Reportin	ng		Instr Dil'n Prep			eр	Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reportin	g		Instr Dil'n	ı	Pre	ep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

Job ID: 57365

Sample#: 57365-003 Sample ID: UV Effluent Matrix: Water

Sampled: 6/10/21 9:00

		Reporting	l		Instr Dil'n	ı Pr	ер		Anal	ysis	
Parameter	Result	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

		D				ъ.			ΛΙ	1 .
		Reporting	9		Instr Dil'r		rep		Anal	,
Parameter	Result	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	ι	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B
рН	6.2 H			рН	1	DJM		2101692	6/11/21	6:17 SM4500H+B
H = Sample was	s received beyon	d method ho	lding time	e.						
Turbidity	U	1.0	0.40	NTU	1	EB		2101695	6/12/21	17:28 SM2130B

Job ID: 57365

Sample#: 57365-005 Sample ID: Maher GSP Matrix: Water

Sampled: 6/10/21 10:00

		Reporting			Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	te 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	ı	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B
рН	6.1 H			рН	1	DJM		2101692	6/11/21	6:19 SM4500H+B
H = Sample was r	received beyon	d method hold	ling tim	e.						
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

·		Reporting	1		Instr Dil'r	n F	Prep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B
рН	6.8 H			рН	1	DJM		2101692	6/11/21	6:26 SM4500H+B
H = Sample was re	eceived beyon	d method ho	lding time	e.						
Turbidity	U	1.0	0.40	NTU	1	EB		2101695	6/12/21	17:31 SM2130B

Job ID: 57365

Sample#: 57365-007 Sample ID: Maher GAC

Matrix: Water

Sampled: 6/10/21 10:00

		Reporting			Instr Dil'r	1	Prep		Analysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst Da	ite 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	ι	umhos/cm	1	WAS		2101702	6/11/21	7:35 SM2510B	
рН	7.2 H			рН	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

		Reporting			Instr Dil'n	ı Pi	rep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference	
Total Organic Carbon (TOC)	U	1.0	0.59	ma/L	1	DBV		2101750	6/16/21	12:14 SM5310C	

Sample#: 57365-005 Sample ID: Maher GSP Matrix: Water

		Reporting			Instr Dil'n	Pi	ер		Anal	ysis	
Parameter	Result	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	



Job ID: 57365

Sample#: 57365-004 Sample ID: Maher Raw Matrix: Water

Sampled: 6/10/21 10:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L WAS 6/16/21 13970 6/16/21 22:45 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 1.9 1.7 0.43 ng/L 1 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 0.34 na/L 1 WAS 6/16/21 13970 6/16/21 22:45 1.7 ng/L perfluorohexanoic acid (PFHXA) 0.29 1 WAS 6/16/21 13970 6/16/21 22:45 28 1.7 perfluorononanoic acid (PFNA) 7.8 0.38 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 1.7 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) 1.7 0.28 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 15 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 0.11 WAS 6/16/21 13970 6/16/21 22:45 17 ng/L 1 1.7 U 0.28 WAS 22:45 perfluoroundecanoic acid (PFUNA) ng/L 1 6/16/21 13970 6/16/21 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 6/16/21 13970 6/16/21 22:45 1.7 U 1.7 ng/L 1 WAS (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.16 ng/L 1 WAS 6/16/21 13970 6/16/21 22:45 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 22:45 94 70-130 1 6/16/21 13970 6/16/21 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 22:45 92 D5-NEtFOSAA SUR 90 70-130 % 1 WAS 6/16/21 13970 6/16/21 22:45 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 89 22.45 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 1 2101749 140 ng/L

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



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

Job ID: 57365

Sample#: 57365-005 Sample ID: Maher GSP Matrix: Water

Sampled: 6/10/21 10:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.26 ng/L WAS 6/16/21 13970 6/16/21 23:01 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.28 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 1.9 1.7 0.42 ng/L 1 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 na/L 1 WAS 6/16/21 13970 6/16/21 23:01 perfluorohexane sulfonic acid (PFHXS) 32 0.33 na/L 1 WAS 6/16/21 13970 6/16/21 23:01 1.7 ng/L perfluorohexanoic acid (PFHXA) 0.29 1 WAS 6/16/21 13970 6/16/21 23:01 30 1.7 perfluorononanoic acid (PFNA) 7.8 0.38 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 1.7 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) 1.7 0.28 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 16 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 0.11 WAS 6/16/21 13970 6/16/21 23:01 1.7 ng/L 1 1.7 U WAS 6/16/21 13970 6/16/21 perfluoroundecanoic acid (PFUNA) 0.27 ng/L 1 23:01 1.7 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 6/16/21 13970 6/16/21 1.7 U 1.7 ng/L 1 WAS 23:01 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.34 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 WAS 6/16/21 13970 6/16/21 23:01 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 99 70-130 1 6/16/21 13970 6/16/21 23:01 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:01 102 D5-NEtFOSAA SUR 92 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:01 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 99 23:01 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 1 2101749 150 ng/L

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



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

Job ID: 57365

Sample#: 57365-006 Sample ID: Maher UV Matrix: Water

Method Reference: E537.1		Reporting	a		Dil'n		Prep		Anal	vsis
Parameter	Result	Limit	_	Units		Analyst	Date	Batch		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-chloroeicosafluoro-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		2	101749		

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



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

Job ID: 57365

Sample#: 57365-008

Sample ID: Field Reagent Blank

Matrix: Water

Sampled: 6/10/21 0:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL** Units Factor Analyst Date Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 ng/L WAS 6/16/21 13970 6/16/21 23:33 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 23:33 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 WAS 6/16/21 13970 6/16/21 23:33 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U WAS 1.7 0.42 ng/L 1 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 na/L 1 WAS 6/16/21 13970 6/16/21 23:33 perfluorohexane sulfonic acid (PFHXS) 1.7 U 1.7 0.33 na/L 1 WAS 6/16/21 13970 6/16/21 23:33 1.7 U ng/L perfluorohexanoic acid (PFHXA) 0.29 1 WAS 6/16/21 13970 6/16/21 23:33 1.7 perfluorononanoic acid (PFNA) 1.7 U 0.37 ng/L 1 WAS 6/16/21 13970 6/16/21 23:33 1.7 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 0.11 WAS 6/16/21 13970 6/16/21 23:33 17 ng/L 1 1.7 U WAS 6/16/21 13970 6/16/21 23:33 perfluoroundecanoic acid (PFUNA) 1.7 0.27 ng/L 1 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 6/16/21 13970 6/16/21 23:33 1.7 U 1.7 ng/L 1 WAS (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 23:33 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 WAS 6/16/21 13970 6/16/21 23:33 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 93 70-130 1 6/16/21 13970 6/16/21 23:33 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:33 96 D5-NEtFOSAA SUR 94 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:33 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:33 91 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 U 1.7 1 2101749 ng/L

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



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

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

- QC Report -

			- QU Nepi	Oit									
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt Added	%R	Limits		RPD	RPD Li	imit
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	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 Ar	mt 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 A	Amt Added	%R	L	imits		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	Ç	90	110			
		Chloride			100	mg/L	100	100	ç	90	110			
		Nitrate-N			10	mg/L	10	100	ç	90	110			
		Nitrite-N			15	mg/L	15	98	ç	90	110			
		Sulfate			99	mg/L	100	99	Ç	90	110			
E300.0A	LCSD2101707	Bromide			9.9	mg/L	10	99	Ç	90	110		0	10
		Chloride			100	mg/L	100	100	ç	90	110		0	10
		Nitrate-N			10	mg/L	10	100	ç	90	110		0	10
		Nitrite-N			15	mg/L	15	99	Ç	90	110		0	10
		Sulfate			99	mg/L	100	99	Ç	90	110		0	10
E300.0A	MS2101707	Bromide	57363-001		1.6	mg/L	1.66	96	Ç	90	110			
		Chloride	57363-001		85	mg/L	16	11	Ç	90	110			
		Nitrate-N	57363-001		5.2	mg/L	1.66	63	* 9	90	110			
		Nitrite-N	57363-001		2.3	mg/L	2.53	92	Ç	90	110			
		Sulfate	57363-001		33	mg/L	16	83	* 9	90	110			
SM2120B	DUP2101689	Apparent Color	57326-010		45	CU						0		20
SM2120B	DUP2101689	Apparent Color	57365-006	<	5	CU								20
	LCS2101689		21.230 000		10	CU	10			5	15			
SM2120B		Apparent Color					IU			5	15			
SM2120B	PB2101689	Apparent Color		<	5	CU				5				



Method	QC ID	Parameter	Associated Sample		Result	Units A	Amt Added	%R	Limits		RPD	RPD	Limit
SM2320B	CCVB2101727	Alkalinity, Total (as CaCO3)			6.01	рН			5.94	6.06			
SM2320B	CCVE2101727	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06			
SM2320B	CCVM2101727	Alkalinity, Total (as CaCO3)			4.03	рН			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	рН	57362-001		6.5	рН							
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	Limi	ts	RPD	RPD Limit
E537.1	BLK13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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		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		Units	Amt Added	%R	Limits	s RPD	RPD Limit
E537.1	DUP13970) 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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 1	30	
		13C2-PFDA SUR	57407-001	99			%			70 1	30	
		D5-NEtFOSAA SUR	57407-001	98			%			70 1	30	
		13C3-HFPO-DA SUR	57407-001	95			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit		Units	Amt Added	%R	Limi	ts	RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoioacid (GenX acid) (HFPODA)	C	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-chloroeicosafluoro-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		Units	Amt Added	%R	Limit	ts	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-chloroeicosafluoro-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		

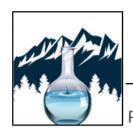


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Sample Receipt Condition Report

57365

Absolute Re	source As	socia		Sall	pie Necei	pic	onai	HOII		Job Numb	er:	31	303	
Samples Receiv			□-UPS □	J-Fee	IEx U -USI	PS		Lab Co				rop-off	O-	
Custody Seals		ntact:		J-No	10-N/A					CoC s			D Yes	□-No
Receipt Temp:			Samples o				No II	N/A			-		o? D-Yes	□-No
receipt remp.		-			ice? Tes								g?	□-No
Comments:			11713-0111	y ICai	ice: 121es	— -1	10	14/11		7111y 51	gns o	1 IICCZIIIĘ	5. – 1 Co	4
Preservation					Bottle Size/	Type	& O11	antity	_			Check	H for ALL	applicable*
/ Analysis					Dottie Size/	Турс	a Qu	antity					and docum	
HCl	40mL(G)	8	250mL(P)		500mL(P)		1L(G)							
HNO ₃	125mL(P)	0	250mL(P)	5	500mL(P)							Olto	-7	
H ₂ SO ₄	40mL(G)	4	60mL(P)		125mL(P)		250ml	L(P)		500mL(P)		PTI		
NaOH	125mL(P)		250mL(P)											
(NH ₄) ₂ SO ₄	60mL(P)	-	125mL(P)		250mL(P)									
ZnAc-NaOH	125mL(P)	-	250mL(P)	7								*-11-/1		DEAC TOCOSC
Trizma	125mL(P)		250mL (P)	1									Cl not pre	PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)	2									5Pest6	
NaS ₂ O ₃	40mL(G)		120mL(P)	5									ResCl ✓ by a	
MeOH	20mL(G)		40mL(G)											6
None (solid)	2oz(G)	12	4oz(G)	0	8oz(G)	1	Syring	- 1	1 2		0		applicable?	
None (water)	40ml (G)	12	60mL(P)	J	125mL(P)	1	250ml	L(P) 1	1	500mL(P)	3	1L(G)		1L (P)
Mtall	60n/ C2	16				, ,			1					
Mold	Cassette		Bulk		Plate		Tape L	ift						
Asbestos	Cassette		Bulk											
Lead	Cassette		Bulk		Wipe									
						Total Control								
Login Review						Yes	s No	NA	C	omments				
Proper lab sam	ple containers	s/enou	igh volume/co	orrect	preservative?	1								
Analyses marke	ed on COC m	atch b	ottles received	1?		-								
VOC &TOC W	Vater-no heads	pace?				1	-							
VOC Solid-MeC	OH covers solid	, no lea	iks, Prep Expira	tion C	K?					- 00	~			
PFAS: ARA bo	ottles & sampl	es/FR	B same Lot#	QC:	rec'd, if req'd?	-			Lo	ot ID#:	105			
Bacteria bottles	s provided by	ARA?				-	-							
Samples within	holding time	?					-							
Immediate test			writing:		~									
NO3, NO2,0-10	oH BOD, Colife	rm/F	coli (P/A) or MPN), Ente	rococci Color	/	DRI	1 .v	1	in en				
Surfactants, Turbid			and the second second	Oxygen	Unpres 624		000	100	ph	UO, EB				
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Rushes commu		-	writing?					/						
Subcontract no	te on login bo	pard?				/								
Pesticides EPA	608 pH5-9?							-						
Compliance sar	nples have no	discre	epancies/requ	ire no	flags?	1		-	(C	Or must be re	jected)		
Log-in Supervis								-	D	Discrepancies, o	complia	nce sample	es (NHDES,	MADEP, DoD
Log-in Supervis	sor nouned in	mean	ately of follow	nig ne	1115.			-	etc	c.) or uncomm	on req	uests.		
		1				K			- 4	(101	ne si	2-07	
		and]	Received By:			0		Da	te/	Time: ()	10/	61 18	-00	
Peer Review C	Checklist													
☐ Client ID/I	Project Manag	ger	☐ On Ice, T	empe	rature OK?			Sam	ple !	IDs		□ A	nalyses in (Correctly
☐ Project Nar	ne		□ PO# (if p	rovid	ed)			Mat	rix			-t	eferences	
	s communica				nt? Shipping Ch	arge				ime collected			vastewater 1	methods
☐ Received D	rate/Time				ove communic	ated?	_ D		rt F1	Ts communi	cated		otes from (CoC in LIMS
N	4		viewed By:				D	ate: _			Б		77.71	10
Notes: (conti	inue on ba	ck as	needed)						,	Initials	Date		What wa	
							- CO. C. C. C. C. C. C. C. C. C. C. C. C. C.	aded /						DD / Invoice
							7	aded /						DD / Invoice
							Uplo	aded /	PD)F		_ Report	/ Data / E	DD / Invoice



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: Work Order #:

06/22/2021 2106-02507

Client Job #:

06/15/2021

Date Received: 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



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

Absolute Resource Associates CLIENT NAME:

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

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:					CLIE	NT 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 0	5/16/2021 09:05AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	5/17/2021 05:47PM
2,3-Dibromopropionic Acid	98	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	5/17/2021 05:47PM

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

Donald a. D.



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

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

DATE AND TIME COLLECTED:

06/10/2021 06/15/2021

09:00AM 11:20AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE:

A A CCA

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 0	6/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 03:31AM
2,3-Dibromopropionic Acid	79	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/19/2021 03:31AM

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



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

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

DATE AND TIME COLLECTED:

06/10/2021

10:00AM 11:20AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE:

RECEIPT TEMPERATURE:

06/15/2021 HAA GSA

ON ICE 1.4° CELSIUS

MORE LOC INFO:					CLIE	NI 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 0	6/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:12AM
2,3-Dibromopropionic Acid	92	%	√			70-130%	EPA 552.2 - SS	KV-NH 0	6/19/2021 04:12AM



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

2106-02507-004 **SAMPLE ID #:**

SAMPLED BY: Absolute Resource Associates

SAMPLE ADDRESS: 57365

Maher UV

MA

Legend

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

DATE AND TIME COLLECTED:

DATE AND TIME RECEIVED:

RECEIPT TEMPERATURE:

06/10/2021

10:00AM 06/15/2021 11:20AM

ANALYSIS PACKAGE: HAA GSA

ON ICE 1.4° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	6/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 04:52AM
2,3-Dibromopropionic Acid	81	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/19/2021 04:52AM

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

	*
Absolute Resour	ce

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57365

	associates											absoluteresourceassociates.com																										
1	Company Nar	Pr	Project Name: Bw Straightway									345						J		SS											1							
- 1	Bluelear Inc.										Project #: 1/204								上上		0			7	True		ardne		2	10 10	S	oride						١
	Company Address:										Project Location: NH (MA) ME VT								TTHING HARS	print	1-0100 Browide			10	Collor		☐ TAL Metals 🕅 Hardness		TE MA	IN _ ION A IOC _ renous	□ Phenols	□ Fluoride		ticide				
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	Report To:	Aaron	Davis		Protocol: RCRA SDWA NPDES							3 8021		List:	TPH	N	t/PCB	lilution	70	App	Acid	TAL		7	2 3	Ortho P	J Bron		J 70L	☐ Asbestos		t						
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	PO #:		□ NH Reimbursement Pricing							BTEX	GRO 8015	524.2	3015	NA PA	☐ 8081 Pesticides	S 533	ral 0&	ductiv	P	ority P	17	t (ACIEN S	S CHIS	□ Ignitibility/FP	OTCLP VOC	Size	>	₹ ©								
										ervation Method Sampling							00 C	- GR	J V0C	DRO 8	82704	8081	□ PFA	I I	□ Cor	U TS	O Pr	st:	☐ Dissolved Metals-lis ☐ Ammonia ☐ COD	2	ا ا	Bite 2	J Igniti	010	Grain	IT.	+ moosi	
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57382
57 Dresser Hill Road Date Received: 6/11/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 6/18/2021

Total number of pages: 23

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57382

Sample#: 57382-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/11/21 8:30

		Reporting]		Instr Dil'n	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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

-		Reporting	1		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	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

Job ID: 57382

Sample#: 57382-001 Sample ID: RAW Matrix: Water

Sampled: 6/11/21 8:30

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Time Reference Result DL Units Batch Date 1.4-dioxane 0.31 0.25 0.13 ug/L LMM 2101731 6/15/21 18:50 SW8260Dmod

Sample#: 57382-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/11/21 8:30

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1.4-dioxane U 0.25 0.13 ug/L LMM 2101731 6/15/21 19:21 SW8260Dmod

Sample#: 57382-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/11/21 8:30

Reporting Prep **Analysis** Instr Dil'n Limit Time Reference **Parameter** Result DL Units Factor Analyst Date Time Batch Date U 0.25 1,4-dioxane 0.13 ug/L LMM 2101731 6/15/21 19:53 SW8260Dmod

Sample#: 57382-005 Sample ID: GSP CBW Matrix: Water

Sampled: 6/11/21 9:00

Prep Reporting **Analysis** Instr Dil'n Time Reference **Parameter** Limit **Factor Analyst Date** Time Batch Date Result DL Units 1,4-dioxane U 0.25 0.13 2101731 6/15/21 20:24 SW8260Dmod ug/L LMM



Job ID: 57382

Sample#: 57382-001
Sample ID: RAW
Matrix: Water

Sampled: 6/11/21 8:30

		Reporting			Instr Dil'n	ı Pı	rep		Analysis				
Parameter	Result	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	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

		Reporting			Instr Dil'n	ı Pı	Prep			ysis
Parameter	Result	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	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

		Reporting			Instr Dil'n	ı Pi	rep	Analysis			
Parameter	Result	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	15:37 SM5310C	



Job ID: 57382

Sample#: 57382-004 Sample ID: GAC Matrix: Water

Sampled: 6/11/21 8:30

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit **DL Units Factor Analyst Date** Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 1.7 U 1.7 0.25 ng/L WAS 6/16/21 13970 6/16/21 22:29 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 1.7 U 1.7 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 22:29 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 1.7 U 1.7 0.27 ng/L 1 WAS 6/16/21 13970 6/16/21 22:29 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 1.7 U WAS 1.7 0.42 ng/L 1 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 na/L 1 WAS 6/16/21 13970 6/16/21 22:29 perfluorohexane sulfonic acid (PFHXS) 1.7 U 1.7 0.33 na/L 1 WAS 6/16/21 13970 6/16/21 22:29 1.7 U ng/L perfluorohexanoic acid (PFHXA) 0.29 1 WAS 6/16/21 13970 6/16/21 22.29 1.7 perfluorononanoic acid (PFNA) 1.7 U 0.37 ng/L 1 WAS 6/16/21 13970 6/16/21 22:29 1.7 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 0.11 WAS 6/16/21 13970 6/16/21 22:29 17 ng/L 1 1.7 U WAS 22:29 perfluoroundecanoic acid (PFUNA) 1.7 0.27 ng/L 1 6/16/21 13970 6/16/21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 0.33 6/16/21 13970 6/16/21 22:29 1.7 U 1.7 ng/L 1 WAS (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 1.7 U 17 0.33 ng/L 1 WAS 6/16/21 13970 6/16/21 22:29 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 1.7 U 1.7 0.15 ng/L 1 WAS 6/16/21 13970 6/16/21 22:29 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 22:29 99 70-130 1 6/16/21 13970 6/16/21 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 22:29 107 D5-NEtFOSAA SUR 106 70-130 % 1 WAS 6/16/21 13970 6/16/21 22:29 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 22:29 97 Sum of MA PFAS6 Analytes (MAPFAS6) 1.7 U 1.7 1 2101749 ng/L

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



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

Job ID: 57382

Sample#: 57382-005 Sample ID: GSP CBW Matrix: Water

Sampled: 6/11/21 9:00

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit DL **Units Factor Analyst Date** Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 2.0 U 2.0 0.30 ng/L WAS 6/16/21 13969 6/16/21 20:21 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 2.0 U 2.0 0.39 ng/L 1 WAS 6/16/21 13969 6/16/21 20:21 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 2.0 U 2.0 0.32 ng/L 1 WAS 6/16/21 13969 6/16/21 20:21 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 4.0 2.0 0.49 ng/L 1 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 na/L 1 WAS 6/16/21 13969 6/16/21 20:21 perfluorohexane sulfonic acid (PFHXS) 22 2.0 0.39 na/L 1 WAS 6/16/21 13969 6/16/21 20:21 ng/L perfluorohexanoic acid (PFHXA) 0.34 1 WAS 6/16/21 13969 6/16/21 20:21 8.3 2.0 perfluorononanoic acid (PFNA) 1.3 J 2.0 ng/L 1 WAS 6/16/21 13969 6/16/21 20:21 0.44 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 WAS 6/16/21 13969 6/16/21 20:21 ng/L 1 2.0 U WAS 6/16/21 13969 6/16/21 perfluoroundecanoic acid (PFUNA) 2.0 0.32 ng/L 1 20:21 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 2.0 U 0.39 6/16/21 13969 6/16/21 2.0 ng/L 1 WAS 20:21 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 2.0 U 20 0.39 ng/L 1 WAS 6/16/21 13969 6/16/21 20:21 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 2.0 U 2.0 0.18 ng/L 1 WAS 6/16/21 13969 6/16/21 20:21 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 83 70-130 1 6/16/21 13969 6/16/21 20:21 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13969 6/16/21 20:21 102 D5-NEtFOSAA SUR 85 70-130 % 1 WAS 6/16/21 13969 6/16/21 20:21 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13969 6/16/21 79 20:21 Sum of MA PFAS6 Analytes (MAPFAS6) 2 1 2101748 63 ng/L

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



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

Job ID: 57382

Sample#: 57382-006 Sample ID: Field Blank Matrix: Water

Sampled: 6/11/21 Method Reference: E537.1

Method Reference: E537.1		Reporting	3		Dil'n		Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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-chloroeicosafluoro-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		2	101748		

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



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

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

- QC Report -

			- QC Nep									
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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	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 A	mt Added	%R	Limit	S	RPD	RPD Lin
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		0 10
		Nitrite-N			15	mg/L	15	99	90	110		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 Asso	ciated 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 ac (NETFOSAA)	id	<	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 Assoc	iated Sample		Result	Units Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13969	9 2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid (GenX acid) (HFPODA)	57299-001	<	1.8	ng/L				30
		n-ethyl perfluorooctanesulfonamido acetic acic (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 13	0	
		13C2-PFDA SUR	57299-001		95	%		70 13	0	
		D5ETFOSAA SUR	57299-001		91	%		70 13	0	
		HFPODA13C3 SUR	57299-001		76	%		70 13	0	



Method	QC ID	Parameter	Associated Sample	Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
E537.1	LCS13969	2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid (acid) (HFPODA)	GenX	4.5	ng/L	4	113	50	150		
		n-ethyl perfluorooctanesulfonamido a (NETFOSAA)	ncetic acid	4.3	ng/L	4	107	50	150		
		n-methylperfluorooctane sulfonamido acid (NMEFOSAA)	acetic	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 (PFHX	S)	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-oxaundecan sulfonic acid (11CLPF3OUDS)	e-1-	3.6	ng/L	3.78	95	50	150		
		9-chlorohexadecafluoro-3-oxanone-1 acid (9CLPF3ONS)	-sulfonic	3.5	ng/L	3.74	93	50	150		
		4,8-dioxa-3h-perfluorononanoic acid acid) (ADONA)	(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 Assoc	iated Sample	Result	Units A	hmt 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 Associ	ciated 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 aci (NETFOSAA)	d	<	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 Associ	iated 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)	d 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 13	0	
		13C2-PFDA SUR	57407-001		99	%		70 13	0	
		D5ETFOSAA SUR	57407-001		98	%		70 13	0	
		HFPODA13C3 SUR	57407-001		95	%		70 13	0	



Method	QC ID	Parameter	Associated Sample	Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid acid) (HFPODA)	(GenX	35	ng/L	40	89	70	130		
		n-ethyl perfluorooctanesulfonamido (NETFOSAA)	acetic acid	40	ng/L	40	100	70	130		
		n-methylperfluorooctane sulfonamid acid (NMEFOSAA)	o acetic	39	ng/L	40	97	70	130		
		perfluorobutane sulfonic acid (PFBS	5)	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 (PFH)	(S)	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	5)	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-chloroeicosafluoro-3-oxaundecar sulfonic acid (11CLPF3OUDS)	ne-1-	35	ng/L	37	93	70	130		
		9-chlorohexadecafluoro-3-oxanone-acid (9CLPF3ONS)	1-sulfonic	35	ng/L	37	94	70	130		
		4,8-dioxa-3h-perfluorononanoic acid acid) (ADONA)	(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 Assoc	iated 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-chloroeicosafluoro-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		



Uploaded / PDF _____ Report / Data / EDD / Invoice Uploaded / PDF _____ Report / Data / EDD / Invoice

Date

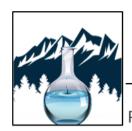
Initials

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Notes: (continue on back as needed)



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: Work Order #:

06/22/2021 2106-02508

Client Job #:

06/15/2021

Date Received: 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

Donald a. D



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

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

06/11/2021 08:30AM 11:19AM

DATE AND TIME RECEIVED: 06/15/2021 **ANALYSIS PACKAGE:** HAA GSA

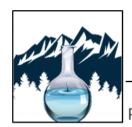
DATE AND TIME COLLECTED:

RECEIPT TEMPERATURE: ON ICE 1.4° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	6/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 05:33AM
2,3-Dibromopropionic Acid	91	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/19/2021 05:33AM

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

Donald a. L.



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 06/15/2021

08:30AM 11:19AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE:

RECEIPT TEMPERATURE:

10/2021 I

HAA GSA

ON ICE 1.4° CELSIUS

CLIENT JOB #:

MORE LOC INFO:					CLIE	NI 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 0	6/18/2021 08:55AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/19/2021 06:14AM
2,3-Dibromopropionic Acid	80	%	√			70-130%	EPA 552.2 - SS	KV-NH 0	6/19/2021 06:14AM

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

OF

Absolute Resource

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57382

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Lab			SS.	N	/latrix		Pres	serva	-	-	T		Sampling		\dashv	□ V0C 8	700	D GH	200	CIUS UHU D	8081	D PFA	Miner	D Con	O TS	□ Pri	#			- B			DTC	Grain Size			Composite (C)
Sample ID (Lab Use Only)	RA	eld D	# CONTAINERS	WATER	SOLID	ОТНЕВ	IOH	HNOs	H ₂ SO ₄	NaOH	МеОН	11/9 DATE	TIME			-	□ V0C 624.1 □	X	1 1	D 00788100	□ 8082 PCB	MLPFAS 537.1 □ PFAS 533 □ P	□ 0&G 1664 □	008	SOTO SSTO	☐ RCRA Metals	☐ Total Metals-list:	☐ Dissolved Metals-list:	☐ Ammonia ☐ C0D		Cyanide	Nitrate Militrite	O TCLP Metals				Grab (G) or Con
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57383
57 Dresser Hill Road Date Received: 6/11/21

Charlton, MA 01507

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

Willie Stone Date of Approval: 6/18/2021

Authorized Signature Total number of pages: 12

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57383

Sample#: 57383-001 Sample ID: GSP CBW Matrix: Water

Sampled: 6/4/21 9:45

Method Reference: E537.1 Reporting Dil'n Prep **Analysis Parameter** Result Limit DL **Units Factor Analyst Date** Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 2.0 U 2.0 0.30 na/L WAS 6/16/21 13970 6/16/21 23:49 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 2.0 U 6/16/21 13970 6/16/21 2.0 0.38 ng/L 1 WAS 23:49 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 2.0 U 2.0 0.32 ng/L 1 WAS 6/16/21 13970 6/16/21 23:49 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) WAS 6/16/21 13970 6/16/21 3.5 20 0.49 ng/L 1 23:49 0.50 J WAS perfluorodecanoic acid (PFDA) 2.0 0.33 ng/L 1 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 na/L 1 WAS 6/16/21 13970 6/16/21 23:49 perfluorohexane sulfonic acid (PFHXS) 25 2.0 0.39 na/L 1 WAS 6/16/21 13970 6/16/21 23:49 WAS perfluorohexanoic acid (PFHXA) 11 2.0 0.34 na/L 1 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 1 WAS 6/16/21 13970 6/16/21 23:49 ng/L 2.0 U 2.0 0.32 WAS 6/16/21 13970 6/16/21 23:49 perfluoroundecanoic acid (PFUNA) ng/L 1 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 2.0 U 0.38 WAS 6/16/21 13970 6/16/21 23:49 2.0 ng/L 1 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 2.0 U 20 0.39 ng/L 1 WAS 6/16/21 13970 6/16/21 23:49 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 2.0 U 2.0 0.18 ng/L 1 WAS 6/16/21 13970 6/16/21 23:49 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 6/16/21 13970 6/16/21 23:49 96 70-130 1 13C2-PFDA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:49 121 WAS 6/16/21 13970 6/16/21 D5-NEtFOSAA SUR 92 70-130 % 1 23:49 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/16/21 13970 6/16/21 23:49 90 80 2 1 Sum of MA PFAS6 Analytes (MAPFAS6) 2101749 ng/L

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

Absolute Resource



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 Ass	sociated 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 (NETFOSAA)	acid	<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acetiacid (NMEFOSAA)	C .	<	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-sulfor acid (9CLPF3ONS)	nic	<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADON acid) (ADONA)	NA ·	<	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 Assoc	iated 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 13	0	
		13C2-PFDA SUR	57407-001		99	%		70 13	0	
		D5ETFOSAA SUR	57407-001		98	%		70 13	0	
		HFPODA13C3 SUR	57407-001		95	%		70 13	0	



Method	QC ID	Parameter	Associated Sample	Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid acid) (HFPODA)	(GenX	35	ng/L	40	89	70	130		
		n-ethyl perfluorooctanesulfonamido (NETFOSAA)	acetic acid	40	ng/L	40	100	70	130		
		n-methylperfluorooctane sulfonamid acid (NMEFOSAA)	o acetic	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 (PFH)	(S)	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	3)	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-chloroeicosafluoro-3-oxaundecar sulfonic acid (11CLPF3OUDS)	ne-1-	35	ng/L	37	93	70	130		
		9-chlorohexadecafluoro-3-oxanone-acid (9CLPF3ONS)	1-sulfonic	35	ng/L	37	94	70	130		
		4,8-dioxa-3h-perfluorononanoic acid acid) (ADONA)	(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 Associa	ated Sample	Result	Units A	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-chloroeicosafluoro-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		



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Absolu	te	F	2	ρ,	SI	2	U	ır	c	P	X
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mnany Name											

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57383

associates		36-2001	100	1000	To the	100		ANI	ALV	CIC	D	-01	III-	7		1000			1747	
Company Name:		ceassociates.com	and the same	ALC: UN				AN	ALY	SIS	KE	QU	UE	51				10		
Bluckect, Tyc. Company Address:	Project #: \\Zo				Ħ				_	☐ Hardness			☐ Ferrous Iron	COCCI	□ Fluoride		a Ge			
57 Diesser H. 11 Rd Chalton	1 Toject Location. 14		g. ,	_	SS-LIST:				☐ Apparent Color	als			□ Ferr	☐ Enterococci			Pesticio			
Report To: A Gran Devi	Accreditation Requi		MADEP	A170	PH Fin	8	tion		☐ Appare	TAL Metals			2		□ Bromide		CCLP	estos		١
Phone #: 7711 720 //27 G	Protocol: RCRA MCP	SDWA NPDES NHDES DOD	□ VOC 8260	oxane oxane	ADEP OTPH	B Pest/F	pe dilu						O N	ria MPN			0	☐ Asbestos		١
Phone #: 774 700 8029 Invoice to: Evil Grotts	Reporting QAPP Limits: EPA DV	GW-1 S-1 V Other	5	à Ö		D EC	4S isoto		□ Turbidity	Metals			NOT CO V	cteria P/A 🗆 Bacteria MPN	Sulfate		☐ TCLP SV0C ☐ TCLP Pesticide	☐ Herbicides		-
Email: eg/otton @bluelectwater.com	Quote #		HDES	MIDE,	NH LIS	1 625.1	I PH	G 1664		ollutan			-	1 7		0		□ Hert		-
PO #:	□ NH Reimburseme	nt Pricing	8260 N	☐ GRO 8015	524.2 8015	ABN C	S 533	ral 0&	nductivity	iority P		ti.	O TKN			bility/F				te (C)
Lab 🖁 Matrix Pres	servation Method	Sampling	U VOC 8260 NHDES	5 5	☐ VOC 524.2 NH LIST	18270	D PFA	☐ Mineral 0&G 1664	Conductivity Or T. C. D. T.C.	j _	list:	stals-lis		S D B	itrite (□ Igniti		Grain Size		Composite (C)
Lab Sample ID (Lab Use Only) (Lab Use Only) Lab Sample ID Lab Sa	HNO ₃ H ₂ SO ₄ NaOH MeOH	DATE TIME SAMPLER			☐ VOC 524.2 ☐ VOC 524.2 ☐ TPH 8100 ☐ DRO 8015	□ 8270PAH □ 8270ABN □ 625.1 □ E0B	₩ PFAS 537.1 □ PFAS 533 □ PFAS isotope dilution	□ 0&G 1664	ODEC HQD	☐ RCRA Metals ☐ Priority Pollutant Metals	☐ Total Metals-list:	☐ Dissolved Metals-list:	☐ Ammonia ☐	☐ T-Phosphorus ☐ Ba	□ Syamide □ Sumo	☐ Corrosivity ☐ Ignitibility/FP		Subcontract:		Grab (G) or C
57383 GSP CBW 2 X	THE RESERVE THE PARTY OF THE PA	14/21 9:45 NF					X											03		
TAT REQUESTED See absoluteresourceassociates.com	SPECIAL INSTRUC	CTIONS																		
Priority (24 hr)*																				
Standard (10 Business Days) REPORTING INSTRUCTIONS	PDF (e-mail addre	ess) adavis (e	06/	ucle	ech	VCT	c	, (on				_ F	RECE	IVED	ON	ICE ?	WF.		
*Date Needed HARD COPY REQUIRED □ EI	DD			In :						-			1	remp	PERA	-	_	4	-	°C
CUSTODY		Date Tin		Recei	ved by			2	1		_			_		Date		Ĺ	Time 3.50	5
RECORD Retinquished that		Date Tin	ne	Recei	ved by	<i>r</i> :		576								Date)	1	Time	\neg
OSD-01 Revision 03/09/2020 Relinquished by:		Date Tin	ne	Recei	ved by	Labo	rate	1							61	Pate // i/	21	1	5.51	

Sample Receipt Condition Report

57383

Absolute Re	esource Asso	ciates						_	Job Numb	er:			
Samples Received from:													
Custody Seals	- present & in	tact:	J-No	DEN/A	A				CoC s	igned:		Yes	□-No
Receipt Temp	:_U_°C	Samples of	n ice	Yes	□-N	No D-1	N/A		Sampl	ed < 2	24 hrs :	ago? □-Yes	■-No
		PFAS-onl	y real	ice? Yes	□-N	No D-	N/A		Any si	gns of	f freezi	ng? □-Yes	No
Comments:													.,
Preservation				Bottle Size/	'Type	& Qu	antity		You are the			pH for ALL	
/ Analysis								.017			sampl	es and docun	nent:
HCl	40mL(G)	250mL(P)		500mL(P)		1L(G)					-		
HNO ₃	125mL(P)	250mL(P)		500mL(P)		250 1	(T))		500 I m				
H ₂ SO ₄	40mL(G)	60mL(P) 250mL(P)	-	125mL(P)		250mI	(P)		500mL(P)				
NaOH (NH ₄) ₂ SO ₄	125mL(P) 60mL(P)	125mL(P)	-	250mL(P)									
ZnAc-NaOH	125mL(P)	250mL(P)		2501112(1)									
Trizma	125mL(P)	250mL (P)	2								*pH √1	oy analyst:VOC,	PFAS, TOC,O&C
NH ₄ Ac	125mL(P)	250mL (P)	-								Residu	ial Cl not pre	sent:
NaS ₂ O ₃	40mL(G)	120mL(P)	-									25Pest(
MeOH	20mL(G)	40mL(G)	-								Bacteri	a ResCl ✓ by a	nalyst
None (solid)	20z(G)	40z(G)	8oz(G)		Syring	0				PC D	y applicable?	Y N	
None (water)	40ml (G)	60mL(P)	125mL(P)		250mI		-	500mL(P)		1L(G)		1L (P)	
None (water)	40111 (0)	OOIIL(I)		12511112(1)		230111)(1)		3001112(1)		112(0)		12 (1)
36.11		D II		DI .		en r							
Mold Asbestos	Cassette	Bulk Bulk		Plate		Tape L	ift						
Lead	Cassette	Bulk		Wipe									
Lead	Cassette	Duik		Wipe									
												WIND THE REAL PROPERTY.	
Login Reviev	v		Title		Yes	No	NA	Co	omments				
		enough volume/c	orrect	preservative?	1								
		ch bottles received		P	1	+			FE 12. 1				
	Vater-no headspace		J.		-	1	1				-		
		no leaks, Prep Expira	ation C	OK?			X		00				
		/FRB same Lot#			X			La	ot ID#:	00	1		West and the second
	s provided by A			,1	-		X				_		
		ICI:			-								
Samples within		1 1			X					-			
	s communicated	n/E. coli (P/A or MPN) Ente	rococci Color			X						
		rrous Iron, Dissolved					//						
Date, time & Il	D on samples m	natch CoC?			>	1							
Rushes commu	inicated to analy	st in writing?					×						
	ote on login boar	144											
Pesticides EPA								-	7777				TO THE
		liscrepancies/requ	iro no	· flags?				10	or must be re	iected			
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Log-in Supervi	sor notified imn	nediately of follow	ring it	ems:			1		c.) or uncomm			pico (11112) Ec	,
				4/1					6	116	1 /	1120	
	Inspected a	and Received By:		No			Da	te/	Γime: 01	11/2		622	
Peer Review (1017	FE LOVE IS									
Tel steps received the straight	Project Manager	r 🗖 On Ice, T	empe	rature OK?			Sam	nle '	IDs			Analyses in (Correctly
the second second			-					•				-references	
☐ Project Na		□ PO# (if p		***			Mat						1
☐ TAT/rushe	es communicate			nt? Shipping Ch					ime collected			-wastewater	
☐ Received D	Date/Time			ove communic	cated?			rt H	Ts communi	cated		Notes from	CoC in LIMS
		Reviewed By:	-			D	ate: _						
Notes: (cont	inue on bacl	k as needed)							<u>Initials</u>	Date		What w	
						Uplo	aded /	PD)F				EDD / Invoice
		Uploaded / PDF Report / Data / EDD / Invoice											
						Unlo	aded /	PD)F		Repo	rt / Data / F	EDD / Invoice

Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 12204
Blueleaf, Inc. Job ID: 57407
57 Dresser Hill Road Date Received: 6/14/21

Charlton, MA 01507

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

Willie Stone

Date of Approval: 6/18/2021

Authorized Signature Total number of pages: 18

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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



Job ID: 57407

Sample#: 57407-001 Sample ID: Raw

Matrix: Water

Sampled: 6/14/21 11:00

Reporting Instr Dil'n **Analysis** Prep **Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1.4-dioxane 0.20 J 0.25 0.12 ug/L LMM 2101731 6/15/21 20:55 SW8260Dmod

Sample#: 57407-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/14/21 11:00

Reporting Instr Dil'n Prep **Analysis Parameter** Result Limit Units Factor Analyst Date Time **Batch** Date Time Reference DL 0.25 2101731 6/15/21 21:27 SW8260Dmod 1.4-dioxane 0.14 J 0.12 ug/L LMM

Sample#: 57407-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/14/21 11:00

Reporting Prep **Analysis** Instr Dil'n Time Reference **Parameter** Limit **Factor Analyst Date** Time **Batch** Date Result DL Units 1,4-dioxane U 0.25 0.12 2101731 6/15/21 21:58 SW8260Dmod ug/L LMM



Job ID: 57407

Sample#: 57407-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/14/21 11:00

		Reporting)		Instr Dil'r	ı	Pr	ер		Anal	ysis
Parameter	Result	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	3%. The	acceptar	nce criteria is	90-110% .	All other	er associa	ed QC samp	oles were	acceptable.
Nitrite-N	U	0.1	0.019	ma/L	1	DBV			2101730	6/15/21	13:04 E300.0A



Job ID: 57407

Sample#: 57407-001 Sample ID: Raw Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1		Reporting	q		Dil'n		Prep		Anal	ysis
Parameter	Result	Limit	-	Units	Factor	Analyst	Date	Batch		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-chloroeicosafluoro-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		2	101749		

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.

Job ID: 57407

Sample#: 57407-004 Sample ID: GAC Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1		Reporting	q		Dil'n		Prep		Anal	vsis
Parameter	Result	Limit	-	Units	Factor	Analyst	Date	Batch		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		2	101749		

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



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

Job ID: 57407

Sample#: 57407-005 Sample ID: Field Blank Matrix: Water

Sampled: 6/14/21 11:00

Method Reference: E537.1

Method Reference: E037.1		Reporting	g		Dil'n		Prep		Anal	lysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Batch	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		2	101749		

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



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

Quality Control Report



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

Absolute Resource



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



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Portsmouth, NH 03801
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- QC Report -

Method	QC ID	Parameter As	sociated 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 (NETFOSAA)	acid	<	2.0	ng/L				
		n-methylperfluorooctane sulfonamido acet acid (NMEFOSAA)	С	<	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-sulfo acid (9CLPF3ONS)	nic	<	2.0	ng/L				
		4,8-dioxa-3h-perfluorononanoic acid (ADO acid) (ADONA)	NA	<	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 Ass	ociated 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 a (NETFOSAA)	cid 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-sulfon acid (9CLPF3ONS)	c 57407-001	<	1.8	ng/L				30
		4,8-dioxa-3h-perfluorononanoic acid (ADON acid) (ADONA)	A 57407-001	<	1.8	ng/L				30
		13C2-PFHxA SUR	57407-001		99	%		70 13	0	
		13C2-PFDA SUR	57407-001		99	%		70 13	0	
		D5ETFOSAA SUR	57407-001		98	%		70 13	0	
		HFPODA13C3 SUR	57407-001		95	%		70 13	0	



Method	QC ID	Parameter	Associated Sample	Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
E537.1	LCS13970	2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid acid) (HFPODA)	(GenX	35	ng/L	40	89	70	130		
		n-ethyl perfluorooctanesulfonamido (NETFOSAA)	acetic acid	40	ng/L	40	100	70	130		
		n-methylperfluorooctane sulfonamidacid (NMEFOSAA)	o acetic	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 (PFH)	(S)	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-chloroeicosafluoro-3-oxaundecar sulfonic acid (11CLPF3OUDS)	e-1-	35	ng/L	37	93	70	130		
		9-chlorohexadecafluoro-3-oxanone-acid (9CLPF3ONS)	-sulfonic	35	ng/L	37	94	70	130		
		4,8-dioxa-3h-perfluorononanoic acid acid) (ADONA)	(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 Associ	ated Sample	Result	Units A	Amt Added	%R	Limits	i	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-chloroeicosafluoro-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 Am	nt 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 A	mt Added	%R		Limits	s	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 10
		Nitrite-N			15	mg/L	15	98		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	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		



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amanami. Manan													

124 Heritage Avenue #16 Portsmouth, NH 03801 603-436-2001 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57407

		socia	tes		5							urceasso										AN	IAL	YS	IS	RE	Ql	JΕ	ST					3/13		
Report To:	re: ct I dress: ser H: con 14 Zoo crik Gr	Davis 6029	Ler	1 ts	- W			Pro Pro Ac Pro Re Lin	oject oject oject oredi otoco eportii nits:	H: (Local tation	tion: RECR MCP QAP EPA	NH MA N quired? N/Y A SDW	A NPD	nky ES	8260 NHDES 🗆 VOC 8260 MADEP	□ VOC BTEX MtBE, only □ VOC 8021VT	☐ GR0 8015 🔀1,4-Dioxane	24.2 NH List Gases-List:	015 C EPH MADEP C TPH Fingerprint	SN □ 625.1 □ EDB	resticides 608.3 Pest/PCB	4	furbidity	Ikalinity	☐ RCRA Metals ☐ Priority Pollutant Metals ☐ TAL Metals ☐ Hardness			TKN TION TOOL TErrous Iron	ria MPN 🗅 Enterococci	+ Nitrite Ortho P	□ Chioride □ Sulfate □ Bromide □ Fluoride	ility/FP	, =			(C)
Lab			RS	N	/latrix	,	Pre	serva			_		mpling	_	□ V0C 8	2 VOC	□ GRC	J VOC	DRO 8	8270A	18081	Miner	Conc	OTS	□ Pric	ist	tals-list		. □ Ba	Sulfide	trite	J Ignitibility/FP				Composite (C)
Sample ID (Lab Use Only)	ı	eld D	# CONTAINERS	WATER	SOLID	ОТНЕВ	HCI	HNO3	H ₂ SO₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260 □	_	U VPH MADEP	☐ VOC 524.2 ☐ VOC 524.2 NH List ☐	☐ TPH 8100 ☐	□ 8270PAH □	U 8082 PCB U 8081 Pesticides	□ 0&G 1664 C	□ pH □ 800 □ Conductivity	OTS OTDS	☐ RCRA Metals	☐ Total Metals-list:	☐ Dissolved Metals-list:	☐ Ammonia ☐ C0D	☐ T-Phosphorus	□ Cyanide □	☐ Nitrate ☐ Nitrite	Corrosivity Ignitibility/FP	Subcontract			Grab (G) or Co
57407-0)	Rau		4 2	X	- 0.0							6 4 21	11:00	AD			X				X		Ma													G
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-04	GAC		7 2	V		0.000											1				×	41.730										I				
-05	F.eld	Blank	2	4		0.99						V	V	V							X															A
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Absolute Re	source Asse	ociat		Sam	ple Recei	ipt (Condi	tion .		o <i>rt</i> o Numb	er:	574	107	
Samples Receiv Custody Seals - Receipt Temp:	ved from: - present & in	tact:	□-UPS □	I-No n ice?	P-N/A	A :	No 0-1			CoC s	ent Di igned ed <	24 hrs a	□-Yes go? □-Yes ug? □-Yes	□-No □-No □-No
Comments:														
-					Bottle Size/	/T	8. O.	antity:				Check	pH for ALL	applicable*
Preservation					Dottie Size/	Турс	& Qui	antity					s and docum	
/ Analysis	10 1 (0)		are I (D)		500 T (D)		1T (C)				T	Sample	s and docum	iciii.
HCl	40mL(G)		250mL(P)	-	500mL(P)		1L(G)	-					-	
HNO ₃	125mL(P)		250mL(P)		500mL(P)				-	00 T m				
H ₂ SO ₄	40mL(G)		60mL(P)		125mL(P)		250mI	(P)	50	00mL(P)				
NaOH	125mL(P)		250mL(P)								-			
(NH ₄) ₂ SO ₄	60mL(P)		125mL(P)		250mL(P)				-			-		
ZnAc-NaOH	125mL(P)		250mL(P)	,								- 1		
Trizma	125mL(P)		250mL (P)	5										PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)								1999		al Cl not pre	
NaS ₂ O ₃	40mL(G)		120mL(P)										25Pest6	
MeOH	20mL(G)		40mL(G)									Bacteria	ResCl ✓ by a	nalyst
				-	9(C)	-	Cymina	_ +				DC De	applicable?	Y (N)
None (solid)	2oz(G)	6	4oz(G)	-	8oz(G)		Syringe	10000		00 T (7)	-		аррисание:	
None (water)	40ml (G)	10	60mL(P)	1	125mL(P)		250mL	(P)	50	00mL(P)		1L(G)		1L (P)
		1												
Mold	Cassette		Bulk		Plate		Tape Li	ift						
Asbestos	Cassette		Bulk									_		
Lead	Cassette		Bulk		Wipe						_			
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PFAS: ARA bo	ttles & sample	s/FR	B same Lot#?	QC 1	rec'd, if req'd?	1			Lot I	D#:_ PI	5-UL	<u>†</u>		
Bacteria bottles	provided by A	RA?						/						
Samples within		-												
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L Client ID/I	Project Manage	r	☐ On Ice, T	empe	rature OK?			Sam	ple IDs	S			Analyses in (Correctly
☐ Project Nar	ne		□ PO# (if p	rovid	ed)			Mat	rix			1	-references	
☐ TAT/rushe	s communicate	ed	☐ Sub samp	les ser	nt? Shipping Ch	narge?		Date	e/Time	collected			-wastewater	methods
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57435
57 Dresser Hill Road Date Received: 6/15/21

Charlton, MA 01507

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

lucer

Aaron DeWees

Chief Operating Officer

Date of Approval: 7/2/2021

Total number of pages: 26

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine NH902

Sample Association Table

Water 6/15/2021 10:00 57435-001 Alkalinity in water by SM2320B Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Water 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 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 SM2 Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C	
Apparent Color by SM2120B Bacteria by SM9223B Colilert in Drinking Walter 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 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 SM2 Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C	
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Sulfate in water (SO4) by 300.0A Total Dissolved Solids by SM2540C	E10D
Total Dissolved Solids by SM2540C	.5106
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	140D
Total Hardness (includes Ca & Mg) by SM23	340B
Total Organic Carbon by 5310C	
True Color by SM2120B	
Turbidity by SM2130B	
Turbidity Check for Direct Metals Analysis	
Zinc in water by 200.8	
Water 6/15/2021 10:00 57435-002	
Alkalinity in water by SM2320B	
Apparent Color by SM2120B	
Bacteria by SM9223B Colilert in Drinking Wa	ater
Calcium in water by 200.8	
Chloride in water by 300.0A	
Direct Analysis Prep for Drinking Water	
Haloacetic acids in water by SM6251 (subco	ntract)
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 SM2	510B
Sulfate in water (SO4) by 300.0A	
Total Dissolved Solids by SM2540C	
Total Bissolved Solids by SM25400 Total Hardness (includes Ca & Mg) by SM25	840B
(,-00
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	B
				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	
GSP Filter-DISS	Water	6/15/2021 10:00	57435-006	Direct Analysis Prep for Drinking Water
GSP Filter-DISS	Water	6/15/2021 10:00	57435-006	Direct Analysis Prep for Drinking Water Iron in water by 200.8



Job ID: 57435

Sample#: 57435-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/15/21 10:00

		Reporting	J		Instr Dil'r	1	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Dat	e 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

·		Reporting	1		Instr Dil'ı	า	Prep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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

Job ID: 57435

Sample#: 57435-001 Sample ID: Raw

Matrix: Water

Sampled: 6/15/21 10:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1,4-dioxane 0.15 J 0.25 0.12 ug/L LMM 2101754 6/16/21 15:59 SW8260Dmod

Sample#: 57435-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/15/21 10:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Batch Date Time Reference Result DL Units 1,4-dioxane U 0.25 0.12 ug/L LMM 2101754 6/16/21 16:31 SW8260Dmod

Sample#: 57435-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/15/21 10:00

Analysis Reporting Instr Dil'n Prep Factor Analyst Date Result **Parameter** Limit DL Units Time Batch Date Time Reference U 0.25 1,4-dioxane 0.12 ug/L LMM 2101754 6/16/21 17:03 SW8260Dmod



Job ID: 57435

Sample#: 57435-001

Sample ID: Raw Matrix: Water

Sampled: 6/15/21 10:00

		Reportir	ng		Instr Dil'r	1	Pre	ер		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reportir	ng		Instr Dil'r	1	Pre	ep		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'r	Prep		Analysis			
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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



Job ID: 57435

Sample#: 57435-004 Sample ID: GAC

Matrix: Water

Sampled: 6/15/21 10:00

		Reporting			Instr Dil'n P			Prep An			nalysis		
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

		Reporting			Instr Dil'n Prep			ep	Analysis			
Parameter	Result	Limit	DL	Units	Factor A	Analyst	Date	Time	Batch	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

		Reportin	g		Instr Dil'r	1	Pre	еp		Anal	ysis
Parameter	Result	Limit	DL	Units	Factor	Analyst	Date	Time	Batch	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

Job ID: 57435

Sample#: 57435-001

Sample ID: Raw Matrix: Water

Sampled: 6/15/21 10:00

		Reporting]		Instr Dil'r	լ	Prep		Anal	ysis
Parameter	Result	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	l	umhos/cm	1	SFM		2101781	6/18/21	12:20 SM2510B
рН	6.7 H			рН	1	SFM		2101813	6/16/21	11:22 SM4500H+B
H = Sample was r	eceived beyond	I method ho	lding time	e.						
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

		Reporting			Instr Dil'r	ր	Prep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	n 1	SFM		2101781	6/18/21	12:20 SM2510B
рН	7.3 H			рН	1	SFM		2101813	6/16/21	11:36 SM4500H+B
H = Sample was	received beyond	method hole	ding time	e.						
Turbidity	U	1.0	0.40	NTU	1	EB		2101761	6/16/21	15:54 SM2130B

Job ID: 57435

Sample#: 57435-003
Sample ID: UV Effluent

Matrix: Water

Sampled: 6/15/21 10:00

		Reporting			Instr Dil'r	1	Pr	ep		Anal	ysis
Parameter	Result	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 s	pike was 56°	%. The	acceptano	e criteria is	90-110%.	All other	er associat	ed QC sam	oles 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 s	pike was 819	%. The	acceptano	e criteria is	90-110%.	All other	er associat	ed QC sam	oles were	acceptable.
Total Dissolved Solids (TDS)	250	20	7.5	mg/L	1	DJM			2101745	6/16/21	12:16 SM2540C
Conductivity	470	5	ι	umhos/cm	1	SFM			2101781	6/18/21	12:20 SM2510B
рН	7.0 H			рН	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

		Reporting			Instr Dil'r	ı P	rep		Anal	ysis
Parameter	Result	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	ι	umhos/cm	1	SFM		2101781	6/18/21	12:20 SM2510B
pH	7.1 H			рН	1	SFM		2101813	6/16/21	11:40 SM4500H+B

H = Sample was received beyond method holding time.



Job ID: 57435

Sample#: 57435-001

Sample ID: Raw Matrix: Water

Sampled: 6/15/21 10:00

Reporting Instr Dil'n Prep **Analysis Parameter** Limit Factor Analyst Date Time Time Reference Result DL Units Batch Date Total Organic Carbon (TOC) U 1.0 0.59 mg/L DBV 2101750 6/16/21 18:04 SM5310C

Sample#: 57435-002 Sample ID: GSP Filter Matrix: Water

Sampled: 6/15/21 10:00

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date Time **Parameter** Result Limit DL Units Batch Date Time Reference Total Organic Carbon (TOC) U 1.0 0.59 DBV 6/16/21 20:13 SM5310C mg/L 2101751

Sample#: 57435-003
Sample ID: UV Effluent
Matrix: Water

Sampled: 6/15/21 10:00

Reporting **Analysis** Instr Dil'n Prep Limit Factor Analyst Date Time Reference **Parameter** Result DL Units Time Batch Date Total Organic Carbon (TOC) 0.68 J 0.59 DBV 2101751 6/16/21 20:50 SM5310C 1.0 mg/L

Sample#: 57435-004
Sample ID: GAC
Matrix: Water

Sampled: 6/15/21 10:00

Reporting Instr Dil'n Prep **Analysis** Factor Analyst Date Limit Time Date Time Reference **Parameter** Result DL Units Batch Total Organic Carbon (TOC) U 1.0 0.59 mg/L DBV 2101751 6/16/21 21:26 SM5310C



Job ID: 57435

Sample#: 57435-001 Sample ID: Raw Matrix: Water

Method Reference: E537.1		Reporting	a		Dil'n		Prep		Anal	vsis
Parameter	Result	Limit	_	Units		Analyst	Date	Batch		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-chloroeicosafluoro-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		2	101835		

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



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

Job ID: 57435

Sample#: 57435-004 Sample ID: GAC Matrix: Water

Method Reference: E537.1		Reporting	n		Dil'n		Prep		Anal	vsis
Parameter	Result	Limit	DL	Units		Analyst	Date	Batch		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-chloroeicosafluoro-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		2	101835		

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



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

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

- QC Report -

			- QC Nepi	J1 C								
Method	QC ID	Parameter	Associated Sample		Result	Units A	mt 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		
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 A	mt Added	%R	Limits		RPD	RPD L	imit
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	20
		Iron			0.53	mg/L	0.5	106	85	115		2	20
		Magnesium			0.50	mg/L	0.5	101	85	115		1	20
		Manganese			0.51	mg/L	0.5	102	85	115		1	20
		Sodium			4.9	mg/L	5	99	85	115		1	20
		Zinc			0.51	mg/L	0.5	102	85	115		2	20
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 A	Amt Added	%R	Limit	6	RPD	RP	D Limi
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	10
		Nitrate-N			10	mg/L	10	100	90	110		0	10
		Nitrite-N			15	mg/L	15	98	90	110		0	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			
E300.0A	BLK2101776	Bromide		<	0.1	mg/L							
2000.071	DENZIOTITO	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			



Method	QC ID	Parameter	Associated Sample		Result	Units /	Amt Added	%R	Limits		RPD	RPC) 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		3	10
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	рН			5.94	6.06			
SM2320B	CCVE2101762	Alkalinity, Total (as CaCO3)			3.99	рН			3.94	4.06			
SM2320B	CCVM2101762	Alkalinity, Total (as CaCO3)			4.03	рН			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							
SM2320B	CCVB2101770	Alkalinity, Total (as CaCO3)			6.05	рН			5.94	6.06			
SM2320B	CCVE2101770	Alkalinity, Total (as CaCO3)			4.01	рН			3.94	4.06			
SM2320B	CCVM2101770	Alkalinity, Total (as CaCO3)			4.02	рН			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		2	10
SM2320B	PB2101770	Alkalinity, Total (as CaCO3)		<	5	mg/L							



Method	QC ID	Parameter	Associated Sample		Result	Units A	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	рН	57432-001		7.3	рН						
SM4500H+B	DUP2101813	рН	57476-001		8.0	рН						
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	s RPD	RPD Limit
E537.1	BLK13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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		89			%			70 1	30	
		13C2-PFDA SUR		91			%			70 1	30	
		D5-NEtFOSAA SUR		97			%			70 1	30	
		13C3-HFPO-DA SUR		99			%			70 1	30	



Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Limits	RPD	RPD Limit
E537.1	DUP13990	0 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoio 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-chloroeicosafluoro-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	Lim	its	RPD	RPD Limit
E537.1	LCS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoi acid (GenX acid) (HFPODA)	С	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-chloroeicosafluoro-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		

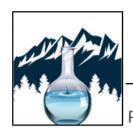


Method	QC ID	Parameter	Associated Sample	Result	Reporting Limit	DL	Units	Amt Added	%R	Lim	iits	RPD	RPD Limit
E537.1	MS13990	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoid acid (GenX acid) (HFPODA)	57444-001	34	1.8	0.28	ng/L	36	93	70	130		
		n-ethyl perfluorooctanesulfonamido acetic acid (NETFOSAA)	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-chloroeicosafluoro-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		



	۸bso	Juto E) Occur	*						1		tsmo	age Aven	03801					OF VAL								RD		_	57	4	35	5				
١	ADSU	as	Resour	es						abso	lute		-436-200 urceasso	ı ciates.co	m						ă d		A	NA	LY	SIS	R	EC	UE	ST						To Vo	
Ì	Company Nar								Pr	oject	Nam	e: 👸	N STro	igh Tha	1	Г			E/AS						ň	9											
	Blue e	dress:							Pr	oject	#:	112			,				O Gases-List: TTH Mr HAAS	int	· de			17	101 + 1/2V	M Hardness			¥T0C □ Ferrous Iron	,0000ci	☐ Phenols	☐ Fluoride		side			
	57 Dre	sser Hil	IRd, CL	101	14	بماه	Μ	A								di di	5		7	☐ TPH Fingerprint	20			Ce, Mg,	3					J Ente		ide	1	Pestin	2		
	Report To: .		Davi							otoco		RCR/	uired? N/	-		8260 MADEF	8021		List:	TPH.F	8	1/PCB	ilution	10	Appa	TAI Metals			¥T0C	NPN C	Ortho P	☐ Bromide	TO A	C TCLP F	NOTICE IN		
	DI "		200 8 Erotton		9				Re	porti	ng	QAPE	GW-1	S-1		D V0C 826	ly □ V0C 8021VT	☐ GRO 8015 X 1,4-Dioxane	□ Gases-	☐ DRO 8015 ☐ EPH MADEP ☐	O 8270ABN C 625.1 CEDB (S.10 L. Le	608.3 Pes	☐ PFAS isotope dilution	Nay	Conductivity X initiality	D Priority Pollintant Metals			NOT	Bacteria N	itrite 🗆 (Sulfate 🗆	001			4	22
١	Invoice to:	=11/2 (protton	0				20 COS	_	nits:		EPA I	OW Other	<u> </u>		ES C	BE, on	X1.4	1 List	EPH	1.626	S	D PFAS	100	3 3	Tage 1	4	8 8	NEO	■	te + N	A	0	□ TCL Herbic	Light .	-	
- 1	12	co Tron (2 bluela	eat	W	GTT	er.	coh		iote #						BO NHI	U VOC BTEX MtBE, only	8015	☐ VOC 524.2 NH List	15	5	esticide	533	986	Journey	S division	,	5/7	KN	teria P	☐ Sulfide Mitrate + Nitrite	Chloric	ity/FP	s OTCLP VOC OTCLP SVO	j D	MCTIVIT	90
	PO #:			(0)						-	-		nent Pricing			.0C 82	VOC B	GR0	VOC 52)RO 80	ZYUAB	3081 Pe	☐ PFAS 533	Minera	Cond	S Prior		Is-list:	000	Bac	lfide)	e X	☐ Ignitibility/FP	TCLP Train S	i and	52	A V
	Lab	Fi	eld	NERS		Vlatri	x	Pre	serva	ation	Meti	nod	Sa	mpling	· ~	0 - 1000			2 🗆	0		<u> </u>	2		200		Islanda Islanda	Meta	00	SUJOL	ns 🗖	D Nitri	D A		j _ =	5 4	or Composite (C)
5	Sample ID (Lab Use Only)	١	D	# CONTAINERS	WATER	SOLID	ОТНЕВ	면 단	HNO3	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260	☐ V0C 624.1	O VPH MADEP	☐ V0C 524.2	☐ TPH 8100	□ 8270PAH	☐ 8082 PCB	A PFAS 537.1		UDAL HOLD	O ISS Wetals	Vi Total Metals-list	Dissolved Metals-list:	☐ Ammonia	□ T-Phosphorus ★Bacteria P/A □ Bacteria MPN □ Enterococci	Cyanide	□ Nitrate □ Nitrite 'X Chloride X Sulfate	☐ Corrosivity	O TCLP Metals	Suncomma	Cond	Grab (G) o
5	574350	Raid			X							1	6/15/21		AC			X		2024	X	100	X	X	X	X	(×	16-1		X		The same of			y		G
6	-12	GSP F	Filter										-101-		1			X	X				1	X	X	X	()	(X				X			Ý	X	4
	-03	UV EF	flyant		1										1	-	100	X	X				1999	X		X	5		X		X	X				XX	
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				107523										0.000	100.00	+		01	11	A	IN-T	14									1000	3302	3332 3	43 3		100	
			de la company																3																		
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				Li-gr	David.		U-SES	15223	125020	1821/97	196000	0000		Part and the				18003		2000			20ES	3396		Links	Reg los	00 101	01-00	1980	DE L		5.000	5050		544	
	TAT DEOL	HECTED							ep	ECIA	AL IN	CTD	UCTIONS																								
	Priority (24 h		See absolute for sample	acce	eptan	ice po	olicy									L	٠١.		i.	. ,	0 A	,—	- \	• / :	1	100		_									
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	(10 Busines	ss Days)	REPORTI						XQ EDD	PDF	(e-m	ail ad	dress)0	nd av	15	0	6	he	16	ct	-W	C	١٠	·.	C0	h-	_		-				URE	CE ,	AVE)	_°C
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		YDO	Relinquishe	ed by	-	4	1	-	-				, Da	ate ,		me	\dashv	Rec	eivec	t by	: 4		/	-		_				د د		, [Date			Time	е
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	QSD-01 Revision	on 03/09/2020	Relinquishe	id by	7	_	6		>	_			8	ate /5	(6:	02		nec	GIVE		N		Siy.	1	1		X			_	+	10	15	2	16	Tim	2

Absolute Re		cooia		Sam	ple Rece	eipt (Condit	tion R	Job Numb	or.	5/	435	
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Custody Seals	-			J-No	7-17-17					signed:			□-No
Receipt Temp:	-()	°C	Samples o				10 O-1					go? Tes	
			PFAS-onl	y real	ice?	es \square -1	10 O-1	N/A	Any s	igns of	freezing	g? D-Yes	DNO.
Comments:													JI COLOR
Preservation					Bottle Size	/Type	& Qua	intity					_ applicable*
/ Analysis	10 100	ih	250 7 700	-	500 T 600		47.00				samples	and docum	nent:
HCI	40mL(G)	1	250mL(P)	0	500mL(P)	-	1L(G)	-		1	Ho	7	
HNO ₃ H ₂ SO ₄	125mL(P) 40mL(G)	d	250mL(P) 60mL(P)	6	500mL(P) 125mL(P)		250mL	(D)	500mL(P)	P	110	-	
NaOH	125mL(P)	D	250mL(P)		123IIL(F)		2301111	(1)	JOOHIL (F)	-			
(NH ₄) ₂ SO ₄	60mL(P)	-	125mL(P)		250mL(P)								
ZnAc-NaOH	125mL(P)		250mL(P)		2001112(1)								
Trizma	125mL(P)		250mL (P)	4							*pH √by	analyst:VOC.	PFAS, TOC,O&G
NH ₄ Ac	125mL(P)		250mL (P)								Residua	l Cl not pre	esent:
NaS ₂ O ₃	40mL(G)		120mL(P)	2								5Pest	
MeOH	20mL(G)		40mL(G)								Bacteria	ResCl ✓ by a	inalyst 🔿
None (solid)	20z(G)	-	4oz(G)	,	8oz(G)		Syringe				PC Dry	applicable?	YN
None (water)	40ml (G)	6	60mL(P)	8	125mL(P)	10	250mL		500mL(P)	2-	1L(G)	пррисполе	1L (P)
NHULL	60ml	6	COME(I)	0	1231113(1)	10	2301112	(1)	3001112(1)	0	IL(O)		12(1)
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Login Review	v	11 27			5 5 5 7 7	Yes	s No	N/A	Comments				
Proper lab sam		s/enoi	igh volume/co	orrect	preservative								
Analyses marke		-			Preservative		-		No HA	1/1//	(no	r our	-614
VOC &TOC V		10	L CV	-04									
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Bacteria bottles						-	/	-					
Samples within						1							
Immediate test	s communicat	ted in	WITTING:	Enter	vacagi Color) . /	No. 1	CTN	0110				
Surfactants, Turbid	lity Odor, CrVI,	Ferrous	Iron, Dissolved	Oxygen,	Unpres 624	V	000	1941	HAUR				
Date, time & II						-	/						
Rushes commu	inicated to an	alvst in	writing?					/					
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Compliance sar	nples have no	discr	epancies/requ	ire no	flags?	0	Jegn	9	(Or must be			-1 AUIDI	CC MADED
Log-in Supervis	sor notified in	nmedia	ately of follow	ing ite	ms:	16	37761	15/31	Discrepancies DoD etc.) or t				es, MADEP,
						0	10.		DOD Cic.) Of	uncomm	ion reque	oto.	
	Inspected	and l	Received By:			M	<	Date	/Time:/	2/10	7/75	17:0	5
Peer Review C	-	and	received by.					Date	/ Time:	111	10		
					OV)		_	c 1	ID		-	1	C1
☐ Client ID/I	-		On Ice, T					Sample				analyses in (Correctly
☐ Project Nar	ne		□ PO# (if p	rovide	ed)			Matrix			-1	references	7
☐ TAT/rushe	s communica	ted	☐ Sub samp	les ser	t? Shipping C	harge?		Date/	Time collected	l	-1	wastewater	methods
☐ Received D	ate/Time		☐ Issues not	ed abo	ove commun	icated?		Short	HTs communi	cated		otes from	CoC in LIMS
			viewed By:				Da						
Notes: (conti	nue on ba								Initials	Date	1	What wa	as sent?
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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: Work Order #:

07/02/2021 2106-03288

Client Job #:

06/21/2021

Date Received: 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

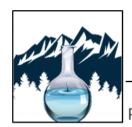
SAMPLE STATE SPECIFIC NOTES:

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

Donald a. D



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

Absolute Resource Associates CLIENT NAME:

CLIENT ADDRESS: 124 Heritage Avenue, Suite 10

Portsmouth, NH 03801

SAMPLE ID #: 2106-03288-001

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: 06/15/2021 10:00AM DATE AND TIME RECEIVED: 10:02AM 06/21/2021

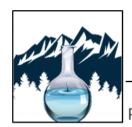
ANALYSIS PACKAGE: HAA GSA

RECEIPT TEMPERATURE: ON ICE 3.9° CELSIUS

MORE LOC INFO:					CLIE	NT 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 0	6/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	6/24/2021 10:13AM
2,3-Dibromopropionic Acid	108	%	\checkmark			70-130%	EPA 552.2 - SS	KV-NH 0	6/24/2021 10:13AM

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

Donald a. D.



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

Fails EPA Primary Fails EPA Secondary Fails State Guideline

Attention

Passes

DATE AND TIME COLLECTED:

06/15/2021

10:00AM

DATE AND TIME RECEIVED: ANALYSIS PACKAGE:

06/21/2021 HAA GSA

10:02AM

RECEIPT TEMPERATURE:

ON ICE 3.9° CELSIUS

MORE LOC INFO: CLIENT IOR #

MORE LOC INFO:					CLIE	NI 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 0	06/22/2021 09:00AM
Dibromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
Dichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
Monobromoacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
Monochloroacetic Acid*	<2	ug/L			2	No Limit	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
Total Haloacetic Acids*	<1	ug/L	\checkmark		1	60 ug/L	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
Trichloroacetic Acid*	<1	ug/L			1	No Limit	EPA 552.2	KV-NH 0	06/24/2021 10:53AM
2,3-Dibromopropionic Acid	91	%	√			70-130%	EPA 552.2 - SS	KV-NH 0	06/24/2021 10:53AM

	Abso	duta F	Racoui	rce.			6			•		rtsmo	age Aver outh, NH -436-200	03801				AN AN									ΚD		5	57	4	35	5	550000				
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	Company Na								Pr	oject	Nam	ie: 🖁	W STr	cigh Twa	1				4/45			T			ň	9									T			
	Bluele Company Ad								Pr	oject	#:	112	204 NH MA 1		,				O Gases-List: TTH Mr HAAS	rint	· de			Cc, Mg, Zu	2+ 1010	W Hardness	k		☐ Ferrous Iron	☐ Enterococci	☐ Phenols) Fluoride		cide				
			11 Rd. 21		14	ini	Μ	A					uired? N/	0		NADEP	121VT		TTH.	☐ TPH Fingerprint	5:00 km	88	ion	M	parent Co	0			70C D F		OP OP	omide C		CLP Pesti	sotos			
	DI #-		Day		q					otoco	000,00	RCR MCP QAP	NHD	ES DOD	S	☐ VOC 8260 MADEF	☐ VOC 8021VT	xane	Gases-Lis	EP O TP	TOTOR Browing	.3 Pest/P	tope dilut						OT NOTO NTO	teria MPN	e 🗆 Ortho P	ate 🗆 Br		VOC DI	s 🗆 Asbestos		143	
	Invoice to:	Erik (200 8 Grotton							mits:	_		P GW- DW Othe					X1,4-Dioxane	st	н мар	2	09	FAS isc			Alkalli of Mot		5 5	N N	□ Bac	+ Nitrit	Sulf		CLPS	☐ Herbicides		*	
	Email: ea	ro Hon	@ bluel	eaf	·W	GT	es.	coh	- 1	uote :						U VOC 8260 NHDES	☐ VOC BTEX MtBE, only	GRO 8015 🕱	☐ VOC 524.2 NH List	☐ DRO 8015 ☐ EPH MADEP	CI 8270ABN CI 625.1	☐ 8081 Pesticides	☐ PFAS 533 ☐ PFAS isotope dilution	☐ Mineral 0&6 1664	Conductivity X lurbidity	Deiority Pollutant Metals	4	ક ઇો.		teria P/A	☐ Sulfide Nitrate + Nitrite	Chloride	ity/FP	V0C		end mesivity	PC!	1
	PO #:								-	-			nent Pricir	-		OC 826	VOC B1	GR0	/OC 52	RO 80	TOAB	081 Pe	PFAS:	Ainera	Condu	5 5		s-list:	00	Bac	fide)	5 X	gnitibil	TCLP	☐ Grain Size	3	Composite (C)	
	Lab		eld	NERS		Matrix	X	Pre	serv	ation	Met	hod	S	ampling	T	11	0	9	2 0		B	8					als-list	Metal		orus	ln Sul	D Nitri	0	als		3	J. J.	
55	Sample ID (Lab Use Only)		ID	# CONTAINERS	WATER	SOLID	OTHER	· 당	HNO	H₂SO₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260	☐ V0C 624.1	CI VPH MADEP	☐ VOC 524.2	☐ TPH 8100	☐ 8 270P AH	☐ 8082 PCB	₩ PFAS 537.1	D 08G 1664	008 L Hq L	SULA WILLIA	Total Metals-list:	M Dissolved Metals-list:	☐ Ammonia ☐ COD ☐ TKN	□ T-Phosphorus ★Bacteria P/A □ Bacteria MPN	☐ Cyanide	□ Nitrate □ Nitrite 🏋 Chloride 🌣 Sulfate □ Bromide □ Fluoride	☐ Corrosivity ☐ Ignitibility/FP	☐ TCLP Metals ☐ TCLP VOC ☐ TCLP SVOC ☐ TCLP Pesticide	Subcontract:	Con	Grah (G) or	al an ini
5	574350	Raw			X	0,								10:00				X			X		X	X	X	X	XX	X	-			X			0,	X	X C	,
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Laboratory Report

Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Aaron Davis PO Number: 11204
Blueleaf, Inc. Job ID: 57465
57 Dresser Hill Road Date Received: 6/17/21

Charlton, MA 01507

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

Willie Stone Date of Approval: 7/1/2021

Authorized Signature Total number of pages: 16

Absolute Resource Associates Certifications

New Hampshire 1732 Massachusetts M-NH902

Maine 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

		Reporting			Instr Dil'n		Prep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	e 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

		Reporting			Instr Dil'n	ı Pı	rep		Anal	ysis	
Parameter	Result	Limit	DL	Units	Factor	Analyst Date	Time	Batch	Date	Time Reference	
Total Suspended Solids (TSS)	26	16	7.4	ma/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 Reporting Dil'n Prep **Analysis Parameter** Result Limit DL **Units Factor Analyst Date** Batch Date Time 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid 2.0 U 2.0 0.31 ng/L WAS 6/22/21 13990 6/22/21 14:06 (GenX acid) (HFPODA) n-ethyl perfluorooctanesulfonamido acetic acid 2.0 U 2.0 0.40 ng/L 1 WAS 6/22/21 13990 6/22/21 14:06 (NETFOSAA) n-methylperfluorooctane sulfonamido acetic acid 2.0 U 2.0 0.33 ng/L 1 WAS 6/22/21 13990 6/22/21 14:06 (NMEFOSAA) perfluorobutane sulfonic acid (PFBS) 0.51 WAS 6/22/21 13990 6/22/21 6.1 20 ng/L 1 14:06 2.0 U WAS perfluorodecanoic acid (PFDA) 2.0 0.35 ng/L 1 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 na/L 1 WAS 6/22/21 13990 6/22/21 14:06 perfluorohexane sulfonic acid (PFHXS) 31 2.0 0.40 na/L 1 WAS 6/22/21 13990 6/22/21 14:06 WAS 6/22/21 13990 6/22/21 perfluorohexanoic acid (PFHXA) 11 2.0 0.35 na/L 1 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 1 WAS 6/22/21 13990 6/22/21 14:06 ng/L 2.0 U WAS 6/22/21 13990 6/22/21 perfluoroundecanoic acid (PFUNA) 2.0 0.33 ng/L 1 14.06 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid 2.0 U 0.40 WAS 6/22/21 13990 6/22/21 2.0 ng/L 1 14:06 (11CLPF3OUDS) 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid 2.0 U 20 0.40 ng/L 1 WAS 6/22/21 13990 6/22/21 14:06 (9CLPF3ONS) 4,8-dioxa-3h-perfluorononanoic acid (ADONA acid) 2.0 U 2.0 0.19 ng/L 1 WAS 6/22/21 13990 6/22/21 14:06 (ADONA) Limits **Surrogate Recovery** 13C2-PFHxA SUR % WAS 6/22/21 13990 6/22/21 93 70-130 1 14:06 13C2-PFDA SUR 70-130 % 1 WAS 6/22/21 13990 6/22/21 14:06 91 WAS 6/22/21 13990 6/22/21 D5-NEtFOSAA SUR 99 70-130 % 1 14:06 13C3-HFPO-DA SUR 70-130 % 1 WAS 6/22/21 13990 6/22/21 95 14:06 1 Sum of MA PFAS6 Analytes (MAPFAS6) 2 2101835 81 ng/L

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

Absolute Resource



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 A	mt Added	%R	Limit	s	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 Associate	d 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 Assoc	iated 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)	I 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-chloroeicosafluoro-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 13	30	
		13C2-PFDA SUR	57435-001		91	%		70 13	30	
		D5ETFOSAA SUR	57435-001		101	%		70 13	80	
		HFPODA13C3 SUR	57435-001		105	%		70 13	80	



Method	QC ID	Parameter	Associated Sample	Result	Units A	Amt Added	%R	Limits		RPD	RPD Limit
E537.1	LCS13990	2,3,3,3-tetrafluoro-2- (heptafluoropropoxy)propanoic acid (acid) (HFPODA)	GenX	180	ng/L	200	90	70	130		
		n-ethyl perfluorooctanesulfonamido a (NETFOSAA)	cetic acid	180	ng/L	200	90	70	130		
		n-methylperfluorooctane sulfonamido acid (NMEFOSAA)	acetic	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 (PFHX	S)	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-chloroeicosafluoro-3-oxaundecane sulfonic acid (11CLPF3OUDS)	e-1-	160	ng/L	189	83	70	130		
		9-chlorohexadecafluoro-3-oxanone-1-acid (9CLPF3ONS)	sulfonic	150	ng/L	187	82	70	130		
		4,8-dioxa-3h-perfluorononanoic acid acid) (ADONA)	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 Associ	ated Sample	Result	Units	Amt Added	%R	Limits	3	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-chloroeicosafluoro-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		



AGE	OF

Absolute Resource

124 Heritage Avenue #16 Portsmouth, NH 03801 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

57465

associates						а	absoluteresourceassociates.com				ANALYSIS REQUEST																								
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Sweleat Inc.							Pro	Project #: 204					7											☐ Hardness			s Iron	ij	S	200					١
Company Address:					Pro	Project Location: NH MA ME VT										nint				olor					☐ Ferrous Iron	Prococ	U Phenois	1	icide				1		
S7 Dresser Hill Rd, Charlton MA 01507 Report To: Aaron Davis Phone #: 774 - 200 - 8029					7						a.	5			☐ TPH Fingerprint				☐ Apparent Color	^	TAL Metals				20000	T	2	Pesti	S			١			
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ID (Lab Use Only)	eld D	# CONTAINERS	WATER	SOLID	OTHER	HCI	HNO3	H ₂ SO ₄	NaOH	МеОН	DATE	TIME	SAMPLER	□ V0C 8260	□ V0C 624.1	☐ VPH MADEP ☐ GRO 8015	☐ V0C 524.2	☐ TPH 8100 ☐ DRO 8015	□ 8270PAH □ 8270ABN □ 625.1 □ EDB	DOOZ FUB GOOD FESTIVE	□ 0&G 1664 □ Mineral 0&G 1664	□ pH □ BOD □ Conductivity □ Turbidity	ATS OTD	☐ RCRA Metal	☐ Total Metals-list:	☐ Dissolved Metals-list:	☐ Ammonia ☐ COD	□ T-Phosphorus	Cyanide	Corrosivity Ignitibility/FP	□ TCLP Metals □ TCLP VOC □ TCLP SVOC □ TCLP Pesticide	Subcontract:		Grab (G) or (5
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TAT REQUESTED Priority (24 hr)*	See absolu for sampl curre		eptan	ce po	licy a		SPE	CIA	L IN	STR	UCTIONS	8																							
Standard	REPORT	ING	INST	RUC	TIO	NS	O P	PDF (e-ma	ail add	dress)																T	REC	EIVE	D 01	N ICE	9	ES	UNO	5
(10 Business Days) *Date Needed									3		ાં			(1)								°C	3												
		□ HARD COPY REQUIRED □ EDD Relinquished by Sampler:									, Da	ate I	Tin	ne		Rec	eivec	by	:							200	-		T	Da	ite	- 1	Tim	ne	1
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Sample Receipt Condition Report

57465

Absolute Resource Associates Job Number:										a line				
Samples Recei		PS	□-Lab Courier □-Client Drop-off □											
Custody Seals	Custody Seals - present & intact: □-Yes □-No □-N/A							CoC	signed:		1-Yes	□-No		
Receipt Temp:	Receipt Temp: °C Samples on ice?							Samp	led < 2	24 hrs ag	go? □-Yes	-No		
		PFAS-onl	y real	ice?	; U -N	No DA	N/A	Any s	igns of	freezing	g? D-Yes	Q-No		
Comments:														
Preservation				Bottle Size	/Type	& Qua	ntity				H for ALL			
/ Analysis	10. 100			1 500 T 500	1	47			-	samples	and docum	ent:		
HCl	40mL(G)	250mL(P)		500mL(P)		1L(G)								
HNO ₃ H ₂ SO ₄	125mL(P) 40mL(G)	250mL(P) 60mL(P)		500mL(P) 125mL(P)	-	250mL	(D)	500mL(P)						
NaOH	125mL(P)	250mL(P)		123IIL(F)		23011112	(1)	300IIIL(I)						
(NH ₄) ₂ SO ₄	60mL(P)	125mL(P)		250mL(P)										
ZnAc-NaOH	125mL(P)	250mL(P)												
Trizma	125mL(P)	250mL (P)	2	Para la						*pH √by	analyst:VOC, I	PFAS, TOC,O&G		
NH4Ac	125mL(P)	250mL (P)								Residua	l Cl not pre	sent:		
NaS ₂ O ₃	40mL(G)	120mL(P)									5Pest6			
MeOH	20mL(G)	40mL(G)								Bacteria	ResCl ✓ by a	nalyst		
None (solid)	2oz(G)	4oz(G)		8oz(G)		Syringe				PC Dry	applicable?	Y N		
None (water)	40ml (G) 7	_60mL(P)		125mL(P)		250mL		500mL(P)		1L(G)		1L (P)		
Trone (water)	Tomic (G)	- COMES(I)		1201123(1)		2001112	(-)	0000000		(-)		(-)		
Mold	Cassette	Bulk		Plate		Tana Lii	G.							
Asbestos	Cassette	Bulk		Flate		Tape Li								
Lead	Cassette	Bulk		Wipe										
Dead	GROOTIC													
Login Review	v				Yes	No	N/A	Comments						
Proper lab sam	ple containers/enou	igh volume/c	orrect	preservative?	>									
-	ed on COC match b		100		17									
	Water-no headspace?	01.000 2000 10			+		1			-				
	OH covers solid, no lea	ks, Prep Expira	ation C	OK?			X							
	cific bottles? QC red				>									
	s provided by ARA?						X			THE REAL				
Samples within					X		-							
	s communicated in	veition:			1	-	1		-					
NO ₃ , NO ₂ ,o-PO ₄ ,	pH, BOD, Coliform/E.	coli (P/A or MPN), Enter	rococci, Color			X							
Surfactants, Turbic	lity, Odor, CrVI, Ferrous	Iron, Dissolved					-							
Date, time & I	D on samples match	CoC?			X									
Rushes commu	inicated to analyst in	writing?					A							
Subcontract no	te on login board?											FE-TIVE TWO		
Pesticides EPA														
-	mples have no discre	enancies / requ	ire no	flage?				(Or must be	rejecte	·d)				
							1	Discrepancie			ples (NHDF	S. MADEP.		
Log-in Supervi	sor notified immedia	ately of follow	ring ite	ems:				DoD etc.) or				o,,		
			Till to	/0	NA			1	11-71-	21 1	C. C-			
	Inspected and	Received By:		2K	11		Date	/Time:	11/12	4 1	5-63			
Peer Review (Checklist				TO STATE									
TW		☐ On Ice, T	emne	rature OK?			Sampl	le IDs			analyses in C	Correctly		
all annual de centre						1000					references	Jozzetaj		
☐ Project Na		□ PO# (if p					Matrix							
☐ TAT/rushe	es communicated	☐ Sub samp	les ser	nt? Shipping Ch	narge?		Date/	Time collected	d	-1	wastewater 1	nethods		
☐ Received D	ate/Time	☐ Issues not	ted ab	ove communi	cated?		Short	HTs commun	icated		Notes from (CoC in LIMS		
	Re	viewed By:				Da	te:		- Pila					
Notes: (cont	inue on back as	needed)						Initials	Date		What wa	as sent?		
						Uploa	ded / P					DD / Invoice		
						WHITE SASSING	ded / P	245 00 00 14 U				DD / 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

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: 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 Number: BW-STRAIGHTWAY Lab Number: L2113238

Project Number: 07202 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.											



Serial_No:03242112:48

Project Name: BW-STRAIGHTWAY Lab Number: L2113238

Project Number: 07202 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.

Wille M. Morris

Authorized Signature:

Title: Technical Director/Representative

ALPHA

Date: 03/24/21

INORGANICS & MISCELLANEOUS



Project Name: BW-STRAIGHTWAY Lab Number: L2113238

Project Number: 07202 Report Date: 03/24/21

SAMPLE RESULTS

Lab ID: L2113238-01 Date Collected: 03/17/21 10:00

Client ID: RAW Date Received: 03/17/21

Sample Location: BARNSTABLE, MA 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 - Westh	orough Lal)								
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 Lab Number:

L2113238

Project Number: 07202 Report Date: 03/24/21

SAMPLE RESULTS

Lab ID: Date Collected: L2113238-02 03/17/21 10:00

Client ID: FILTER B Date Received: 03/17/21

Refer to COC Sample Location: BARNSTABLE, MA Field Prep:

Sample Depth:

Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough Lat)								
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



Lab Number:

Project Name: BW-STRAIGHTWAY

L2113238

Project Number: 07202 **Report Date:** 03/24/21

Method Blank Analysis Batch Quality Control

Parameter	Result Quali	fier Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - W	estborough Lab for	sample(s): 02	Batch:	WG14	176570-1				
Chlorine, Total Residual	ND	mg/l	0.02		1	-	03/19/21 16:50	121,4500CL-E) AS
General Chemistry - W	estborough Lab for	sample(s): 02	Batch:	WG14	176571-1				
Chlorine, Residual Free	ND	mg/l	0.05		1	-	03/19/21 16:50	121,4500CL-E) 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 Asso	ociated sample(s): 01-02	Batch: WG1475	582-1				
Oxidation/Reduction Potential	101		-		90-110	-		20
General Chemistry - Westborough Lab Asso	ociated sample(s): 02 E	Batch: WG1476570	-2				
Chlorine, Total Residual	108		-		90-110	-		
General Chemistry - Westborough Lab Asso	ociated sample(s): 02 E	Batch: WG1476571	-2				
Chlorine, Residual Free	108		-			-		

Matrix Spike Analysis Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 07202

7202

Lab Number:

L2113238

Report Date:

03/24/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual Found	MSD %Recovery Qu	Recovery al Limits	RPD Qu	RPD _{ual} Limits
General Chemistry - Westborou	igh Lab Asso	ciated samp	le(s): 02	QC Batch ID: V	VG1476570-4	QC Sample: L21132	238-02 Client	ID: FILTE	R 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	<u>Units</u>	RPD Qı	ual RPD Limits
General Chemistry - Westborough Lab Associated samp	le(s): 01-02 QC Batch	ID: WG1475582-2	QC Sample: L2	2113186-01 Clie	nt ID: DUP Sample
Oxidation/Reduction Potential	27	25	mv	8	20
General Chemistry - Westborough Lab Associated samp	le(s): 02 QC Batch ID:	WG1476570-3 Q	C Sample: L211	3238-02 Client I	D: FILTER B
Chlorine, Total Residual	0.68	0.73	mg/l	7	20
General Chemistry - Westborough Lab Associated samp	le(s): 02 QC Batch ID:	WG1476571-3 Q	C Sample: L2113	3238-02 Client I	D: FILTER B
Chlorine, Residual Free	ND	ND	mg/l	NC	

Lab Number: L2113238

Report Date: 03/24/21

Sample Receipt and Container Information

Were project specific reporting limits specified?

BW-STRAIGHTWAY

Cooler Information

Project Name:

Project Number: 07202

Cooler Custody Seal

A Absent

Container Info	ormation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	pН	рН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2113238-01A	BOD bottle Powder Pillow preserved	Α	NA		3.4	Υ	Absent		DO-4500(.3)
L2113238-01B	Plastic 120ml unpreserved/No Headspace	Α	NA		3.4	Υ	Absent		CO2(1)
L2113238-01C	Plastic 950ml unpreserved	Α	7	7	3.4	Υ	Absent		ORP(1)
L2113238-02A	BOD bottle Powder Pillow preserved	Α	NA		3.4	Υ	Absent		DO-4500(.3)
L2113238-02B	Plastic 120ml unpreserved/No Headspace	Α	NA		3.4	Υ	Absent		CO2(1)
L2113238-02C	Plastic 950ml unpreserved	Α	7	7	3.4	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2113238-02D	Plastic 950ml unpreserved	Α	7	7	3.4	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2113238-02X	Plastic 250ml NaOH preserved split	Α	7	>12	3.4	N	Absent		-



Project Name: BW-STRAIGHTWAY Lab Number: L2113238

Project Number: 07202 Report Date: 03/24/21

GLOSSARY

Acronyms

EDL

LOD

LOQ

MS

RPD

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.)

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.

- 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.)

- 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.

 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.

- 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.



Project Name: BW-STRAIGHTWAY Lab Number: L2113238
Project Number: 07202 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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



Project Name:BW-STRAIGHTWAYLab Number:L2113238Project Number:07202Report 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 Lab Number: L2113238
Project Number: 07202 Report Date: 03/24/21

REFERENCES

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.



Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873

Revision 18

Page 1 of 1

Published Date: 2/16/2021 5:32:02 PM

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 Kieldahl-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 II, 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.

Pre-Qualtrax Document ID: 08-113 Document Type: Form

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13238-01	RAW	31	17/21 10:01	2 DW	ARD						1	X	×	X			sample Comments	5 3
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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



Serial_No:03292116:25

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



Serial No:03292116:25

Project Name: BW-STRAIGHTWAY Lab Number: L2114524
Project Number: 11204 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.

M 2014 Jennifer L Clements

Authorized Signature:

Title: Technical Director/Representative

ALPHA

Date: 03/29/21

INORGANICS & MISCELLANEOUS



Serial_No:03292116:25

Project Name: BW-STRAIGHTWAY Lab Number: L2114524

Project Number: 11204 Report Date: 03/29/21

SAMPLE RESULTS

Lab ID: L2114524-01 Date Collected: 03/23/21 09:10

Client ID: FILTER B CBW Date Received: 03/23/21 Sample Location: BARNSTABLE, MA 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 - Westh	orough Lab)								
Solids, Total Suspended	260		mg/l	50	NA	10	-	03/28/21 13:07	121,2540D	SH



Serial_No:03292116:25

Project Name: BW-STRAIGHTWAY

W-STRAIGHTWAY Lab Number: L2114524

Project Number: 11204 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 - W	estborough Lab for sam	nple(s): 01	Batch	: WG14	179707-1				
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

Lab Number: L2114524

Project Number: Report Date: 03/29/21 11204

LCS **LCSD** %Recovery %Recovery %Recovery Limits RPD **RPD Limits** Parameter Qual Qual Qual General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1479707-2 Solids, Total Suspended 98 80-120



Project Name:

BW-STRAIGHTWAY

Lab Duplicate Analysis

Batch Quality Control

Lab Number: **Project Name: BW-STRAIGHTWAY** L2114524

Project Number: 11204 Report Date: 03/29/21

Parameter	Native Sample	Duplicate Sam	ple Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sa	ample(s): 01 QC Batch ID:	WG1479707-3	QC Sample: L21	14366-01	Client ID: D	OUP Sample
Solids, Total Suspended	68	61	mg/l	11		29



Serial_No:03292116:25

Lab Number: L2114524

Report Date: 03/29/21

Sample Receipt and Container Information

YES Were project specific reporting limits specified?

BW-STRAIGHTWAY

Cooler Information

Project Name:

Project Number: 11204

Custody Seal Cooler

Absent Α

Container Information				Initial	Final	Temp			Frozen	
	Container ID	Container Type	Cooler	рН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
	I 2114524-01A	Plastic 950ml unpreserved	Α	7	7	4.3	Υ	Absent		TSS-2540(7)



Project Name: BW-STRAIGHTWAY Lab Number: L2114524

Project Number: 11204 Report Date: 03/29/21

GLOSSARY

Acronyms

EDL

LOQ

MS

RPD

SRM

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)

from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

- 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)

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.)

- 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.

 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.

- 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.

- 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.



Project Name: BW-STRAIGHTWAY Lab Number: L2114524
Project Number: 11204 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

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

receipt, if applicable.

- A Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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



Project Name:BW-STRAIGHTWAYLab Number:L2114524Project Number:11204Report 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.



Serial_No:03292116:25

Project Name: BW-STRAIGHTWAY Lab Number: L2114524
Project Number: 11204 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.



Serial_No:03292116:25

Alpha Analytical, Inc.
Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:**17873** Revision 18

Page 1 of 1

Published Date: 2/16/2021 5:32:02 PM

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: lodomethane (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 II, 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

Page 14 of 15

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

Document Type: Form

ALPHA	CHAIN O	F CUS	TODY	PAC	GE/_	of	Date	Rec'o	d in Lab):	3	23	12	١	ALP	HA.	Job#:	LZ	11452	24
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Westboro, MA Tel. 508-898-9	01581 Mansfield, MA 02048	Project Nam	ie: 13L/-	STAAL	CUTIC	Au	0/	DEx		DΕ	MAIL				□ Sa	me as	Client in	nfo P	0#:	
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ALPHA Lab ID (Lab Use Only)	Sample ID		Collectio	n Time	Sample Matrix	Sampler Initials	80,	SVOC	METAL	EPH.	VPH:	D PC	Hay	4	//	/ /	/ / .	<u> </u>	mple Commer	
14524-01	Filter 13 CB	W 3,	23 9	:10	Dye	DJC							Y							1
Container Type P= Plastic A= Amber glass V= Vial G= Glass B= Bacteria cup C= Cube Q= Other E= Encore D= BOD Bottle	Preservative A= None B= HCI C= HNO ₃ D= H ₂ SO ₄ E= NaOH F= MeOH G= NaHSO ₄ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ CI K= Zn Acetate	7 Relfinquish	ed 8y:_		Pre	eservative	- Tu	(eu	Recei	ved B	Ý.		P A		/Time	1625		Terms a	omitted are sub and Conditions le.	



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

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: 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 Lab Number: L2118928
Project Number: 11204 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.										



Serial_No:04252118:43

Project Name: BW-STRAIGHTWAY Lab Number: L2118928
Project Number: 11204 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:

Title: Technical Director/Representative Date: 04/25/21

600, Shandow Kelly Stenstrom

INORGANICS & MISCELLANEOUS



Serial_No:04252118:43

Project Name: BW-STRAIGHTWAY Lab Number: L2118928

Project Number: 11204 Report Date: 04/25/21

SAMPLE RESULTS

Lab ID: L2118928-01 Date Collected: 04/14/21 10:00

Client ID: RAW Date Received: 04/14/21

Sample Location: BARNSTABLE, MA 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 - Westh	orough La	b								
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



Serial_No:04252118:43

Project Name: BW-STRAIGHTWAY Lab Number: L2118928

Project Number: 11204 Report Date: 04/25/21

SAMPLE RESULTS

Lab ID: L2118928-02 Date Collected: 04/14/21 11:00

Client ID: FILTER B Date Received: 04/14/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Campio Essation. Briting Prop. 1100 110p.

Sample Depth:

Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough Lat)								
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



Serial_No:04252118:43

L2118928

Lab Number:

Project Name: BW-STRAIGHTWAY

Project Number: 11204 **Report Date:** 04/25/21

Method Blank Analysis Batch Quality Control

Parameter	Result Q	ualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab	for sam	ple(s): 02	Batch:	WG14	86302-1				
Chlorine, Total Residual	ND		mg/l	0.02		1	-	04/14/21 20:36	121,4500CL-[D AS
General Chemistry	- Westborough Lab	for sam	ple(s): 02	Batch:	WG14	86306-1				
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

04/25/21

Report Date:

Parameter	LCS %Recovery (Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab	Associated sample(s):	02 Ba	atch: WG1486302-	2				
Chlorine, Total Residual	108		-		90-110	-		
General Chemistry - Westborough Lab	Associated sample(s):	02 Ba	atch: WG1486306-	2				
Chlorine, Residual Free	96		-			-		
General Chemistry - Westborough Lab	Associated sample(s):	01-02	Batch: WG14863	69-1				
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 Found	MSD %Recovery Qua	Recovery Limits	RPD Qu	RPD _{ual} Limits
General Chemistry - Westborou	gh Lab Asso	ciated samp	ole(s): 02	QC Batch ID: V	VG1486302-4	QC Sample: L211892	3-02 Client	ID: FILTE	RB
Chlorine, Total Residual	1.7	2.5	4.1	97	-	-	80-120	-	20



L2118928

Lab Duplicate Analysis Batch Quality Control

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Lab Number:

Report Date: 04/25/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual RPD	Limits
General Chemistry - Westborough Lab Associated samp	ole(s): 02 QC Batch ID:	WG1486302-3 QC	Sample: L2118	8928-02 CI	lient ID: FILTER E	3
Chlorine, Total Residual	1.7	1.8	mg/l	6		20
General Chemistry - Westborough Lab Associated samp	ole(s): 02 QC Batch ID:	WG1486306-3 QC	Sample: L2118	8928-02 CI	lient ID: FILTER I	3
Chlorine, Residual Free	ND	ND	mg/l	NC		
General Chemistry - Westborough Lab Associated samp	ole(s): 01-02 QC Batch	ID: WG1486369-2	QC Sample: L2	2118928-01	Client ID: RAW	
Oxidation/Reduction Potential	150	150	mv	0		20
General Chemistry - Westborough Lab Associated samp	ole(s): 01-02 QC Batch	ID: WG1486467-2	QC Sample: L2	2118928-02	Client ID: FILTE	R B
Carbon Dioxide	120	120	mg/l	0		



Serial_No:04252118:43

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?

Cooler Information

Cooler Custody Seal

A Absent

Container Info	rmation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	рН	рН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2118928-01A	Plastic 120ml unpreserved/No Headspace	Α	NA		4.5	Υ	Absent		CO2(1)
L2118928-01B	BOD bottle unpreserved	Α	NA		4.5	Υ	Absent		DO-4500(.3)
L2118928-01C	Plastic 950ml unpreserved	Α	7	7	4.5	Υ	Absent		ORP(1)
L2118928-02A	Plastic 120ml unpreserved/No Headspace	Α	NA		4.5	Υ	Absent		CO2(1)
L2118928-02B	BOD bottle unpreserved	Α	NA		4.5	Υ	Absent		DO-4500(.3)
L2118928-02C	Plastic 950ml unpreserved	Α	7	7	4.5	Υ	Absent		ORP(1)
L2118928-02D	Plastic 950ml unpreserved	Α	7	7	4.5	Υ	Absent		RFC-4500(1),TRC-4500(1)



Project Name: Lab Number: **BW-STRAIGHTWAY** L2118928

Report Date: Project Number: 11204 04/25/21

GLOSSARY

Acronyms

EDL

LOQ

MS

RPD

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.)

- 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.)

- 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

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

MDI - 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.

> - 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.

- 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.

TEO - 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 Lab Number: L2118928
Project Number: 11204 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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 Lab Number: L2118928
Project Number: 11204 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.

Report Format: Data Usability Report



Serial_No:04252118:43

Project Name: BW-STRAIGHTWAY Lab Number: L2118928
Project Number: 11204 Report Date: 04/25/21

REFERENCES

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.



Serial_No:04252118:43

Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873

Published Date: 4/2/2021 1:14:23 PM

Page 1 of 1

Revision 19

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;

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, 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 II, 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.

Pre-Qualtrax Document ID: 08-113 Document Type: Form

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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

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: 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



L2120551

Project Name: BARNSTABLE MA Lab Number:

Project Number: 11204 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 Lab Number: L2120551

Project Number: 11204 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.

Nachelle M. Morris

Authorized Signature:

Title: Technical Director/Representative

Date: 05/04/21



INORGANICS & MISCELLANEOUS



Project Name: BARNSTABLE MA Lab Number: L2120551

Project Number: 11204 Report Date: 05/04/21

SAMPLE RESULTS

Lab ID: L2120551-01 Date Collected: 04/22/21 11:00

Client ID: RAW Date Received: 04/22/21

Sample Location: BARNSTABLE MA 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 - Westb	orough La	ab								
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 Lab Number: L2120551

Project Number: 11204 Report Date: 05/04/21

SAMPLE RESULTS

Lab ID: L2120551-02 Date Collected: 04/22/21 11:00

Client ID: FILTER B Date Received: 04/22/21 Sample Location: BARNSTABLE MA 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 - Westb	orough 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



L2120551

Project Name: BARNSTABLE MA Lab Number:

Project Number: 11204 Report Date: 05/04/21

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifie	r Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab for sa	mple(s): 02	Batch:	WG14	189700-1				
Chlorine, Total Residual	ND	mg/l	0.02		1	-	04/23/21 08:24	121,4500CL-D	MR
General Chemistry	- Westborough Lab for sa	mple(s): 02	Batch:	WG14	189702-1				
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 %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Asso	ciated sample(s): 01-02	Batch: WG14896	672-1				
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab Asso	ciated sample(s): 02 E	Batch: WG1489700	-2				
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab Asso	ciated sample(s): 02 E	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	MSD Qual Found	MSD %Recovery Qua	Recovery Limits	RPD Q	RPD ual Limits
General Chemistry - Westborou	igh Lab Asso	ciated samp	ole(s): 02	QC Batch ID: V	WG1489700-4	QC Sample: L212032	5-04 Client	ID: MS Sa	ample
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	<u>Units</u>	RPD	Qual RPD Limits
General Chemistry - Westborough Lab Associated samp	ole(s): 01-02 QC Batch	ID: WG1489672-2	QC Sample: I	_2120551-01	Client ID: RAW
Oxidation/Reduction Potential	170	170	mv	0	20
General Chemistry - Westborough Lab Associated samp	ole(s): 02 QC Batch ID	: WG1489700-3 Q	C Sample: L21	20325-02 Cli	ent ID: DUP Sample
Chlorine, Total Residual	ND	ND	mg/l	NC	20
General Chemistry - Westborough Lab Associated samp	ole(s): 02 QC Batch ID	: WG1489702-3 Q	C Sample: L21	20551-02 Cli	ent ID: FILTER B
Chlorine, Residual Free	ND	ND	mg/l	NC	
General Chemistry - Westborough Lab Associated samp	ole(s): 01-02 QC Batch	ID: WG1489769-1	QC Sample: I	_2120672-05	Client ID: DUP Sample
Carbon Dioxide	560	300	mg/l	60	



Project Name: BARNSTABLE MA

Project Number: 11204

YES

Lab Number: L2120551 **Report Date:** 05/04/21

Sample Receipt and Container Information

Were project specific reporting limits specified?

Cooler Information

Cooler Custody Seal

A Absent

Container Information		rmation		Initial	Final	Temp			Frozen	
	Container ID	Container Type	Cooler	pН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
	L2120551-01A	BOD bottle unpreserved	Α	NA		3.7	Υ	Absent		DO-4500(.3)
	L2120551-01B	Plastic 950ml unpreserved	Α	7	7	3.7	Υ	Absent		ORP(1)
	L2120551-01C	Plastic 950ml unpreserved	Α	NA		3.7	Υ	Absent		CO2(1)
	L2120551-02A	BOD bottle unpreserved	Α	NA		3.7	Υ	Absent		DO-4500(.3)
	L2120551-02B	Plastic 950ml unpreserved	Α	7	7	3.7	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
	L2120551-02C	Plastic 950ml unpreserved	Α	NA		3.7	Υ	Absent		CO2(1)



L2120551

Project Name: Lab Number: **BARNSTABLE MA**

Report Date: Project Number: 11204 05/04/21

GLOSSARY

Acronyms

LOQ

MS

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**

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.

Environmental Protection Agency.

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.)

- 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

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

MDI - 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.

- 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.

TEO - 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 Lab Number: L2120551
Project Number: 11204 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

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

receipt, if applicable.

- A Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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 MALab Number:L2120551Project Number:11204Report 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.

Report Format: Data Usability Report



Project Name:BARNSTABLE MALab Number:L2120551Project Number:11204Report Date:05/04/21

REFERENCES

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.



Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873

Revision 19

Page 1 of 1

Published Date: 4/2/2021 1:14:23 PM

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;

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, 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 II, 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.

Pre-Qualtrax Document ID: 08-113 Document Type: Form

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																		THE CONTRACTOR OF STREET	



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 Lab Number: L2122099

Project Number: 11204 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.	



Serial_No:05112115:37

Project Name: BARNSTABLE MA Lab Number: L2122099

Project Number: 11204 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.

Sebastian Corbin

Authorized Signature:

Title: Technical Director/Representative

Date: 05/11/21



INORGANICS & MISCELLANEOUS



Serial_No:05112115:37

Project Name: BARNSTABLE MA Lab Number: L2122099

Project Number: 11204 Report Date: 05/11/21

SAMPLE RESULTS

Lab ID: L2122099-01 Date Collected: 04/29/21 09:30

Client ID: RAW Date Received: 04/29/21

Sample Location: BARNSTABLE MA 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 - Westb	orough La	b								
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



Serial_No:05112115:37

Project Name: BARNSTABLE MA Lab Number: L2122099

Project Number: 11204 Report Date: 05/11/21

SAMPLE RESULTS

Lab ID: L2122099-02 Date Collected: 04/29/21 09:30

Client ID: FILTER B Date Received: 04/29/21 Sample Location: BARNSTABLE MA Field Prep: Not Specified

Cample Location. Briting Printer with

Sample Depth:

Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough Lat)								
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



Serial_No:05112115:37

L2122099

Lab Number:

Project Name: BARNSTABLE MA

Project Number: 11204 **Report Date:**

05/11/21

Method Blank Analysis Batch Quality Control

Parameter	Result Q	ualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab	for sam	ple(s): 02	Batch:	WG14	192624-1				
Chlorine, Residual Free	ND		mg/l	0.05		1	-	04/30/21 04:12	121,4500CL-E) AW
General Chemistry	- Westborough Lab	for sam	ple(s): 02	Batch:	WG14	192625-1				
Chlorine, Total Residual	ND		mg/l	0.02		1	_	04/30/21 03:45	121,4500CL-E) AW



L2122099

Lab Control Sample Analysis Batch Quality Control

Project Name: BARNSTABLE MA

Project Number:

11204

Lab Number:

Report Date: 05/11/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Ass	sociated sample(s):	01-02	Batch: WG14928	531-1				
Oxidation/Reduction Potential	99		-		90-110	-		20
General Chemistry - Westborough Lab Ass	sociated sample(s):	: 02 B	atch: WG1492624	-2				
Chlorine, Residual Free	92		-			-		
General Chemistry - Westborough Lab Ass	sociated sample(s):	02 B	atch: 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 C	Recovery Qual Limits	RPD C	RPD Qual Limits
General Chemistry - Westborou	gh Lab Asso	ciated samp	le(s): 02	QC Batch ID: V	VG14926	325-4	QC Sample: L2122	2099-02 Client	ID: FILT	ER 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 same	ple(s): 01-02 QC Batch	ID: WG1492531-2	QC Sample: L2	122099-01	Client ID: RAW	
Oxidation/Reduction Potential	200	200	mv	0		20
General Chemistry - Westborough Lab Associated sam	ple(s): 02 QC Batch ID:	WG1492624-3 QC	C Sample: L2122	2099-02 CI	lient ID: FILTER B	
Chlorine, Residual Free	1.1	1.2	mg/l	9		
General Chemistry - Westborough Lab Associated sam	ple(s): 02 QC Batch ID:	WG1492625-3 QC	C Sample: L2122	2099-02 CI	lient ID: FILTER B	
Chlorine, Total Residual	2.0	1.9	mg/l	5		20
General Chemistry - Westborough Lab Associated sam	pple(s): 01-02 QC Batch	ID: WG1492653-2	QC Sample: L2	122099-02	Client ID: FILTER	R B
Carbon Dioxide	170	160	mg/l	6		



Serial_No:05112115:37

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?

Cooler Information

Cooler Custody Seal

A Absent

Container Info	rmation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	рН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2122099-01A	Plastic 120ml unpreserved/No Headspace	Α	NA		4.0	Υ	Absent		CO2(1)
L2122099-01B	BOD bottle unpreserved	Α	NA		4.0	Υ	Absent		DO-4500(.3)
L2122099-01C	Plastic 950ml unpreserved	Α	7	7	4.0	Υ	Absent		ORP(1)
L2122099-02A	Plastic 120ml unpreserved/No Headspace	Α	NA		4.0	Υ	Absent		CO2(1)
L2122099-02B	BOD bottle unpreserved	Α	NA		4.0	Υ	Absent		DO-4500(.3)
L2122099-02C	Plastic 950ml unpreserved	Α	7	7	4.0	Υ	Absent		ORP(1)
L2122099-02D	Plastic 950ml unpreserved	Α	7	7	4.0	Υ	Absent		RFC-4500(1),TRC-4500(1)



Project Name: Lab Number: **BARNSTABLE MA** L2122099

Report Date: Project Number: 11204 05/11/21

GLOSSARY

Acronyms

EDL

LOD

LOQ

MS

RPD

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.)

- 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.

- 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.)

- 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

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

MDI - 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.

- 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.

- 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.

TEO - 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 MALab Number:L2122099Project Number:11204Report 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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 MALab Number:L2122099Project Number:11204Report Date:05/11/21

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.

Report Format: Data Usability Report



Serial_No:05112115:37

Project Name: BARNSTABLE MA Lab Number: L2122099
Project Number: 11204 Report Date: 05/11/21

REFERENCES

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.



Serial_No:05112115:37

Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873

Revision 19

Page 1 of 1

Published Date: 4/2/2021 1:14:23 PM

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;

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, 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 II, 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.

Pre-Qualtrax Document ID: 08-113 Document Type: Form

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Email: egrotton@blu	eleafwater.com	_					1	ı										☐ Lab to do
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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
lowa	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

Revision date: 09/29/2020



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 Report: 519818

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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 Date

Client Name: Alpha Analytical

Report #: 519818

Client Name: Alpha Analytical Report #: 519818

Sampling Point: L2128319/UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 519818

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

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Client	Client Information	Pr	Project Information	Regulatory Requir	Regulatory Requirements/Report Limits	ts
Client: Alpha Analyi Address: Eight Walkup Westborough	Alpha Analytical Labs Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	t Location: MA t Manager: Maria Cathcart Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com	0 alphalab.com	Due Date: 06/11/21 Deliverables:	11/21			
		Project Specific Re	Project Specific Requirements and/or Report Requirements	ments		
Refer	Reference following Alpha Job Number on final report/deliverables: L2128319	mber on final report/deli	rables: L2128319	Report to include Method Blank, LCS/LCSD:	.cs/LcsD:	
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Client	Client Information		Project Information	rmation	 Regulatory Requirements/Report Limits	ments/Report Lin	its
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	cal Labs Drive , MA 01581-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	1A Jaria Cathcar d & Deliver	st Location: MA st Manager: Maria Cathcart Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com	J Ilphalab.com	Due Date: 06/11/21 Deliverables:	/11/21				
Rofere	Project Specific Requirements and/c	Project Specific F	Requirement	or Report Red	uirements Report to include Method Blank 1 CS/I CSD:	S/I CSD.	
Additional Comments	Additional Comments: Send all results/reports to subreports@alphalab.com	ubreports@alphalab.c	mox				
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AWAII V SAFE A BUILLAS	Chluckeefwater.com	Standa Date D		RUSH (only	confirmed if pre-a _i	igrovedt)	ANALYSIC	SVOC: DABN DS24 DS24.2	METALS: DMCP 13	EPH. DRCRAS CHCP 14 DRCP	VPH. CRanges & Targets CPP13	Ranges & Targer	TPH: DO	ant Only DFings	Dilles Te	//	//			SAMPLE INFO	CL # BO
ALPHA Lab ID (Lab Use Only)	Sample ID		Colle	ection	Sample Matrix	Sampler	, , , ,	SVOC.	METALS	EPL	NPH.	D PCB	TPH: D	/0	7/			//		☐ Lab to do	TTLES
28319-01	UV EFFLVENT		5/25/21	12:15	DW	NCF								X						, and a second	1
Container Type P= Plastic A= Amber glass V= Vial G= Glass	Preservative A= None B= HCI C= HNO			F	1002351000	ainer Type													===		F
G= Glass B= Bacteria cup C= Cube O= Other E= Encore D= BOD Bottle	D= H ₂ SO _x E= NaOH F= MeOH G= NaHSO ₄ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ Cl K= Zn Accetate O= Other	Relinqui	shed By:	<i>š</i> t	Date 2/21	e/Time /4:40	MU	Up)	Recei	ved B	y:				7/2/	000	Alr Se	pha's T ee reve	Terms an erse side	nitted are subject d Conditions.	et to



Subcontract Chain of Custody

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

Alpha Job Number L2128319

Client	Information	and the Asia St.	Project In	formation		equirements/Re	irements/Report Limits				
Client: Alpha Analyti Address: Eight Walkup Westborough	cal Labs Drive , MA 01581-1019	Project Location Project Manage Turnaro	n: MA r: Maria Cath		ation	State/Federal Progra Regulatory Criteria:	No recognización de la contract				
Phone: 508.439.5150 Email: mcathcart@a) lphalab.com	Due Date: Deliverables:		2.18.4-1989-7 - DE 191-1	estito parto.						
The state of the		Project Specifi	c Requirem	ents and/or Re	d/or Report Requirements						
Refere	ence following Alpha Job Nu	mber on final report	Vdeliverables:	L2128319	Rep	ort to include Method B	lank, LCS/LCSD:				
Additional Comments	Send all results/reports to s	ubreports@alphala	b.com								
NEW SERVICE								14 15			
Lab ID	Client ID	Collection Date/Time	Sample Matrix		Analysis				Batch QC		
	UV EFFLUENT	05-27-21 12:15	DW	Bromate			45				
			8						54		
									10 10		
# J	18 4				2						
			- 33					7.9			
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		7		GITIZI			14				
Form No: AL_subcoc											
OTTI NO. AL_SUDCOC											



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 Lab Number: L2128315
Project Number: 11204 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 Lab Number: L2128315
Project Number: 11204 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.

Sebastian Corbin

Authorized Signature:

Title: Technical Director/Representative

ΔLPHA

Date: 06/15/21

INORGANICS & MISCELLANEOUS



Project Name: BW-STRAIGHTWAY Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-01 Date Collected: 05/27/21 10:00

Client ID: RAW Date Received: 05/27/21

Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
oorough La	b								
200		mg/l	2.0		1	-	05/27/21 19:55	121,4500CO2-D	JT
1.1		mg/l	0.10		1	-	05/27/21 16:20	121,4500O-C	JT
140		mv	-	NA	1	-	05/27/21 20:45	12,1498	AS
	oorough La 200 1.1	porough Lab 200 1.1	porough Lab 200 mg/l 1.1 mg/l	porough Lab 200 mg/l 2.0 1.1 mg/l 0.10	porough Lab 200 mg/l 2.0 1.1 mg/l 0.10	Result Qualifier Units RL MDL Factor Dorrough Lab 200 mg/l 2.0 1 1.1 mg/l 0.10 1	Result Qualifier Units RL MDL Factor Prepared Dorrough Lab 200 mg/l 2.0 1 - 1.1 mg/l 0.10 1 -	Result Qualifier Units RL MDL Factor Prepared Analyzed Dorough Lab 200 mg/l 2.0 1 - 05/27/21 19:55 1.1 mg/l 0.10 1 - 05/27/21 16:20	Result Qualifier Units RL MDL Factor Prepared Prepared Analyzed Method Dorough Lab 200 mg/l 2.0 1 - 05/27/21 19:55 121,4500CO2-D 1.1 mg/l 0.10 1 - 05/27/21 16:20 121,4500CO-C



Project Name: BW-STRAIGHTWAY Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-02 Date Collected: 05/27/21 10:00

Client ID: GSP FILTER HIGH CAP Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	oorough 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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-03 Date Collected: 05/27/21 10:00

Client ID: UV EFFLUENT Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westk	orough La	b								
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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-04 Date Collected: 05/27/21 10:00

Client ID: GAC Date Received: 05/27/21

Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	orough 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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-05 Date Collected: 05/27/21 09:00

Client ID: MAHER RAW Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	oorough La	b								
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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-06 Date Collected: 05/27/21 09:00

Client ID: MAHER MNGS Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westk	orough Lal	b								
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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-07 Date Collected: 05/27/21 09:00

Client ID: MAHER UVAOP Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westk	orough La	b								
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 Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

SAMPLE RESULTS

Lab ID: L2128315-08 Date Collected: 05/27/21 09:00

Client ID: MAHER GAC Date Received: 05/27/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough Lal)								
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



L2128315

Project Name: BW-STRAIGHTWAY Lab Number:

Project Number: 11204 Report Date: 06/15/21

Method Blank Analysis Batch Quality Control

Parameter	Result Q	ualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry -	- Westborough Lab	for sam	ple(s):	02,04,08	Batch:	WG1504730-	-1			
Chlorine, Total Residual	ND		mg/l	0.02		1	-	05/27/21 22:47	121,4500CL-E) AS
General Chemistry -	- Westborough Lab	for sam	ple(s):	02,04,08	Batch:	WG1504731	-1			
Chlorine, Residual Free	ND		ma/l	0.05		1	-	05/27/21 22:47	121.4500CL-E) 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: WG1504	715-1				
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab	Associated sample(s)): 02,04,08	8 Batch: WG15	04730-2				
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab	Associated sample(s)): 02,04,08	8 Batch: WG15	04731-2				
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 Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual Found	MSD %Recovery Qu	Recovery al Limits	RPD (RPD Qual Limits
General Chemistry - Westboroug	gh Lab Asso	ciated samp	le(s): 02,04,	,08 QC Batch	h ID: WG1504730-4	QC Sample: L	2128374-02	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	Nati	ve Samp	ole D	uplicate 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	B QC Batch I	D: WG1504730-	3 QC Samp	le: L2128374-	-01 Client I	ID: DUP Sample
Chlorine, Total Residual		ND		ND	mg/l	NC		20
General Chemistry - Westborough Lab	Associated sample(s):	02,04,08	8 QC Batch I	D: WG1504731-	3 QC Samp	le: L2128315	-02 Client I	ID: GSP FILTER
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		



Serial_No:06152113:23

Lab Number: L2128315

Report Date: 06/15/21

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 Info	ormation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	рН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2128315-01A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-01B	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		ORP(1)
L2128315-01C	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-01D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-02A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-02B	Plastic 950ml unpreserved	Α	7	7	4.9	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-02C	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-02D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-03A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-03B	Plastic 120ml unpreserved	Α	7	7	4.9	Υ	Absent		SUB-BROMATE()
L2128315-03C	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		ORP(1)
L2128315-03D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-03E	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-04A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-04B	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-04C	Plastic 120ml unpreserved	Α	7	7	4.9	Υ	Absent		SUB-BROMATE()
L2128315-04D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-04E	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-05A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-05B	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		ORP(1)
L2128315-05C	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-05D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-06A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)



Serial_No:06152113:23

Lab Number: L2128315

Report Date: 06/15/21

Project Name: BW-STRAIGHTWAY

Project Number: 11204

Container Info	rmation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	pН	рН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2128315-06B	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		ORP(1)
L2128315-06C	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-06D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-07A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-07B	Plastic 120ml unpreserved	Α	7	7	4.9	Υ	Absent		SUB-BROMATE()
L2128315-07C	Plastic 60ml unpreserved	Α	7	7	4.9	Υ	Absent		ORP(1)
L2128315-07D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-07E	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-08A	Plastic 250ml unpreserved/No Headspace	Α	NA		4.9	Υ	Absent		CO2(1)
L2128315-08B	Plastic 500ml unpreserved	Α	7	7	4.9	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
L2128315-08C	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)
L2128315-08D	BOD bottle Powder Pillow preserved	Α	NA		4.9	Υ	Absent		DO-4500(.3)



Project Name: BW-STRAIGHTWAY Lab Number: L2128315

Project Number: 11204 Report Date: 06/15/21

GLOSSARY

Acronyms

EDL

EPA

LOQ

MS

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.)

- 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.

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.

Environmental Protection Agency.

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.)

 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.

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 Lab Number: L2128315
Project Number: 11204 Report Date: 06/15/21

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.
- 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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-STRAIGHTWAYLab Number:L2128315Project Number:11204Report Date:06/15/21

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.

Report Format: Data Usability Report



Serial_No:06152113:23

Project Name: BW-STRAIGHTWAY Lab Number: L2128315
Project Number: 11204 Report Date: 06/15/21

REFERENCES

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.



Serial_No:06152113:23

Alpha Analytical, Inc.
Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873

Revision 19

Published Date: 4/2/2021 1:14:23 PM Page 1 of 1

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: lodomethane (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, 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 II, 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.

Document Type: Form

Pre-Qualtrax Document ID: 08-113

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Subcontract Chain of Custody

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Additional Comr	ments: Send all results/reports	to subreports@alphala	ab.com			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
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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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Page 27 of 32 Page 1 of 6



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
lowa	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

Revision date: 09/29/2020

Page 28 of 32 Page 2 of 6



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 Report: 519813

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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 Date

Client Name: Alpha Analytical

Report #: 519813

Page 1 of 3

Page 29 of 32 Page 3 of 6

Serial_No:06152113:23

Client Name: Alpha Analytical Report #: 519813

Sampling Point: L2128315-03/UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 519813

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

A N A L V T I G A L		South South	Eurofins US 110 South Hill St. South Bend, IN 46617	8617			Alpha Job Number L2128315	umber
Client	Client Information		Project Information	ormation	Regulator	Regulatory Requirements/Report Limits	ts/Report Limi	ts
Client: Alpha Analyti Address: Eight Walkup Westborough	Alpha Analytical Labs Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	MA Maria Cathoo nd & Delive	t Location: MA I Manager: Maria Cathcart Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:	ogram: ia:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com) Ilphalab.com	Due Date: 06/13/21 Deliverables:	16/13/21					
		Project Specific	Requireme	Project Specific Requirements and/or Report Requirements	ments			
Refer Additional Comments	Reference following Alpha Job Number on final regarditional Comments: Send all results/reports to subreports@alph	nber on final report/c ubreports@alphalab	port/deliverables: L2128315		Report to include Method Blank, LCS/LCSD:	od Blank, LCS/LC	SD:	
		roitoollo O	Olamoo				-	40,000
Lab ID	Client ID	Date/Time	Matrix	Analysis				OC
	UV EFFLUENT -03 GAC MAHER UVAOP -01	05-27-21 10:00 05-27-21 10:00 05-27-21 09:00	MQ MQ	Bromate 4917 413 Bromate 4917 413				
				Boylus show ur	s parosadu	5623		
	đ			644 to present 6/2/21 ANH	up to present	x 6/2/21 K	44	
				Clean Provi	Olient Provided Sample Container	101	d	
				EDA adeled L	you wend	Je 562-2	_	
				orial_No:0		erial_No:0	J .	
	Relinquished By:	\.		Date/Time:	Received By:	0615	Date/Time:	
		8	78	12/1/21	18 188	2113	0 18-8	830
						: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
lowa	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

Revision date: 09/29/2020



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 Report: 520031

Attn: Nathalie Lewis Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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 Date

Client Name: Alpha Analytical

Report #: 520031

Client Name: Alpha Analytical Report #: 520031

Sampling Point: L2128998/UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 520031

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: (MS or MSD value - Sample value) * 100 / spike target / dilution factor = **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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		nS	bcontract Cha	Subcontract Chain of Custody		3	530031
A N A L Y T I C A L.	***	Eurofin 110 So South I	Eurofins US 110 South Hill St. South Bend, IN 46617			Alpha Job Number L2128998	lumber
Client Information	tion	d	Project Information	ion	Regulatory Requirements/Report Limits	ements/Report Lim	its
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	81-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	t Location: MA t Manager: Maria Cathcart Turnaround & Deliverables Information	. Information	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com	Wo:	Due Date: 06/15/21 Deliverables:	15/21				
		Project Specific R	equirements an	Project Specific Requirements and/or Report Requirements	ments '		
Reference following Alpha Job Number on final report/delive Additional Comments: Send all results/reports to subreports@alphalab.com	Reference following Alpha Job Number on final report/deliverables: L2128998 ments: Send all results/reports to subreports@alphalab.com	ber on final report/de breports@alphalab.c	liverables: L2128 om		Report to include Method Blank, LCS/LCSD:	CS/LCSD:	
Lab ID Clier	Client ID	Collection Date/Time	Sample Matrix	Analysis			Batch QC
4919348 UV EFFLUENT		06-01-21 11:00	DW Bromate				
No	NO EDA lusted SS 6321	Ss6331					
0	ounts proved			100	Client Provided Sample Container		
<u> </u>	EDA added u	you record	4556331				110000
					1	2097	
	Relinquished By	:	Date/Time:	rime:	Received By:	Date/Time:	
		9	1/2/21	24	2000	6-3-31	00001
Form No: AL_subcoc							

Дірна	CHAIN O	F CU	STO	DY ,	AGE	of <u> </u>	Date F	Rec'd in	n Lab:	6	1 /2	W.		AL	PHA	Job#:	LZ	128998
8 Walkup Drive	320 Forbes Blvd	Project	Informa	ition		SHE	Repo	ort Info	rmati	on - Da	ta De	livera	bles	Bi	iling I	nformat	ion	
Westboro, MA Tel: 508-898-9	01581 Mansfield, MA 02048	Project Na	ame: Bl	N STR	AIGHT	TIAN	XQ AD	Ex		□ EMAII	9			us	ame a	s Client in	nfo PC	#:
Client Information	on	Project Lo	cation:	Barnsta	((.)	MA	Regu	latory	Requ	iiremen	ts 8	Pr	oject	Inforr	nation	n Requir	ement	3
Client: Blued	ect Tu	Project #:	117	-04	ore,	VIII				CP Analyt						☐ No C for MCP I		Analytical Methods
Address: 57 T	est, Inc. Dresser Hill Rd.	Project Ma		Acron	D	٠,	☐ Yes	□ No	GW1 S	Standards	110					H with Tar		2)
Charl	to MA OICH	ALPHA C	Quote #:	116200	1/61	2.5	THE PROPERTY OF THE PARTY OF TH			S RGP Program					Cr	riteria		
Phone: 774 Zo	ton, MA 01571	Turn-A	round T	ime		Wall st		7	_	7 7	-7	1	/ /	7	7	1 1	11	
	Project Information:	Date Di		□ RUSH (enty-	confirmed if pre-a	(praved)	4/	WETALL DABY DELL	METALS, DMCP 13 DMC-	EPH: DRanges & Tarm.	Ranges & Targets	7PH, COugas	Scoto Tringerprint				//	SAMPLE INFO Filtration Field Lab to do Preservation Lab to do
ALPHA Lab ID (Lab Use Only) Sample ID			Co	llection Time	Sample Matrix	Sampler Initials	, vo.	META.	METALS	EPH: D	O PCB	TPH:	/ Ba		/ /	///	San	nple Comments
28998-01	UV Effluent		6 1	16:00	DW	AP						51 7	4					
Container Type P= Plastic A= Amber glass V= Vial G= Glass Bacteria cup C= Cube O= Other E= Encore D= BOD Bottle	Preservative A= None B= HCI C= HNO ₂ D= H ₂ SO ₄ E= NaOH F= MeOH G= NaHSO ₄ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J= NH ₄ CI K= Zn Acetate	Refinquis	shed By:	6/1/-	Pr	ainer Type eservative e/Time	Ca	lh	Receive	ed By:	> /	ly.	Dat Glila	e/Time			Terms ar	nitted are subject ad Conditions.



Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2128998

Client Information		Project Inf	formation	Pegulatory Reg	uiromante/Papart Limite
Client: Alpha Analytical Lahs		r roject iiii	IOITIIation	Regulatory Req	uirements/Report Limits
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	Project Location Project Manage		eart erables Informatio	State/Federal Program: Regulatory Criteria:	
Phone: 508.439.5150 Email: mcathcart@alphalab.com	Due Date: Deliverables:		erables information		
医艾斯克曼斯特别的英雄形态的	Project Specifi	c Requirem	ents and/or Repo	rt Requirements	
Reference following Alpha Job Nu	umber on final report	/deliverables:	L2128998	Report to include Method Blan	nk, LCS/LCSD:
Additional Comments: Send all results/reports to	subreports@alphala	ib.com			
		Noger de les			MET REPORT OF PARTY.
Lab ID Client ID	Collection Date/Time	Sample Matrix		Analysis	Batch QC
UV EFFLUENT	06-01-21 11:00	DW	Bromate		
Relinquished	LBv:		Date/Time:	Received By:	Date/Time:
			6/2/21		
	-0		75011 (0)		
Form No: AL_subcoc					



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

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:
 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 Lab Number: L2129637

Project Number: 11204 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 Lab Number: L2129637

Project Number: 11204 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.

Sebastian Corbin

Authorized Signature:

Title: Technical Director/Representative

Date: 06/21/21

INORGANICS & MISCELLANEOUS



Project Name: BW STRAIGHTWAY Lab Number: L2129637

Project Number: 11204 Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-01 Date Collected: 06/03/21 10:00

Client ID: GSP FILTER HIGH CAP Date Received: 06/03/21 Sample Location: BARNSTABLE, MA 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 - Wes	tborough 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 Lab Number: L2129637

Project Number: 11204 Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-03 Date Collected: 06/03/21 09:00

Client ID: MAHER RAW Date Received: 06/03/21 Sample Location: BARNSTABLE, MA 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 - Westb	orough Lal)								
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 Lab Number:

L2129637

Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: Date Collected: L2129637-04 06/03/21 09:00

Client ID: MAHER MNGS Date Received: 06/03/21 Not Specified Sample Location: BARNSTABLE, MA Field Prep:

Sample Depth:

Matrix: Dw

Project Number: 11204

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westb	orough La)								
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



L2129637

Project Name: BW STRAIGHTWAY Lab Number:

Project Number: 11204 Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: L2129637-05 Date Collected: 06/03/21 09:00

Client ID: MAHER UVAOP Date Received: 06/03/21 Sample Location: BARNSTABLE, MA 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 - Westk	orough Lal)								
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 Lab Number:

L2129637 Project Number: 11204 Report Date: 06/21/21

SAMPLE RESULTS

Lab ID: Date Collected: L2129637-06 06/03/21 09:00

Client ID: MAHER GAC Date Received: 06/03/21 Not Specified Sample Location: BARNSTABLE, MA Field Prep:

Sample Depth:

Matrix: Dw

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westk	orough 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



L2129637

Project Name: BW STRAIGHTWAY

Project Number: 11204 Report Date: 06/21/21

d Dianis Analysis

Lab Number:

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - W	estborough Lab for sam	ple(s): 01	,06 Ba	tch: Wo	G1507297-1				
Chlorine, Total Residual	ND	mg/l	0.02		1	-	06/03/21 20:05	121,4500CL-E	D AS
General Chemistry - W	estborough Lab for sam	ple(s): 01	,06 Ba	tch: Wo	G1507360-1				
Chlorine, Residual Free	ND	mg/l	0.05		1	-	06/03/21 20:05	121,4500CL-[O AS



Lab Control Sample Analysis Batch Quality Control

Project Name: BW STRAIGHTWAY

Project Number: 11204

Lab Number:

L2129637

06/21/21

Report Date:

Parameter	LCS %Recovery Qua	LCSD NRecovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab	Associated sample(s): 01,0	06 Batch: WG1507	297-2				
Chlorine, Total Residual	100	-		90-110	-		
General Chemistry - Westborough Lab	Associated sample(s): 01,0	06 Batch: WG1507	7360-2				
Chlorine, Residual Free	104	-			-		
General Chemistry - Westborough Lab	Associated sample(s): 03-	06 Batch: WG1507	7399-1				
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 Found	MSD %Recovery Q	Recovery ual Limits	RPD	RPD Qual Limits
General Chemistry - Westborou	igh Lab Assc	ciated samp	ole(s): 01,06	QC Batch ID	D: WG1507297-4	QC Sample: L2	129453-01 CI	ient 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 Sam	ple D	ouplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab CAP	Associated sample(s): 01,06	QC Batch ID:	WG1507297-3	QC Sample:	L2129637-01	Client ID:	GSP FILTER HIGH
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 CAP	Associated sample(s): 01,06	QC Batch ID:	WG1507360-3	QC Sample:	L2129637-01	Client ID:	GSP FILTER HIGH
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		

Serial_No:06212116:01 *Lab Number:* L2129637

Project Name: BW STRAIGHTWAY

Project Number: 11204 Report Date: 06/21/21

Sample Receipt and Container Information

Were project specific reporting limits specified?

Cooler Information

Container Information

Cooler Custody Seal

A Absent

Container info	rmation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	pН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
L2129637-01A	Plastic 950ml unpreserved	Α	7	7	2.9	Υ	Absent		RFC-4500(1),TRC-4500(1)
L2129637-02A	Plastic 250ml Other preserved (sub-lab)	Α	7	7	2.9	Υ	Absent		SUB-BROMATE()
L2129637-03A	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-03B	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-03C	Plastic 250ml unpreserved/No Headspace	Α	NA		2.9	Υ	Absent		CO2(1)
L2129637-03D	Plastic 60ml unpreserved	Α	7	7	2.9	Υ	Absent		ORP(1)
L2129637-04A	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-04B	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-04C	Plastic 250ml unpreserved/No Headspace	Α	NA		2.9	Υ	Absent		CO2(1)
L2129637-04D	Plastic 60ml unpreserved	Α	7	7	2.9	Υ	Absent		ORP(1)
L2129637-05A	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-05B	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-05C	Plastic 250ml unpreserved/No Headspace	Α	NA		2.9	Υ	Absent		CO2(1)
L2129637-05D	Plastic 60ml unpreserved	Α	7	7	2.9	Υ	Absent		ORP(1)
L2129637-05E	Plastic 250ml Other preserved (sub-lab)	Α	7	7	2.9	Υ	Absent		SUB-BROMATE()
L2129637-06A	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-06B	BOD bottle Powder Pillow preserved	Α	NA		2.9	Υ	Absent		DO-4500(.3)
L2129637-06C	Plastic 250ml unpreserved/No Headspace	Α	NA		2.9	Υ	Absent		CO2(1)
L2129637-06D	Plastic 60ml unpreserved	Α	7	7	2.9	Υ	Absent		ORP(1)
L2129637-06E	Plastic 500ml unpreserved	Α	7	7	2.9	Υ	Absent		RFC-4500(1),TRC-4500(1)
	Container ID L2129637-01A L2129637-02A L2129637-03B L2129637-03C L2129637-03D L2129637-04A L2129637-04B L2129637-04D L2129637-05A L2129637-05B L2129637-05C L2129637-05D L2129637-06A L2129637-06A L2129637-06B L2129637-06C L2129637-06C	L2129637-01A Plastic 950ml unpreserved L2129637-02A Plastic 250ml Other preserved (sub-lab) L2129637-03A BOD bottle Powder Pillow preserved L2129637-03B BOD bottle Powder Pillow preserved L2129637-03C Plastic 250ml unpreserved/No Headspace L2129637-03D Plastic 60ml unpreserved L2129637-04A BOD bottle Powder Pillow preserved L2129637-04B BOD bottle Powder Pillow preserved L2129637-04C Plastic 250ml unpreserved/No Headspace L2129637-04D Plastic 60ml unpreserved L2129637-05A BOD bottle Powder Pillow preserved L2129637-05B BOD bottle Powder Pillow preserved L2129637-05C Plastic 250ml unpreserved/No Headspace L2129637-05D Plastic 60ml unpreserved L2129637-05E Plastic 250ml Other preserved (sub-lab) L2129637-06A BOD bottle Powder Pillow preserved L2129637-06B BOD bottle Powder Pillow preserved L2129637-06B BOD bottle Powder Pillow preserved L2129637-06B BOD bottle Powder Pillow preserved L2129637-06C Plastic 250ml unpreserved/No Headspace L2129637-06C Plastic 250ml unpreserved/No Headspace	Container IDContainer TypeCoolerL2129637-01APlastic 950ml unpreservedAL2129637-02APlastic 250ml Other preserved (sub-lab)AL2129637-03ABOD bottle Powder Pillow preservedAL2129637-03BBOD bottle Powder Pillow preservedAL2129637-03CPlastic 250ml unpreserved/No HeadspaceAL2129637-03DPlastic 60ml unpreservedAL2129637-04ABOD bottle Powder Pillow preservedAL2129637-04BBOD bottle Powder Pillow preservedAL2129637-04CPlastic 250ml unpreserved/No HeadspaceAL2129637-05ABOD bottle Powder Pillow preservedAL2129637-05BBOD bottle Powder Pillow preservedAL2129637-05CPlastic 250ml unpreserved/No HeadspaceAL2129637-05DPlastic 60ml unpreservedAL2129637-05EPlastic 250ml Other preserved (sub-lab)AL2129637-06ABOD bottle Powder Pillow preservedAL2129637-06BBOD bottle Powder Pillow preservedAL2129637-06CPlastic 250ml unpreserved/No HeadspaceAL2129637-06DPlastic 60ml unpreserved/No HeadspaceAL2129637-06DPlastic 60ml unpreserved/No HeadspaceA	Container ID Container Type Cooler pH L2129637-01A Plastic 950ml unpreserved A 7 L2129637-02A Plastic 250ml Other preserved (sub-lab) A 7 L2129637-03A BOD bottle Powder Pillow preserved A NA L2129637-03B BOD bottle Powder Pillow preserved A NA L2129637-03C Plastic 250ml unpreserved/No Headspace A NA L2129637-03D Plastic 60ml unpreserved A NA L2129637-04A BOD bottle Powder Pillow preserved A NA L2129637-04B BOD bottle Powder Pillow preserved A NA L2129637-04C Plastic 250ml unpreserved/No Headspace A NA L2129637-05A BOD bottle Powder Pillow preserved A NA L2129637-05B BOD bottle Powder Pillow preserved A NA L2129637-05C Plastic 250ml unpreserved/No Headspace A NA L2129637-05C Plastic 250ml unpreserved/No Headspace A NA L2129637-05D Plastic 60ml unpreserved A NA L2129637-05D Plastic 250ml unpreserved A NA L2129637-05E 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Project Name: Lab Number: **BW STRAIGHTWAY** L2129637

Project Number: Report Date: 11204 06/21/21

GLOSSARY

Acronyms

EDL

LOD

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.)

- 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.

- 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

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

MDI - 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.

TEO - 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.



Project Name: BW STRAIGHTWAY Lab Number: L2129637
Project Number: 11204 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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



Project Name:BW STRAIGHTWAYLab Number:L2129637Project Number:11204Report 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.



Serial_No:06212116:01

Project Name: BW STRAIGHTWAY Lab Number: L2129637
Project Number: 11204 Report Date: 06/21/21

REFERENCES

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.



Serial_No:06212116:01

Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:17873 Revision 19

Published Date: 4/2/2021 1:14:23 PM

Page 1 of 1

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;

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, 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 II, 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.

Document Type: Form

Pre-Qualtrax Document ID: 08-113

Дирна	CHAIN	F CU	STO	DY ,	PAGE_	OF	Da	te Re	c'd in	Lab	‡	61	3/2	21		Al	LPHA	A Job#: L2129637	
WESTBORO, MA	MANSFIELD, MA	Project	Informa	ation	Mary 18	m ou	R	eport	t Info	rma	tion -	Data	Deliv	erab	les		00.00	Information	
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Charles	MA 01571	ALPHA	Quote #:	Tazon	-IJ CV	4		1000				FEET		150	160		100	W. Called St. Co.	
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ALPHA Lab ID (Lab Use Only)	Sample ID		Co Date	llection Time	Sample Matrix	Sampler's	1	7	4	9	97	7	//	//	/			(Please specify below) Sample Specific Comments	
29637 21	GSP Filter H:	gh Cop	6/3	10:00	DW	AIT	X												
702	UV Effluent	, ,		1				X											
03	Maker Raw			9:00					X	X	X								
204	Maher MaGS								X	X	19								Ī
25	Maher UVADI	2						./					\top	+		+	П		_
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FORM NO: 01-01 (rev. 14-0) Page 21 of 28	CT-07)						0				~		-10	9	151	61		See reverse side.	



Subcontract Chain of Custody

World Character		Eu 111 So	rofins US 0 South Hill St uth Bend, IN 4	46617		Alpha Job Number L2129637
C	lient Information		Project In	formation	Regulatory Re	equirements/Report Limits
	Analytical Labs Valkup Drive Irough, MA 01581-1019 9.5150 art@alphalab.com	Project Location Project Manage Turnard Due Date Deliverables:	ound & Deliv	cart erables Informati	State/Federal Program Regulatory Criteria:	m:
Email: mcathc	art@alphalab.com	20 20 20 20 20 20 20 20 20 20 20 20 20 2				
	Reference following Alpha Job ments: Send all results/reports	Number on final repor	t/deliverables	ents and/or Repo	Report to include Method B	lank, LCS/LCSD:
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	Bromate Bromate		
	Relinquish	ed By:		Date/Time:	Received By:	Date/Time:
		10 B	11 12 1	6/7/21		
Form No: AL_su	bcoc					



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.

Page 23 of 28 Page 1 of 6



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
lowa	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

Revision date: 09/29/2020

Page 24 of 28 Page 2 of 6



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 Report: 520327

Attn: Maria Cathcart Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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 Date

Client Name: Alpha Analytical

Report #: 520327

Page 1 of 3

Page 25 of 28 Page 3 of 6

Serial_No:06212116:01

Client Name: Alpha Analytical Report #: 520327

Sampling Point: L2129637/UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 520327

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

		-			DW 6/8/20	437837	
		nS	bcontract	Subcontract Chain of Custody	-	52032	7
ANALYTICAL World Glass Chemistry		Eurofir 110 Sc South	Eurofins US 110 South Hill St. South Bend, IN 46617	21		Alpha Job Number	mber
Client	Client Information	Р	Project Information	mation	Regulatory Requirements/Report Limits	nts/Report Limits	
Client: Alpha Analytic Address: Eight Walkup Westborough	Alpha Analytical Labs Eight Walkup Drive Westborough, MA 01581-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	A Iaria Cathcart d & Delivera	bles Information	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com) Iphalab.com	Due Date: 06/17/21 Deliverables:	17/21				
		Project Specific R	equirement	Project Specific Requirements and/or Report Requirements	ients		
Refere	Reference following Alpha Job Number on final re	nber on final report/de	port/deliverables: L2129637	2129637 Report	Report to include Method Blank, LCS/LCSD:	CSD:	
Additional Comments	Additional Comments: Send all results/reports to subreports@alphalab.com	ubreports@alphalab.c	шо				
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis		- Br	Batch QC
a ¹ s	UV EFFLUENT MAHER UVAOP	06-03-21 10:00 06-03-21 09:00	DW B	Bromate 4933450 Bromate 4933451			
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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 Lab Number: L2131271

Project Number: 11204 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 Lab Number: L2131271

Project Number: 11204 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.

Sebastian Corbin

Authorized Signature:

Title: Technical Director/Representative

Date: 06/28/21



INORGANICS & MISCELLANEOUS



Project Name: STRAIGHTWAY Lab Number: L2131271

Project Number: 11204 Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-02 Date Collected: 06/10/21 10:00

Client ID: MAHER RAW Date Received: 06/10/21 Sample Location: BARNSTABLE Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough La	b								
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 Lab Number: L2131271

Project Number: 11204 Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-03 Date Collected: 06/10/21 10:00

Client ID: MAHER MNGS Date Received: 06/10/21 Sample Location: BARNSTABLE Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	oorough La	ıb								
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 Lab Number: L2131271

Project Number: 11204 Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-04 Date Collected: 06/10/21 10:00

Client ID: MAHER UVADP Date Received: 06/10/21 Sample Location: BARNSTABLE Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - West	borough La	b								
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 Lab Number: L2131271

Project Number: 11204 Report Date: 06/28/21

SAMPLE RESULTS

Lab ID: L2131271-05 Date Collected: 06/10/21 10:00

Client ID: MAHER GAC Date Received: 06/10/21 Sample Location: BARNSTABLE Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	oorough Lat)								
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



L2131271

Project Name: STRAIGHTWAY

Project Number: 11204 Rep

Report Date: 06/28/21

Lab Number:

Method Blank Analysis Batch Quality Control

Parameter	Result Q	ualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab	for sam	nple(s): 05	Batch:	WG15	510711-1				
Chlorine, Residual Free	ND		mg/l	0.05		1	-	06/11/21 06:16	121,4500CL-E) AW
General Chemistry	- Westborough Lab	for sam	nple(s): 05	Batch:	WG15	510716-1				
Chlorine, Total Residual	ND		mg/l	0.02		1	-	06/11/21 05:45	121,4500CL-E) 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 A	Associated sample(s)	: 02-05	Batch: WG1510	572-1				
Oxidation/Reduction Potential	101		-		90-110	-		20
General Chemistry - Westborough Lab A	Associated sample(s)	: 05 B	satch: WG1510711	-2				
Chlorine, Residual Free	100		-			-		
General Chemistry - Westborough Lab A	Associated sample(s)	: 05 B	satch: 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 Sam	ple D	uplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated samp	ole(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 samp	ole(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 samp	ole(s): 02-05	QC Batch ID:	WG1510621-1	QC Sample:	L2131271-04	Client ID:	MAHER UVADP
Carbon Dioxide	58		55	mg/l	5		



Serial_No:06282115:41 *Lab Number:* L2131271

Project Name: STRAIGHTWAY

Project Number: 11204 Report Date: 06/28/21

Sample Receipt and Container Information

Were project specific reporting limits specified?

Cooler Information

Cooler Custody Seal

A Absent

Container Info	ormation		Initial	Final	Temp			Frozen	
Container ID	Container Type	Cooler	рН	рН		Pres	Seal	Date/Time	Analysis(*)
L2131271-01A	Plastic 250ml Other preserved (sub-lab)	Α	7	7	2.3	Υ	Absent		SUB-BROMATE()
L2131271-02A	Plastic 250ml unpreserved/No Headspace	Α	NA		2.3	Υ	Absent		CO2(1)
L2131271-02B	Plastic 60ml unpreserved	Α	7	7	2.3	Υ	Absent		ORP(1)
L2131271-02C	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-02D	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-03A	Plastic 250ml unpreserved/No Headspace	Α	NA		2.3	Υ	Absent		CO2(1)
L2131271-03B	Plastic 60ml unpreserved	Α	7	7	2.3	Υ	Absent		ORP(1)
L2131271-03C	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-03D	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-04A	Plastic 120ml unpreserved	Α	7	7	2.3	Υ	Absent		SUB-BROMATE()
L2131271-04B	Plastic 60ml unpreserved	Α	7	7	2.3	Υ	Absent		ORP(1)
L2131271-04C	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-04D	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-04E	Plastic 250ml unpreserved/No Headspace	Α	NA		2.3	Υ	Absent		CO2(1)
L2131271-05A	Plastic 500ml unpreserved	Α	7	7	2.3	Υ	Absent		RFC-4500(1),TRC-4500(1),CO2(1)
L2131271-05B	Plastic 60ml unpreserved	Α	7	7	2.3	Υ	Absent		ORP(1)
L2131271-05C	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)
L2131271-05D	BOD bottle Powder Pillow preserved	Α	NA		2.3	Υ	Absent		DO-4500(.3)



Project Name: STRAIGHTWAY Lab Number: L2131271

Project Number: 11204 Report Date: 06/28/21

GLOSSARY

Acronyms

EDL

LOQ

MS

RPD

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.)

- 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.)

 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.

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.

Organic Tre 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.

- 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.



Project Name: STRAIGHTWAY Lab Number: L2131271
Project Number: 11204 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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.
- 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



Project Name:STRAIGHTWAYLab Number:L2131271Project Number:11204Report 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 Lab Number: L2131271
Project Number: 11204 Report Date: 06/28/21

REFERENCES

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.



Alpha Analytical, Inc.
Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

ID No.:**17873** Revision 19

Published Date: 4/2/2021 1:14:23 PM

Page 1 of 1

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: lodomethane (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, 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 II, 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.

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G= Glass B= Bacteria cup C= Cube	D= H ₂ SO ₄ E= NaOH F= MeOH	1 V	Relinqu	ished By:		Dat	e/Time		Re	eceive	d By:			Date	e/Tim	e					
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Page 19 of 26	J = NH₄CI K= Zn Acetate O= Other						_					_	+		_		1100000		se side. 11-01 (rev. 12	2-Mar-2012)	

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Client: Alpha A ddress: Eight V Westbo	Analytical Labs Valkup Drive prough, MA 01581-1019	Project Location Project Manage Turnaro		cart verables Informati		State/Federal Pr Regulatory Crite			
Phone: 508.43 Email: mcathc	9.5150 cart@alphalab.com	Due Date: Deliverables:							
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	Reference following Alpha Jo	ob Number on final report	t/deliverables	: L2131271	Report	to include Meth	nod Blank, LCS	S/LCSD:	
Additional Com	ments: Send all results/repor	ts to subreports@alphala	ab.com						
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Lab ID	Client ID	Collection Date/Time	Sample Matrix		Analysis		HIPPOTO II		Batch QC
Lab ID	Client ID UV EFFLUENT MAHER UVADP	Collection Date/Time 06-10-21 09:00 06-10-21 10:00	Sample Matrix WATER WATER	Bromate Bromate	Analysis	teantamil N			Batch QC
Lab ID	UV EFFLUENT	06-10-21 09:00	WATER		Analysis				Batch QC
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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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Page 21 of 26 Page 1 of 6



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
lowa	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

Revision date: 09/29/2020

Page 22 of 26 Page 2 of 6



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 Report: 520858

Attn: Maria Cathcart Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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

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 Date

Client Name: Alpha Analytical

Report #: 520858

Page 1 of 3

Page 23 of 26 Page 3 of 6

Serial_No:06282115:41

Client Name: Alpha Analytical Report #: 520858

Sampling Point: UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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

			Gener	al Chem	istry			
Analyte Analyte Method Reg MRL† Result Units Preparation Analyzed ID # Date 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:	*	۸	!

Client Name: Alpha Analytical Report #: 520858

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.



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
lowa	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

Revision date: 09/29/2020



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 Report: 521473

Attn: Maria Cathcart Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e Information			
EEA ID#	Client ID	Method	Collected Date / Time	Collected Received By: Date / Tim	
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.

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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

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 521473

Lab Definitions

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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).

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		nS	bcontract	Subcontract Chain of Custody				
AH-10		Eurofin 110 So South	Eurofins US 110 South Hill St. South Bend, IN 46617	17			Alpha Job Number L2131616	ımber
21055							SAITIES	
Client	Client Information	d	Project Information	mation	Regula	Regulatory Requirements/Report Limits	its/Report Limi	ts
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019	cal Labs Drive , MA 01581-1019	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	A faria Cathcar d & Delivera	ation: MA nager: Maria Cathcart naround & Deliverables Information	State/Federal Program: Regulatory Criteria:	l Program: riteria:		
Phone: 508.439.5150 Email: mcathcart@alphalab.com) Iphalab.com	Due Date: 06/29/21 Deliverables:	/29/21					
		Project Specific R	equiremen	Project Specific Requirements and/or Report Requirements	uirements			
Refere	Reference following Alpha Job Number on final report/deliverables: L2131616	nber on final report/del	liverables: L		Report to include M	Report to include Method Blank, LCS/LCSD:	CSD:	
Additional Comments.	Additional Comments: Send all results/reports to subreports@alphalab.com	ubreports@alphalab.co	шо		e run		£ 10	8
Lab ID	Client ID	Collection Date/Time	Sample Matrix	Analysis	S			Batch QC
TREAST!	UV EFFLUENT	06-11-21 08:30	WATER	Bromate			te .	
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8 Walkup Drive	320 Forbes Blvd	Project Inf				Report	nformat	ion - Dat	a Delive	rables	Billin	g Informat	ion
Westboro, MA (Tel: 508-898-9;	220 Tel: 508-622-9300	Project Name	BW St	raightwas	7	□ ADEx	STATE OF THE PARTY	□ EMAIL		e 15 10 10	State of the last	as Client in	
Client Information	n	Project Locat	ion: Bam	stoble	F							ion Requir	
Client: Blue	leaf Inc	Project #:	11204					CP Analyti Spike Red				es U No C ed for MCP I	T RCP Analytical Methods Inorganics)
Address: 57	Presser Hill R	Project Mana	ger:		1000		No GW1		(Info Red	quired for	Metals & E	PH with Tar	rgets)
Charle	on MA DISOT	ALPHA Quo	te #:		1700			Program				Criteria	
Phone: 77	1-200-8029	Turn-Arou	nd Time					13 2	13/	1/	7/	7.7	
	roject Information:	Date Due:	□ RUSH (mily	confirmed if pre-approved()		D 8260 D 624 D 522	METALS: DMCP 13 DW	EPH: DRanges & Targes. VPH: DRanges & Targes.	D PCB D PEST	Bount Only DFingerprint			SAMPLE INFO Filtration □ Field □ Lab to do Preservation □ Lab to do
ALPHA Lab ID (Lab Use Only)	Sample ID		Collection Date Time		mpler itials	SVOC.	METAL	EPH: C	D PC	1 8		11,	Sample Comments
31616-01	UV Effhent	6	111 830	2	(F					*			
Container Type	Preservative				-0.0000								
P= Plastic A= Amber glass	A= None B= HCl			Container	9.400	-	-				-	+	
V= Vial G= Glass B= Bacteria cup C= Cube O= Other E= Encore D= BOD Bottle	C= HNO ₃ D= H ₂ SO ₄ E= NaOH F= MeOH G= NaHSO ₃ H = Na ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₂ CI K= Zn Acetate O= Other	Relinquishe	дву:	Date/Tim	e	05	Receiv	ed By:	AC	-/	e/Time	See reve	oles submitted are subject t Terms and Conditions. erse side. : 01-01 (rev. 12-Mar-2012)



Subcontract Chain of Custody

Eurofins US 110 South Hill St. South Bend, IN 46617 Alpha Job Number L2131616

	The state of the s					
Cl	ient Information		Project In	formation	Regulatory Req	uirements/Report Limits
Client: Alpha A Address: Eight W Westbor	nalytical Labs alkup Drive rough, MA 01581-1019	Project Location Project Manage Turnaro		cart verables Information	State/Federal Program: Regulatory Criteria:	
Phone: 508.439 Email: mcathca	9.5150 art@alphalab.com	Due Date Deliverables:	06/29/21			
		Project Specif	ic Requirem	ents and/or Report	Requirements	企业 有一个产品的
F	Reference following Alpha Job	Number on final repor	t/deliverables	: L2131616	Report to include Method Blan	ik, LCS/LCSD:
Additional Comm	nents: Send all results/reports	to subreports@alphala	ab.com			
Lab ID	Client ID	Collection Date/Time	Sample Matrix	A	nalysis	Batch QC
	UV EFFLUENT	06-11-21 08:30	WATER	Bromate		
	Relinquish	ned By:		Daţe/Tjme:	Received By:	Date/Time:
	Ciel	eau		6/14/21		
Form No: AL_sul	осос					



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
lowa	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

Revision date: 09/29/2020



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 Report: 521477

Attn: Maria Cathcart Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 PWS ID: Not Supplied

	Sampl	e 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.

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 Date

Client Name: Alpha Analytical

Report #: 521477

Client Name: Alpha Analytical Report #: 521477

Sampling Point: UV Effluent PWS ID: Not Supplied

			Gener	al Chem	istry				
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:	*	۸	!

Client Name: Alpha Analytical Report #: 521477

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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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.

Subc Eurofins L Froid class chomation Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 01581-1019 Project Location: MA Project Location: MA Project Location: MA Project Specific Req Project Specific Req Reference following Alpha Job Number on final report/delive		Su Eurofir 110 Sc South	Subcontract C Eurofins US 110 South Hill St. South Bend, IN 46617	Subcontract Chain of Custody ofins US South Hill St.		Alpha Job Number	Į,
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 015 Email: mcathcart@alphalab.c		Eurofin 110 Sc South	ıs US Juth Hill St. Bend, IN 46	617		Alpha Job Numb	ď
Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 016 Phone: 508.439.5150 Email: mcathcart@alphalab.o		4				L2132035	;
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Client: Alpha Analytical Labs Address: Eight Walkup Drive Westborough, MA 015 Phone: 508.439.5150 Email: mcathcart@alphalab.o Reference follo	ıtion	THE REAL PROPERTY OF THE PARTY	Project Information	ormation	Regulatory Requ	Regulatory Requirements/Report Limits	
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Lab ID Clie	Client ID	Collection Date/Time	Sample Matrix	Analysis		Batch	
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ALPHA Lab ID (Lab Use Only)	Use Only) Sample ID				Sample Matrix	Sampler Initials AD	VOC: Den	Preservation Lab to do						BOTTLES						
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= HCI C= HNO ₃ D= H ₂ SO ₄ E= NaOH F= MeOH G= NeHSO ₆ H = N8 ₂ S ₂ O ₃ I= Ascorbic Acid J = NH ₄ CI	Relinqui	shed By:	6/141	Pre	ainer Type eservative e/Time	2		Reger	ved By:	X	Q-1	/D///	ate/Tir	me VAIS	Alph	a's Te		mitted are subjected Conditions.	oct to



Subcontract Chain of Custody

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

Alpha Job Number L2132035

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Client: Alpha Analy Address: Eight Walku Westboroug	tical Labs p Drive h, MA 01581-1019	Project Location Project Manage Turnaro		cart verables Informati	on	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.519 Email: mcathcart@	50 alphalab.com	Due Date Deliverables:						
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Refe	rence following Alpha Job Nu	mber on final repor	t/deliverables	: L2132035	Repo	ort to include Method Blank, LCS/I	LCSD:	2
Additional Comment	s: Send all results/reports to	subreports@alphala	ab.com					
No. of the last								
Lab ID	Client ID	Collection Date/Time	Sample Matrix	i i	Analysis			Batch QC
q	UV EFFLUENT	06-14-21 11:00	DW	Bromate				
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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 Lab Number: L2132277

Project Number: 11204 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 Lab Number: L2132277

Project Number: 11204 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:

Title: Technical Director/Representative Date: 07/01/21

(600, Senstrom Kelly Stenstrom

INORGANICS & MISCELLANEOUS



Project Name: BW-STRAIGHTWAY Lab Number: L2132277

Project Number: 11204 Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-01 Date Collected: 06/15/21 10:00

Client ID: RAW Date Received: 06/15/21

Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westh	orough La	b								
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 Lab Number: L2132277

Project Number: 11204 Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-02 Date Collected: 06/15/21 10:00

Client ID: GSP FILTER HIGH CAP Date Received: 06/15/21 Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westl	orough 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 Lab Number: L2132277

Project Number: 11204 Report Date: 07/01/21

SAMPLE RESULTS

 Lab ID:
 L2132277-03
 Date Collected:
 06/15/21 10:00

 Client ID:
 UV EFFLUENT
 Date Received:
 06/15/21

Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westb	orough Lal)								
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 Lab Number: L2132277

Project Number: 11204 Report Date: 07/01/21

SAMPLE RESULTS

Lab ID: L2132277-04 Date Collected: 06/15/21 10:00

Client ID: GAC Date Received: 06/15/21

Sample Location: BARNSTABLE, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westk	orough 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



L2132277

Lab Number:

Project Name: BW-STRAIGHTWAY

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 - W	estborough Lab for sam	ple(s): 02	,04 Ba	tch: Wo	G1512544-1				
Chlorine, Total Residual	ND	mg/l	0.02		1	-	06/15/21 21:47	121,4500CL-I	D AS
General Chemistry - W	estborough Lab for sam	ple(s): 02	,04 Ba	tch: Wo	G1512545-1				
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 %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab	Associated sample(s)	: 01-04	Batch: WG1512	523-1				
Oxidation/Reduction Potential	100		-		90-110	-		20
General Chemistry - Westborough Lab	Associated sample(s)	: 02,04	Batch: WG15128	544-2				
Chlorine, Total Residual	104		-		90-110	-		
General Chemistry - Westborough Lab	Associated sample(s)	: 02,04	Batch: WG15128	545-2				
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	MSD Qual Found	MSD %Recovery Qu	Recovery ual Limits	RPD Qua	RPD Limits
General Chemistry - Westborou	gh Lab Assc	ciated samp	ole(s): 02,04	QC Batch IE	D: WG1512544-4	QC Sample: L21	32277-04 Cli	ent 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

07/01/21 Report Date:

Parameter	Native Sample		ple D	ouplicate 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 CAP	Associated sample(s):	02,04	QC Batch ID:	WG1512544-3	QC Sample:	L2132277-02	Client ID:	GSP F	FILTER HIGH
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?

Cooler Information

Cooler Custody Seal

A Absent

Container Information				Initial	Final	Temp			Frozen	
	Container ID	Container Type	Cooler	pН	pН	deg C	Pres	Seal	Date/Time	Analysis(*)
	L2132277-01A	Plastic 60ml unpreserved	Α	7	7	5.5	Υ	Absent		ORP(1)
	L2132277-01C	Plastic 250ml unpreserved/No Headspace	Α	NA		5.5	Υ	Absent		CO2(1)
	L2132277-01D	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-01E	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-02C	Plastic 250ml unpreserved/No Headspace	Α	NA		5.5	Υ	Absent		CO2(1)
	L2132277-02D	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-02E	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-02F	Plastic 950ml unpreserved	Α	7	7	5.5	Υ	Absent		RFC-4500(1),ORP(1),TRC-4500(1)
	L2132277-03A	Plastic 60ml unpreserved	Α	7	7	5.5	Υ	Absent		ORP(1)
	L2132277-03B	Plastic 250ml Other preserved (sub-lab)	Α	7	7	5.5	Υ	Absent		SUB-BROMATE()
	L2132277-03C	Plastic 250ml unpreserved/No Headspace	Α	NA		5.5	Υ	Absent		CO2(1)
	L2132277-03D	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-03E	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-04A	Plastic 60ml unpreserved	Α	7	7	5.5	Υ	Absent		ORP(1)
	L2132277-04B	Plastic 120ml Other preserved (sub-lab)	Α	7	7	5.5	Υ	Absent		SUB-BROMATE()
	L2132277-04C	Plastic 250ml unpreserved/No Headspace	Α	NA		5.5	Υ	Absent		CO2(1)
	L2132277-04D	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-04E	BOD bottle Powder Pillow preserved	Α	NA		5.5	Υ	Absent		DO-4500(.3)
	L2132277-04F	Plastic 950ml unpreserved	Α	7	7	5.5	Υ	Absent		RFC-4500(1),TRC-4500(1)



Project Name: Lab Number: **BW-STRAIGHTWAY** L2132277

Project Number: Report Date: 11204 07/01/21

GLOSSARY

Acronyms

EMPC

LOD

MS

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).

- 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.

- 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

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

MDI - 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. - 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.

- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile NR

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.

TEO - 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 Lab Number: L2132277

Project Number: 11204 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.
- 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 concentrations of the analyte at less than ten times (10x) the concentrations of the analyte was 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).
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- 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 Lab Number: L2132277

Project Number: 11204 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.

Report Format: Data Usability Report



Serial_No:07012116:54

Project Name: BW-STRAIGHTWAY Lab Number: L2132277

Project Number: 11204 Report Date: 07/01/21

REFERENCES

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.



Serial_No:07012116:54

Alpha Analytical, Inc. Facility: Company-wide

Department: Quality Assurance

Title: Certificate/Approval Program Summary

Revision 19

Published Date: 4/2/2021 1:14:23 PM

ID No.:17873

Page 1 of 1

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;

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, 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 II, 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.

Document Type: Form

Pre-Qualtrax Document ID: 08-113

Serial_No:07012116:54 CHAIN OF CUSTODY PAGE____OF___ Date Rec'd in Lab: 6//5/ ALPHA Job #: Project Information Report Information - Data Deliverables **Billing Information** 8 Walkup Drive 320 Forbes Blvd Project Name: 13 Westboro, MA 01581 Mansfield, MA 02048 ADEX ☐ Same as Client info PO #: □ EMAIL Tel: 508-898-9220 Tel: 508-822-9300 Client Information Regulatory Requirements & Project Information Requirements Project Location: ☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods Client: Project #: ☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics) ☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets) Project Manager: ☐ Yes ☐ No NPDES RGP ALPHA Quote #: Other State /Fed Program Criteria **Turn-Around Time** Ranges Only EPH: DRanges & Targets D Ranges O. ANALYSIS Standard RUSH (only confirmed if pre-approved!) METALS: DROKAS DROKAS DMCP 14 D 524,2 VPH: DRanges & Targels D R Date Due: Additional Project Information: D PAH SAMPLE INFO METALS: DMCP 13 (Filtration TPH: Clouant Only C O PCB OPEST ☐ Field ☐ Lab to do D 8260 Preservation ☐ Lab to do ALPHA Lab ID Collection Sample Sampler Sample ID (Lab Use Only) Matrix Initials Date Time Sample Comments 10:00 Container Type Preservative Container Type 0 P= Plastic A= None A= Amber glass B= HCI A V= Viat Preservative C= HNO G= Glass D= H2SO4 B= Bacteria cup E= NaOH Relinguished By: Date/Time Date/Time C= Cube Received By: F= MeOH O= Other G= NaHSO All samples submitted are subject to H = Na₂S₂O₂ E= Encore Alpha's Terms and Conditions. D= BOD Bottle I= Ascorbic Acid 6/15/21/437 J = NH₄CI See reverse side. K= Zn Acetate Page 20 of 27 O= Other FORM NO: 01-01 (rev. 12-Mar-2012)



Subcontract Chain of Custody

ALPH/		Eu 110 So	rofins US 0 South Hill So uth Bend, IN	t. 46617			Alpha Job L2132277	Number
Clie	nt Information		Project In	formation		Regulatory Req	uirements/Report Li	mits
11.07.240.000.000.000	lytical Labs cup Drive igh, MA 01581-1019	The state of the s	ound & Deliv	cart verables Informa	ation	State/Federal Program: Regulatory Criteria:		
Phone: 508.439.5 Email: mcathcart	150 @alphalab.com	Due Date Deliverables:	: 06/29/21					
I TO A LONG THE REAL PROPERTY.		Project Specif	ic Requirem	ents and/or Re	port Require	ements	10000000000000000000000000000000000000	
Re	ference following Alpha Jo	b Number on final repor	t/deliverables	: L2132277	Rep	ort to include Method Blan	k, LCS/LCSD:	
	nts: Send all results/reports		Creation .					
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	Bromate Bromate				
14					ñ a			
	Relinquis			Date/Time:		Received By:	Date/Time:	
	e se	leau		6/1921		"	(67) is	
Form No: AL_subco	oc				155			



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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Page 22 of 27 Page 1 of 6



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
lowa	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

Revision date: 09/29/2020

Page 23 of 27 Page 2 of 6



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 Report: 521478

Attn: Maria Cathcart Priority: Standard Written

Eight Walkup Drive Status: Final

Westborough, MA 01581 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 Date

Client Name: Alpha Analytical

Report #: 521478

Page 1 of 3

Page 24 of 27 Page 3 of 6

Serial_No:07012116:54

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 #									
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:	*	۸	!

Client Name: Alpha Analytical Report #: 521478

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 or MSD value - Sample value) * 100 / spike target / dilution factor = **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.

Client: Alpha Analytical Labs Westborough, MA 01581-1019 Phone: 508,439,5150 Due	Eurofins US 110 South Hill St. South Bend, IN 46617	1		
Projec Projec		/ 100		Alpha Job Number L2132277
Projec Projec	Project Information	formation	Regulatory Requirements/Report Limits	nts/Report Limits
	Project Location: MA Project Manager: Maria Cathcart Turnaround & Delivera	t Location: MA t Manager: Maria Cathcart Turnaround & Deliverables Information	State/Federal Program: Regulatory Criteria:	
	Due Date: 06/29/21 Deliverables:			
Project Spec		cific Requirements and/or Report Requirements	ments	
Reference following Alpha Job Number on final report/deliverables: L2132277	report/deliverables:		Report to include Method Blank, LCS/LCSD:	CSD:
Additional Comments: Send all results/reports to subreports@alphalab.com	alphalab.com	6		
Collection Client ID Date/Time	Sample Matrix	Analysis		Batch
UV EFFLUENT 06-15-21 10:00 GAC 06-15-21 10:00	MQ 00	Bromate 4933365 Bromate 2005		. 6
		Client Provide	Client Provided Sample Containst	
				, 8 a
	-		Fun)	, - 4
Relinquished By:		Date/Time:	Received By:	Date/Time:
C Jelvean		10/01/0		
			Kom	10-17-2021

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	В3	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

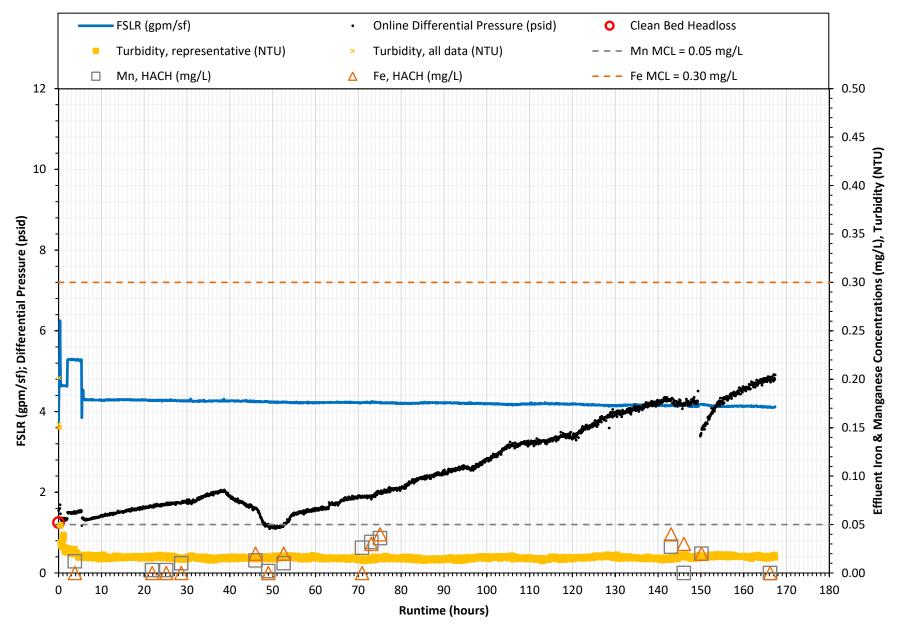


Figure E-2: Trial B.1 - Straightway 1 Well

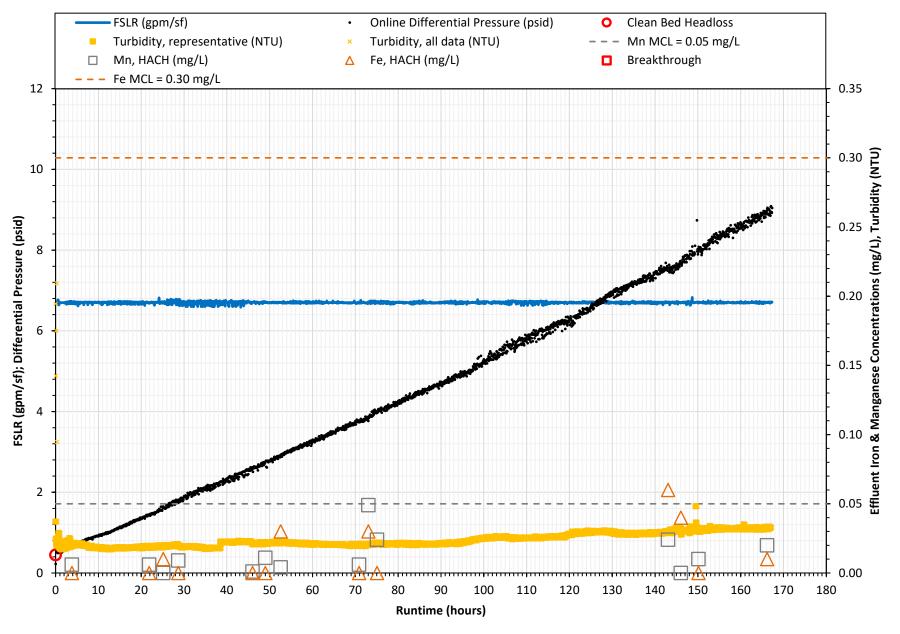


Figure E-3: Trial C.1 - Straightway 1 Well

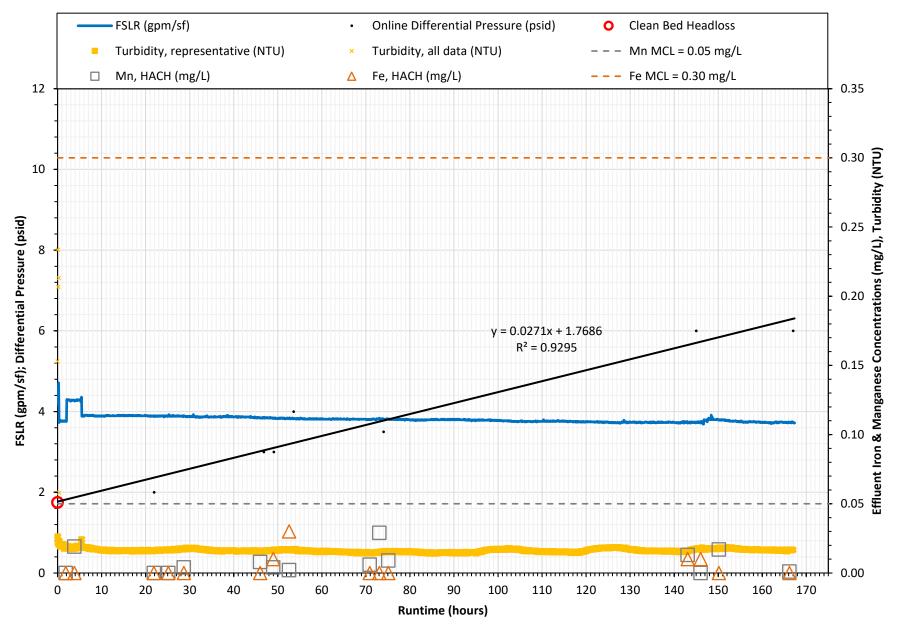


Figure E-4: Trial D.1 - Straightway 1 Well

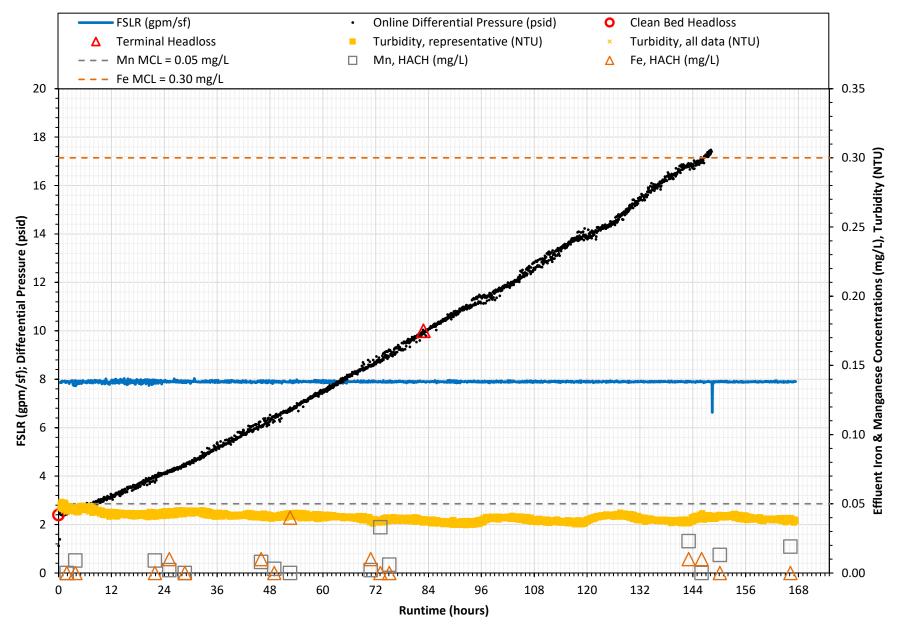


Figure E-5: Trial A.2 - Straightway 2 Well

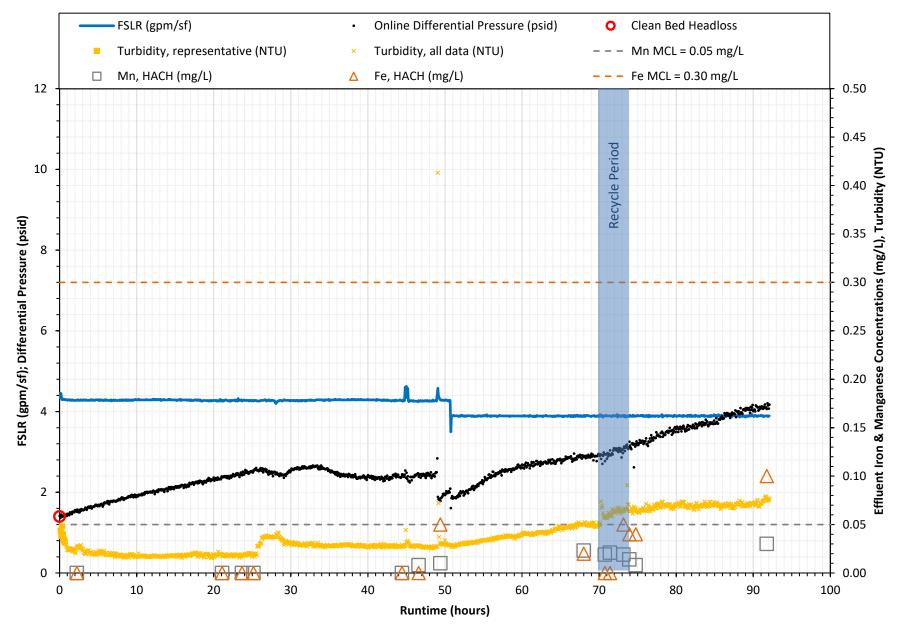


Figure E-6: Trial B.2 - Straightway 2 Well

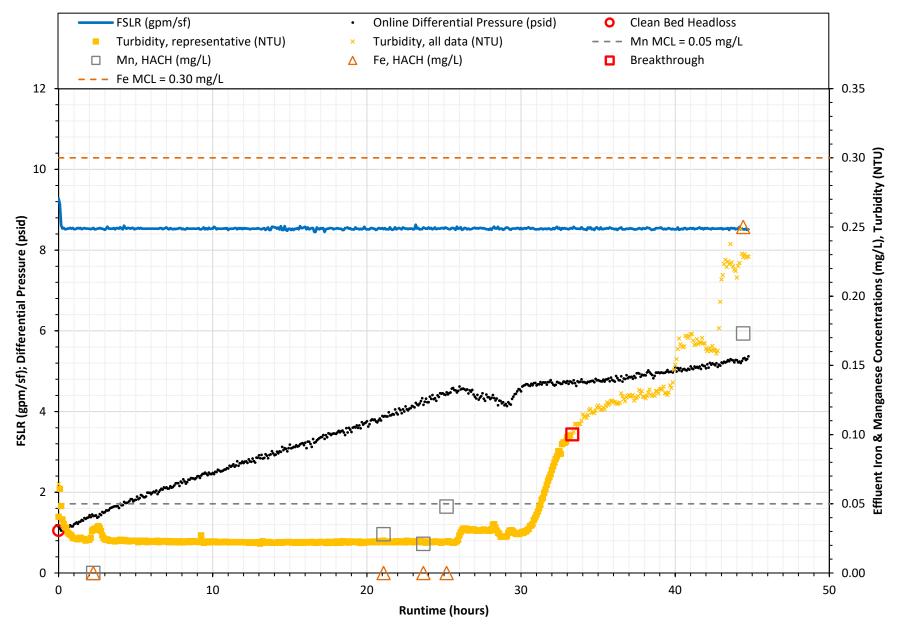


Figure E-7: Trial C.2 - Straightway 2 Well

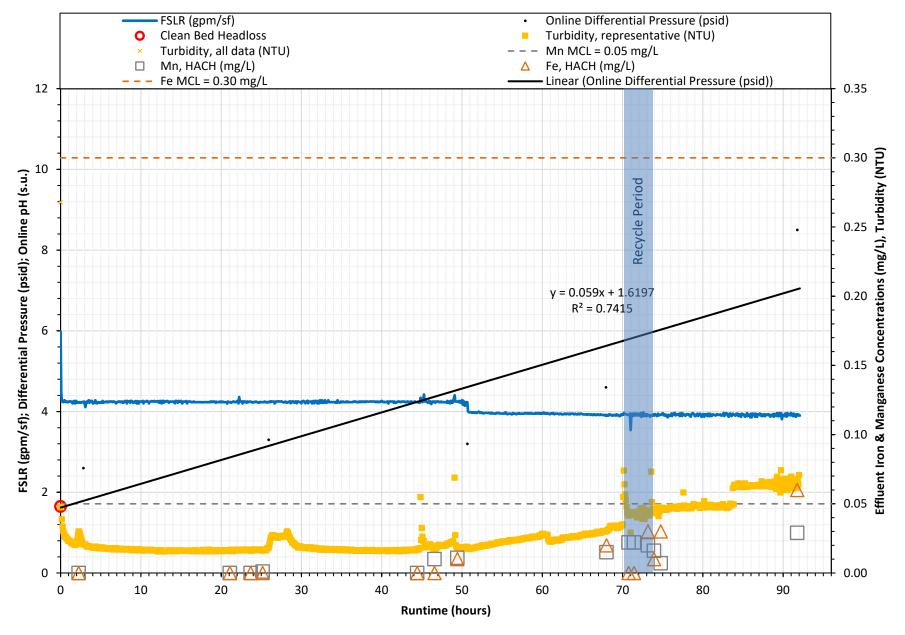


Figure E-8: Trial D.2 - Straightway 2 Well

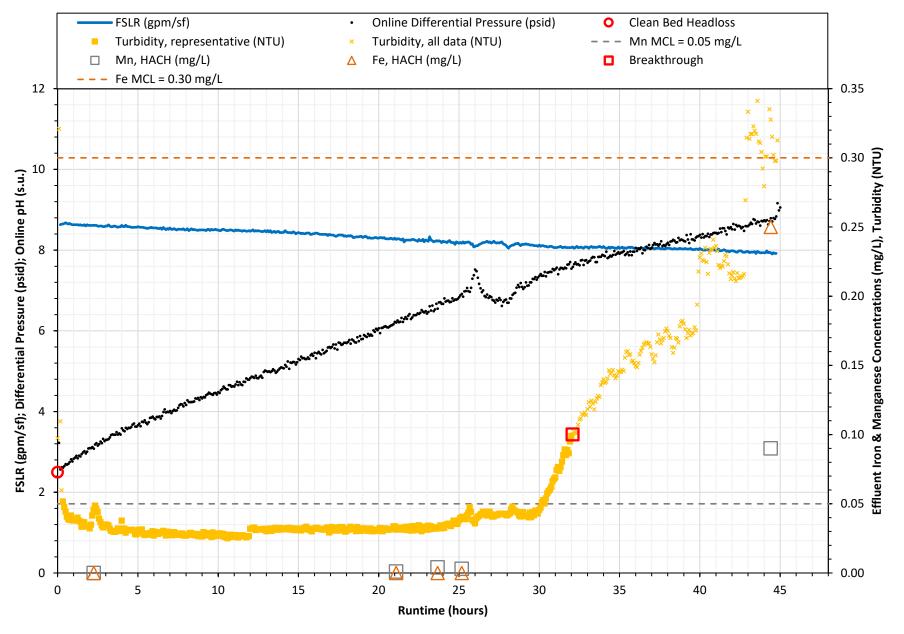


Figure E-9: Trial A.3 - Straightway 2 Well

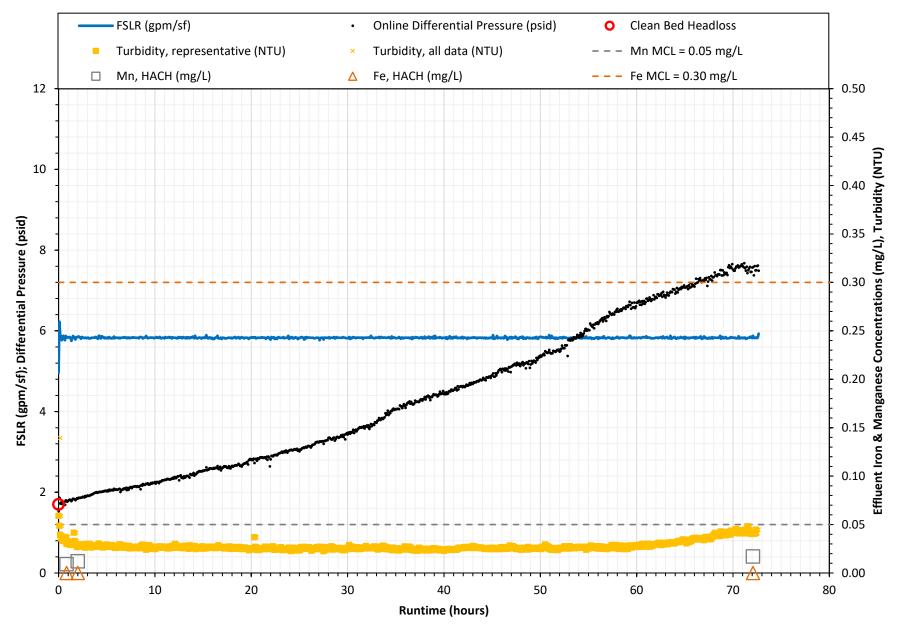


Figure E-10: Trial B.3 - Straightway 2 Well

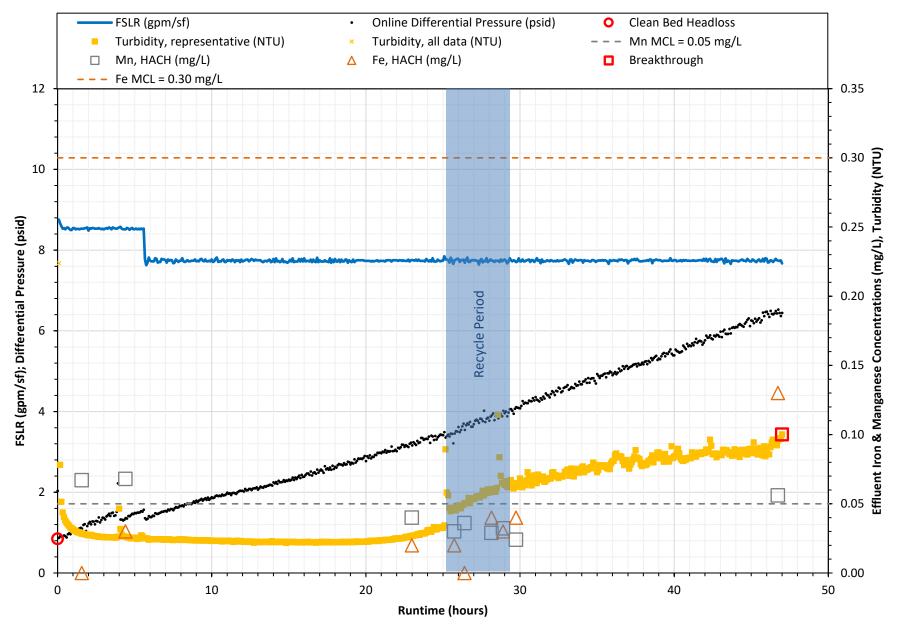


Figure E-11: Trial C.3 - Straightway 2 Well

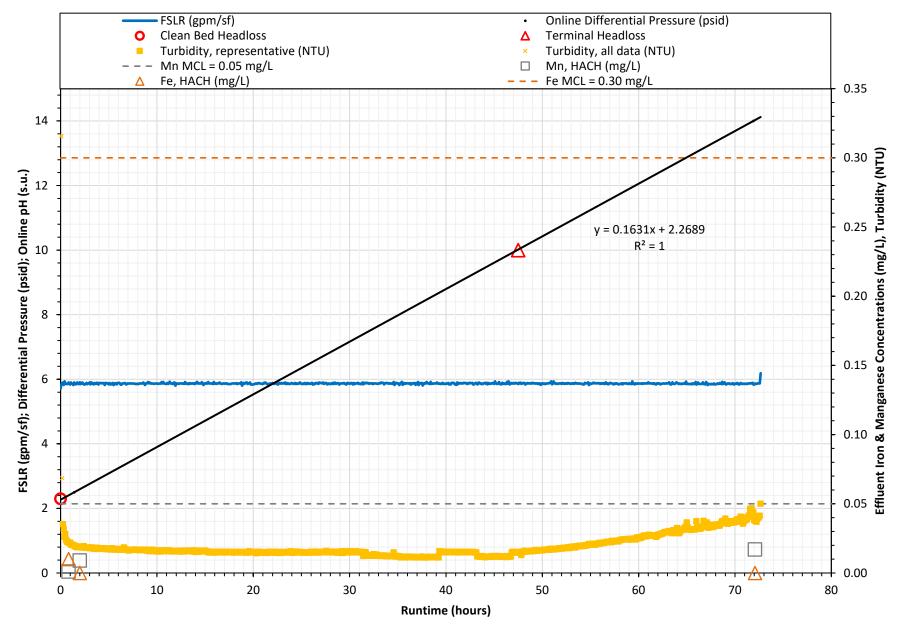


Figure E-12: Trial D.3 - Straightway 2 Well

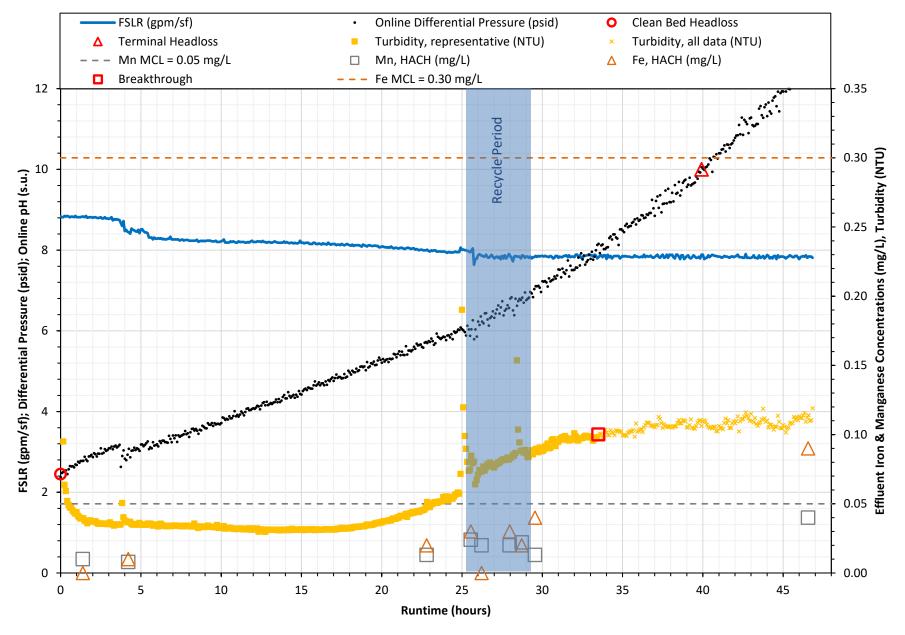


Figure E-13: Trial A.4 - Simmons Pond Well

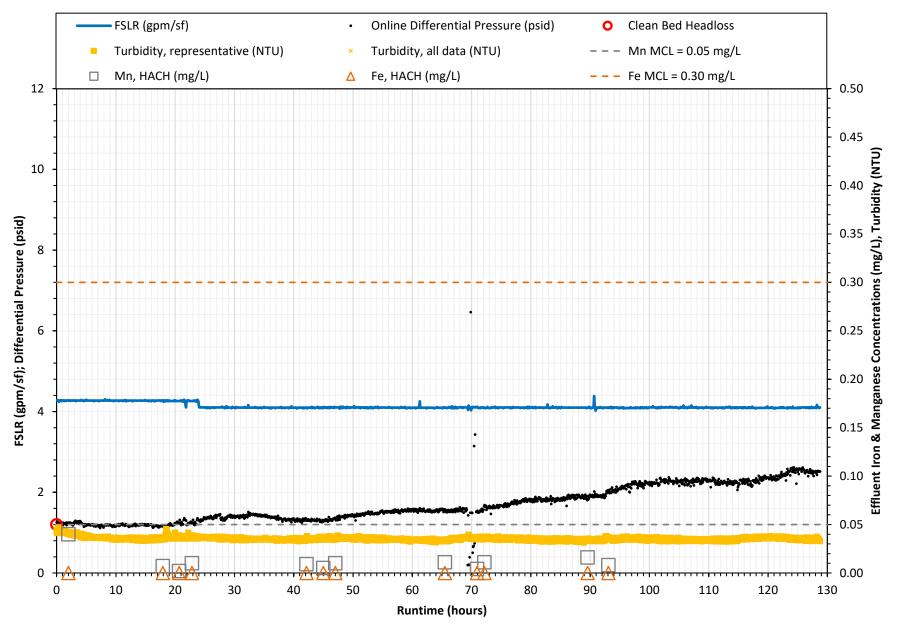


Figure E-14: Trial B.4 - Straightway 2 Well

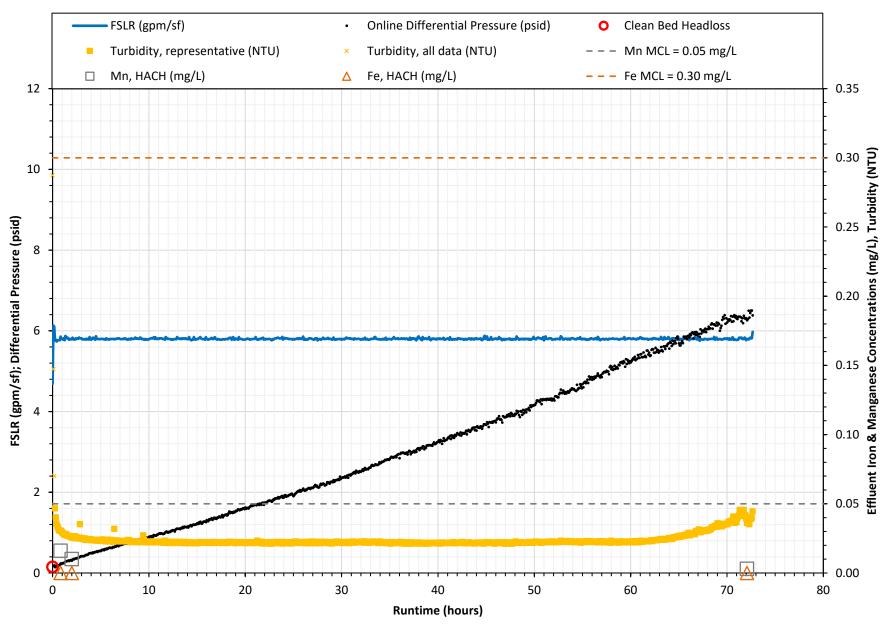


Figure E-15: Trial C.4 - Simmons Pond Well

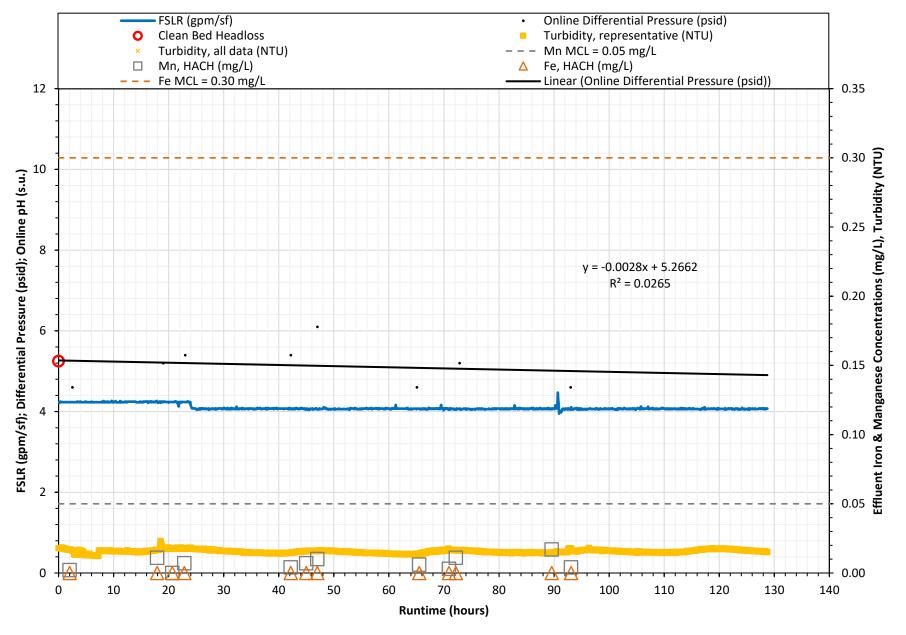


Figure E-16: Trial D.6 - Straightway 2 Well

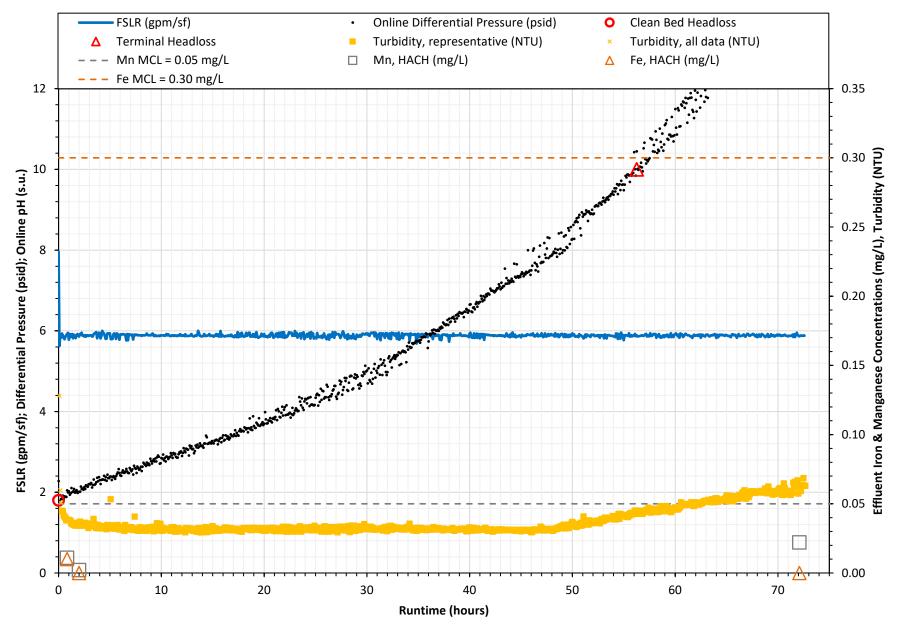


Figure E-17: Trial A.5 - Hyannisport Well

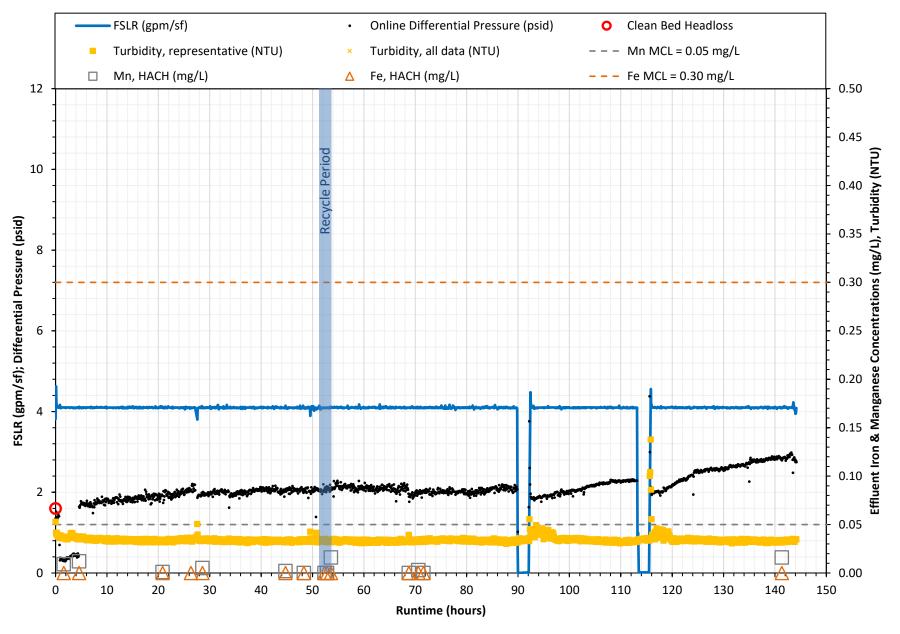


Figure E-18: Trial B.5 - Simmons Pond Well

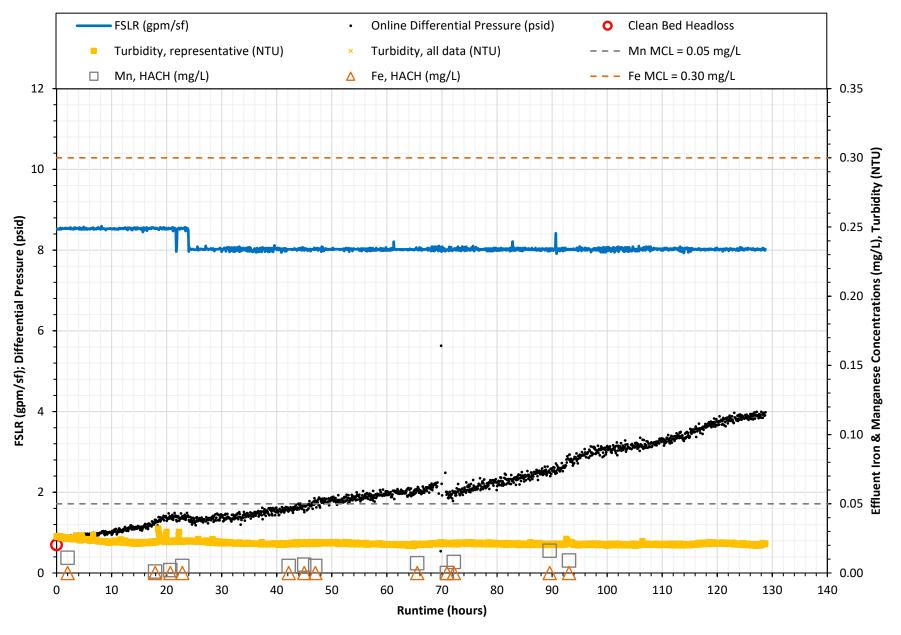


Figure E-19: Trial C.5 - Hyannisport Well

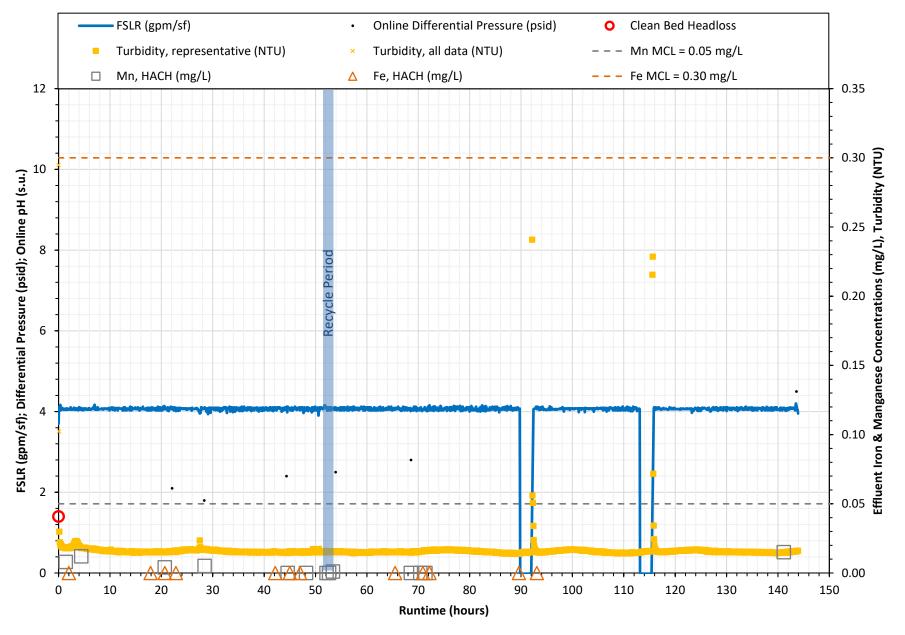


Figure E-20: Trial D.5 - Simmons Pond Well

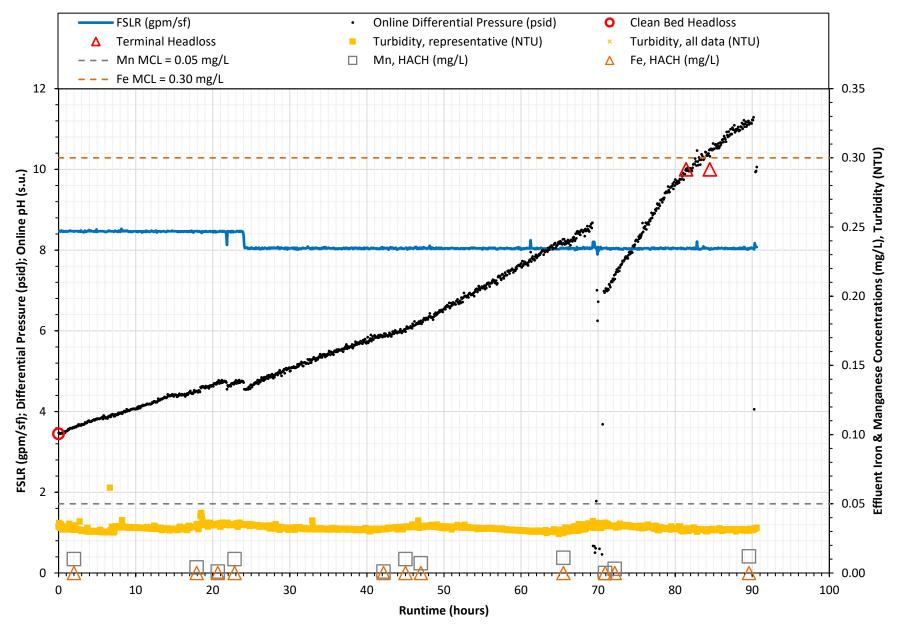


Figure E-21: Trial B.6 - Hyannisport Well

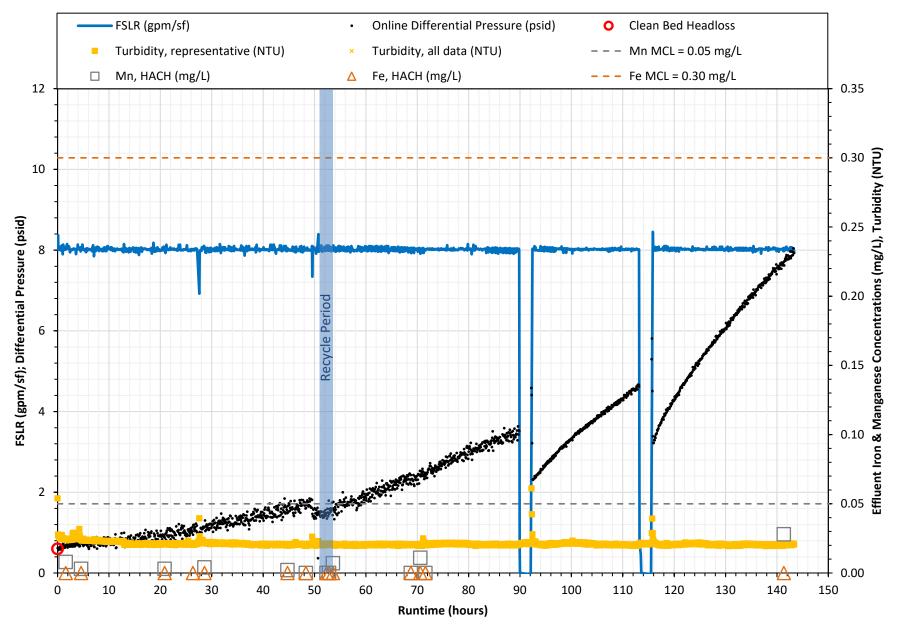


Figure E-22: Trial D.6 - Simmons Pond Well

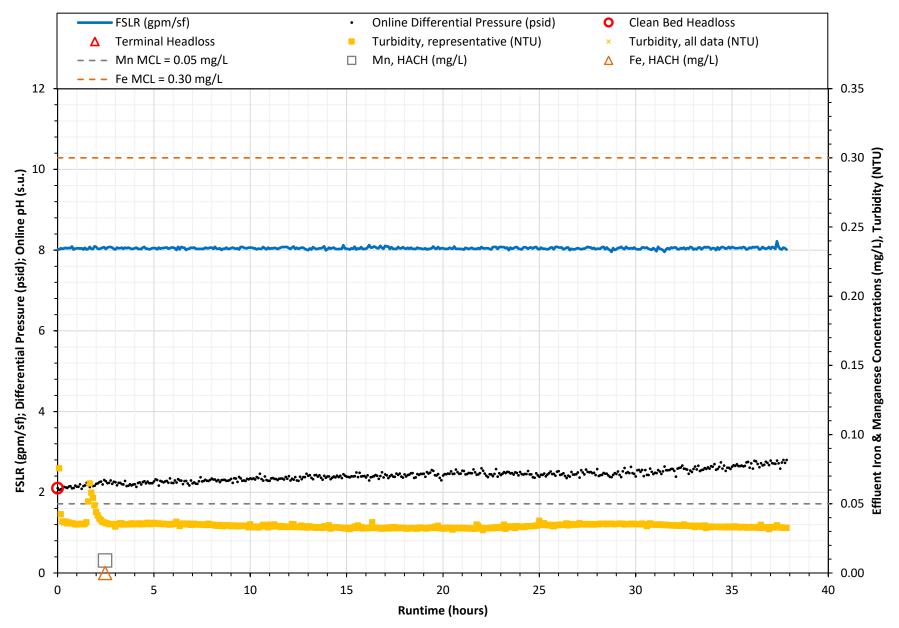
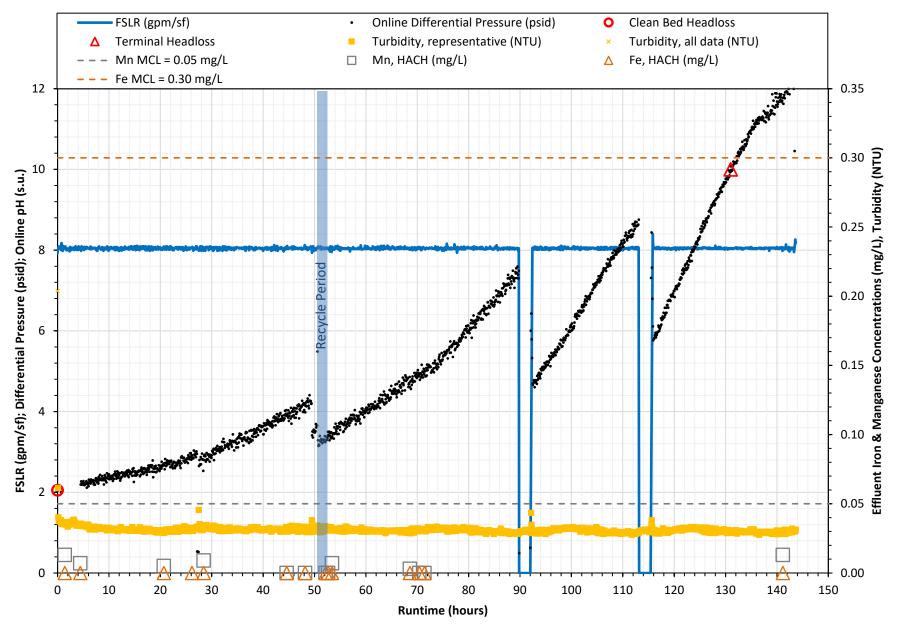


Figure E-23: Trial D.7 - Hyannisport Well



Appendix F – GreensandPlus™ and Calgon Filtrasorb® 400 GAC Product Data Sheets

Inversand Company

GREENSANDPLUS™ TECHNICAL DATA



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.

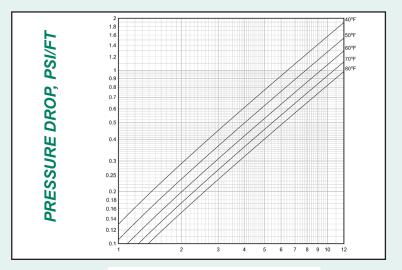
The silica sand core of GreensandPlus allows it to withstand waters that are low in silica, TDS and hardness without breakdown.

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.

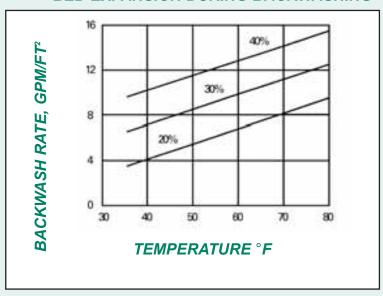
GreensandPlus is a proven technology for iron, manganese, hydrogen sulfide, arsenic and radium removal. Unlike other media, there is no need for

GREENSANDPLUS PRESSURE DROP (CLEAN BED)



FLOW RATE (GPM/FT²)

BED EXPANSION DURING BACKWASHING



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.

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)

MaximumT emperature

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

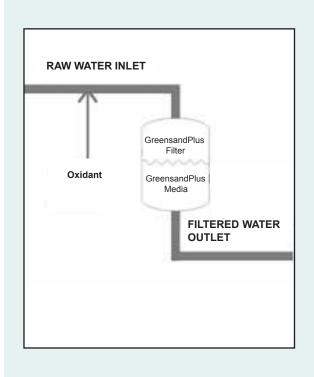
2 -12 gpm/sq. ft (4.9m/hr - 29.4 m/hr)

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 (CI₂) 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:

 $mg/L Cl_2 = (1 \times mg/L Fe) + (3 \times mg/L Mn) + (6 \times mg/L H_2S) + (8 \times mg/L NH_3)$

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

= $(1 \times mg/L Fe) + (2 \times mg/L Mn)$

 $= (1 \times 1.7) + (2 \times 0.3)$

= (2.3 mg/L or 2.3/17.1 = 0.13 grains/gal. (gpg)

At 1,200 grains / sq. ft. loading ÷ 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

pΗ

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:



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Disclaimer: The information and recommendations in this publication are true and reliable to the best of our knowledge. These recommendations are offered in good faith but without warranty or liability for consequential damage as conditions and method of use of our products are varied and beyond our control. We suggest the user determine the suitability and performance of our products before they are adopted on a commercial scale.



FILTRASORB® 400

Granular Activated Carbon

Applications



Industrial Wastewater



Groundwater



Surface Water



Pond/Aquarium/



Bottle &



Water Processing



Pharmaceuticals







Beverage

Food &



Drinking Water Industrial



Water Reuse



Drinking Water (Potable)



Granular Activated Carbon



Municipal



Reactivation

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.

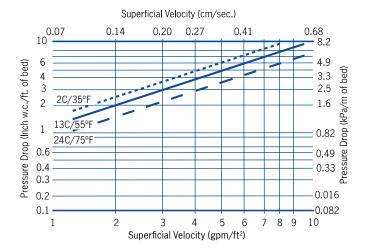
Specifications ¹	FILTRASORB 400		
lodine Number, mg/g	1000 (min)		
Moisture by Weight	2% (max)		
Effective Size	0.55-0.75 mm		
Uniformity Coefficient	1.9 (max)		
Abrasion Number	75 (min)		
Screen Size by Weight, US Sieve Series			
On 12 mesh	5% (max)		
Through 40 mesh	4% (max)		
¹Calgon Carbon test method			

Typical Properties*	FILTRASORB 400
Apparent Density (tamped)	0.54 g/cc
Water Extractables	<1%
Non-Wettable	<1%

^{*}For general information only, not to be used as purchase specifications.

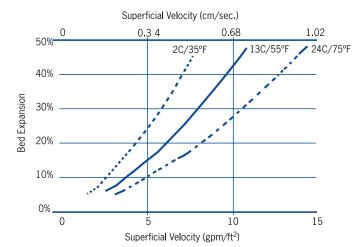
Typical Pressure Drop

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)
- 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

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.

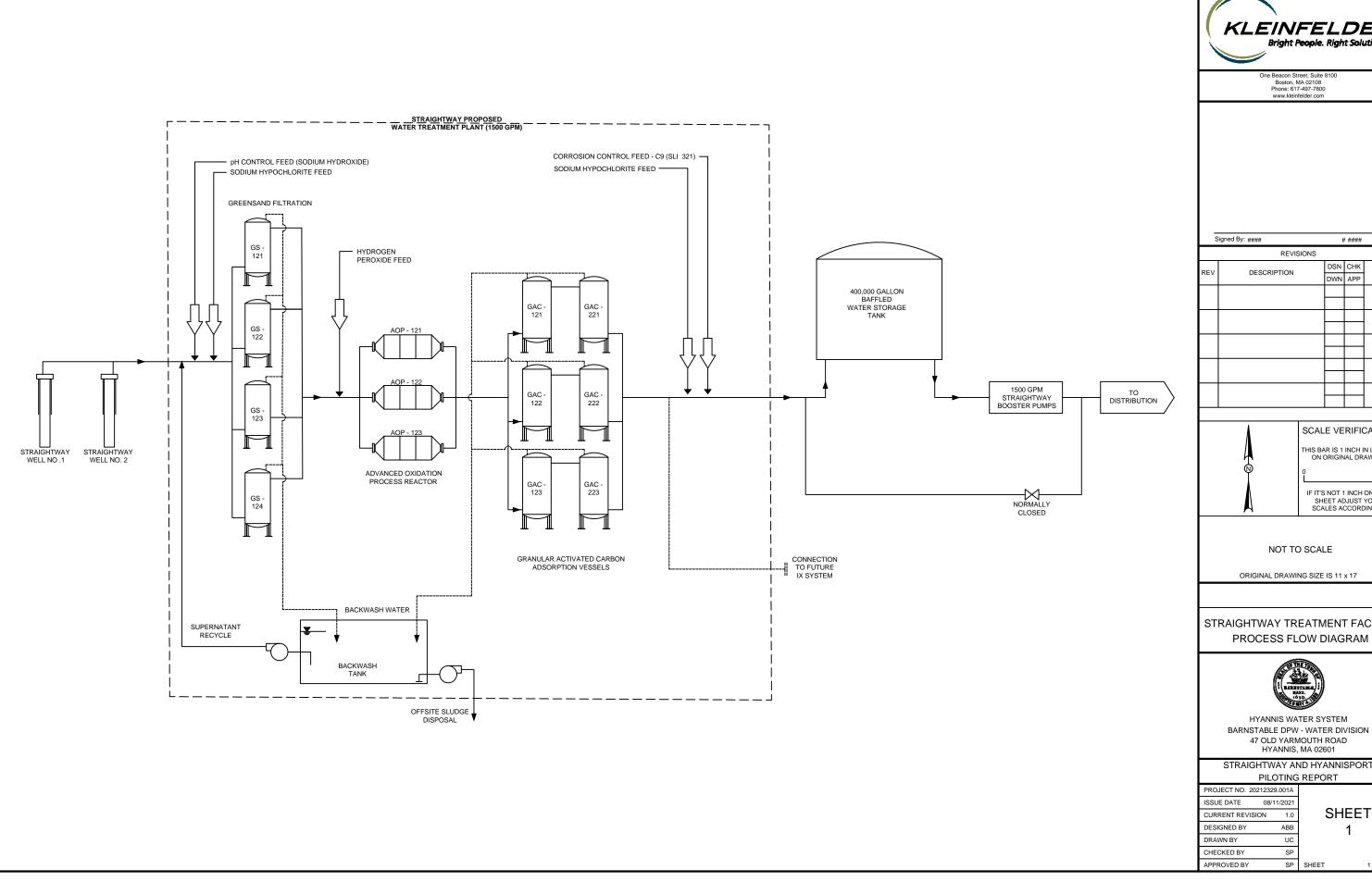
^{*}Duration representative of initial backwash conditions. Required duration during operational backwashes can be shorter but will vary by utility, solids load, and GAC throughput. Contact Calgon Carbon for more information"

Appendix G – Trojan Technologies™ Sleeve Fouling Test Results

	<u>e Reads R</u>	eport				
Collection Time:	7/13/2021 12:08					
Method:						
Version	5.0.0.999					
Instrument:	Cary 60					
Ave Time						
sec)	1					
	Т	arget 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	0.90259625
4	82.84	254	0.91016482	81.441	254	0.902446674
5	81.903	254	0.905002762	81.659	254	0.90365369
6	81.966	254	0.905350761	80.405	254	0.89668835
7	82.932	254	0.910670083	81.523	254	0.9029008
8	82.207	254	0.90668076	81.716	254	0.903969020
9	82.092	254	0.906046356	81.494	254	0.90274027
10	76.863	254	0.876715461	81.511	254	0.90283442
11	82.622	254	0.908966446	81.389	254	0.90215852
12	80.628	254	0.897930955	81.081	254	0.90044988
13	81.771	254	0.904273189	81.055	254	0.90030550
14	82.356	254	0.907502066	80.967	254	0.89981664
15	82.235	254	0.906835156	80.553	254	0.89751323
16	81.612	254	0.903393602	81.544	254	0.90301716
17	78.587	254	0.886493091	79.792	254	0.89326367
18	76.659	254	0.875551255	80.858	254	0.89921076
19	78.241	254	0.884539428	81.291	254	0.90161521
20	77.987	254	0.883102486	81.686	254	0.90380307
21	78.822	254	0.887817549	81.574	254	0.90318325
22	79.34	254	0.890730038	81.289	254	0.90160412
23	78.494	254	0.885968397	81.725	254	0.90401880
24	78.38	254	0.885324799	81.491	254	0.90272365
25	78.763	254	0.887485211	81.138	254	0.9007663
		average	0.895041611		average	0.90143237



APPENDIX F PROCESS FLOW DIAGRAMS



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####

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STRAIGHTWAY TREATMENT FACILITY PROCESS FLOW DIAGRAM

> BARNSTABLE DPW - WATER DIVISION 47 OLD YARMOUTH ROAD HYANNIS, MA 02601

STRAIGHTWAY AND HYANNISPORT



One Beacon Street, Suite 8100 Boston, MA 02108 Phone: 617-497-7800 www.kleinfelder.com

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	DESCRIPTION	DWN	APP	DATE
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STRAIGHTWAY TREATMENT FACILITY **EQUIPMENT LAYOUT**



HYANNIS WATER SYSTEM BARNSTABLE DPW - WATER DIVISION 47 OLD YARMOUTH ROAD HYANNIS, MA 02601

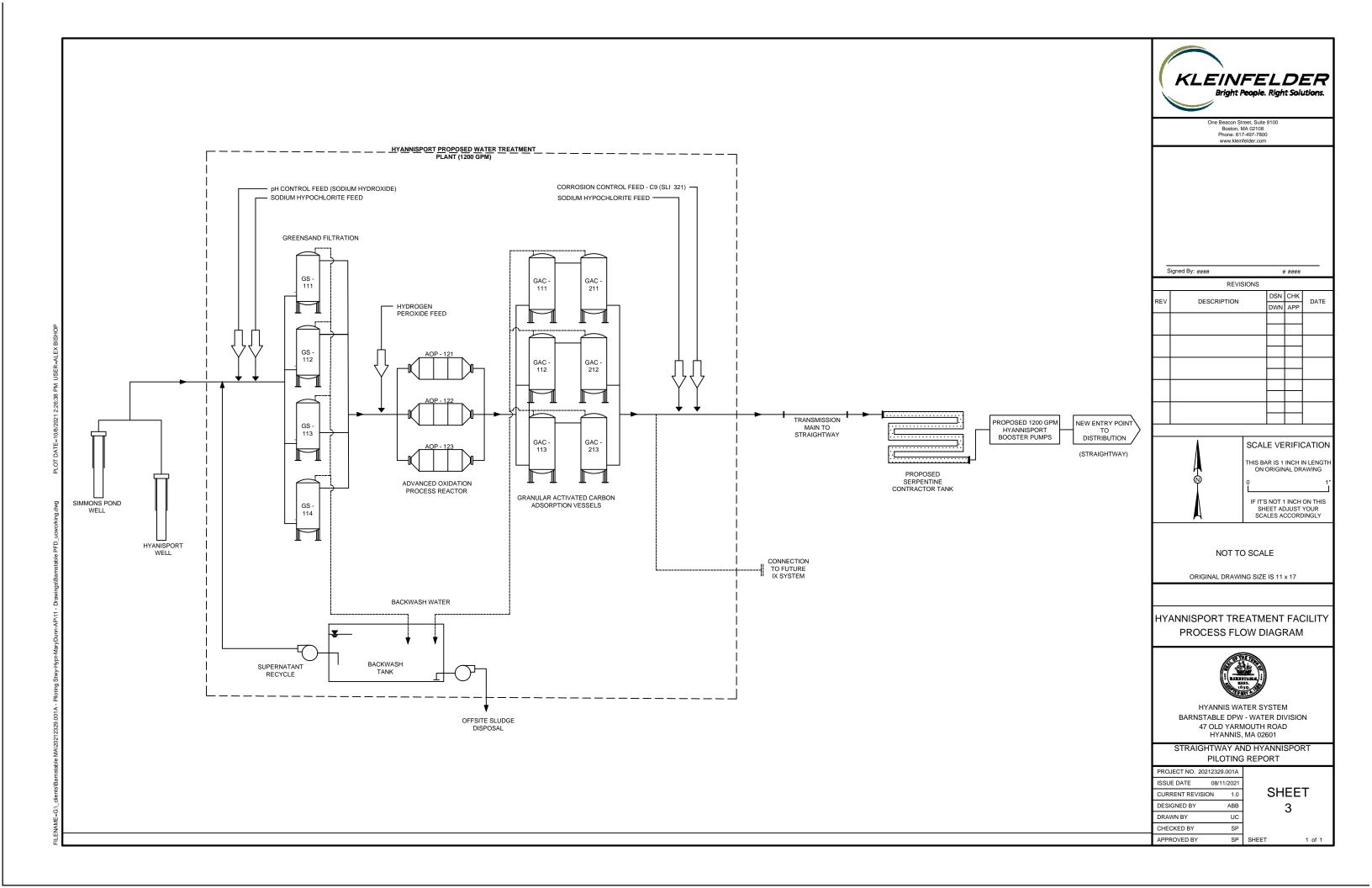
STRAIGHTWAY AND HYANNISPORT PILOTING REPORT

PROJECT NO. 20212	2329.001A
ISSUE DATE	08/11/2021
CURRENT REVISION	1.0
DESIGNED BY	ABB
DRAWN BY	UC
CHECKED BY	SP
APPROVED BY	SP

SHEET 2

SHEET

1 of 1





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ORIGINAL DRAWING SIZE IS 11 x 17

HYANNISPORT TREATMENT FACILITY EQUIPMENT LAYOUT



HYANNIS WATER SYSTEM
BARNSTABLE DPW - WATER DIVISION
47 OLD YARMOUTH ROAD
HYANNIS, MA 02601

STRAIGHTWAY AND HYANNISPORT PILOTING REPORT

PROJECT NO. 20212329.001A

ISSUE DATE 08/11/2021

CURRENT REVISION 1.0

DESIGNED BY ABB

DRAWN BY UC

CHECKED BY SP

APPROVED BY SP

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HEET 1 of 1

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