DES Waste Management Division
29 Hazen Drive; PO Box 95
Concord, NH 03302-0095

March 15, 2021
HOUSE BILL 494 – SURFACE WATER TREATMENT PILOT STUDY RESULTS MEMO
North Hampton and Greenland
New Hampshire

NHDES Site #: 198712001
Project Type: Superfund Site
Project Number: 0431

Prepared For:
New Hampshire Department of Environmental Services
29 Hazen Drive
Concord, New Hampshire 03302-0095

Suzanne Yerina

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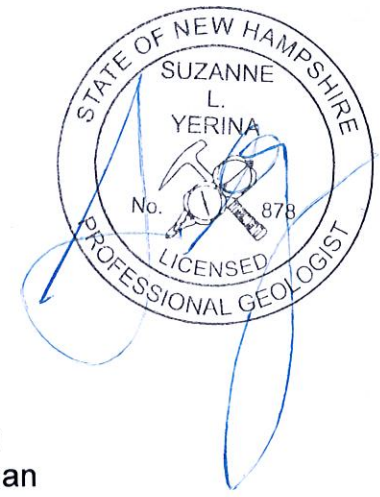

Prepared By:
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Date of Memo: (March 2021)

HALEY WARD
ENGINEERING | ENVIRONMENTAL | SURVEYING
FORMERLY: CES INC

MEMO

To: Peter Britz – Coakley Landfill Group

From: Christopher Buckman – Haley Ward, Inc.

Re: HB 494 Surface Water Treatment Pilot Study Results

Date: March 15, 2021

New Hampshire House Bill 494 (HB 494) required that the New Hampshire Department of Environmental Services (NHDES) propose a remedy to "ensure the substantial reduction of the contaminants entering Berrys Brook from the Coakley Landfill Superfund site." To address HB 494 requirements, Haley Ward, Inc (Haley Ward), on behalf of the Coakley Landfill Group (CLG), developed a pilot study work plan for the implementation of a pilot-scale passive surface water treatment system. The work plan was provided in the memorandum *House Bill 494 - Surface Water Treatment Pilot Study* dated October 10, 2020. A copy of the final version of HB 494 has been included as **Attachment A**.

Though HB 494 does not define specific contaminants to be addressed, the United States Environmental Protection Agency (USEPA) and NHDES focus in recent years has been on per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. Given that 1,4-dioxane has generally not been detected in surface water samples outside the groundwater management zone (GMZ), it was agreed with the agencies that the pilot study would focus on the assessment of PFAS removal.

Investigations have demonstrated that PFAS in overburden and shallow bedrock groundwater discharge to surface water in the large wetland complex located west of the landfill. This complex ultimately becomes Berrys Brook, although a defined stream channel does not exist until the north end of the wetland complex, near Breakfast Hill Road, approximately 3,000 feet north of the landfill (**Figure 1**). It appears that most or all of the PFAS entering the wetland complex result from the discharge of groundwater to the surface. This is supported by regular flow (baseflow) observed within the stream channel during prolonged periods of no measurable precipitation. During rain events;

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however, PFAS found in landfill stormwater discharge is also a source of contamination to the complex. For the reasons provided in the pilot study memorandum, and as approved by NHDES and USEPA, the area near Breakfast Hill Road where the defined stream channel exists was the most appropriate location for evaluating treatment of PFAS in Berrys Brook associated with the Site.

It should be noted that the removal of a culvert blockage that had interrupted drainage between wetlands located east and west of the railroad easement was completed on October 20, 2020 in preparation for the pilot study. The removal of this blockage resulted in a visual increase in the amount of water entering the headwaters of Berrys Brook. This culvert is located approximately 600 feet south of the treatment area (**Figure 1**) and where water passage between these two wetlands had been limited previously to water overtopping the railroad easement during rain events. Water is now visibly flowing through the culvert. In addition, the beaver dam located at the north end of the wetland and south end of the channel (**Figure 1**) was lowered in select areas by removing accumulated debris. This was completed to ensure no modification of the natural channel occurred and incrementally performed to limit potential for the mobilization of sediment within the waterway and eliminate the likelihood for erosion along the banks of the brook.

A passive treatment approach was selected for the pilot test. The implementation of a passive approach required minimal disturbance/maintenance. This approach allowed for an assessment of the selected remedy outside of a controlled environment (e.g., laboratory bench tests) and evaluation of specific characteristics of both the remedy and environmental effects that may aid in the evaluation of other technologies. As per recommendation of the NHDES during a Site visit on October 16, 2020, modification of the natural channel bottom was to be avoided so that it was not affected by the pilot study such as through scour or erosion. The treatment area, as illustrated on **Figure 1**, was generally located at the northern end of the GMZ, west of the former railroad easement, and east of the residential property located at 368 Breakfast Hill Road (where private well R-3 is located).

TREATMENT TECHNOLOGY

Bioavailable Absorbent Media (BAM) was selected as the media for evaluation during the pilot study. BAM is an inert plant-based cellulose bio-char product that provides a substrate for contaminant absorption. It is a trademarked material manufactured and marketed by ORIN Technologies, LLC. (ORIN). The characteristics of BAM are analogous to that of granular activated carbon (GAC) in that it allows for a large surface area per unit weight of material for sorption to take place.

The treatment of surface water for PFAS has not been as widely investigated or implemented as it has for soil and groundwater, in large part due to the absence of established surface water regulatory standards. Implementation of BAM technology to date has been primarily though soil blending and injection; however, ORIN has been treating surface water and stormwater passively through deployment of floating booms and curtains/blankets containing BAM within stormwater vaults. As a substrate, BAM has shown capability to absorb PFAS (**Attachment B**).

On November 5, 2020, BAM was deployed in blankets with "pillows" of the absorbent material sewn into large (3.5 foot by 3.5 foot) pieces of non-woven geotextile fabric and laid within the stream channel (**Attachment C**). Prior to placement, the channel was prepared by removing large rocks and vegetation that had fallen into the channel so that a consistent channel width and uniform flow could be maintained along its length. A total of four blankets were deployed within the channel, with the downstream end of each blanket supported approximately 1 foot above the channel bottom. This allowed water to pool behind the upstream side of the blankets and be forced through the BAM. Blankets were deployed along the channel at stations located 6 feet, 30 feet, 44 feet, and 56 feet from the start of the channel (Photo No. 2 – **Attachment C**).

The blankets were left in place from November 5, 2020 to December 4, 2020. They were removed due to freezing temperatures and icing over of water upstream of the blankets. Removal was completed following the collection of the pre- and post-treatment samples on December 4, 2020. All materials associated with the implementation of the pilot study were removed from the treatment area and stored for future use, if any.

PHYSICAL OBSERVATIONS

Though some water was treated by the media during the pilot test, it was determined that water could not effectively pass through the media at such a rate as to avoid overtopping the blankets. In addition, the accumulation of sediment on the upstream side and biological growth on the exposed downstream side of each blanket further limited the permeability of the blankets.

TREATMENT SAMPLING

Samples were collected from established pre- and post-treatment locations that were free from dilution that may occur via other sources of surface water drainage (e.g., railroad easement ditches) as illustrated on **Figure 1**. Pre-treatment sampling occurred upstream of the blankets with post-treatment samples collected downstream, immediately before where the channel enters the box culvert under the easement. The first set of samples were collected 24-hours after deployment of the blankets on November 6, 2020, with subsequent sampling completed every two weeks (November 20, 2020 and December 4, 2020) until the blankets were removed.

Samples were submitted to Alpha Analytical Laboratory of Westborough, Massachusetts for analysis for the expanded list of PFAS compounds included on **Table 1**. This allowed for a more direct comparison with surface water samples previously collected in accordance with the GMP. Laboratory analytical reports have been included as **Attachment D**.

TREATMENT RESULTS

In general, there were no observed reductions in PFAS in post-treatment samples (**Table 1**). With the exception of samples collected on November 6, 2020, concentrations of individual PFAS were largely consistent between pre- and post-treatment samples and between successive sampling events. The pre-treatment sample collected on November 6, 2020 had lower concentrations of individual PFAS compounds than those reported in

the post-treatment sample. This is likely due to variations in PFAS concentrations within surface water at any given time and the equilibrating of water levels and flow rates following installation of the blankets on November 5, 2020. Similarities in PFAS concentrations between pre- and post-treatment samples collected on November 20, 2020 and December 4, 2020 were due to one or more factors that include:

- Limited contact time between the surface water and the BAM,
- Generally low permeability of the blanket and BAM materials resulting in bypass of the blankets; and,
- Dilution of treated water with untreated bypass and shallow groundwater discharge.

To allow for successful absorption of PFAS, water must be in direct contact with treatment media for a longer period of time. In the case of the blankets deployed as part of this investigation, though water did pass through the media, a limited amount is believed to have been treated such that a measurable reduction in PFAS concentration could not be readily achieved. Also, as mentioned above, the limited permeability of the media allowed for bypass and dilution of treated samples prior to sampling.

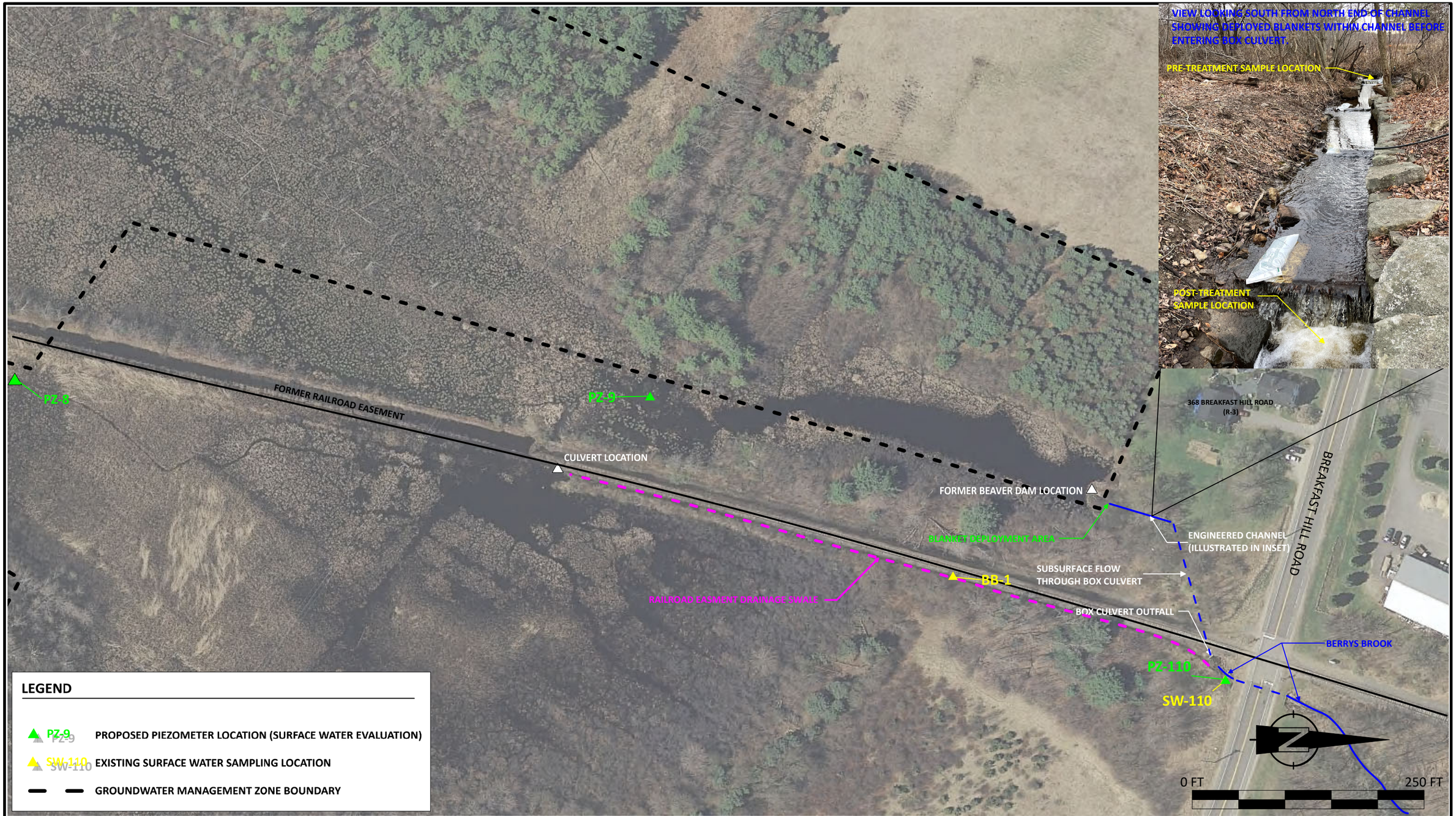
In the absence of New Hampshire surface water quality standards for PFAS, reported concentrations were compared to USEPA site-specific Screening Levels (SLs) for adult and child recreators (**Table 1**). The SLs are based on toxicity values for a specific compound and utilize conservative default exposure assumptions and physical and chemical properties. SLs have been established for perfluorobutanesulfonic acid (PFBS), perfluorooctanoic acid (PFOA), and perfluorooctane sulfonic acid (PFOS). There were no exceedances of these SLs during the pilot study and results were all well below the lowest established SL (760 nanograms per liter [ng/L] for PFOA or PFOS for 120-day exposure of child recreator). The highest reported concentration was 164 ng/L of PFOA from the pre-treatment sample collected on December 4, 2020.

RECOMMENDATIONS

Based on the results of the pilot study as discussed above, it is recommended that another remedy technology be evaluated. A passive treatment option is preferred and additional information on flow rate and treated volume will need to be collected. The limitations of the blankets previously discussed will be addressed through implementation of the following:

Controlled Treatment: Due to variations in flow within the channel that result from seasonal variations and precipitation, treatment of a controlled amount of water at a known rate and media contact time will allow for a more measurable effect of treatment.

Permeable Media: Limitations of low media permeability resulted in additional bypass and diminished contact time between the media and untreated surface water. The use of a sorption media with a higher permeability should reduce bypass and increase available flow through the media. Though the effectiveness of treatment is directly tied to contact time with the media, the flow rate needs to be managed to maximize the treatment capacity of the media.



PROJECT TITLE: **COAKLEY LANDFILL SUPERFUND SITE NORTH HAMPTON & GREENLAND, NEW HAMPSHIRE**	DWG: **FIGURE 1**	BY: CFB	REV:	NOTE: 1. THIS SITE PLAN IS BASED ON EXISTING SAMPLING LOCATIONS AS PER THE COAKLEY LANDFILL SUPERFUND SITE REVISED SAMPLING AND ANALYSIS PLAN DATED JULY 18, 2018. 2. GMZ BOUNDARY IS BASED UPON "GMZ BOUNDARY PLAN" DATED MAY 9, 2008 INCLUDED IN THE 2008 GMP APPLICATION PREPARED BY HANCOCK ASSOCIATES AND 2013 GMZ EXPANSION AREA ESTABLISHED BY THE 2013 GMP DATED JANUARY 7, 2014. 3. GIS DATA COURTESY OF NEW HAMPSHIRE ONLINE GRANITE DATABASE. 4. MAP IS PROJECTED USING THE NEW HAMPSHIRE STATE PLANE PROJECTION, US FEET AND REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1983.	HALEY WARD
		DATE: 2021-03-09	REV DATE:		
SHEET TITLE: **SURFACE WATER TREATMENT EVALUATION AREA**	JN: 10424.020	APPROVED BY: CFB	ISSUE:		
	SCALE: AS SHOWN	CHECKED BY:	ISSUE DATE:		

TABLE 1
Summary of Surface Water Analytical Data for Surface Water Treatment Pilot Study
Coakley Landfill Superfund Site - North Hampton Greenland, New Hampshire

SAMPLE IDENTIFICATION	Pre	Post	Pre	Post	Pre	Post	USEPA Screening Levels		USEPA Screening Levels	
DATE SAMPLED	11/6/2020		11/20/2020		12/4/2020		Adult Recreator	Child Recreator	Adult Recreator	Child Recreator
PERFLUORINATED CHEMICALS BY MODIFIED 537 - (ng/L)							EF = 45 Days		EF = 120 Days	
Perfluorobutanoic Acid (PFBA)	**8.23**	**8.59**	**8.48**	**9.06**	**11.7**	**11.2**	---	---	---	---
Perfluoropentanoic acid (PFpEA)	**15.2**	**17.7**	**15**	**15.7**	**19.6**	**19.3**	---	---	---	---
Perfluorobutanesulfonic acid (PFBS)	**2.82**	**3.35**	**2.87**	**3.16**	**2.61**	**2.72**	18,300,000	2,030,000	6,850,000	760,000
Perfluorohexanoix Acid (PFHxA)	**29.8**	**32.3**	**34.5**	**33.5**	**42.4**	**41.3**	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	**58.6**	**67.9**	**66.7**	**68.4**	**86**	**82**	---	---	---	---
Perfluorohexanesulfonic acid (PFHxS)	**6.29 F**	**7.37**	**6.66**	**6.91**	**6.74**	**6.35**	---	---	---	---
1H, 1H, 2H, 2H-Perfluorooctanesulfonic Acid (6:2 FTS)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluorooctanoic acid (PFOA)	**117 F**	**153 F**	**133 F**	**131 F**	**164**	**154**	18,300	2,030	6,850	760
Perfluoroheptanesulfonic Acid (PFHpS)	**0.837 J**	**1.41 J**	<1.75	<1.82	**1.06 J**	**0.828 J**	---	---	---	---
Perfluorononanoic acid (PFNA)	**36.8**	**54.7**	**36.3**	**36.6**	**41.4**	**37.8**	---	---	---	---
Perfluorooctanesulfonamide (PFOSA)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluorooctanesulfonic (PFOS)	**73.7 F**	**107 F**	**74.2 F**	**78.4 F**	**89.1**	**80.5**	18,300	2,030	6,850	760
Perfluorodecanoic Acid (PFDA)	**9.02**	**13.2**	**9.87**	**9.24**	**9.1**	**8.32**	---	---	---	---
1H, 1H, 2H, 2H-Perfluorodecanesulfonic Acid (8:2 FTS)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
N-Ethyl Perfluorooctanesulfonamidoacetic (EtFOSAA)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluoroundecanoic Acid (PFUnA)	**0.297 JF**	**0.444 JF**	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluorodecanesulfonic Acid (PFDS)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluorododecanoic Acid (PFDoA)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
N-Methyl Perfluorooctane Sulfonamide (MeFOSA)	<17.1	<17.9	<17.5	<18.2	<18.1	<18.0	---	---	---	---
Perfluorotridecanoic Acid (PFTrDA)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
Perfluorotetradecanoic Acid (PFTeDa)	<1.71	<1.79	<1.75	<1.82	<1.81	<1.80	---	---	---	---
N-Ethyl Perfluorooctane Sulfonamide (EtFOSA)	<17.1	<17.9	<17.5	<18.2	<18.1	<18.0	---	---	---	---
Perfluorogexadecanoic Acid (PFHxDA)	<3.42	<3.58	<3.50	<3.65	<3.61	<3.60	---	---	---	---
N-Methyl Perfluorooctanesulfonamido Ethanol (MeFOSE)	<42.7	<44.7	<43.8	<45.6	<45.2	<45.0	---	---	---	---
N-Ethyl Perfluorooctanesulfonamido Ethanol (EtFOSE)	<42.7	<44.7	<43.8	<45.6	<45.2	<45.0	---	---	---	---
Combination of PFOA and PFOS	**190.7**	**260.0**	**207.2**	**209.4**	**253.1**	**234.5**	---	---	---	---
FIELD PARAMETERS										
Temperature (degrees C)	10	9	3	3	3	2				
pH (Standard Units)	6.4	6.8	6.5	7.4	6.9	7.2				
Specific Conductance (uS/cm)	286	294	278	290	237	238				
Dissolved Oxygen (mg/L)	7.3	7.2	6	7	7.8	8.9				
Turbidity (NTU)	<5	5	7	7	5	25				
Oxidation Reduction Potential (mV)	30	25	87	58	60	47				

NOTES:

1. --- no standard has been established for the indicated parameter.
2. There are no ROD ICLs established for surface water.
3. Highlighting: Bold values denote laboratory detections of a compound.

J Concentration detected is below the reporting limit/LOQ.

F Ratio of quantifier ion response to qualifier ion response is outside lab accesptance criteria. Value is estimated maximum concentration.

#.## U Not detetced at the reporting limit.

UJ Undetcted estimated

uS/cm microSiemens per centimeter

ug/L micrograms per liter, parts per billion

mg/L milligrams per liter, parts per million

ng/L nanograms per liter, parts per trillion

NTU nephelometric turbidity unit

mV millivolt

EF Effective Days

< # Less than number indicated

ATTACHMENT A
HOUSE BILL 494

CHAPTER 328
HB 494 - FINAL VERSION

05/30/2019 2334s
27Jun2019... 2615-CofC
27Jun2019... 2664-EBA

2019 SESSION

19-0534
08/03

HOUSE BILL ***494***

AN ACT **relative to removal or containment of contaminants from the Coakley Landfill.**

SPONSORS: **Rep. Cushing, Rock. 21; Rep. Edgar, Rock. 21; Rep. Loughman, Rock. 21; Rep. Bushway, Rock. 21; Rep. Janvrin, Rock. 37; Rep. Le, Rock. 31; Rep. Malloy, Rock. 23; Rep. Grote, Rock. 24; Rep. Altschiller, Rock. 19; Rep. Meuse, Rock. 29; Sen. Sherman, Dist 24**

COMMITTEE: **Environment and Agriculture**

AMENDED ANALYSIS

This bill directs the department of environmental services to pursue a remedy regarding the substantial reduction of certain contaminants from the Coakley Landfill.

Explanation: **Matter added to current law appears in *bold italics.***
Matter removed from current law appears [~~in brackets and struckthrough.~~]
Matter which is either (a) all new or (b) repealed and reenacted appears in regular type.

CHAPTER 328
HB 494 - FINAL VERSION

05/30/2019 2334s
27Jun2019... 2615-CofC
27Jun2019... 2664-EBA

19-0534
08/03

STATE OF NEW HAMPSHIRE

In the Year of Our Lord Two Thousand Nineteen

AN ACT **relative to removal or containment of contaminants from the Coakley Landfill.**

Be it Enacted by the Senate and House of Representatives in General Court convened:

328:1 Findings. The general court finds that:

I. On July 7, 2017 the department of environmental services issued correspondence stating the following:

"First, and in the near term, the department of environmental services believes that signage to alert the public to the presence of contaminants in the adjacent wetlands, seasonally flooded railroad bed, and the uppermost reach of Berrys Brook is appropriate. We have discussed this issue with the Environmental Protection Agency (EPA) and are working with them to determine how to best accomplish this.

"Second, with regard to the expressed concerns about potential impacts to fish in Berrys Brook, the department of environmental services believes that additional work needs to be completed, in concert with the department of fish and game, to determine whether the surface water quality in the lower reaches of the brook poses any risk to recreational anglers who catch and consume the stocked brown trout or other species from the brook. Since early May, the department of environmental services has been engaged with EPA on this topic. The department of fish and game is currently working to address a number of relevant questions developed by EPA about the fisheries. Once that information is received, we will work with EPA and the department of fish and game to determine how best to address this question.

"Third, the department of environmental services believes that actions need to be implemented at the site to provide additional removal or containment of the contamination, in order to mitigate these surface water quality impacts. In the long run, this will be the most reliable way to limit exposure to site contaminants via the surface water pathway."

II. In correspondence to the Coakley Landfill Group (CLG) dated October 5, 2018 the department of environmental services stated "The enclosed laboratory report confirms that the concentration exceeds the recently revised Ambient Groundwater Quality Standard (AGQS) of 0.32 ppb." Consistent with the guidelines stated in department's letter dated September 14, 2018, the CLG shall immediately provide bottled

water to the residence at 368 Breakfast Hill Road and, within 30 days of this letter, provide recommendations for corrective action."

III. In correspondence to the Coakley Landfill Group dated November 1, 2018 the department of environmental services stated "The enclosed laboratory report confirms that the concentration of 1,4-dioxane exceeds the recently revised Ambient Groundwater Quality Standard (AGQS) of 0.32 ppb. Consistent with the guidelines stated in the NHDES letter dated September 14, 2018, the CLG shall immediately take steps to provide bottled water and/or treatment to the Golf Course Clubhouse at 339 Breakfast Hill Road and, within 30 days of this letter, provide recommendations for corrective action."

328:2 Remedy.

I. The general court concurs with the New Hampshire department of environmental services that the migration of contaminants from the site groundwater at the Coakley Landfill superfund site to the headwaters of Berry's Brook is unacceptable and that actions need to be implemented to provide additional removal or containment of the contamination in the surface water bodies that flow through all seacoast towns, including but not limited to Hampton, North Hampton, Rye, Greenland, and Portsmouth, and to public and private drinking water in the towns of Hampton, North Hampton, Rye, and Greenland.

II. Therefore, by November 1, 2019, the department of environmental services, working with the Coakley Landfill Group and the Environmental Protection Agency (EPA), shall propose, under the applicable consent decree involving the Coakley Landfill superfund site, an appropriate remedy including a design solution, its associated costs, and a reasonable timetable for implementing the proposed remedy, to ensure the substantial reduction of the contaminants entering Berry's Brook from the Coakley Landfill superfund site.

III. By January 1, 2020, there shall be a written agreement among the appropriate parties, which may include without limitation the department of environmental services, the Coakley Landfill Group, and the EPA, as to an acceptable remedy, which shall include funding and an implementation schedule.

IV. The implementation of the remedy shall commence no later than September 1, 2020.

V. If any of the above deadlines are not met, the office of the attorney general shall seek such a remedy through any means appropriate, consistent with the consent decree.

328:3 Severability. If any provision of this act or the application thereof to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of the act which can be given effect without the invalid provision or

application, and to this end the provisions of this act are severable.

328:4 Effective Date. This act shall take effect upon its passage.

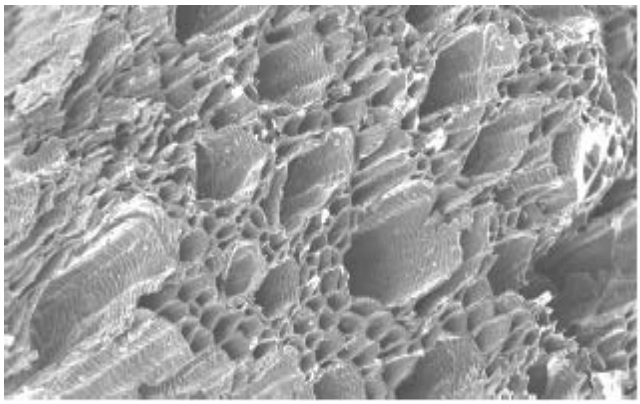
Approved: August 16, 2019
Effective Date: August 16, 2019

ATTACHMENT B
BIOAVAILABLE ABSORBANT MEDIA (BAM) INFORMATION

Bioavailable Absorbent Media (BAM)

BAM is a sustainable, pyrolized, recycled cellulosic bio-mass product (>80% fixed carbon) derived from a proprietary blend of recycled organic materials with a high cation exchange and an estimated half-life of 500 years. BAM has diverse pore sizes with a minimum total surface area of up to 1,133 square meters per gram.

BAM has numerous synergistic qualities and is relatively affordable in large quantities for remediation purposes for both **soils and groundwater**. It has the ability to provide ample usable surface area for maximizing microbial colonization and thereby an active microbial community. Due to its unique 'honeycomb' structure, BAM has the ability to provide increased pore space for the different strains of microbes. Most importantly, BAM's honeycomb structure allows for maximum contact (bio-availability through high sorbency). This allows for complete degradation of the contaminant.



Example Honeycomb structure

Advantages

- **Immediate clean up of groundwater through absorption**
- **Treats both soils and groundwater**
- **Effective on wide range of hydrocarbons, chlorinated solvents, and some heavy metals**
- **Absorbed contaminants are treated biologically, and can be additionally treated through oxidation or chemical reduction**
- **Long lasting treatment with no additional costs after initial application**
- **Effective as a standalone and works simultaneously with various treatment chemistries**

The unique absorption capability of BAM prevents exterior surface microfilm buildup. This allows BAM to absorb contaminants for more productive bio-attenuation of contaminants over a longer period of time. Granular Activated Carbon (GAC) primarily adsorbs contamination to the surface of the media, which then is subject to bio-film development, preventing further adsorption. As a result, BAM has been proven to supply long term maintenance free remedial abilities over GAC. Laboratory tests have also shown that BAM has significantly more absorptive capacity than commercially available GAC products.

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Web: www.orinrt.com

Application

The diverse honeycomb structure has various size pore openings. This variation in pore size enables BAM to be efficient at storing CO2, treatment chemistries, and absorbing multiple contaminants from large chain structures to small chemical compounds. The greater storage capacity allows for favorable environments for the long-term destruction of contaminants. In recent years, the focus at TCA contaminated sites deepened to also investigate 1, 4-Dioxane. Also, Per and Polyfluoroalkyl Substances (PFASs) are also being investigated, especially at site where PFA containing fire retardants were used. Research for their adverse health effects of these emerging contaminants led to the EPA establishing new Minimal Risk Levels for both of the contaminants, and treatment solutions will need to be employed. Through ORIN's continued research, BAM has been successful at treating 1, 4-Dioxane, PFASs, and other listed contaminants.

BAM's exceptional ability to work alone in both aerobic and anaerobic conditions with numerous other treatment chemistries makes it a flexible treatment choice. This characteristic follows ORIN's belief of choosing the right treatment option for the contaminant based on the sites specific parameters. Chemical oxidation or chemical reduction work more effectively than traditional methods due to the increased contact between the treatment chemistry and the absorbed contaminant. In addition to contaminant degradation on the absorption site, chemical treatment addresses residual contaminant that is bound to the soil. Again, this approach treats soils and groundwater for both in-situ and ex-situ applications.

Some Examples of Treated Contaminants

Total Petroleum Hydrocarbons
- DRO
- GRO
- ORO

Aromatic Hydrocarbon Compounds
- BTEX

Chlorinated - VOCs
- 1-4,-Dioxane
- Carbon Tetrachloride
- -ethenes(PCE/TCE)
- -ethanes(DCA/PCA)

Semi Volatile Organic Compounds
- Naphthalene
- Pyrene's
- Phenol's

Pesticides
- BHC's
- DDT
- Toxaphene

Per/Polyfluoroalkyl Substances (PFASs)
- Perfluoroctane Sulfonate (PFOS)
- Perfluorooctanoic Acid (PFOA)

And More!

BAM can be utilized in conjunction with the following chemistries:

- Peroxy Compounds
- Carbon Sources
- Zero Valent Metals

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BAM Injection – Per- and polyfluoroalkyl substances (PFAS)

Former Tannery – Northeast Michigan

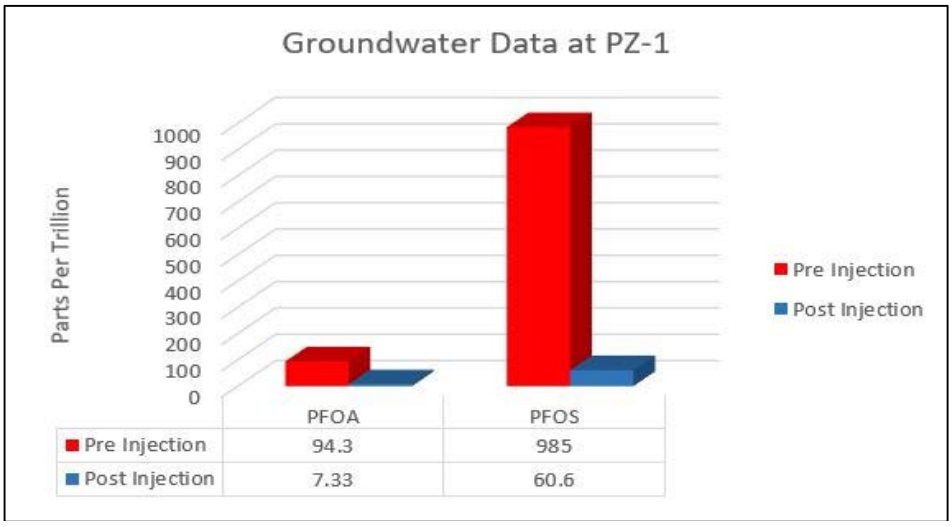
Project Profile: Former Tannery – Northeast Michigan

Contaminants: Perfluorooctanoic Acid (PFOA): 94.3 ng/L
Perfluorooctyl Sulfonate (PFOS): 985 ng/L

Treatment Chemistry: BAM (Bioavailable Absorbent Media)

Impacted Matrix: Silty Sands with Organics

Project Summary: ORIN conducted a pilot test to treat groundwater contaminated with PFAS using BAM, a pyrolized cellulosic material. BAM was mixed with water and injected through 46 DPT points encompassing PZ-1 and MW-5. A total of 4,445 gallons of BAM solution was injected through the 46 points. During injection activities, BAM was observed in PZ-1. BAM treatment chemistry was administered via DPT.



Project Results: Baseline samples were taken prior to treatment to characterize the contaminant level and compare treatment reductions. Current EPA standards for PFOA and PFOS are 70 ng/L. One week following injection a round of sampling was completed. At PZ-1, initial concentrations of PFOA and PFOS were 94.3 and 985 ng/L respectively. One week post injection PFOA and PFOS concentrations are 7.33 and 60.6 ng/L respectively. This results in a 92.2% reduction in PFOA and a 93.8% reduction in PFOS.

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ORIN Technologies, LLC.
405 Investment Ct, Verona, WI 53593
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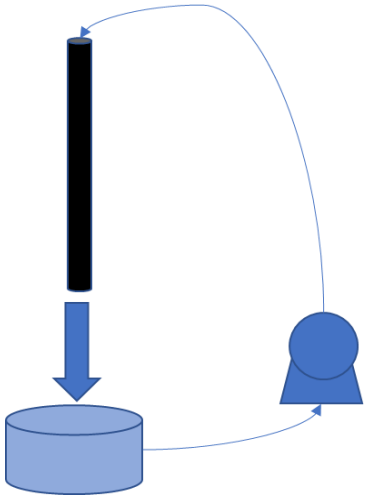
Web: www.orinrt.com

Aqueous PFAS Removal Using BAM

ORIN Technologies is currently establishing PFAS removal rates, holding capacity, and stability using BAM within a laboratory column test apparatus. Understanding the PFAS specific capabilities allows ORIN to better utilize BAM for the reduction / removal of PFAS compounds from groundwater, soils, and surface waters.

Method

A BAM packed column apparatus was used to evaluate the BAM's PFAS remediation characteristics. PFAS contaminated water was pumped at a known rate to the top of the packed column. The rate was only fast enough to a facilitate gravity percolation through the column and not forced through via the pump. The treated water was returned to the reservoir and continued to be circulated. Samples were taken from the reservoir at predetermined intervals for analysis.



Results

PFAS removal from the reservoir was achieved quickly with encouraging results and excellent contaminant retention for the duration of the test. Figure 1 contains concentrations for all detected PFAS compounds for the duration of the test period.

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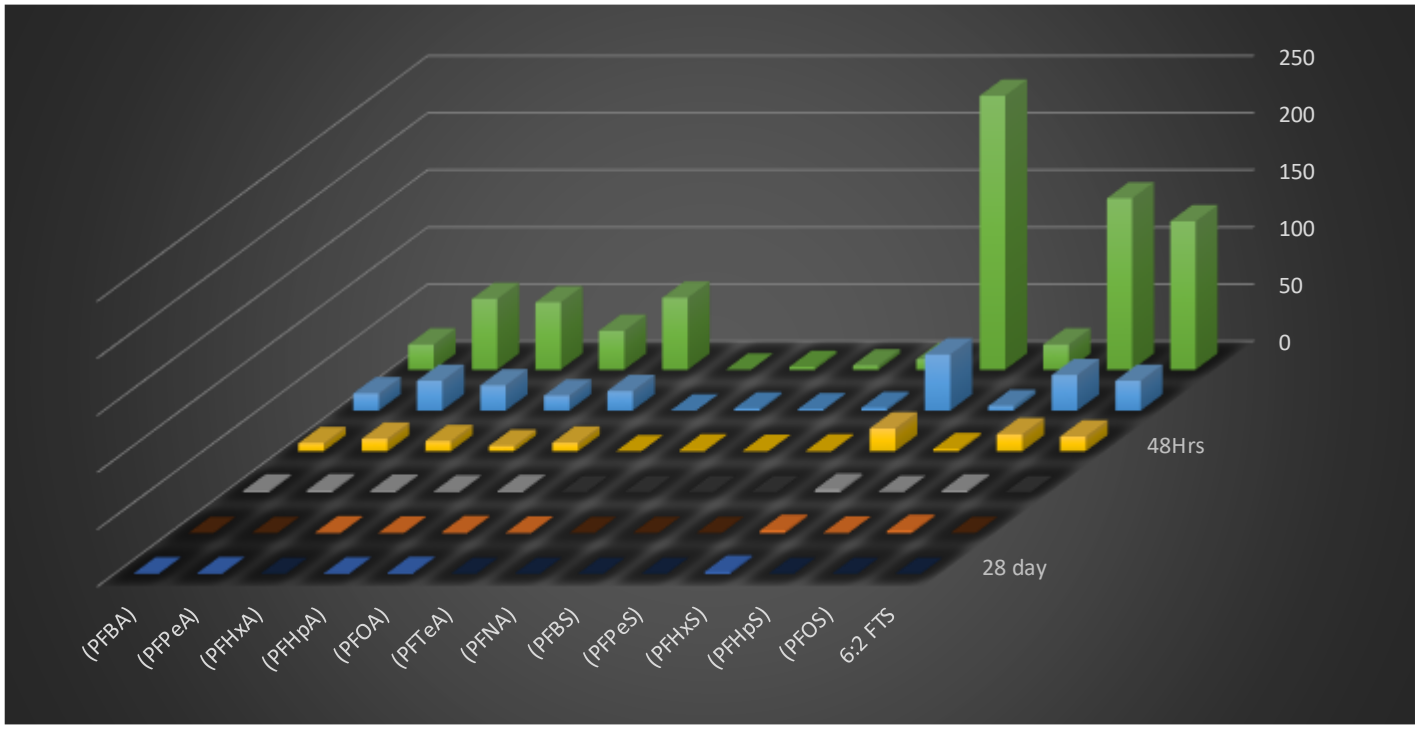

Figure 1. PFAS compound concentrations in parts per trillion (ppt) for testing duration.

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TOP Analysis

A concern with any PFAS remediation endeavor is Total Oxidizable Precursors (TOP). Oxidizable precursor compounds are those that can be oxidized and result in the production of additional PFAS compounds. The presence of these compounds on any given site may render oxidation processes undesirable due to the additional PFAS compounds that may be produced. BAM's sorbative properties allow for the removal of TOP compounds in addition to the PFAS compounds present resulting in better reductions of PFAS as shown in Table 1.

	Control		7 Day		28 Day	
	Pre-Treatment	Post Treatment	Pre-Treatment	Post Treatment	Pre Treatment	Post Treatment
(PFBA)	23	60	ND	11	ND	10
(PFPeA)	59	120	ND	ND	ND	ND
(PFHxA)	62	430	ND	ND	ND	ND
(PFHpA)	35	35	ND	ND	ND	ND
(PFOA)	63	60	ND	ND	ND	ND
(PFNA)	ND	ND	ND	ND	ND	ND
(PFDA)	ND	ND	ND	ND	ND	ND
(PFUnA)	ND	ND	ND	ND	ND	ND
(PFDoA)	ND	ND	ND	ND	ND	ND
(PFTriA)	ND	ND	ND	ND	ND	ND
(PFTeA)	ND	ND	ND	ND	ND	ND
(PFBS)	ND	ND	ND	ND	ND	ND
(PFPeS)	8.8	9.1	ND	ND	ND	ND
(PFHxS)	260	230	ND	ND	ND	ND
(PFHpS)	21	20	ND	ND	ND	ND
(PFOS)	150	130	ND	ND	ND	ND
(PFNS)	ND	ND	ND	ND	ND	ND
(PFDS)	ND	ND	ND	ND	ND	ND
(FOSA)	ND	ND	ND	ND	ND	ND
(NMeFOSAA)	ND	ND	ND	ND	ND	ND
(NEtFOSAA)	ND	ND	ND	ND	ND	ND
4:2 FTS	ND	ND	ND	ND	ND	ND
6:2 FTS	120	ND	ND	ND	ND	ND
8:2 FTS	ND	ND	ND	ND	ND	ND

Table 1. Aqueous TOP Analysis Pre and Post Oxidative Treatment (ppt)

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Additionally, the BAM used in the packed column was submitted for TOP Analysis. The results in Table 2 demonstrate BAM's ability to retain contaminants even while undergoing adverse changes in environmental conditions. Notice the similar profile is obtained from the BAM itself both prior to being used and after treatment. TCLP and SPLP data gathered from field trials confirms these finding.

	BAM Solids Control		BAM Solids 28 Day	
	Pre-Treatment	Post Treatment	Pre-Treatment	Post Treatment
(PFBA)	ND	0.96	ND	1.3
(PFPeA)	ND	ND	ND	ND
(PFHxA)	ND	ND	ND	ND
(PFHpA)	ND	ND	ND	ND
(PFOA)	ND	ND	ND	ND
(PFNA)	ND	ND	ND	ND
(PFDA)	ND	ND	ND	ND
(PFUnA)	ND	ND	ND	ND
(PFDoA)	ND	ND	ND	ND
(PFTriA)	ND	ND	ND	ND
(PFTeA)	ND	ND	ND	ND
(PFBS)	ND	ND	ND	ND
(PFPeS)	ND	ND	ND	ND
(PFHxS)	ND	ND	ND	ND
(PFHpS)	ND	ND	ND	ND
(PFOS)	ND	ND	ND	ND
(PFNS)	ND	ND	ND	ND
(PFDS)	ND	ND	ND	ND
(FOSA)	ND	ND	ND	ND
(NMeFOSAA)	ND	ND	ND	ND
(NEtFOSAA)	ND	ND	ND	ND
4:2 FTS	ND	ND	ND	ND
6:2 FTS	ND	ND	ND	ND
8:2 FTS	ND	ND	ND	ND

Table 2 BAM Solids TOP Analysis (ppt)

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Boom with float
Curtain with BAM fill
BAM filled boom

ATTACHMENT C
PHOTOGRAPHIC LOG

Coakley Landfill Superfund Site
HB494 Remedy Pilot Study

Photo No. 1

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Pre-deployment conditions of channel looking upstream. Overhead vegetation and rocks within channel visible.

Photo By: CFB

Photo No. 2

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Pre-deployment conditions following brush removal and relocation of rocks to sides of channel.

Photo By: CFB

Photo No. 3

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Detail of rebar holding up downstream end of blanket. Higher water level visible on upstream (top side of blanket).

Photo By: CFB

Photo No. 4

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Image looking upstream of four deployed blankets within channel. Note higher water level on upstream side of blanket.

Photo By: CFB

Photo No. 5

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Image of water visibly transmitting through blanket fabric and absorptive media.

Photo By: CFB

Photo No. 6

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
First blanket located after confluence of two channels at north end of wetland complex. Wire screen placed upstream to filter out leaves and detritus.

Photo By: CFB

Photo No. 7

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Image of bypass created by lower relative permeability of BAM blanket.

Photo By: CFB

Photo No. 8

Photo Date:
November 5, 2020

Site Location:
Coakley Landfill Superfund Site

Description:
Image of blanket showing four “pillows” of BAM material within geotextile fabric.

Photo By: AJH

ATTACHMENT D
LABORATORY ANALYTICAL REPORTS

ANALYTICAL REPORT

Lab Number:	L2048928
Client:	CES, Inc 415 Lisbon St. 2nd floor Lewiston, ME 04240
ATTN:	Chris Buckman
Phone:	(207) 989-4824
Project Name:	COAKLEY SURFACE WATER
Project Number:	10424.020
Report Date:	11/24/20

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020

Lab Number: L2048928
Report Date: 11/24/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2048928-01	HB494-POST-20201106	WATER	GREENLAND, NH	11/06/20 10:40	11/06/20
L2048928-02	HB494-PRE-20201106	WATER	GREENLAND, NH	11/06/20 10:55	11/06/20

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

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:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Perfluorinated Alkyl Acids by Isotope Dilution

L2048928-01 and -02: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2048928-01 and -02: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

WG1435090-1, WG1435090-2, and WG1435090-3: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

WG1435090-1, WG1435090-2, and WG1435090-3: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

The WG1435090-2/-3 LCS/LCSD recovery, associated with L2048928-01 and -02, is above the acceptance criteria for perfluorohexadecanoic acid (pfhxda) (201%/186%); however, the associated samples are non-detect to the RL for this target analyte. The results of the original analysis are reported.

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

Authorized Signature: Elizabeth Porta

Title: Technical Director/Representative Date: 11/24/20

ORGANICS

SEMIVOLATILES

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020
Lab Number: L2048928
Report Date: 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-01
Client ID: HB494-POST-20201106
Sample Location: GREENLAND, NH

Date Collected: 11/06/20 10:40
Date Received: 11/06/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/18/20 22:21
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	8.59		ng/l	1.79	0.365	1
Perfluoropentanoic Acid (PFPeA)	17.7		ng/l	1.79	0.354	1
Perfluorobutanesulfonic Acid (PFBS)	3.35		ng/l	1.79	0.213	1
Perfluorohexanoic Acid (PFHxA)	32.3		ng/l	1.79	0.293	1
Perfluoroheptanoic Acid (PFHpA)	67.9		ng/l	1.79	0.202	1
Perfluorohexanesulfonic Acid (PFHxS)	7.37		ng/l	1.79	0.336	1
Perfluorooctanoic Acid (PFOA)	153	F	ng/l	1.79	0.211	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.79	1.19	1
Perfluoroheptanesulfonic Acid (PFHpS)	1.41	J	ng/l	1.79	0.616	1
Perfluorononanoic Acid (PFNA)	54.7		ng/l	1.79	0.279	1
Perfluorooctanesulfonic Acid (PFOS)	107	F	ng/l	1.79	0.451	1
Perfluorodecanoic Acid (PFDA)	13.2		ng/l	1.79	0.272	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.79	1.08	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.79	0.580	1
Perfluoroundecanoic Acid (PFUnA)	0.444	JF	ng/l	1.79	0.233	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.79	0.877	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.79	0.719	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.79	0.333	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.79	0.293	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.79	0.222	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.58	1.11	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-01 Date Collected: 11/06/20 10:40

Client ID: HB494-POST-20201106 Date Received: 11/06/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	91		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	90		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	83		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	86		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	105		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	108		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	91		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	194		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	86		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	90		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	84		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	166		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	57		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	89		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	83		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	50		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	**33**	Q	50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020
Lab Number: L2048928
Report Date: 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-01
Client ID: HB494-POST-20201106
Sample Location: GREENLAND, NH

Date Collected: 11/06/20 10:40
Date Received: 11/06/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/24/20 14:12
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.79	0.519	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	17.9	6.58	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	17.9	5.94	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	44.7	19.9	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	44.7	20.2	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	60		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	64		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	60		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	76		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	83		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020
Lab Number: L2048928
Report Date: 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-02
Client ID: HB494-PRE-20201106
Sample Location: GREENLAND, NH

Date Collected: 11/06/20 10:55
Date Received: 11/06/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/18/20 22:37
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	8.23		ng/l	1.71	0.348	1
Perfluoropentanoic Acid (PFPeA)	15.2		ng/l	1.71	0.338	1
Perfluorobutanesulfonic Acid (PFBS)	2.82		ng/l	1.71	0.203	1
Perfluorohexanoic Acid (PFHxA)	29.8		ng/l	1.71	0.280	1
Perfluoroheptanoic Acid (PFHpA)	58.6		ng/l	1.71	0.192	1
Perfluorohexanesulfonic Acid (PFHxS)	6.29	F	ng/l	1.71	0.321	1
Perfluorooctanoic Acid (PFOA)	117	F	ng/l	1.71	0.202	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.71	1.14	1
Perfluoroheptanesulfonic Acid (PFHpS)	0.837	J	ng/l	1.71	0.588	1
Perfluorononanoic Acid (PFNA)	36.8		ng/l	1.71	0.266	1
Perfluorooctanesulfonic Acid (PFOS)	73.7	F	ng/l	1.71	0.430	1
Perfluorodecanoic Acid (PFDA)	9.02		ng/l	1.71	0.260	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.71	1.04	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.71	0.553	1
Perfluoroundecanoic Acid (PFUnA)	0.297	JF	ng/l	1.71	0.222	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.71	0.837	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.71	0.687	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.71	0.318	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.71	0.279	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.71	0.212	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.42	1.06	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-02 Date Collected: 11/06/20 10:55

Client ID: HB494-PRE-20201106 Date Received: 11/06/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	101		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	95		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	89		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	94		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	113		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	118		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	99		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	212		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	98		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**180**	Q	7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	81		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	101		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	62		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	57		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	**40**	Q	50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

SAMPLE RESULTS

Lab ID: L2048928-02
Client ID: HB494-PRE-20201106
Sample Location: GREENLAND, NH

Date Collected: 11/06/20 10:55
Date Received: 11/06/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/24/20 14:19
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.71	0.495	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	17.1	6.29	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	17.1	5.67	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	42.7	19.0	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	42.7	19.2	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	68		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	68		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	65		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	82		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	90		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/18/20 19:18
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1435090-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	0.352	JF	ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	0.864	J	ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	4.00	1.24

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/18/20 19:18
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1435090-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	100		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	118		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	106		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	149		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	100		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	107		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	116		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	184		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	93		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	93		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**194**	Q	7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	76		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	101		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	70		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	98		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	60		33-143
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	**156**	Q	50-150
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	**46**	Q	50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2048928

Project Number: 10424.020 **Report Date:** 11/24/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/24/20 13:46
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/17/20 15:45

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1435090-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	20.0	7.36
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	20.0	6.64
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	50.0	22.2
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	50.0	22.5

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	67		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	53		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	56		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	86		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	97		50-150

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.020

Lab Number: L2048928

Report Date: 11/24/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1435090-2 WG1435090-3								
Perfluorobutanoic Acid (PFBA)	105		100		67-148	5		30
Perfluoropentanoic Acid (PFPeA)	111		107		63-161	4		30
Perfluorobutanesulfonic Acid (PFBS)	112		103		65-157	8		30
Perfluorohexanoic Acid (PFHxA)	107		102		69-168	5		30
Perfluoroheptanoic Acid (PFHpA)	101		97		58-159	4		30
Perfluorohexanesulfonic Acid (PFHxS)	103		105		69-177	2		30
Perfluorooctanoic Acid (PFOA)	105		100		63-159	5		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	115		110		49-187	4		30
Perfluoroheptanesulfonic Acid (PFHpS)	110		104		61-179	6		30
Perfluorononanoic Acid (PFNA)	106		103		68-171	3		30
Perfluorooctanesulfonic Acid (PFOS)	114		112		52-151	2		30
Perfluorodecanoic Acid (PFDA)	102		98		63-171	4		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	119		107		56-173	11		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	97		99		60-166	2		30
Perfluoroundecanoic Acid (PFUnA)	106		99		60-153	7		30
Perfluorodecanesulfonic Acid (PFDS)	112		109		38-156	3		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	100		94		45-170	6		30
Perfluorododecanoic Acid (PFDoA)	104		98		67-153	6		30
Perfluorotridecanoic Acid (PFTrDA)	96		80		48-158	18		30
Perfluorotetradecanoic Acid (PFTA)	127		123		59-182	3		30
Perfluorohexadecanoic Acid (PFHxDA)	**201**	Q	**186**	Q	50-150	8		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.020

Lab Number: L2048928

Report Date: 11/24/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1435090-2 WG1435090-3								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		102		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	123		119		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	110		108		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	163		161		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	107		101		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	115		108		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	128		116		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	105		100		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	199		186		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	101		95		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108		100		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	103		95		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**204**	Q	**213**	Q	7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	90		73		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109		101		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	82		69		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	107		93		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	67		45		33-143
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	118		126		50-150
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	**48**	Q	**34**	Q	50-150

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.020

Lab Number: L2048928

Report Date: 11/24/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1435090-2 WG1435090-3								
Perfluorooctanesulfonamide (FOSA)	102		99		46-170	3		30
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	110		114		50-150	4		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	119		123		50-150	3		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	116		120		50-150	3		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	102		105		50-150	3		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	72		70		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	58		53		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	59		52		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	80		79		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	96		91		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020

Lab Number: L2048928
Report Date: 11/24/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2048928-01A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		4.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2048928-01B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		4.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2048928-02A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		4.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2048928-02B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		4.0	Y	Absent		A2-537-ISOTOPE-36(14)

*Values in parentheses indicate holding time in days

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.020
Lab Number: L2048928
Report Date: 11/24/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

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. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

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

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

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

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

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

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

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

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. 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 method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: DU Report with 'J' Qualifiers

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

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: DU Report with 'J' Qualifiers

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2048928
Project Number:	10424.020	**Report Date:**	11/24/20

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

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

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

Certification Information

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

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

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

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

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

Mansfield Facility:

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

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

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

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 11/7/20

ALPHA Job #: L2048928

ALPHA ANALYTICAL
8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

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

Client Information

Client: CES
Address: 415 Lisbon St #200
Lewiston, ME 04240
Phone: 2077956089
Email: cbuckman@cesinchsa.com

Additional Project Information:

Project Information

Project Name: Cooksey Surface Water
Project Location: Greenland, NH
Project #: 10424.020
Project Manager: Chris Buckman
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

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

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	ANALYSIS: 537 Mod. - List of 26	SAMPLE INFO	TOTAL # BOTTLES
48928-01	HB4944-POST-20201106	11-6-20	1040	SW	WH	X		2
-02	HB4944-PRE-20201106	11-6-20	1055	SW	WH	X		2

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

Sample Comments

Container Type			P		
Preservative			A		

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

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	11/6/20 1150		11/6/20 1150
	11/6/20 1545		11/6/20 1545
	11/6/20 2115		11/6/20 2115
Fedex Courier 9:35 107	11/7/20 0815	Fedex Courier	11-7 8:15

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

11/7/20 09:35 WH

ANALYTICAL REPORT

Lab Number:	L2052007
Client:	CES, Inc 415 Lisbon St. 2nd floor Lewiston, ME 04240
ATTN:	Chris Buckman
Phone:	(207) 989-4824
Project Name:	COAKLEY SURFACE WATER
Project Number:	10424.016
Report Date:	12/04/20

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2052007
Report Date: 12/04/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2052007-01	HB494-POST-20201120	WATER	GREENLAND, NH	11/20/20 10:40	11/20/20
L2052007-02	HB494-PRE-20201120	WATER	GREENLAND, NH	11/20/20 10:50	11/20/20

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

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:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

Case Narrative (continued)

Perfluorinated Alkyl Acids by Isotope Dilution

L2052007-01 and -02: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

WG1439430-1, WG1439430-2, WG1439430-3, WG1439430-4, and WG1439430-5: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

WG1439430-1(MEOH): Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

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: Elizabeth Porta

Title: Technical Director/Representative Date: 12/04/20

ORGANICS

SEMIVOLATILES

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-01
Client ID: HB494-POST-20201120
Sample Location: GREENLAND, NH

Date Collected: 11/20/20 10:40
Date Received: 11/20/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/01/20 14:58
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	9.06		ng/l	1.82	--	1
Perfluoropentanoic Acid (PFPeA)	15.7		ng/l	1.82	--	1
Perfluorobutanesulfonic Acid (PFBS)	3.16		ng/l	1.82	--	1
Perfluorohexanoic Acid (PFHxA)	33.5		ng/l	1.82	--	1
Perfluoroheptanoic Acid (PFHpA)	68.4		ng/l	1.82	--	1
Perfluorohexanesulfonic Acid (PFHxS)	6.91		ng/l	1.82	--	1
Perfluorooctanoic Acid (PFOA)	131	F	ng/l	1.82	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.82	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.82	--	1
Perfluorononanoic Acid (PFNA)	36.6		ng/l	1.82	--	1
Perfluorooctanesulfonic Acid (PFOS)	78.4	F	ng/l	1.82	--	1
Perfluorodecanoic Acid (PFDA)	9.24		ng/l	1.82	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.82	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.82	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.82	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.82	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.82	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.82	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.82	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.82	--	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.65	--	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-01 Date Collected: 11/20/20 10:40

Client ID: HB494-POST-20201120 Date Received: 11/20/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	85		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	87		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	76		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	77		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	88		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	90		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	82		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	184		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	88		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	77		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	76		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	113		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	58		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	76		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	6		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	70		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	57		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	59		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2052007
Report Date: 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-01
Client ID: HB494-POST-20201120
Sample Location: GREENLAND, NH

Date Collected: 11/20/20 10:40
Date Received: 11/20/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/03/20 21:31
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.82	--	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	18.2	--	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	18.2	--	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	45.6	--	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	45.6	--	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	60		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	60		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	61		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	74		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	82		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-02
Client ID: HB494-PRE-20201120
Sample Location: GREENLAND, NH

Date Collected: 11/20/20 10:50
Date Received: 11/20/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/01/20 15:31
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	8.48		ng/l	1.75	--	1
Perfluoropentanoic Acid (PFPeA)	15.0		ng/l	1.75	--	1
Perfluorobutanesulfonic Acid (PFBS)	2.87		ng/l	1.75	--	1
Perfluorohexanoic Acid (PFHxA)	34.5		ng/l	1.75	--	1
Perfluoroheptanoic Acid (PFHpA)	66.7		ng/l	1.75	--	1
Perfluorohexanesulfonic Acid (PFHxS)	6.66		ng/l	1.75	--	1
Perfluorooctanoic Acid (PFOA)	133	F	ng/l	1.75	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.75	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.75	--	1
Perfluorononanoic Acid (PFNA)	36.3		ng/l	1.75	--	1
Perfluorooctanesulfonic Acid (PFOS)	74.2	F	ng/l	1.75	--	1
Perfluorodecanoic Acid (PFDA)	9.87		ng/l	1.75	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.75	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.75	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.75	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.75	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.75	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.75	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.75	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.75	--	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.50	--	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-02 Date Collected: 11/20/20 10:50

Client ID: HB494-PRE-20201120 Date Received: 11/20/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	102		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	108		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	108		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	117		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	211		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	104		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	91		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	153		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	75		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	88		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	62		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	63		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	67		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

SAMPLE RESULTS

Lab ID: L2052007-02
Client ID: HB494-PRE-20201120
Sample Location: GREENLAND, NH

Date Collected: 11/20/20 10:50
Date Received: 11/20/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/03/20 21:45
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.75	--	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	17.5	--	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	17.5	--	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	43.8	--	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	43.8	--	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	59		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	62		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	62		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	72		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	80		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/01/20 14:08
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1439430-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	--
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	--
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	--
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	--
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	--
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	--
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	--
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	--
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	--
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	--
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	--
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	--
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	4.00	--

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/01/20 14:08
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1439430-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	93		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	112		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	97		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	96		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	100		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	95		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	119		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	102		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	90		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	87		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	153		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	87		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	88		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	81		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	84		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	72		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	65		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2052007

Project Number: 10424.016 **Report Date:** 12/04/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/03/20 21:09
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 11/30/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1439430-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	--
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	20.0	--
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	20.0	--
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	50.0	--
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	50.0	--

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	**49**	Q	50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	**49**	Q	50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	77		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	90		50-150

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1439430-2 WG1439430-3								
Perfluorobutanoic Acid (PFBA)	101		111		67-148	9		30
Perfluoropentanoic Acid (PFPeA)	100		110		63-161	10		30
Perfluorobutanesulfonic Acid (PFBS)	100		114		65-157	13		30
Perfluorohexanoic Acid (PFHxA)	105		114		69-168	8		30
Perfluoroheptanoic Acid (PFHpA)	100		109		58-159	9		30
Perfluorohexanesulfonic Acid (PFHxS)	107		115		69-177	7		30
Perfluorooctanoic Acid (PFOA)	101		111		63-159	9		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	116		136		49-187	16		30
Perfluoroheptanesulfonic Acid (PFHpS)	108		114		61-179	5		30
Perfluorononanoic Acid (PFNA)	91		100		68-171	9		30
Perfluorooctanesulfonic Acid (PFOS)	111		119		52-151	7		30
Perfluorodecanoic Acid (PFDA)	103		113		63-171	9		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	121		136		56-173	12		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	101		105		60-166	4		30
Perfluoroundecanoic Acid (PFUnA)	101		113		60-153	11		30
Perfluorodecanesulfonic Acid (PFDS)	109		114		38-156	4		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	96		109		45-170	13		30
Perfluorododecanoic Acid (PFDoA)	109		114		67-153	4		30
Perfluorotridecanoic Acid (PFTrDA)	113		120		48-158	6		30
Perfluorotetradecanoic Acid (PFTA)	116		123		59-182	6		30
Perfluorohexadecanoic Acid (PFHxDA)	124		132		50-150	6		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1439430-2 WG1439430-3								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	91		92		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	106		109		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		97		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	94		96		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94		95		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		100		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	90		91		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	117		117		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	101		101		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		92		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	87		88		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	134		121		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	84		85		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	91		89		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	90		81		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	85		86		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75		72		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	83		84		50-150

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1439430-2 WG1439430-3								
Perfluorooctanesulfonamide (FOSA)	104		109		46-170	5		30
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	112		116		50-150	4		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	110		117		50-150	6		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	116		119		50-150	3		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	99		101		50-150	2		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	71		67		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	52		52		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	53		53		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	73		72		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	90		87		50-150

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-4 QC Sample: L2052007-01 Client ID: HB494-POST-20201120												
Perfluorobutanoic Acid (PFBA)	9.06	37.2	46.7	101		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	15.7	37.2	54.5	104		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	3.16	33.1	40.2	112		-	-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	33.5	37.2	72.2	104		-	-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	68.4	37.2	102	90		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	6.91	34	44.5	110		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	131F	37.2	164F	89		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	35.5	44.6F	126		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	35.5	42.4	120		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	36.6	37.2	69.8	89		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	78.4F	34.6	110F	91		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	9.24	37.2	48.5	105		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	35.8	43.0F	120		-	-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	37.2	38.1F	102		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	37.2	39.7	107		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	35.9	39.6	110		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	37.2	39.5	106		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	37.2	40.9	110		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	37.2	41.1	110		-	-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	ND	37.2	43.8	118		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	37.2	46.6	125		-	-		59-182	-		30
Perfluorohexadecanoic Acid (PFHxDA)	ND	37.2	47.7	128		-	-		50-150	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-4 QC Sample: L2052007-01 Client ID: HB494-POST-20201120												
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND	372	427	115		-	-		50-150	-		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND	372	430F	115		-	-		50-150	-		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND	372	428	115		-	-		50-150	-		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND	372	381	102		-	-		50-150	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	140				7-170
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	196				1-244
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	80				50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	72				50-150
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57				23-146
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	65				1-181
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	55				50-150
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	61				50-150
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	79				40-144
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	80				38-144
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	79				21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	90				30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101				47-153
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	73				24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	61				33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	67				50-150
Perfluoro[13C4]Butanoic Acid (MPFBA)	88				2-156

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2052007

Report Date: 12/04/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-4 QC Sample: L2052007-01 Client ID: HB494-POST-20201120												

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89				16-173
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	64				1-87
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	86				42-146
Perfluoro[13C8]Octanoic Acid (M8PFOA)	83				36-149
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	91				34-146
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	83				31-159

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2052007
Report Date: 12/04/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-5 QC Sample: L2052007-02 Client ID: HB494-PRE-20201120						
Perfluorobutanoic Acid (PFBA)	8.48	7.95	ng/l	6		30
Perfluoropentanoic Acid (PFPeA)	15.0	15.0	ng/l	0		30
Perfluorobutanesulfonic Acid (PFBS)	2.87	2.82	ng/l	2		30
Perfluorohexanoic Acid (PFHxA)	34.5	33.0	ng/l	4		30
Perfluoroheptanoic Acid (PFHpA)	66.7	64.9	ng/l	3		30
Perfluorohexanesulfonic Acid (PFHxS)	6.66	7.03F	ng/l	5		30
Perfluorooctanoic Acid (PFOA)	133F	130F	ng/l	2		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	36.3	36.0	ng/l	1		30
Perfluorooctanesulfonic Acid (PFOS)	74.2F	82.1F	ng/l	10		30
Perfluorodecanoic Acid (PFDA)	9.87	11.3	ng/l	14		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2052007
Report Date: 12/04/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-5 QC Sample: L2052007-02 Client ID: HB494-PRE-20201120						
Perfluorohexadecanoic Acid (PFHxDA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	102		93		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	108		98		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		91		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92		84		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	108		96		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	117		108		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98		87		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	211		204		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		96		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	104		93		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	91		82		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	153		146		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	75		67		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	88		81		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	62		59		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		75		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	63		62		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	67		61		50-150

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2052007
Report Date: 12/04/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1439430-5 QC Sample: L2052007-02 Client ID: HB494-PRE-20201120						
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	59		61		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	62		57		50-150
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	62		54		50-150
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	72		69		50-150
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	80		76		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2052007
Report Date: 12/04/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2052007-01A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.3	Y	Absent		A2-537-ISOTOPE-36(14)
L2052007-01B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.3	Y	Absent		A2-537-ISOTOPE-36(14)
L2052007-02A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.3	Y	Absent		A2-537-ISOTOPE-36(14)
L2052007-02B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.3	Y	Absent		A2-537-ISOTOPE-36(14)

*Values in parentheses indicate holding time in days

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2052007
Report Date: 12/04/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

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

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

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

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

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

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

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

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

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

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

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

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:	COAKLEY SURFACE WATER	**Lab Number:**	L2052007
Project Number:	10424.016	**Report Date:**	12/04/20

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

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

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

Certification Information

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

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

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

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

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

Mansfield Facility:

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

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

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

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 11/21/20

ALPHA Job #: L2052007

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: CES

Address: 415 Lisbon St #200, Lewiston ME 04240

Phone: 2077955009

Email: cbuchman@cesmaine.com

Project Information

Project Name: Conley Subsurface

Project Location: Greenland, NH

Project #: 10424.016

Project Manager: Chris Buchman

ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Report Information - Data Deliverables

☐ ADEx ☐ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods

☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)

☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)

☐ Yes ☐ No NPDES RGP

☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2

SVOC: ☐ ABN ☐ PAH

METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15

METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13

EPH: ☐ Ranges & Targets ☐ Ranges Only

VPH: ☐ Ranges & Targets ☐ Ranges Only

☐ PCB ☐ PEST

TPH: ☐ Quant Only ☐ Fingerprint

PFAS (1312 of 2605 537) mod.

SAMPLE INFO

Filtration
☐ Field
☐ Lab to do

Preservation
☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	PFAS	TOTAL # BOTTLES
52007-01	HB494-POST-20201120	11-20-20	1040	SW	WH	X	22
-02	HB494-PRE-20201120	1	1050	SW	WH	X	

Sample Comments

Container Type						P	
Preservative						A	

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

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	11-20-20 1450		11/20/20 1450
	11/20/20 1810		11/20/20 1810
	11-20-20 2040		11/20/20 2040
	11-21-20 06:00		11-21-20 06:00

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L2054007
Client:	CES, Inc 415 Lisbon St. 2nd floor Lewiston, ME 04240
ATTN:	Chris Buckman
Phone:	(207) 989-4824
Project Name:	COAKLEY SURFACE WATER
Project Number:	10424.016
Report Date:	12/29/20

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2054007
Report Date: 12/29/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2054007-01	HB494-POST-20201204	WATER	GREENLAND, NH	12/04/20 09:10	12/04/20
L2054007-02	HB494-PRE-20201204	WATER	GREENLAND, NH	12/04/20 09:20	12/04/20

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
Project Number:	10424.016	**Report Date:**	12/29/20

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:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
Project Number:	10424.016	**Report Date:**	12/29/20

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Perfluorinated Alkyl Acids by Isotope Dilution

L2054007-01 and -02: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

WG1446480-1, WG1446480-2, WG1446480-3, WG1446480-4, and WG1446480-5: The MeOH fraction of the extraction is reported for the following compounds: Perfluorooctanesulfonamide (FOSA), N-Methyl Perfluorooctane Sulfonamide (NMeFOSA), N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA), N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE), and N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE) due to better extraction efficiency of the Surrogates (Extracted Internal Standards).

WG1446480-2/-3: The LCS/LCSD recoveries, associated with L2054007-01 and -02, are above the acceptance criteria for perfluorohexadecanoic acid (pfhxda) (271%/269%); however, the associated samples are non-detect to the RL for this target analyte. The results of the original analysis are reported.

WG1446480-4: The MS recovery, performed on L2054007-01, is outside the acceptance criteria for perfluorohexadecanoic acid (pfhxda) (276%).

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:  Alycia Mogayzel

Title: Technical Director/Representative Date: 12/29/20

ORGANICS

SEMIVOLATILES

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2054007
Report Date: 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-01
Client ID: HB494-POST-20201204
Sample Location: GREENLAND, NH

Date Collected: 12/04/20 09:10
Date Received: 12/04/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/19/20 14:37
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	11.2		ng/l	1.80	0.367	1
Perfluoropentanoic Acid (PFPeA)	19.3		ng/l	1.80	0.356	1
Perfluorobutanesulfonic Acid (PFBS)	2.72		ng/l	1.80	0.214	1
Perfluorohexanoic Acid (PFHxA)	41.3		ng/l	1.80	0.295	1
Perfluoroheptanoic Acid (PFHpA)	82.0		ng/l	1.80	0.203	1
Perfluorohexanesulfonic Acid (PFHxS)	6.35		ng/l	1.80	0.338	1
Perfluorooctanoic Acid (PFOA)	154		ng/l	1.80	0.212	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.80	1.20	1
Perfluoroheptanesulfonic Acid (PFHpS)	0.828	J	ng/l	1.80	0.619	1
Perfluorononanoic Acid (PFNA)	37.8		ng/l	1.80	0.281	1
Perfluorooctanesulfonic Acid (PFOS)	80.5		ng/l	1.80	0.454	1
Perfluorodecanoic Acid (PFDA)	8.32		ng/l	1.80	0.274	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.80	1.09	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.80	0.583	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.80	0.234	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.80	0.882	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.80	0.724	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.80	0.335	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.80	0.294	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.80	0.223	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.60	1.12	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2054007

Project Number: 10424.016 **Report Date:** 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-01 Date Collected: 12/04/20 09:10

Client ID: HB494-POST-20201204 Date Received: 12/04/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	107		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	102		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	100		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	85		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	102		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	125		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	103		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	91		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	119		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	116		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	102		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	62		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	77		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	121		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	70		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	107		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	105		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	59		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2054007
Report Date: 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-01
Client ID: HB494-POST-20201204
Sample Location: GREENLAND, NH

Date Collected: 12/04/20 09:10
Date Received: 12/04/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/28/20 13:46
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.80	0.522	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	18.0	6.62	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	18.0	5.98	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	45.0	20.0	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	45.0	20.3	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	69		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	63		10-161
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	63		10-160
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	67		10-189
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	60		10-187

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2054007
Report Date: 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-02
Client ID: HB494-PRE-20201204
Sample Location: GREENLAND, NH

Date Collected: 12/04/20 09:20
Date Received: 12/04/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/19/20 15:10
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	11.7		ng/l	1.81	0.369	1
Perfluoropentanoic Acid (PFPeA)	19.6		ng/l	1.81	0.358	1
Perfluorobutanesulfonic Acid (PFBS)	2.61		ng/l	1.81	0.215	1
Perfluorohexanoic Acid (PFHxA)	42.4		ng/l	1.81	0.296	1
Perfluoroheptanoic Acid (PFHpA)	86.0		ng/l	1.81	0.204	1
Perfluorohexanesulfonic Acid (PFHxS)	6.74		ng/l	1.81	0.340	1
Perfluorooctanoic Acid (PFOA)	164		ng/l	1.81	0.213	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.81	1.20	1
Perfluoroheptanesulfonic Acid (PFHpS)	1.06	J	ng/l	1.81	0.622	1
Perfluorononanoic Acid (PFNA)	41.4		ng/l	1.81	0.282	1
Perfluorooctanesulfonic Acid (PFOS)	89.1		ng/l	1.81	0.455	1
Perfluorodecanoic Acid (PFDA)	9.10		ng/l	1.81	0.275	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.81	1.10	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.81	0.586	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.81	0.235	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.81	0.886	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.81	0.727	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.81	0.336	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.81	0.296	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.81	0.224	1
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	3.61	1.12	1

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2054007

Project Number: 10424.016 **Report Date:** 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-02 Date Collected: 12/04/20 09:20

Client ID: HB494-PRE-20201204 Date Received: 12/04/20

Sample Location: GREENLAND, NH Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	101		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	86		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	118		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	100		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	74		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	114		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	65		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	58		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	117		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	60		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	97		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	97		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	58		50-150

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2054007
Report Date: 12/29/20

SAMPLE RESULTS

Lab ID: L2054007-02
Client ID: HB494-PRE-20201204
Sample Location: GREENLAND, NH

Date Collected: 12/04/20 09:20
Date Received: 12/04/20
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/28/20 14:00
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.81	0.524	1
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	18.1	6.65	1
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	18.1	6.00	1
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	45.2	20.1	1
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	45.2	20.4	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	64		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	63		10-161
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	62		10-160
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	63		10-189
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	57		10-187

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2054007

Project Number: 10424.016 **Report Date:** 12/29/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/19/20 13:47
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1446480-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	0.240	J	ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	0.540	J	ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248
Perfluorohexadecanoic Acid (PFHxDA)	ND		ng/l	4.00	1.24

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2054007

Project Number: 10424.016 **Report Date:** 12/29/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/19/20 13:47
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1446480-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	124		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	122		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	55		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	98		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	106		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	104		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	61		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	100		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	83		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	120		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	52		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	102		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	110		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	64		50-150

Project Name: COAKLEY SURFACE WATER **Lab Number:** L2054007

Project Number: 10424.016 **Report Date:** 12/29/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 12/28/20 13:24
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 12/18/20 06:00

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1446480-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND		ng/l	20.0	7.36
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND		ng/l	20.0	6.64
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND		ng/l	50.0	22.2
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND		ng/l	50.0	22.5

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	69		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	49		10-161
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	48		10-160
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	68		10-189
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	63		10-187

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1446480-2 WG1446480-3								
Perfluorobutanoic Acid (PFBA)	99		100		67-148	1		30
Perfluoropentanoic Acid (PFPeA)	101		101		63-161	0		30
Perfluorobutanesulfonic Acid (PFBS)	102		102		65-157	0		30
Perfluorohexanoic Acid (PFHxA)	102		105		69-168	3		30
Perfluoroheptanoic Acid (PFHpA)	96		95		58-159	1		30
Perfluorohexanesulfonic Acid (PFHxS)	110		104		69-177	6		30
Perfluorooctanoic Acid (PFOA)	101		106		63-159	5		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	94		94		49-187	0		30
Perfluoroheptanesulfonic Acid (PFHpS)	119		109		61-179	9		30
Perfluorononanoic Acid (PFNA)	95		97		68-171	2		30
Perfluorooctanesulfonic Acid (PFOS)	115		110		52-151	4		30
Perfluorodecanoic Acid (PFDA)	101		102		63-171	1		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	106		115		56-173	8		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	85		73		60-166	15		30
Perfluoroundecanoic Acid (PFUnA)	108		106		60-153	2		30
Perfluorodecanesulfonic Acid (PFDS)	111		106		38-156	5		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	87		81		45-170	7		30
Perfluorododecanoic Acid (PFDoA)	93		106		67-153	13		30
Perfluorotridecanoic Acid (PFTrDA)	104		98		48-158	6		30
Perfluorotetradecanoic Acid (PFTA)	101		99		59-182	2		30
Perfluorohexadecanoic Acid (PFHxDA)	**271**	Q	**269**	Q	50-150	1		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1446480-2 WG1446480-3								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	102		105		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	118		121		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	130		129		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	62		66		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	96		98		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	103		108		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	109		112		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	103		105		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	78		75		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		111		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108		113		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	99		103		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	66		71		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	70		89		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	116		123		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	79		94		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	108		110		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	109		105		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	64		64		50-150

Lab Control Sample Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1446480-2 WG1446480-3								
Perfluorooctanesulfonamide (FOSA)	110		114		46-170	4		30
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	102		110		10-185	8		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	107		108		10-202	1		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	98		100		10-209	2		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	101		100		66-176	1		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	67		68		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	47		48		10-161
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	44		48		10-160
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	65		62		10-189
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	59		59		10-187

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-4 QC Sample: L2054007-01 Client ID: HB494-POST-20201204												
Perfluorobutanoic Acid (PFBA)	11.2	35.2	46.3	100		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	19.3	35.2	54.8	101		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	2.72	31.2	35.0	103		-	-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	41.3	35.2	78.8	107		-	-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	82.0	35.2	119	105		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	6.35	32.2	43.7	116		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	154	35.2	194	114		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	33.5	34.6	103		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	0.828J	33.5	39.5	115		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	37.8	35.2	74.8	105		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	80.5	32.6	120	121		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	8.32	35.2	45.3	105		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	33.8	46.5	138		-	-		56-173	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	35.2	27.4	78		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	35.2	39.1	111		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	33.9	37.9	112		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	35.2	40.5	115		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	35.2	39.8	113		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	35.2	36.2	103		-	-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	ND	35.2	38.5	109		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	35.2	36.4	103		-	-		59-182	-		30
Perfluorohexadecanoic Acid (PFHxDA)	ND	35.2	97.0	**276**	Q	-	-		50-150	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-4 QC Sample: L2054007-01 Client ID: HB494-POST-20201204												
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND	352	386	110		-	-		10-185	-		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND	352	377	107		-	-		10-202	-		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND	352	354	101		-	-		10-209	-		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND	352	353	100		-	-		66-176	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	64				7-170
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	86				1-244
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57				23-146
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	70				1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	109				40-144
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	97				38-144
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	82				21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	95				30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	99				47-153
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	95				24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	97				33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	55				50-150
Perfluoro[13C4]Butanoic Acid (MPFBA)	102				2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	95				16-173
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	107				42-146
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98				36-149
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108				34-146

Matrix Spike Analysis

Batch Quality Control

Project Name: COAKLEY SURFACE WATER

Project Number: 10424.016

Lab Number: L2054007

Report Date: 12/29/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-4 QC Sample: L2054007-01 Client ID: HB494-POST-20201204												

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	100				31-159
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	58				10-187
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	61				10-189
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	61				10-160
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	63				10-161
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	68				1-87

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2054007
Report Date: 12/29/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-5 QC Sample: L2054007-02 Client ID: HB494-PRE-20201204						
Perfluorobutanoic Acid (PFBA)	11.7	11.2	ng/l	4		30
Perfluoropentanoic Acid (PFPeA)	19.6	19.6	ng/l	0		30
Perfluorobutanesulfonic Acid (PFBS)	2.61	2.70	ng/l	3		30
Perfluorohexanoic Acid (PFHxA)	42.4	43.1	ng/l	2		30
Perfluoroheptanoic Acid (PFHpA)	86.0	83.8	ng/l	3		30
Perfluorohexanesulfonic Acid (PFHxS)	6.74	8.00	ng/l	17		30
Perfluorooctanoic Acid (PFOA)	164	157	ng/l	4		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	1.06J	1.11J	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	41.4	40.9	ng/l	1		30
Perfluorooctanesulfonic Acid (PFOS)	89.1	88.3	ng/l	1		30
Perfluorodecanoic Acid (PFDA)	9.10	8.83	ng/l	3		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2054007
Report Date: 12/29/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-5 QC Sample: L2054007-02 Client ID: HB494-PRE-20201204						
Perfluorohexadecanoic Acid (PFHxDA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	101		108		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97		101		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	101		107		31-159
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	86		87		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		106		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	118		102		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	100		107		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	74		84		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	114		117		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		114		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96		101		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	65		63		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	58		65		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	117		115		40-144
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	60		59		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	97		102		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	97		95		33-143
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	58		56		50-150

Lab Duplicate Analysis
Batch Quality Control

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2054007
Report Date: 12/29/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1446480-5 QC Sample: L2054007-02 Client ID: HB494-PRE-20201204						
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	ND	ND	ng/l	NC		30
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	64		67		1-87
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	63		66		10-161
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	62		64		10-160
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d7-NMeFOSE)	63		65		10-189
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (d9-NEtFOSE)	57		60		10-187

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016

Lab Number: L2054007
Report Date: 12/29/20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2054007-01A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2054007-01B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2054007-02A	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.0	Y	Absent		A2-537-ISOTOPE-36(14)
L2054007-02B	2 Plastic/1 Plastic/1 H20 Plastic	A	NA		3.0	Y	Absent		A2-537-ISOTOPE-36(14)

*Values in parentheses indicate holding time in days

Project Name: COAKLEY SURFACE WATER
Project Number: 10424.016
Lab Number: L2054007
Report Date: 12/29/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
Project Number:	10424.016	**Report Date:**	12/29/20

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
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Footnotes

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

Terms

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

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

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

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

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

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. (Note: 'PFAS, Total (6)' is applicable to MassDEP DW compliance analysis only.). If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

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

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

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

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

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

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

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

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

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

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. 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 method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
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Data Qualifiers

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

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

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

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name:	COAKLEY SURFACE WATER	**Lab Number:**	L2054007
Project Number:	10424.016	**Report Date:**	12/29/20

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

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

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

Certification Information

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

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

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

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

Westborough Facility:

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

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

Mansfield Facility:

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

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

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

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 12/4/20

ALPHA Job #: L2054007

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

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

Client Information

Client: CES

Address: 415 Lisbon St #700
Lewiston, ME 04240

Phone: 2077956009

Email: cbuchman@cesinc.com

Project Information

Project Name: Coakley Surface Water

Project Location: Greenland, NH

Project #: 10424.016

Project Manager: Chris Buchman

ALPHA Quote #:

Turn-Around Time

☐ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due:

Additional Project Information:

Report Information - Data Deliverables

☐ ADEx ☐ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

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

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
537 Mod (List of 24)

SAMPLE INFO

Filtration
☐ Field
☐ Lab to do

Preservation
☐ Lab to do

Sample Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	TPH: Quant Only	TOTAL # BOTTLES
54007-01	HB4944-PGST-20201204	12-4-20	0910	SW	WH	X	2
-02	HB4944-PRE-20201204	12-4-20	0920	SW	WH	X	2

Container Type						P	
Preservative						A	

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

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	12-4-20 1008		12/4/20 1008
	12/4/20 1945	MB BEZIO AAL	12/4/20 2000
MB BEZIO AAL	12/4/20 2100		12/4/20 2100

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)