Barnstable AIRPORT HYANNIS

IMMEDIATE RESPONSE ACTION PLAN
Status Report 2

Barnstable Municipal Airport
Hyannis, Massachusetts

RTN 4-26347

October 2017

Prepared for:
Barnstable Municipal Airport
480 Barnstable Road
Hyannis, MA 02840

Prepared by:
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IMMEDIATE RESPONSE ACTION PLAN STATUS REPORT 2

BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS
RTN 4-26347

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1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Barnstable Municipal Airport (the Airport) to develop this second Immediate Response Action (IRA) Plan Status Report for its property at 480 Barnstable Road, Hyannis, Massachusetts (Figure 1). HW has prepared this report in accordance with the Massachusetts Contingency Plan 310 CMR 40.0000 (MCP) on behalf of:

Ms. Katie Servis, Assistant Airport Manager
Barnstable Municipal Airport
Hyannis, Massachusetts 02601
(508) 775-2020

The report covers activities between April 15, 2017 and October 27, 2017. Please note an extension to the October 15, 2017 submission date for this report was granted to allow HW to include laboratory results from recent soil samples collected on September 26, 2017.

2.0 SUMMARY OF IRA PLAN

An IRA was initiated in response to a Notice of Responsibility (NOR) for Release Tracking Number (RTN) 4-26347 dated November 10, 2016, issued to the Airport by the Massachusetts Department of Environmental Protection (DEP). The NOR requested that the Airport conduct additional field investigations to evaluate sources of two types of contaminants previously detected at the Airport and on adjacent properties, and to identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields (Figure 1).

The NOR specifically requests that the Airport investigate perfluoroalkyl substances (PFAS) including perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) previously detected in groundwater at the Airport and several adjacent properties. DEP also requested further evaluation of 1, 4-dioxane, previously detected in a monitoring well downgradient of the Airport on the Maher wellfield property.

A proposed IRA plan was submitted for approval in response to the NOR. Subsequently, a meeting was held by DEP at the Airport that included other stakeholders including the Barnstable Department of Public Works, the Hyannis Water District and Barnstable County representatives (representing the Fire Training Academy). At the meeting, IRA plans were coordinated between the Airport and Fire Training Academy including sampling locations, type of analysis, groundwater modeling, goals and next steps. The IRA plan served as the guide for the first round of sampling and additional soil and groundwater testing was then conducted to follow up on the results of the initial analyses.

Background

Prior to issuance of the NOR, the Airport conducted investigations on both contaminants and provided results to DEP. In July 2015, HW sampled groundwater from seven wells for analysis of 1,4-dioxane. The contaminant was detected in well OW-9DD at a concentration of 0.93 ug/L, above the 0.30 ug/L standard for 1,4-dioxane. This well is screened from 77 to 87 feet below the ground surface. Samples taken from the other wells at the Airport did not contain 1,4-dioxane above laboratory reporting levels.

A potential source of 1,4-dioxane at the Airport is a historic release of 1,1,1-trichloroethane (1,1,1-TCA) from an oil water separator associated with a floor drain in the former Provincetown Boston Airlines hangar (currently leased to Cape Air). Given the screen depth of OW-9DD the 1,4,-dioxane may also be from an off airport source.

On August 4, 2016 DEP issued a Request for Information (RFI) to the Airport requiring investigation of PFAS. On July 1 and 5, 2016, HW collected samples from six monitoring wells and submitted samples for laboratory analysis for the presence of PFOS and PFOA. These compounds were detected in each of the wells tested. At monitoring wells HW-3 and HW-5, concentrations were 0.084 and 0.12 ug/L respectively, above the EPA health advisory limit and DEP standard of 0.07 ug/L. Because of the extremely low detection requirements, HW collected confirmatory samples from these two wells. Results showed 0.16 ug/l in HW-3 and 0.12 ug/L in HW-5. The concentrations detected in all the other wells were below the standard. It should be noted that these compounds were also detected above the standard in well HW-1, located at the upgradient, western boundary of the Airport.

Actions Under the IRA Plan

In the spring of 2017, HW installed a series of new groundwater monitoring wells and collected soil and groundwater samples to further investigate the PFAS compounds and 1,4-dioxane in the area. The initial round of sample results was pending at the time the first IRA status report was submitted in April, 2017, and that information is summarized below, along with additional sampling of soil and groundwater conducted in June, September, and October.

3.0 APPLICABLE MCP STANDARDS

In accordance with MCP Section 310 CMR 40.0900, the characterization of risk of harm to health, safety public welfare, and the environment must be evaluated at each disposal site. This characterization includes the determination of site-specific soil and groundwater categories based on site location and use, and the comparison of laboratory results to these standards (310 CMR 40.0930).

Groundwater located within a Current Drinking Water Source Area is considered category GW-1. The Airport is located within several zones of contribution (Zone II) for Barnstable Village,

the Hyannis Water District and the Town of Yarmouth. Zone IIs are considered current drinking water sources as defined in 310 CMR 40.0006; thus category GW-1 is applicable.

Groundwater located within 30 feet of an occupied building that has an average annual depth of less than 15 feet is categorized as GW-2. This is primarily a concern because of the possibility of vapor impacts to indoor air. The average annual depth to groundwater at the site is greater than 15 feet, therefore GW-2 Standards do not apply. Also, all disposal sites shall be considered a potential source of discharge to surface water, and therefore categorized as GW-3. Based on these criteria, categories GW-1 and GW-3 are applicable to this site.

Currently, there are no DEP soil standards for these compounds.

4.0 FIELD INVESTIGATIONS – DECEMBER 2016 – OCTOBER 2017

The field work conducted to date includes:

- The installation of groundwater monitoring wells at six locations installed in April 2017: in the vicinity of potential sources of PFOA at the Airport Rescue and Fire Fighting (ARFF) Building, at the fire fighting training deployment area adjacent to the East Ramp, and at upgradient locations to evaluate potential off site sources of PFAS and 1,4-dioxane. Groundwater flows from the northwest to southeast across the airport, approximately parallel to Runway 15/33. Figures 2 and 3 provide the locations of monitoring wells used in the analysis to date.

- The first round of groundwater samples for PFAS and 1,4-dioxane were collected on April 5-7 and April 11, 2017. Additional groundwater samples and one surface water sample were collected for analysis of PFAS on June 20, 2017.

- An initial round of three soil samples were taken on December 6, 2016 as reported in the first status report. One sample was taken from each location where it was determined that aircraft fire fighting foam (AFFF) had been used at the Airport, including the site of an airplane crash in 1991, the deployment area, and the drill location along the dirt road adjacent to the deployment area (See Figure 4).

- A second round of soil samples was taken on June 20, 2017 adjacent to the ARFF building and within the deployment area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further map the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below grade.

- In October, 2017 three composite soil samples were taken from piles of sediment and topsoil associated with the redevelopment of Runway 15/33. These piles were located

on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if sediment removed from the airport as part of this redevelopment contained PFAS.

- On October 26, 2017, ten additional PFAS samples were taken to evaluate background conditions in surficial soils on the Airport and in nearby locations in Hyannis.

- Two samples of AFFF have also been analyzed for PFAS compounds to evaluate the foam previously used at the airport and that the foam that is currently in use, which should have reduced concentrations of PFAS compounds.

Groundwater samples were taken in accordance with the Massachusetts Department of Environmental Protection (DEP) Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the MCP, dated January 2017. A submersible pump was utilized to develop each monitoring well prior to sample collection. During well development, a properly calibrated InSitu smarTroll MP multi-parameter meter was utilized to measure temperature, pH, conductivity, DO, and oxidation reduction potential. Samples, including the trip and equipment blanks were submitted to ESS Laboratory, Cranston, Rhode Island for 1,4-dioxane analyses and to Maxim Laboratory for the PFAS compounds. Trip blanks and equipment rinse samples were collected and analyzed for PFAS compounds along with the monitoring well samples.

Soil samples were taken using a hand auger that was decontaminated using Liquinox, and rinsed using Type II De-ionized water. Each boring was advanced to just above the desired depth of sample then the auger was decontaminated and rinsed again prior to sample collection, in order to minimize, to the greatest extent possible, cross contamination between samples/intervals. Each step was repeated in between each interval of sampling. Samples were collected by either shaking the sample directly from the hand auger into the bottle, or, if necessary, using a gloved hand to remove the sample from bottom of the auger and placing directly into bottle. A separate set of gloves was used for each sample.

Results of Groundwater and Soil Analyses

Groundwater Analyses for 1,4-dioxane

Ten groundwater samples were collected in April and analyzed by ESS laboratory for the presence of 1,4-dioxane using Method 8270 SIMS. Wells were sampled from locations hydrologically upgradient of the Airport, at the former source of the 1,1,1-TCA release on the North Ramp, along the path of the plume from this source area, and downgradient of the Airport property at the Maher Wellfield (Table 1 and Figure 2). Upgradient wells were located proximate to the former Packaging Industries site where historic releases of Freon-12 were detected in groundwater that flowed across the Airport towards the Maher Wellfield.

1,4-dioxane was not detected on the Airport property including along the presumed path of the former solvent plume that originated at the oil/water separator adjacent to what is now the Cape Air hangar on the north ramp of the Airport. It was detected in wells OW-9DD, OW-18D and OW-19D on the Maher Wellfield property, at a depth of approximately 80 feet below the water table. HW developed a cross section (Figure 4) to highlight the increasing depth of the sampling locations downgradient of the solvent plume release site. The cross section shows that the sampling locations followed the presumed path of the former plume in a reasonable manner. HW is currently assessing the installation of a deep well on airport property upgradient of the Maher Wellfield to further document the boundaries of the current 1,4-dioxane contamination in deep groundwater. This might help determine the ultimate source, be it the Airport, the former Freon release from Packaging Industries or another source. Freon was detected in the past in deep wells on the eastern side of the Airport (that were abandoned during construction of the runway safety zone), as well as at the Maher Wellfield.

Soil Analyses for PFAS Compounds

Results from the April, September and early October sampling rounds are summarized in Table 2 and Figures 5 and 6. The sample from the site of one training drill in 1991 indicated a combined PFOS/PFOA concentration of 0.6 ug/kg.

PFAS compounds were detected at the deployment area where fire fighting training with foam had been conducted. Concentrations ranged from 0.4 ug/kg to 39 ug/kg in the shallow soil samples. Concentrations in the samples from two and four feet below grade were lower than those detected at the surface. The highest concentration (39 ug/kg) was detected at the site where regular testing of the fire fighting foam equipment was conducted per Federal Aviation Administration (FAA) requirements. This is where foam was sprayed at a target to confirm the foam system worked properly. The concentration four feet below this surface sample dropped to 22 ug/kg.

The Airport plans to coordinate with DEP on the removal of surficial soils in the deployment area to reduce the future risk to groundwater. The total amount and depth of soil removal remains to be determined. Following this action, further soil analysis will be conducted to determine if additional remediation is needed.

PFAS compounds were also detected in soil and within a catch basin just north of the ARFF building at concentrations ranging from 1.85 to 5.3 ug/kg. Further sampling is needed to map the extent of contamination in this area, and soil removal is also under consideration for this area.

Groundwater Analyses for PFAS Compounds

PFOS/PFOA were detected above the 0.07 ug/L standard in wells HW-E and HW-F at the deployment area at concentrations of 0.100 ug/L and 0.075 ug/L respectively (Table 3 and Figure 2). They were also detected at 0.215 ug/L in well HW-3, downgradient of the ARFF

building soil sample locations. Each of these wells is screened at the water table and the results are likely linked to the contamination detected in the overlying soils.

Samples from wells HW-9DD (0.555 ug/L) and HW-18D (0.245 ug/L) at the Maher Wellfield were also above the 0.07 ug/kg standard. Samples from the shallower wells at these two locations contained PFOS/PFOA but at concentrations below the standard. Further analysis is needed to identify if the contamination at the Maher Wellfield is from the Airport, the upgradient Fire Training Academy or a currently unknown source. This will be addressed as part of the Phase II Scope of Work currently being developed for inclusion in the Phase I Initial Site Investigation and Tier Classification report due on November 10, 2017.

PFOS/PFOA were also detected above the standard at well HW-19D south of the Airport parking lot, in well HW-5 adjacent to the Cape Air hangar on the North Ramp, and at well HW-1 upgradient of the Airport. There is no known source that might have contributed PFOS/PFOA to groundwater in these locations, an issue that will be analyzed further moving forward.

Analysis of AFFF

HW has sampled two types of AFFF used at the Airport. One sample was taken from an older version of AFFF previously used at the Airport. The second is of a newer version currently available for use. HW is still working to confirm how Airport personnel diluted the concentrated foam for use to be able to evaluate these results. This data may help evaluate, or fingerprint, the materials found in soil, and possibly groundwater.

5.0 RUNWAY REDEVELOPMENT

On October 12, 2017, DEP raised a concern about the potential for PFAS compounds in soils that were excavated as part of the redevelopment of Runway 15/33. Sand and gravel adjacent to the runway was excavated in 2017, per FAA requirements, with a majority of this material transported off site. The Airport has been working to learn more about the movement of this material, and the potential that it might contain PFAS compounds as summarized below:

- No additional soil has left the Airport since the DEP notification on October 12th. Most of the sand and gravel material taken from the airfield was brought to Cape Cod Aggregates in Hyannis.

- Some sand and gravel was transported to a construction project at the parking lot for the Lombard ball field in West Barnstable. However it was removed as the material did not meet the specifications required for that project. It is not known where the material was taken after leaving the Lombard site.

- HW took two composite samples from the remaining sand and gravel material excavated from along the runway. Each contained PFOS at concentrations of 0.38 ug/kg

and 0.39 ug/kg. Other than PFOS, no other PFAS compounds were detected above laboratory detection limits.

- HW is currently working with the laboratory to conduct an SPLP leaching test with these samples to evaluate the potential for any PFOS to leach out of these soils.

- No topsoil left the Airport as part of this project. Topsoil was delivered to the Airport to augment that which remained on site as part of the final landscaping adjacent to the runway.

- A composite sample from a pile of topsoil delivered to the Airport was sampled and the PFOS concentration was 0.81 ug/kg, approximately twice that measured in the sand and gravel samples from the Airport. Again, no other PFAS compounds were detected above laboratory detection limits. This raises the possibility that PFOS detected in these materials may be representative of background conditions. To help evaluate this question, ten additional samples of surficial soils have been taken representing background conditions at the airport and in other nearby areas in Hyannis. The results of these analyses are expected in mid-November.

6.0 GROUND WATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

DEP requested that the Airport evaluate if potential sources on the western portion of the Airport could be upgradient of the Mary Dunn Wellfield. To answer this question, HW is using and modifying an existing U.S. Geological Survey groundwater model to evaluate groundwater flow under current and recent historical pumping conditions. This work is ongoing and will be informed by the results of the groundwater sampling and water level data collected under this IRA plan. The model will be used to document what areas of the Airport are upgradient of the Mary Dunn Wellfield. It will also be used to evaluate groundwater flow and contaminant transport from potential source areas on Airport property, as well as groundwater flow from the Fire Training Academy across the Airport to the southeast.

7.0 MANAGEMENT OF REMEDIAL WASTE

No remedial waste has been generated to date as a result of the work conducted under the IRA Plan.

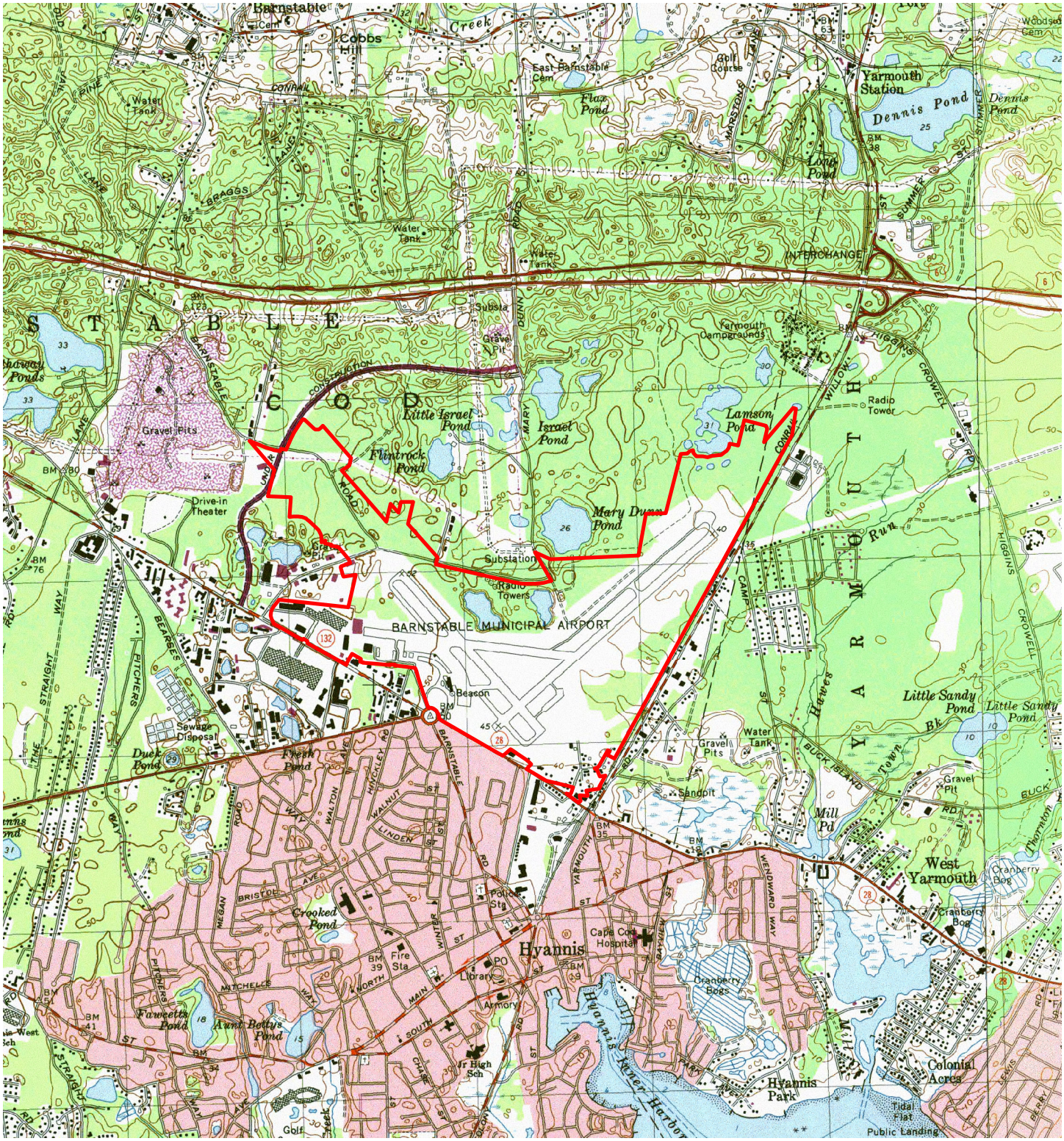
8.0 PLANS FOR NEXT REPORTING PERIOD

Further testing of soil and groundwater is planned and the proposed scope of this work will be provided in the Phase II Scope of Work that will be included in the Phase I – Initial Site Investigation and Tier Classification Report that is due on November 10, 2017. In addition, as mentioned above, the Airport will be moving forward to remove and dispose of soils from the deployment area in order to minimize leaching of PFOA compounds to groundwater.

DEP asked the Airport to investigate whether or not there are private wells downgradient of the airport and potential source areas for 1,4-dioxane and PFAS compounds. In the IRA Plan, HW identified four properties in Yarmouth that, while connected to public water, also were identified as having an onsite well. Given that they are connected to public water it is likely that these wells are used for non-drinking water purposes and/or abandoned.

HW will continue this evaluation upon receipt of our groundwater sampling data and upon completion of our groundwater modeling analysis to determine if any additional areas need to be investigated for the presence of private wells. If any private wells are identified, further analysis will be conducted to determine if private well sampling is needed.

FIGURES



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Legend

Airport Property Line

*Hyannis Topographic Quadrangle

N

Miles

0.5

Horsley Witten Group
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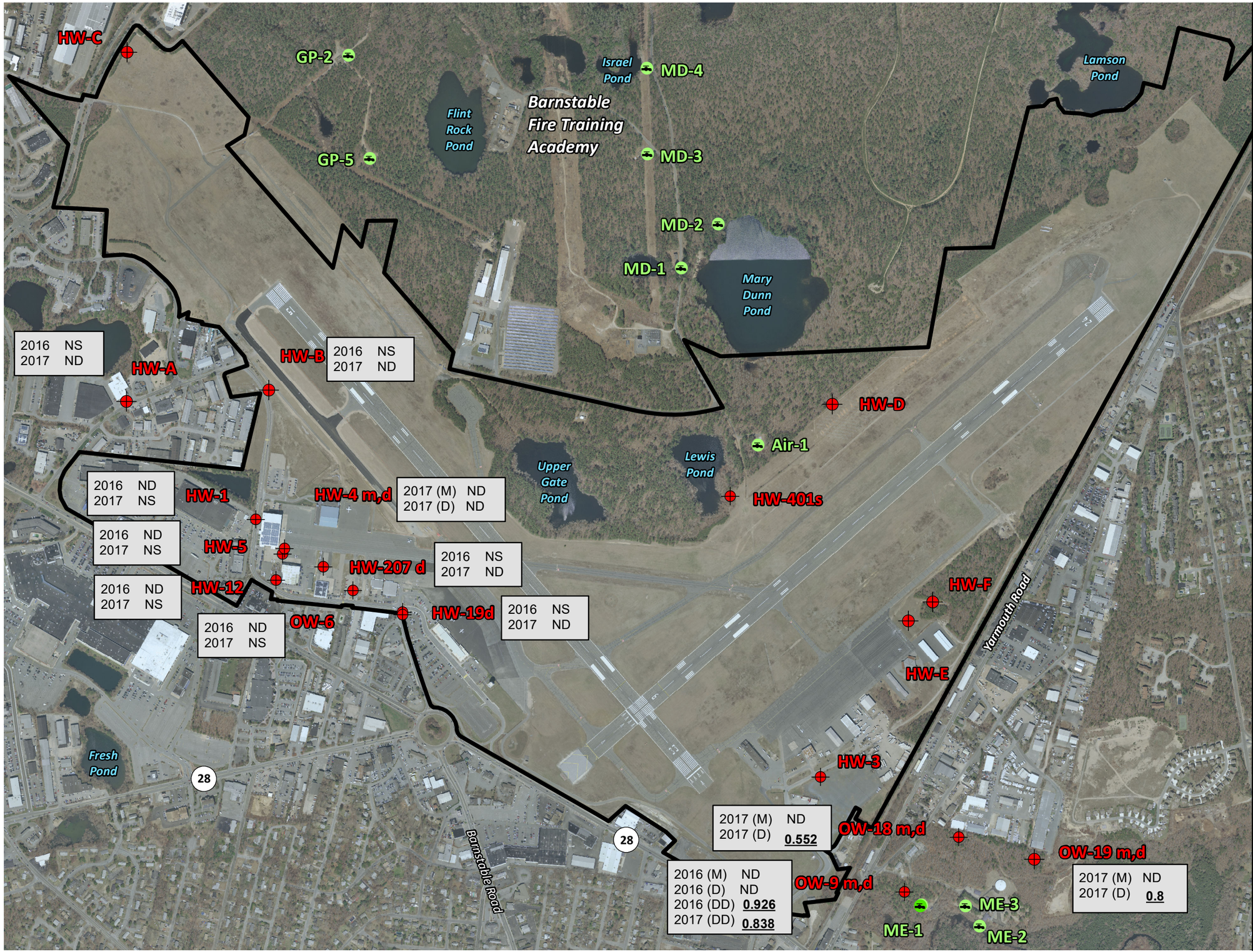
USGS Locus
Barnstable Municipal Airport
Hyannis, MA

Date: 8/15/2013

Figure 1



Legend

- Monitoring Wells
- ND — No Detect
- NS — No Sample Collected
- 0.2 — 1,4 Dioxane Below MassDEP Limit (0.3 ug/L)
- **0.8** — 1,4 Dioxane Above MassDEP Limit (0.3 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary

N

0 750

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1,4 Dioxane Results
Barnstable Municipal Airport
Hyannis, MA

Date: 10/31/2017 Figure 2

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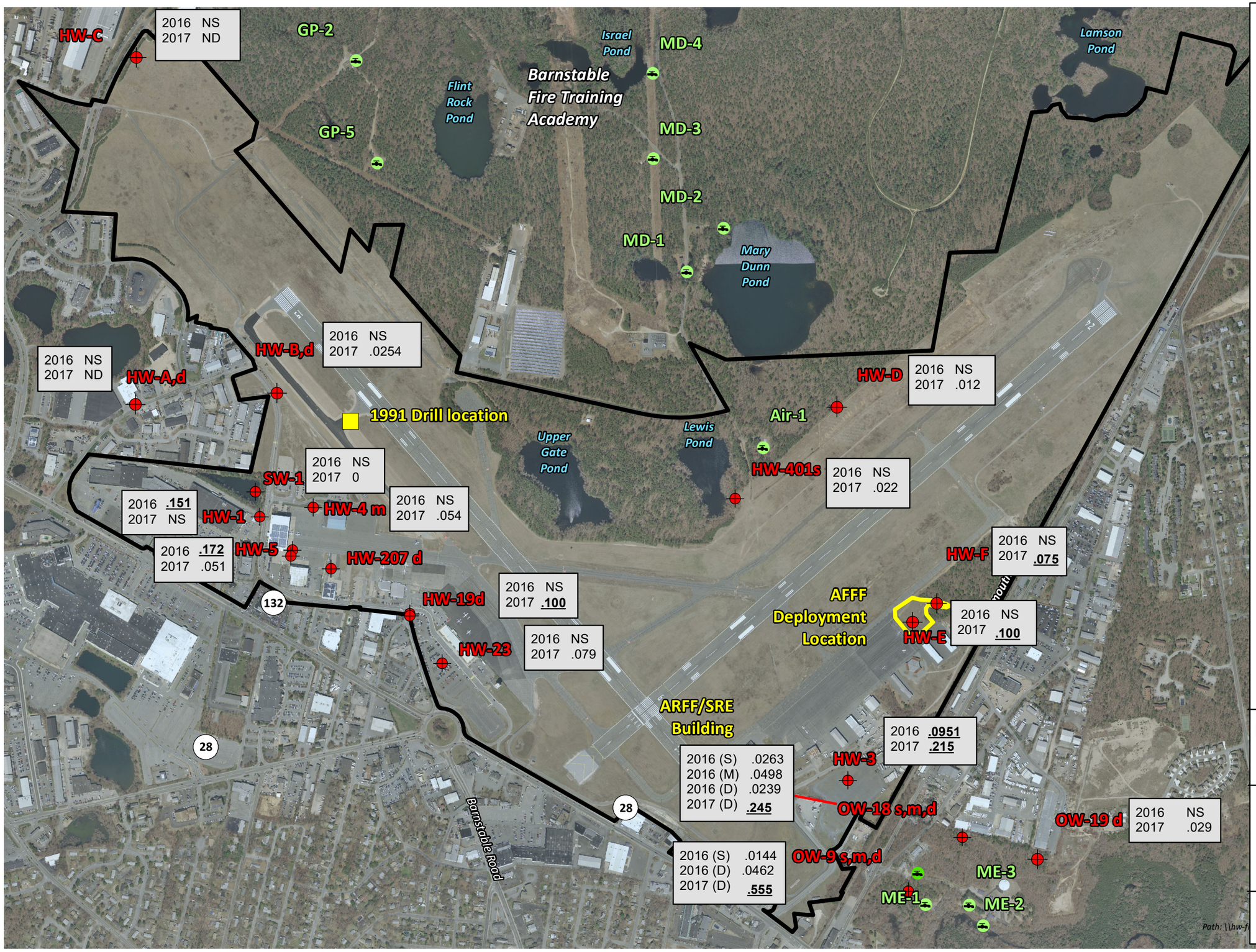

Legend

- Monitoring Wells
- PFOS/PFOA Soil Samples
- ND — No Detect
- NS — No Sample Collected
- .02 — PFOS/PFOA Under EPA Limit (.070 ug/L)
- **.08** — PFOS/PFOA Over EPA Limit (.070 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary

N

0 750

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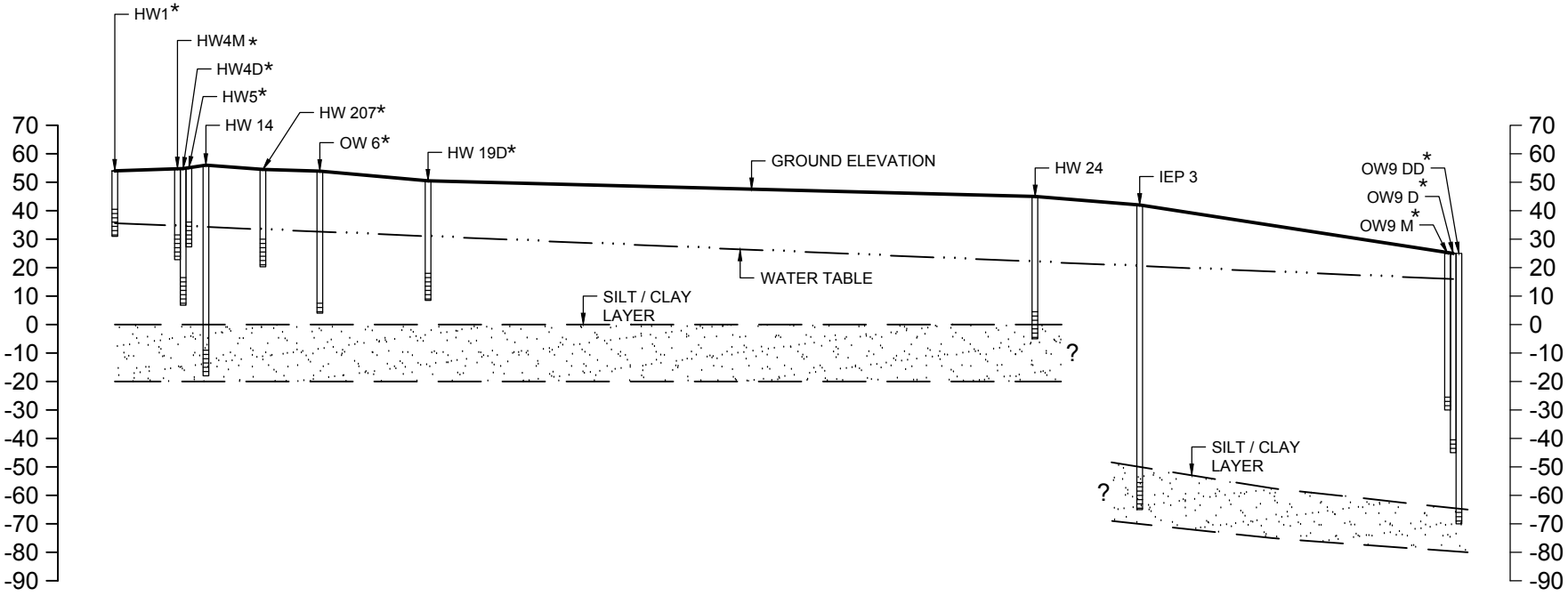
PFOS/PFOA Results
Barnstable Municipal Airport
Hyannis, MA

Date: 10/31/2017 Figure 3

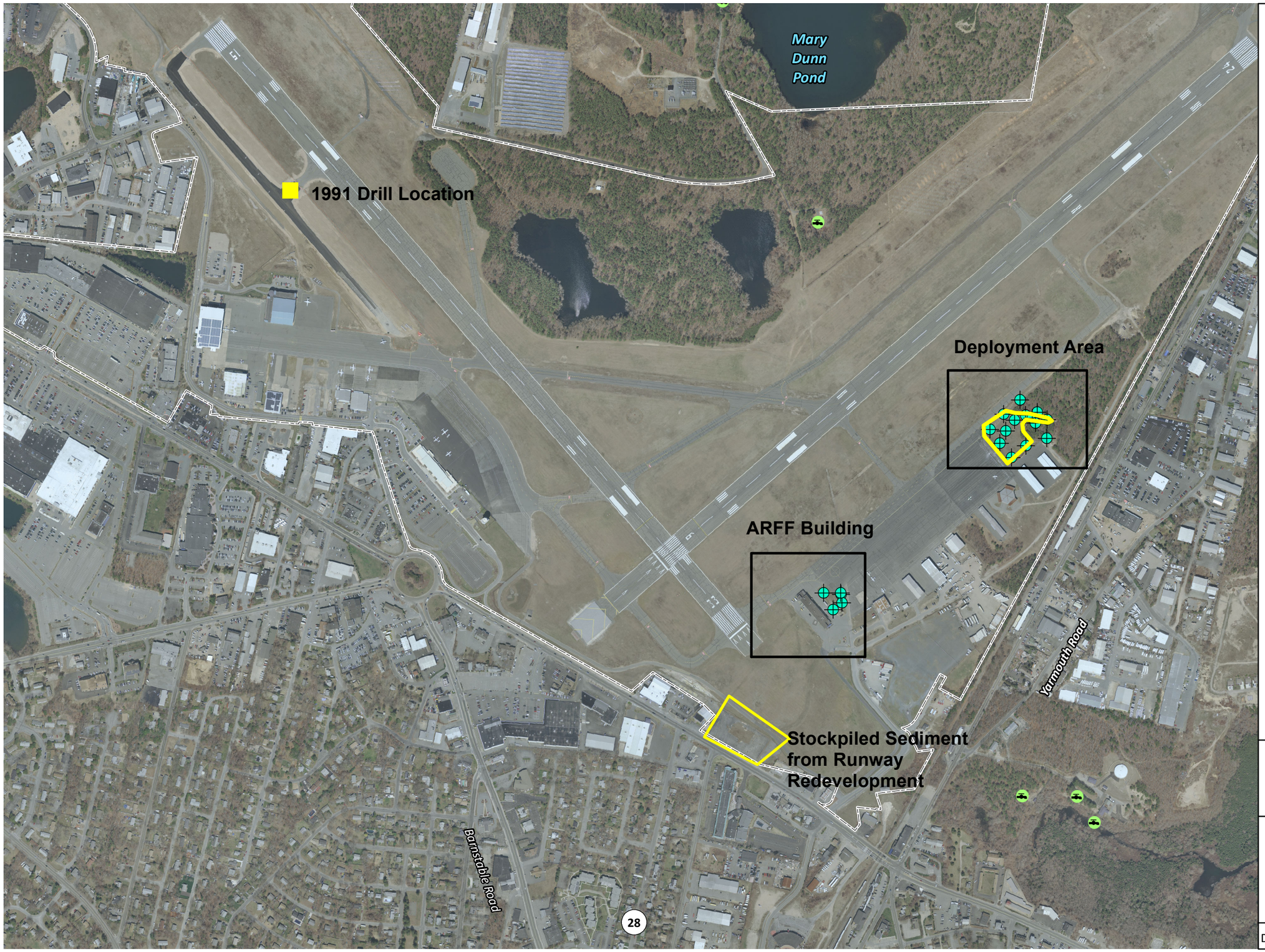


* 1,4, Dioxane Sample Collected

750 0 375 750 1500 3000

Title: HYDROGEOLOGIC PROFILE	Project: Figure 4: Hydrogeologic Cross Section	Prepared For: Barnstable Municipal Airport Barnstable, Massachusetts	**Horsley Witten Group, Inc.** *Sustainable Environmental Solutions* *www.horsleywitten.com* *90 Route 6A* *Sandwich, MA 02563* *508-833-6600 voice* *508-833-3150 fax*

Project:	17027	Sheet:	1 of 1	Date:	OCTOBER 30, 2017
Design By:	MN/ ARM	Drawn By:	MCL	Checked By:	ARM



Legend

- Monitoring Wells
- PFOS/PFOA Soil Samples
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary

N

0 750

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Figure 5
Location of Known
ARFF Use and Storage

Date: 10/31/2017

Path: \\hw-file2\users\mpozimski\My Documents\HW\170720_PFOS_SoilBorings_locations.mxd

DL6
ND

DL5
0-1' 3.7
2' 1.6
4' 0

DL7
0.81

DL9
ND

DL8
0-1' 39
4' 22

HW-F
.075

DL12
0-1' 27.6

DL13
0-1' 2.4

DL10
1.96

DL4
0-1' 2.83
2' 0
4' 0.50

DL11
0-1' 33.7

DL14
0-1' 30.6

HW-E
.100

AFFF
Deployment
Location

DL3
0-1' 1.31
2' 0
4' 0

DL2
0-1' 13.6
2' 5.6
4' 0.74

DL1
0.4

Mary
Dunn
Pond

ARFF4
0-1' 1.97

ARFF1
0-1' 5.25
2' 5.3
4' 1.85

ARFFCB
0-1' 2

ARFF3
0-1' 5.18

ARFF/SRE
Building

ARFF2
ND

HW-3
.215

Yarmouth Road

28

Legend

- Monitoring Wells
- PFOS/PFOA Soil Samples
- ND — No Detect
- * — Pending Laboratory Results
- ## — Soil Concentration (ug/kg PFOS+PFOA)
- ## — GW Concentration (ug/L PFOS+PFOA)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary

N

0 750

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PFOS Soil Investigation
Barnstable Municipal Airport
Hyannis, MA

Date: 10/31/2017

Figure 6

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TABLES

Table 1. 1,4 Dioxane Groundwater Results

	GW-1	Date	HW-4D	HW-4M	HW-207D	HW-19D	HW-A(D)	HW-B(D)
1,4-Dioxane	0.3	4/5/2017	ND	ND	ND	ND	ND	ND
		Date		**OW-18M**	**OW-18D**	**OW-19D**	**OW-19M**	**OW-9DD**
1,4-Dioxane	0.3	4/11/2017		ND	**0.552**	**0.800**	ND	**0.838**

Notes:

ND= Not detected by method

ug/L = micrograms per liter

MDL = method detection limit

Table 2. Soil Results - June and September 2017

	DL1(0-1') 6/20/2017	DL2 (0-1') 6/20/2017	DL2 2' 9/26/2017	DL2 4' 9/26/2017	DL3 (0-1') 6/20/2017	DL3 (0-1') LAB DUP 6/20/2017	DL3 2' 9/26/2017	DL3 4' 9/26/2017
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	0.30J	1.9	1.2	0.48J	0.84J	0.79J	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	0.74J	0.59J	0.34J	0.34J	ND	ND
Perfluorononanoic acid (PFNA)	ND	0.81J	2.5	ND	0.55J	0.51J	ND	ND
Perfluorooctane sulfonate (PFOS)	0.40J	12	1.5	ND	0.51J	0.45J	ND	ND
Perfluorooctanoic acid (PFOA)	ND	1.6	4.1	0.74J	0.80J	0.63J	ND	ND
PFOS+PFOA	0.40J	13.6	5.6	0.74	1.31	1.08	ND	ND
	DL4 (0-1') 6/20/2017	**DL4 2' 9/26/2017**	**DL4 4' 9/26/2017**	**DL5 (0-1') 6/20/2017**	**DL5 2' 9/26/2017**	**DL5 4' 9/26/2017**	**DL6 (0-1') 6/20/2017**	**DL7** (0-1') 6/20/2017**
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	0.31J	ND	ND	2.5	0.40J	0.50J	5	2.5J
Perfluorohexanesulfonic acid (PFHxS)	ND	ND	ND	0.49J	0.49J	ND	ND	ND
Perfluorononanoic acid (PFNA)	2.7	ND	3.7	0.19J	ND	ND	0.19J	9.6J
Perfluorooctane sulfonate (PFOS)	2.0	ND	0.50J	ND	ND	ND	ND	3.9J
Perfluorooctanoic acid (PFOA)	0.83J	ND	ND	3.7	1.6	ND	ND	4.2J
PFOS+PFOA	2.83	ND	0.5	3.7	1.6	ND	ND	8.1
	DL8 (2') 6/20/2017**	**DL8** (4') 9/26/2017**	**DL9 (0-1') 6/20/2017**	**DL10 (0-1') 6/20/2017**	**DL 11 (0-1') 9/26/2017**	**DL12 (0-1') 9/26/2017**	**DL13 (0-1') 9/26/2017**	**DL14 (0-1') 9/26/2017**
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	2.9J	4.7J	0.66J	1.3	2.1	1.2	1.6	4.9
Perfluorohexanesulfonic acid (PFHxS)	ND	ND	0.35J	0.94J	0.82J	ND	ND	0.71J
Perfluorononanoic acid (PFNA)	46	ND	0.22J	ND	16	7.3	1.5	10
Perfluorooctane sulfonate (PFOS)	14	ND	0.38J	0.26J	29	23	0.66J	7.6
Perfluorooctanoic acid (PFOA)	25	22	0.68J	1.7	4.7	4.6	2.4	23
PFOS+PFOA	39	22	1.06	1.96	33.7	27.6	3.06	30.6
	ARFF1 (0-1') 6/20/2017	**ARFF1 (2') 9/26/2017**	**ARFF1 (4') 9/26/2017**	**ARFF2 (0-1') 6/20/2017**	**ARFF3 (0-1') 9/26/2017**	**ARFF4 (0-1') 9/26/2017**	**ARFF4 (0-1') LAB DUP**	**ARFFCB (0-1) 9/26/2017**
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	NA	ND
Perfluoroheptanoic acid (PFHpA)	0.82J	1.8	0.66J	ND	0.60J	0.75J	NA	0.60J
Perfluorohexanesulfonic acid (PFHxS)	ND	ND	ND	ND	0.64J	ND	NA	ND
Perfluorononanoic acid (PFNA)	2.5	5.7	1.4	2.0J	0.91J	2.9	NA	ND
Perfluorooctane sulfonate (PFOS)	4.5	2.7	1.1	0.29J	4.4	1	NA	1.1
Perfluorooctanoic acid (PFOA)	0.75J	2.6	0.75J	ND	0.78J	0.97J	NA	0.90J
PFOS+PFOA	5.25	5.3	1.85	0.29	5.18	1.97	NA	2

	Stockpile East	Stockpile West	Loam Pile
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	ND	ND	ND
Perfluorononanoic acid (PFNA)	ND	ND	ND
Perfluorooctane sulfonate (PFOS)	0.39J	0.38J	0.81J
Perfluorooctanoic acid (PFOA)	ND	ND	ND
PFOS+PFOA	0.39	0.38	0.81

**Sample diluted, Detection limits adjusted accordingly
J = Results between RDL and MDL
ND= Not detected by method
ug/kg = micrograms per kilogram
MDL = method detection limit

Table 3. Groundwater Results 2016-2017

	North Ramp							Lewis Pond		
	HW-1	HW-1	HW-4M	HW-5		HW-23	HW-19D	HW-D	HW-401S	HW-C
	7/1/2016	6/20/2017	4/5/2017	7/1/2016	4/7/2017	6/20/2017	6/20/2017	4/7/2017	4/7/2017	4/7/2017
Perfluorobutanesulfonic acid (PFBS)	ND	0.02	0.005J	ND	ND	0.0051J	0.0081J	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	0.01	0.0042J	0.007J	0.01	0.0084J	0.0045J	0.0052J	ND	0.0043J	ND
Perfluorohexanesulfonic acid (PFHxS)	0.018	0.065	0.02	0.018	0.018J	0.021	0.046	0.0089J	0.011J	ND
Perfluorononanoic acid (PFNA)	ND	0.0057J	ND	ND	ND	ND	0.0065J	ND	ND	ND
Perfluorooctane sulfonate (PFOS)	0.017	**0.24**	0.043	0.017	0.052	0.0079J	0.061	0.022	0.012J	ND
Perfluorooctanoic acid (PFOA)	0.033	0.022	0.011J	0.033	0.020J	ND	0.017J	ND	ND	ND
PFOS+PFOA	0.05	**0.262**	0.054	0.05	**0.072**	0.0079	**0.078**	0.022	0.012	ND

	Steamship Parking Lot						Airfield		Airport Road	
	HW-2	HW-3		HW-300	HW-301	HW-302	HW-E	HW-F	HW-A	HW-B
	7/1/2016	7/1/2016	4/5/2017	7/1/2016	7/1/2016	7/1/2016	4/5/2017	4/5/2017	4/7/2017	4/7/2017
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND	0.017J	0.0077J
Perfluoroheptanoic acid (PFHpA)	0.0071	0.016	0.1	0.0096	0.002	0.019	0.15	0.34	0.0048J	0.049
Perfluorohexanesulfonic acid (PFHxS)	0.0035	0.0043	0.020J	0.012	0.038	0.006.3	0.042	0.019J	0.0079J	0.044
Perfluorononanoic acid (PFNA)	ND	0.0063	0.027	ND	ND	0.054	0.0087J	ND	ND	ND
Perfluorooctane sulfonate (PFOS)	0.012	**0.084**	**0.15**	0.017	0.011	0.014	0.047	ND	ND	0.026
Perfluorooctanoic acid (PFOA)	0.0063	0.0091	0.065	0.0052	0.0037	0.033	0.053	**0.075**	ND	0.0094J
PFOS+PFOA	0.0183	**0.0931**	**0.215**	0.0222	0.0147	0.047	**0.1**	**0.075**	ND	0.0354

	Maher Wells									Kmart
	OW-9S	OW-9D		OW-18S	OW-18M	OW-18D		OW-18D Duplicate	OW-19D	Surface Water
	7/5/2016	7/5/2016	4/11/2017	7/5/2016	7/5/2016	7/5/2016	4/11/2017	7/5/2016	4/11/2017	6/20/2017
Perfluorobutanesulfonic acid (PFBS)	ND	ND	ND	ND	ND	ND	0.016J	ND	0.0055J	ND
Perfluoroheptanoic acid (PFHpA)	0.014	0.0028	0.034	0.00.1	0.0029	0.0071	0.015J	0.0063	0.0051J	ND
Perfluorohexanesulfonic acid (PFHxS)	ND	0.012	0.12	0.0068	0.016	0.01	0.13	0.011	0.029	ND
Perfluorononanoic acid (PFNA)	0.0077	0.0036	0.059	ND	0.0076	0.0065	ND	0.0058	0.006J	0.0043 (NA)
Perfluorooctane sulfonate (PFOS)	0.0074	0.041	**0.5**	0.0083	0.044	0.018	**0.22**	0.019	0.029	ND
Perfluorooctanoic acid (PFOA)	0.007	0.0052	0.055	0.018	0.0058	0.0059	0.025	0.0059	ND	ND
PFOS+PFOA	0.0144	0.0462	**0.555**	0.0263	0.0498	0.0239	**0.245**	0.0249	0.029	ND

J = Results between RDL and MDL
ug/L = micrograms per liter
Shaded / Bold results above DEP GW-1 standard (0.07 ug/L)
ND= Not detected by method
"North Ramp" or "Kmart" = denotes general location near sampling location

LABORATORY RESULTS

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1704197

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 12:20 pm, May 02, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOS

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

SAMPLE RECEIPT

The following samples were received on April 10, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1704197-01	HW-4D	Ground Water	8270D SIM
1704197-02	HW-4M	Ground Water	$, 8270D SIM
1704197-03	HW-207D	Ground Water	8270D SIM
1704197-04	HW-19D	Ground Water	8270D SIM
1704197-05	HW-3	Ground Water	$
1704197-06	HW-E	Ground Water	$
1704197-07	HW-F	Ground Water	$
1704197-08	HW-A (S)	Ground Water	$
1704197-09	HW-A (D)	Ground Water	8270D SIM
1704197-10	HW-B (S)	Ground Water	$
1704197-11	HW-5	Ground Water	$
1704197-12	HW- B (D)	Ground Water	8270D SIM
1704197-13	HW-C	Ground Water	$
1704197-14	HW-D	Ground Water	$
1704197-15	HW-401S	Ground Water	$
1704197-16	Equipment Blank	Aqueous	$

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

PROJECT NARRATIVE

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

C7D0192-TUN1	**Benzidine tailing factor >2.**
C7D0192-TUN1	**DDT breakdown > 20%**
C7D0192-TUN1	**Pentachlorophenol tailing factor > 2.**

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-4D
Date Sampled: 04/05/17 10:13
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 18:39	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	53 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-4M
Date Sampled: 04/05/17 10:30
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 19:15	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	58 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-4M
Date Sampled: 04/05/17 10:30

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-02
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-207D
Date Sampled: 04/05/17 11:25
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 19:50	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	54 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-19D
Date Sampled: 04/05/17 13:00
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-04
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 20:26	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	52 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-3
Date Sampled: 04/05/17 13:30

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-05
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-E
Date Sampled: 04/05/17 14:30

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-06
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-F
Date Sampled: 04/05/17 15:00

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-07
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-A (S)
Date Sampled: 04/07/17 08:50

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-08
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-A (D)
Date Sampled: 04/07/17 09:30
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-09
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 21:02	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	47 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-B (S)
Date Sampled: 04/07/17 09:55

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-10
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-5
Date Sampled: 04/07/17 10:45

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-11
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW- B (D)
Date Sampled: 04/07/17 11:30
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-12
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/10/17 18:20

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/13/17 21:37	C7D0192	CD71038

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	56 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-C
Date Sampled: 04/07/17 12:50

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-13
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-D
Date Sampled: 04/07/17 14:20

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-14
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: HW-401S
Date Sampled: 04/07/17 14:40

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-15
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: Equipment Blank
Date Sampled: 04/05/17 10:00

ESS Laboratory Work Order: 1704197
ESS Laboratory Sample ID: 1704197-16
Sample Matrix: Aqueous
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution										
Batch CD71038 - 3535A										
Blank										
1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	*3.08*		ug/L	*5.000*		*62*	*15-115*			
LCS										
1,4-Dioxane	11.0	0.250	ug/L	10.00		110	40-140			
Surrogate: 1,4-Dioxane-d8	*3.25*		ug/L	*5.000*		*65*	*15-115*			
LCS Dup										
1,4-Dioxane	11.2	0.250	ug/L	10.00		112	40-140	2	20	
Surrogate: 1,4-Dioxane-d8	*3.22*		ug/L	*5.000*		*64*	*15-115*			

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

Notes and Definitions

Z-08	See Attached
U	Analyte included in the analysis, but not detected
PT	Pentachlorophenol tailing factor > 2.
DDT	DDT breakdown > 20%
BT	Benzidine tailing factor >2.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704197

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Your P.O. #: B02623
Your Project #: 1704197
Your C.O.C. #: 1704197

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/05/01
Report #: R4444424
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B774990
Received: 2017/04/15, 14:19

Sample Matrix: GROUND WATER
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water	14	2017/04/19	2017/04/20	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

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CERTIFICATE OF ANALYSIS

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Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiGrazia, Customer Experience Team Lead
Email: MDiGrazia@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH010	EFH011			EFH012			
Sampling Date		2017/04/05 10:30	2017/04/05 13:30			2017/04/05 14:30			
COC Number		1704197	1704197			1704197			
	UNITS	1704197-02	1704197-05	RDL	MDL	1704197-06	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	0.0038 J	0.47	0.020	0.0032	2.0 (1)	0.10	0.016	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.012 J	0.020	0.0036	0.0050 J	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0050 J	0.0048 U	0.020	0.0048	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.0066 U	0.089	0.020	0.0066	0.11	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.0046 U	0.020	0.0046	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.0040 U	0.020	0.0040	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.0028 U	0.020	0.0028	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0070 J	0.10	0.020	0.0033	0.15	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.020	0.020 J	0.020	0.0034	0.042	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0094 J	0.28	0.020	0.0029	0.32	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.011 J	0.065	0.020	0.0046	0.053	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.027	0.020	0.0046	0.0087 J	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.0036 U	0.020	0.0036	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.043	0.15	0.020	0.0026	0.047	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.017 J	0.39	0.020	0.0027	0.49	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.0038 U	0.020	0.0038	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.0033 U	0.020	0.0033	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.0043 U	0.020	0.0043	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	97	88	N/A	N/A	76	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	99	95	N/A	N/A	86	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	82	80	N/A	N/A	83	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 5x dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH013			EFH014	EFH015			
Sampling Date		2017/04/05 15:00			2017/04/07 10:50	2017/04/07 09:55			
COC Number		1704197			1704197	1704197			
	UNITS	1704197-07	RDL	MDL	1704197-08	1704197-10	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	5.7 (1)	0.20	0.032	0.0032 U	0.0032 U	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.016 J	0.020	0.0036	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.020	0.0048	0.017 J	0.0077 J	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.71	0.020	0.0066	0.012 J	0.040	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.020	0.0046	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.020	0.0040	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.020	0.0028	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.34	0.020	0.0033	0.0048 J	0.049	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.019 J	0.020	0.0034	0.0079 J	0.044	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	2.3 (1)	0.20	0.029	0.0092 J	0.13	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.075	0.020	0.0046	0.0046 U	0.0094 J	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.020	0.0046	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.020	0.0036	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0026 U	0.020	0.0026	0.0026 U	0.026	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	3.8 (1)	0.20	0.027	0.027	0.14	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.020	0.0038	0.0038 U	0.0046 J	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.020	0.0033	0.0033 U	0.0054 J	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.020	0.0043	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	78	N/A	N/A	76	78	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	88	N/A	N/A	87	92	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	80	N/A	N/A	83	97	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH016		EFH017	EFH018	EFH019			
Sampling Date		2017/04/07 10:45		2017/04/07 12:50	2017/04/07 14:20	2017/04/07 14:40			
COC Number		1704197		1704197	1704197	1704197			
	UNITS	1704197-11	RDL	1704197-13	1704197-14	1704197-15	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	0.0037 J	0.020	0.0034 J	0.0032 U	0.0040 J	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.020	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.020	0.0048 U	0.0048 U	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	2.9 (1)	0.20	0.0066 U	0.0066 U	0.0066 U	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.020	0.0040 U	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.020	0.0028 U	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0084 J	0.020	0.0033 U	0.0033 U	0.0043 J	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.018 J	0.020	0.0034 U	0.0089 J	0.011 J	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0029 U	0.020	0.0029 U	0.0029 U	0.0029 U	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.020 J	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.020	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.052	0.020	0.0026 U	0.022	0.012 J	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0027 U	0.020	0.0027 U	0.0027 U	0.0027 U	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.020	0.0038 U	0.0038 U	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.020	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.020	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	65 (2)	N/A	83	84	83	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	81	N/A	100	88	81	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	74	N/A	82	92	82	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.
(2) Surrogate recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the surrogate. When considered together, these QC data suggest that matrix interferences may be biasing the data low. Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low surrogate recovery.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH020	EFH021	EFH022	EFH023			
Sampling Date		2017/04/05 10:00	2017/04/11 12:20	2017/04/11 10:20	2017/04/11 15:30			
COC Number		1704197	1704197	1704197	1704197			
	UNITS	1704197-16	1704299-02	1704299-04	1704299-06	RDL	MDL	QC Batch
Miscellaneous Parameters								
6:2 Fluorotelomer sulfonate	ug/L	0.0032 U	0.0032 U	0.0032 U	0.13	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.016 J	0.0055 J	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.0066 U	0.015 J	0.0066 U	0.021	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0033 U	0.015 J	0.0051 J	0.034	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.0034 U	0.13	0.029	0.12	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0029 U	0.046	0.0060 J	0.041	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.0046 U	0.025	0.0046 U	0.055	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.0046 U	0.0060 J	0.059	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0026 U	0.22	0.029	0.50	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0027 U	0.039	0.013 J	0.060	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.0038 U	0.0038 U	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)								
13C4-Perfluorooctanesulfonate	%	82	91	94	82	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	96	94	92	88	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	82	86	95	89	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EFH010 **Collected:** 2017/04/05
Sample ID: 1704197-02 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH011 **Collected:** 2017/04/05
Sample ID: 1704197-05 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH012 **Collected:** 2017/04/05
Sample ID: 1704197-06 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH013 **Collected:** 2017/04/05
Sample ID: 1704197-07 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH014 **Collected:** 2017/04/07
Sample ID: 1704197-08 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH015 **Collected:** 2017/04/07
Sample ID: 1704197-10 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH016 **Collected:** 2017/04/07
Sample ID: 1704197-11 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EFH017 **Collected:** 2017/04/07
Sample ID: 1704197-13 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH018 **Collected:** 2017/04/07
Sample ID: 1704197-14 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH019 **Collected:** 2017/04/07
Sample ID: 1704197-15 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH020 **Collected:** 2017/04/05
Sample ID: 1704197-16 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH021 **Collected:** 2017/04/11
Sample ID: 1704299-02 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH022 **Collected:** 2017/04/11
Sample ID: 1704299-04 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH023 **Collected:** 2017/04/11
Sample ID: 1704299-06 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

GENERAL COMMENTS

TBLK-EPEU-20161219 received however not listed on CoC. Sample will remain on hold as per client request.

Minimal sample volume received for 1704197-16. Please note this may result in elevated DLs.

Results relate only to the items tested.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4944832	DZU	Spiked Blank	13C4-Perfluorooctanesulfonate	2017/04/20		92	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		102	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20		84	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/04/20		87	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/04/20		99	%	70 - 130
			Perfluorobutanoic acid	2017/04/20		82	%	70 - 130
			Perfluorodecane Sulfonate	2017/04/20		87	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20		93	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20		97	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/04/20		103	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/04/20		97	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20		91	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/04/20		94	%	70 - 130
			Perfluorotetradecanoic Acid	2017/04/20		91	%	70 - 130
			Perfluorotridecanoic Acid	2017/04/20		84	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20		100	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/04/20		101	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/04/20		109	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20		97	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/04/20		94	%	70 - 130
4944832	DZU	Spiked Blank DUP	13C4-Perfluorooctanesulfonate	2017/04/20		93	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		107	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20		88	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/04/20		93	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/04/20		102	%	70 - 130
			Perfluorobutanoic acid	2017/04/20		97	%	70 - 130
			Perfluorodecane Sulfonate	2017/04/20		87	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20		93	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/04/20		106	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/04/20		95	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20		97	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/04/20		98	%	70 - 130
			Perfluorotetradecanoic Acid	2017/04/20		102	%	70 - 130
			Perfluorotridecanoic Acid	2017/04/20		95	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20		107	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/04/20		97	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/04/20		98	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20		92	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/04/20		87	%	70 - 130
4944832	DZU	RPD	6:2 Fluorotelomer sulfonate	2017/04/20	5.1		%	30
			8:2 Fluorotelomer sulfonate	2017/04/20	6.4		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/04/20	3.2		%	30
			Perfluorobutanoic acid	2017/04/20	16		%	30
			Perfluorodecane Sulfonate	2017/04/20	0.23		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20	7.7		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20	4.8		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/04/20	3.2		%	30
			Perfluorononanoic Acid (PFNA)	2017/04/20	2.3		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20	5.5		%	30
			Perfluoropentanoic Acid (PFPeA)	2017/04/20	4.2		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorotetradecanoic Acid	2017/04/20	12		%	30
			Perfluorotridecanoic Acid	2017/04/20	13		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20	7.0		%	30
			Perfluorodecanoic Acid (PFDA)	2017/04/20	4.0		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/04/20	10		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20	5.5		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/04/20	6.9		%	30
4944832	DZU	Method Blank	13C4-Perfluorooctanesulfonate	2017/04/20		88	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		93	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20	0.0032 U, MDL=0.0032		ug/L	
			8:2 Fluorotelomer sulfonate	2017/04/20	0.0036 U, MDL=0.0036		ug/L	
			Perfluorobutane Sulfonate (PFBS)	2017/04/20	0.0048 U, MDL=0.0048		ug/L	
			Perfluorobutanoic acid	2017/04/20	0.0066 U, MDL=0.0066		ug/L	
			Perfluorodecane Sulfonate	2017/04/20	0.0046 U, MDL=0.0046		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20	0.0033 U, MDL=0.0033		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20	0.0034 U, MDL=0.0034		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2017/04/20	0.0029 U, MDL=0.0029		ug/L	
			Perfluorononanoic Acid (PFNA)	2017/04/20	0.0046 U, MDL=0.0046		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20	0.0036 U, MDL=0.0036		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2017/04/20	0.0027 U, MDL=0.0027		ug/L	
			Perfluorotetradecanoic Acid	2017/04/20	0.0038 U, MDL=0.0038		ug/L	
			Perfluorotridecanoic Acid	2017/04/20	0.0033 U, MDL=0.0033		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20	0.0043 U, MDL=0.0043		ug/L	
			Perfluorodecanoic Acid (PFDA)	2017/04/20	0.0040 U, MDL=0.0040		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2017/04/20	0.0028 U, MDL=0.0028		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20	0.0046 U, MDL=0.0046		ug/L	

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonate (PFOS)	2017/04/20	0.0026 U, MDL=0.0026		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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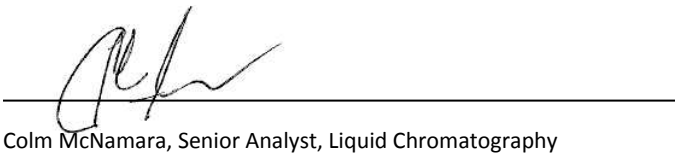
Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Colm McNamara, Senior Analyst, Liquid Chromatography

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Page 1 of 2

Turn Time: (X) Standard Other ____
If faster than 5 days, prior approval by laboratory is required # ____

State where samples were collected from: (MA) RI CT NH NJ NY ME Other ____

Is this project for any of the following: MA-MCP Navy USACE Other ____

Reporting Limits: GW-1

ESS LAB PROJECT ID: 1704197

Electronic Deliverable: Yes (6) No ____

Format: Excel (X) Access ____ PDF (X) Other ____

Co. Name	Project #	Project Name (20 Char. or less)
HORSLEY WITTEN GROUP	17027	BARN. ON-CALL #4

Contact Person	Address
JESSE BEAN	90 Rt. 6A

City	State	Zip	PO#
SANDWICH	MA	02563	

Telephone #	Fax #	Email Address
508 833 6600	508 833 3150	jbean@horsleywitten.com

ESS LAB Sample #	Date	Collection Time	COMP	GRAB	MATRIX	Sample Identification (20 Char. or less)	Pres Code	Number of Containers	Type of Containers	PFOS	1,4 Dioxane	Write Required Analysis
1	4/5/17	1013		X	GW	HW-4D	1	1	G		X	
2	4/5/17	1030		X	GW	HW-4M	1	1	GP	X	X	
3	4/5/17	1125		X	GW	HW-207D	1	1	G		X	
4	4/5/17	1300		X	GW	HW-19D	1	1	G		X	
5	4/5/17	1330		X	GW	HW-3	1	1	P	X		
6	4/5/17	1430		X	GW	HW-E	1	1	P	X		
7	4/5/17	1500		X	GW	HW-F	1	1	P	X		
16	4/5/17	1000		X		EQUIPMENT BLANK	1	1	P	X		

Container Type: (P-Poly) (G-Glass) S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water (GW-Ground Water) SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filters

Cooler Present: (✓) Yes ___ No

Seals Intact: ___ Yes ___ No NA: (✓)

Cooler Temp: 3.9°C & 2.3°C ICE [4/10/17] Technicians ____

Internal Use Only: [ ] Pickup

Preservation Code: (1- NP), 2- HCl, 3- H_2SO_4, 4- HNO_3, 5- NaOH, 6- MeOH, 7- Asorbic Acid, 8- ZnAct, 9- ____

Sampled by:

Comments:

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
	4/7/17 1545		4/7/17 1545		4/10/17 1011		4/10/17 1049
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

*By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VII A

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Receipt

10/26/04 A

ESS Laboratory

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185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Turn Time: ☑ Standard Other ____
If faster than 5 days, prior approval by laboratory is required # ____
State where samples were collected from: MA RI CT NH NJ NY ME Other ____
Is this project for any of the following: MA-MCP Navy USACE Other ____

Reporting Limits: GW-1
ESS LAB PROJECT ID: 1704197
Electronic Deliverable: ☑ Yes ___ No
Format: Excel ☑ Access ___ PDF ☑ Other ____

Co. Name	Project #	Project Name (20 Char. or less)
HORSLEY WITTEN GROUP	17027	BARN. ON-CALL #4

Contact Person	Address
JESSE BEAN	90 RT 6A

City	State	Zip	PO#
SANDWICH	MA	02563	—

Telephone #	Fax #	Email Address
508 833 6600	508 833 3150	jbean@horsleywitten.com

ESS LAB Sample#	Date	Collection Time	COMP	GRAB	MATRIX	Sample Identification (20 Char. or less)	Pres Code	Number of Containers	Type of Containers	PFOS	1,4 DIOXANE	Write Required Analysis
8	4/7/17	0850		X	GW	HW-A (S)	1	1	P	X		
9	4/7/17	0930		X	GW	HW-A(D)	1	2	G		X	
10	4/7/17	0955		X	GW	HW-B(S)	1	1	P	X		
11	4/7/17	1045		X	GW	HW-5	1	1	P	X		
12	4/7/17	1130		X	GW	HW-B(D)	1	2	G	X	X	
13	4/7/17	1250		X	GW	HW-C	1	1	P	X		
14	4/7/17	1420		X	GW	HW-D	1	1	P	X		
15	4/7/17	1440		X	GW	HW-401S	1	1	P	X		

Container Type: P-Poly G-Glass S-Sterile V-VOA | Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water GW-Ground Water SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filters

Cooler Present: ☑ Yes ___ No Internal Use Only
Seals Intact: ___ Yes ___ No NA: ☑ [ ] Pickup
Cooler Temp: 3.9°C & 2.3°C ICE 4/10/17 [ ] Technicians ____

Preservation Code: 1- NP, 2- HCl, 3- H_2SO_4, 4- HNO_3, 5- NaOH, 6- MeOH, 7- Asorbic Acid, 8- ZnAct, 9- ____
Sampled by: HW
Comments: HW-B(D) 1,4 DIOXANE ONLY (DS)

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
[signature]	4/7/17 1545	[signature]	4/7/17 1545	[signature]	4/10/17 1011	[signature]	4/10/17 1049
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

*By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VII A

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Receipt

10/26/04 A

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1704299

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 3:18 pm, May 17, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOS

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704299

SAMPLE RECEIPT

The following samples were received on April 12, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1704299-01	OW-18M	Ground Water	8270D SIM
1704299-02	OW-18D	Ground Water	$, 8270D SIM
1704299-03	OW-19D	Ground Water	8270D SIM
1704299-04	OW-19D	Ground Water	$
1704299-05	OW-19M	Ground Water	8270D SIM
1704299-06	OW-9DD	Ground Water	$, 8270D SIM

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704299

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704299

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-18M
Date Sampled: 04/11/17 10:40
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/13/17 16:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/15/17 4:24	C7D0233	CD71343

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	65 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-18D
Date Sampled: 04/11/17 12:20
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/13/17 16:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	**0.552** (0.250)		8270D SIM		1	04/15/17 5:01	C7D0233	CD71343

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	59 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-18D
Date Sampled: 04/11/17 12:20

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-02
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-19D
Date Sampled: 04/11/17 10:00
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/13/17 16:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	**0.800** (0.250)		8270D SIM		1	04/15/17 5:37	C7D0233	CD71343

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	65 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-19D
Date Sampled: 04/11/17 10:20

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-04
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-19M
Date Sampled: 04/11/17 11:40
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-05
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/13/17 16:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	04/15/17 6:12	C7D0233	CD71343

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	61 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-9DD
Date Sampled: 04/11/17 15:30
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-06
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 4/13/17 16:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	**0.838** (0.250)		8270D SIM		1	04/15/17 6:47	C7D0233	CD71343

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	62 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4
Client Sample ID: OW-9DD
Date Sampled: 04/11/17 15:30

ESS Laboratory Work Order: 1704299
ESS Laboratory Sample ID: 1704299-06
Sample Matrix: Ground Water
Units: %

Subcontracted Analysis

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
PFOS	**See Attached** (N/A)								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704299

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution										
Batch CD71343 - 3535A										
Blank										
1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	*2.42*		ug/L	*5.000*		*48*	*15-115*			
LCS										
1,4-Dioxane	11.6	0.250	ug/L	10.00		116	40-140			
Surrogate: 1,4-Dioxane-d8	*3.00*		ug/L	*5.000*		*60*	*15-115*			
LCS Dup										
1,4-Dioxane	11.3	0.250	ug/L	10.00		113	40-140	2	20	
Surrogate: 1,4-Dioxane-d8	*3.29*		ug/L	*5.000*		*66*	*15-115*			

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4 ESS Laboratory Work Order: 1704299

Notes and Definitions

Z-08	See Attached
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1704299

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Maxxam
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Your P.O. #: B02623
Your Project #: 1704197
Your C.O.C. #: 1704197

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/05/01
Report #: R4444424
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B774990
Received: 2017/04/15, 14:19

Sample Matrix: GROUND WATER
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water	14	2017/04/19	2017/04/20	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: B02623
Your Project #: 1704197
Your C.O.C. #: 1704197

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/05/01
Report #: R4444424
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B774990
Received: 2017/04/15, 14:19

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiGrazia, Customer Experience Team Lead
Email: MDiGrazia@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH010	EFH011			EFH012			
Sampling Date		2017/04/05 10:30	2017/04/05 13:30			2017/04/05 14:30			
COC Number		1704197	1704197			1704197			
	UNITS	1704197-02	1704197-05	RDL	MDL	1704197-06	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	0.0038 J	0.47	0.020	0.0032	2.0 (1)	0.10	0.016	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.012 J	0.020	0.0036	0.0050 J	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0050 J	0.0048 U	0.020	0.0048	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.0066 U	0.089	0.020	0.0066	0.11	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.0046 U	0.020	0.0046	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.0040 U	0.020	0.0040	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.0028 U	0.020	0.0028	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0070 J	0.10	0.020	0.0033	0.15	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.020	0.020 J	0.020	0.0034	0.042	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0094 J	0.28	0.020	0.0029	0.32	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.011 J	0.065	0.020	0.0046	0.053	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.027	0.020	0.0046	0.0087 J	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.0036 U	0.020	0.0036	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.043	0.15	0.020	0.0026	0.047	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.017 J	0.39	0.020	0.0027	0.49	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.0038 U	0.020	0.0038	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.0033 U	0.020	0.0033	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.0043 U	0.020	0.0043	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	97	88	N/A	N/A	76	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	99	95	N/A	N/A	86	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	82	80	N/A	N/A	83	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 5x dilution. Detection limit was adjusted accordingly.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH013			EFH014	EFH015			
Sampling Date		2017/04/05 15:00			2017/04/07 10:50	2017/04/07 09:55			
COC Number		1704197			1704197	1704197			
	UNITS	1704197-07	RDL	MDL	1704197-08	1704197-10	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	5.7 (1)	0.20	0.032	0.0032 U	0.0032 U	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.016 J	0.020	0.0036	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.020	0.0048	0.017 J	0.0077 J	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.71	0.020	0.0066	0.012 J	0.040	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.020	0.0046	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.020	0.0040	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.020	0.0028	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.34	0.020	0.0033	0.0048 J	0.049	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.019 J	0.020	0.0034	0.0079 J	0.044	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	2.3 (1)	0.20	0.029	0.0092 J	0.13	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.075	0.020	0.0046	0.0046 U	0.0094 J	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.020	0.0046	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.020	0.0036	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0026 U	0.020	0.0026	0.0026 U	0.026	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	3.8 (1)	0.20	0.027	0.027	0.14	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.020	0.0038	0.0038 U	0.0046 J	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.020	0.0033	0.0033 U	0.0054 J	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.020	0.0043	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	78	N/A	N/A	76	78	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	88	N/A	N/A	87	92	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	80	N/A	N/A	83	97	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH016		EFH017	EFH018	EFH019			
Sampling Date		2017/04/07 10:45		2017/04/07 12:50	2017/04/07 14:20	2017/04/07 14:40			
COC Number		1704197		1704197	1704197	1704197			
	UNITS	1704197-11	RDL	1704197-13	1704197-14	1704197-15	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	0.0037 J	0.020	0.0034 J	0.0032 U	0.0040 J	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.020	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.020	0.0048 U	0.0048 U	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	2.9 (1)	0.20	0.0066 U	0.0066 U	0.0066 U	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.020	0.0040 U	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.020	0.0028 U	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0084 J	0.020	0.0033 U	0.0033 U	0.0043 J	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.018 J	0.020	0.0034 U	0.0089 J	0.011 J	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0029 U	0.020	0.0029 U	0.0029 U	0.0029 U	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.020 J	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.020	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.020	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.052	0.020	0.0026 U	0.022	0.012 J	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0027 U	0.020	0.0027 U	0.0027 U	0.0027 U	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.020	0.0038 U	0.0038 U	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.020	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.020	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)									
13C4-Perfluorooctanesulfonate	%	65 (2)	N/A	83	84	83	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	81	N/A	100	88	81	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	74	N/A	82	92	82	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.
(2) Surrogate recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the surrogate. When considered together, these QC data suggest that matrix interferences may be biasing the data low. Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low surrogate recovery.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

RESULTS OF ANALYSES OF GROUND WATER

Maxxam ID		EFH020	EFH021	EFH022	EFH023			
Sampling Date		2017/04/05 10:00	2017/04/11 12:20	2017/04/11 10:20	2017/04/11 15:30			
COC Number		1704197	1704197	1704197	1704197			
	UNITS	1704197-16	1704299-02	1704299-04	1704299-06	RDL	MDL	QC Batch
Miscellaneous Parameters								
6:2 Fluorotelomer sulfonate	ug/L	0.0032 U	0.0032 U	0.0032 U	0.13	0.020	0.0032	4944832
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.016 J	0.0055 J	0.0048 U	0.020	0.0048	4944832
Perfluorobutanoic acid	ug/L	0.0066 U	0.015 J	0.0066 U	0.021	0.020	0.0066	4944832
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.0046 U	0.0046 U	0.0046 U	0.020	0.0046	4944832
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.020	0.0040	4944832
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.020	0.0028	4944832
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0033 U	0.015 J	0.0051 J	0.034	0.020	0.0033	4944832
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.0034 U	0.13	0.029	0.12	0.020	0.0034	4944832
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0029 U	0.046	0.0060 J	0.041	0.020	0.0029	4944832
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.0046 U	0.025	0.0046 U	0.055	0.020	0.0046	4944832
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.0046 U	0.0060 J	0.059	0.020	0.0046	4944832
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.0036 U	0.0036 U	0.0036 U	0.020	0.0036	4944832
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0026 U	0.22	0.029	0.50	0.020	0.0026	4944832
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0027 U	0.039	0.013 J	0.060	0.020	0.0027	4944832
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.0038 U	0.0038 U	0.0038 U	0.020	0.0038	4944832
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.020	0.0033	4944832
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.0043 U	0.0043 U	0.0043 U	0.020	0.0043	4944832
Surrogate Recovery (%)								
13C4-Perfluorooctanesulfonate	%	82	91	94	82	N/A	N/A	4944832
13C4-Perfluorooctanoic acid	%	96	94	92	88	N/A	N/A	4944832
13C8-Perfluorooctane Sulfonamide	%	82	86	95	89	N/A	N/A	4944832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EFH010 **Collected:** 2017/04/05
Sample ID: 1704197-02 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH011 **Collected:** 2017/04/05
Sample ID: 1704197-05 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH012 **Collected:** 2017/04/05
Sample ID: 1704197-06 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH013 **Collected:** 2017/04/05
Sample ID: 1704197-07 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH014 **Collected:** 2017/04/07
Sample ID: 1704197-08 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH015 **Collected:** 2017/04/07
Sample ID: 1704197-10 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH016 **Collected:** 2017/04/07
Sample ID: 1704197-11 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EFH017 **Collected:** 2017/04/07
Sample ID: 1704197-13 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH018 **Collected:** 2017/04/07
Sample ID: 1704197-14 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH019 **Collected:** 2017/04/07
Sample ID: 1704197-15 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH020 **Collected:** 2017/04/05
Sample ID: 1704197-16 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH021 **Collected:** 2017/04/11
Sample ID: 1704299-02 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH022 **Collected:** 2017/04/11
Sample ID: 1704299-04 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

Maxxam ID: EFH023 **Collected:** 2017/04/11
Sample ID: 1704299-06 **Shipped:**
Matrix: GROUND WATER **Received:** 2017/04/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4944832	2017/04/19	2017/04/20	Daniela Zupu

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

GENERAL COMMENTS

TBLK-EPEU-20161219 received however not listed on CoC. Sample will remain on hold as per client request.

Minimal sample volume received for 1704197-16. Please note this may result in elevated DLs.

Results relate only to the items tested.

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4944832	DZU	Spiked Blank	13C4-Perfluorooctanesulfonate	2017/04/20		92	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		102	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20		84	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/04/20		87	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/04/20		99	%	70 - 130
			Perfluorobutanoic acid	2017/04/20		82	%	70 - 130
			Perfluorodecane Sulfonate	2017/04/20		87	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20		93	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20		97	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/04/20		103	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/04/20		97	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20		91	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/04/20		94	%	70 - 130
			Perfluorotetradecanoic Acid	2017/04/20		91	%	70 - 130
			Perfluorotridecanoic Acid	2017/04/20		84	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20		100	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/04/20		101	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/04/20		109	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20		97	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/04/20		94	%	70 - 130
4944832	DZU	Spiked Blank DUP	13C4-Perfluorooctanesulfonate	2017/04/20		93	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		107	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20		88	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/04/20		93	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/04/20		102	%	70 - 130
			Perfluorobutanoic acid	2017/04/20		97	%	70 - 130
			Perfluorodecane Sulfonate	2017/04/20		87	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20		93	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/04/20		106	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/04/20		95	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20		97	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/04/20		98	%	70 - 130
			Perfluorotetradecanoic Acid	2017/04/20		102	%	70 - 130
			Perfluorotridecanoic Acid	2017/04/20		95	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20		107	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/04/20		97	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/04/20		98	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20		92	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/04/20		87	%	70 - 130
4944832	DZU	RPD	6:2 Fluorotelomer sulfonate	2017/04/20	5.1		%	30
			8:2 Fluorotelomer sulfonate	2017/04/20	6.4		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/04/20	3.2		%	30
			Perfluorobutanoic acid	2017/04/20	16		%	30
			Perfluorodecane Sulfonate	2017/04/20	0.23		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20	7.7		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20	4.8		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/04/20	3.2		%	30
			Perfluorononanoic Acid (PFNA)	2017/04/20	2.3		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20	5.5		%	30
			Perfluoropentanoic Acid (PFPeA)	2017/04/20	4.2		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorotetradecanoic Acid	2017/04/20	12		%	30
			Perfluorotridecanoic Acid	2017/04/20	13		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20	7.0		%	30
			Perfluorodecanoic Acid (PFDA)	2017/04/20	4.0		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/04/20	10		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20	5.5		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/04/20	6.9		%	30
4944832	DZU	Method Blank	13C4-Perfluorooctanesulfonate	2017/04/20		88	%	70 - 130
			13C4-Perfluorooctanoic acid	2017/04/20		93	%	70 - 130
			13C8-Perfluorooctane Sulfonamide	2017/04/20		86	%	60 - 120
			6:2 Fluorotelomer sulfonate	2017/04/20	0.0032 U, MDL=0.0032		ug/L	
			8:2 Fluorotelomer sulfonate	2017/04/20	0.0036 U, MDL=0.0036		ug/L	
			Perfluorobutane Sulfonate (PFBS)	2017/04/20	0.0048 U, MDL=0.0048		ug/L	
			Perfluorobutanoic acid	2017/04/20	0.0066 U, MDL=0.0066		ug/L	
			Perfluorodecane Sulfonate	2017/04/20	0.0046 U, MDL=0.0046		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2017/04/20	0.0033 U, MDL=0.0033		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2017/04/20	0.0034 U, MDL=0.0034		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2017/04/20	0.0029 U, MDL=0.0029		ug/L	
			Perfluorononanoic Acid (PFNA)	2017/04/20	0.0046 U, MDL=0.0046		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2017/04/20	0.0036 U, MDL=0.0036		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2017/04/20	0.0027 U, MDL=0.0027		ug/L	
			Perfluorotetradecanoic Acid	2017/04/20	0.0038 U, MDL=0.0038		ug/L	
			Perfluorotridecanoic Acid	2017/04/20	0.0033 U, MDL=0.0033		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2017/04/20	0.0043 U, MDL=0.0043		ug/L	
			Perfluorodecanoic Acid (PFDA)	2017/04/20	0.0040 U, MDL=0.0040		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2017/04/20	0.0028 U, MDL=0.0028		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/04/20	0.0046 U, MDL=0.0046		ug/L	

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Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonate (PFOS)	2017/04/20	0.0026 U, MDL=0.0026		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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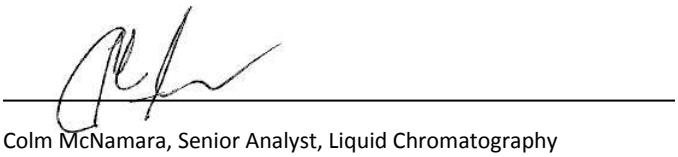
Maxxam Job #: B774990
Report Date: 2017/05/01

ESS Laboratory
Client Project #: 1704197
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Colm McNamara, Senior Analyst, Liquid Chromatography

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory — MAXXAM — CHAIN OF CUSTODY

ESS Lab # 1704299

Division of Thielsch Engineering, Inc.

185 Frances Avenue,Cranston RI 02910-2211
Tel. (401)461-7181 Fax (401)461-4486
www.esslaboratory.com

Turn Time _____**Standard** Other_____

Regulatory State: **MA** RI CT NH NJ NY ME Other_____

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Reporting Limits - **GW-1**

Electonic Deliverables Excel Access PDF

Co. Name	Project #	Project Name	
ESS Laboratory		**1704299**	
Contact Person	Proj. Location		
Shawn Morrell			
Address	City , State	Zip	PO #
			B02623
Tel. ext 3083	email: smorrell@thielsch.com		

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis	PFOS
	4/11/17	**1220**		**GW**	**1704299-02**	**1**	**1**	**P**			**X**
	4/11/17	**1020**		**GW**	**1704299-04**	**1**	**1**	**P**			**X**
	4/11/17	**1530**		**GW**	**1704299-06**	**1**	**1**	**P**			**X**

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present _____Yes _____No

Seals Intact ____ Yes _____No NA:____

Cooler Temperature: _____

Internal Use Only

[ ] Pickup

[ ] Technician____

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by :

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
4/13/17 1500	FED EX		
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges sampels were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

Report Method Blank & Laboratory Control Sample Results

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Page _____ of _____

Turn Time: (X) Standard ( ) Other _____
If faster than 5 days, prior approval by laboratory is required # _____
State where samples were collected from: MA RI CT NH NJ NY ME Other _____
Is this project for any of the following: MA-MCP Navy USACE Other _____

Reporting Limits: GW-1
ESS LAB PROJECT ID: 1704299
Electronic Deliverable: (X) Yes ( ) No
Format: Excel (X) Access ( ) PDF (X) Other _____

Co. Name	Project #	Project Name (20 Char. or less)
HORSLEY WITTEN GROUP	17027	BARN. UN - CALL #4

Contact Person	Address
JESSE BEAN	90 RT 6A

City	State	Zip	PO#
SANDWICH	MA	02563	—

Telephone #	Fax #	Email Address
508 833 6600	508 833 3150	jbean@horsleywitten.com

ESS LAB Sample#	Date	Collection Time	COMP	GRAB	MATRIX	Sample Identification (20 Char. or less)	Pres Code	Number of Containers	Type of Containers	Write Required Analysis: 1,4 DIOXANE	Write Required Analysis: PFCs
1	4/11/17	1040		X	GW	OW-18M	1	2	G	X	
2	4/11/17	1220		X	GW	OW-18D	1	1	2	AP	X	X
3	4/11/17	1060		X	GW	OW-19D	1	2	G	X	
4	4/11/17	1020		X	GW	OW-19D	1	1	P		X
5	4/11/17	1140		X	GW	OW-19M	1	2	G	X	
6	4/11/17	1530		X	GW	OW 9DD	1	1	2	AP	X	X

Container Type: P-Poly G-Glass S-Sterile V-VOA
Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water GW-Ground Water SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filters

Cooler Present: (X) Yes ( ) No
Seals Intact: ( ) Yes ( ) No (X) NA
Cooler Temp: 2.8 ice
Internal Use Only: [X] Pickup [ ] Technicians _____

Preservation Code: 1- NP, 2- HCl, 3- H_2SO_4, 4- HNO_3, 5- NaOH, 6- MeOH, 7- Asorbic Acid, 8- ZnAct, 9- _____
Sampled by: HW
Comments:

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
	4/11/17 1630		4/12/17 1615		4/12/17 1702		4/12/17 1727
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

*By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VII A

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Copy

10/26/04 A

ESS Laboratory **MAXXAM** CHAIN OF CUSTODY

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston RI 02910-2211
Tel. (401)461-7181 Fax (401)461-4486
www.esslaboratory.com

ESS Lab # 1704299

Turn Time **Standard** Other

Reporting Limits - **GW-1**

Regulatory State: **MA** RI CT NH NJ NY ME Other

Is this project for any of the following (please circle)
MA-MCP Navy USACE CT DEP Other

Electonic Deliverables Excel Access PDF

Co. Name: ESS Laboratory	Project #	Project Name: 1704299	
Contact Person: Shawn Morrell	Proj. Location		
Address	City, State	Zip	PO #: B02623
Tel. ext 3083	email: smorrell@thielsch.com		

Analysis: PFOS

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	PFOS
	4/11/17	1220		GW	1704299-02	1	1	P		X
	4/11/17	1020		GW	1704299-04	1	1	P		X
	4/11/17	1530		GW	1704299-06	1	1	P		X

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ____ Yes ____ No

Seals Intact ____ Yes ____ No NA: ____

Cooler Temperature: ____

Internal Use Only
[ ] Pickup
[ ] Technician____

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-____

Sampled by:

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
[signature] 4/13/17 1500	FED EX		
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time) KLAPKE ELPPA [signature] 2017/04/15	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges sampels were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

Report Method Blank & Laboratory Control Sample Results

3.1 /3.2/3.2 14:19

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1709723

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 3:26 pm, Oct 23, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOS

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

SAMPLE RECEIPT

The following samples were received on September 26, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1709723-01	DL-2 2'	Soil	§
1709723-02	DL-2 4'	Soil	§
1709723-03	DL-3 2'	Soil	§
1709723-04	DL-3 4'	Soil	§
1709723-05	DL-11 0-1'	Soil	§
1709723-06	DL-4 2'	Soil	§
1709723-07	DL-4 4'	Soil	§
1709723-08	DL-12 0-1'	Soil	§
1709723-09	DL-5 2'	Soil	§
1709723-10	DL-5 4'	Soil	§
1709723-11	DL-8 4'	Soil	§
1709723-12	DL-13 0-1'	Soil	§
1709723-13	DL-14 0-1'	Soil	§
1709723-14	ARFF-1 2'	Soil	§
1709723-15	ARFF-1 4'	Soil	§
1709723-16	ARFF-CB 0-1'	Soil	§
1709723-17	ARFF-3 0-1'	Soil	§
1709723-18	ARFF-4 0-1'	Soil	§

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

Subcontracted Analysis

Client Sample ID: DL-2 2'
Date Sampled: 09/26/17 08:10

ESS Laboratory Sample ID: 1709723-01
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-2 4'
Date Sampled: 09/26/17 08:15

ESS Laboratory Sample ID: 1709723-02
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-3 2'
Date Sampled: 09/26/17 08:50

ESS Laboratory Sample ID: 1709723-03
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-3 4'
Date Sampled: 09/26/17 09:00

ESS Laboratory Sample ID: 1709723-04
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-11 0-1'
Date Sampled: 09/26/17 09:15

ESS Laboratory Sample ID: 1709723-05
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

Subcontracted Analysis

Client Sample ID: DL-4 2'
Date Sampled: 09/26/17 09:25

ESS Laboratory Sample ID: 1709723-06
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-4 4'
Date Sampled: 09/26/17 09:35

ESS Laboratory Sample ID: 1709723-07
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-12 0-1'
Date Sampled: 09/26/17 09:45

ESS Laboratory Sample ID: 1709723-08
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-5 2'
Date Sampled: 09/26/17 09:55

ESS Laboratory Sample ID: 1709723-09
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-5 4'
Date Sampled: 09/26/17 10:05

ESS Laboratory Sample ID: 1709723-10
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

Subcontracted Analysis

Client Sample ID: DL-8 4'
Date Sampled: 09/26/17 10:35

ESS Laboratory Sample ID: 1709723-11
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-13 0-1'
Date Sampled: 09/26/17 11:00

ESS Laboratory Sample ID: 1709723-12
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: DL-14 0-1'
Date Sampled: 09/26/17 11:10

ESS Laboratory Sample ID: 1709723-13
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: ARFF-1 2'
Date Sampled: 09/26/17 11:40

ESS Laboratory Sample ID: 1709723-14
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: ARFF-1 4'
Date Sampled: 09/26/17 11:50

ESS Laboratory Sample ID: 1709723-15
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

Subcontracted Analysis

Client Sample ID: ARFF-CB 0-1'
Date Sampled: 09/26/17 11:55

ESS Laboratory Sample ID: 1709723-16
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: ARFF-3 0-1'
Date Sampled: 09/26/17 12:05

ESS Laboratory Sample ID: 1709723-17
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

Client Sample ID: ARFF-4 0-1'
Date Sampled: 09/26/17 12:10

ESS Laboratory Sample ID: 1709723-18
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	See Attached								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4 ESS Laboratory Work Order: 1709723

Notes and Definitions

Z-08	See Attached
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1709723

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Maxxam
A Bureau Veritas Group Company

Your P.O. #: B02623
Your Project #: 1709723
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/10/18
Report #: R4790410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7L3940
Received: 2017/09/28, 16:04

Sample Matrix: Soil
Samples Received: 18

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	18	N/A	2017/09/30	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	3	2017/10/10	2017/10/17	CAM SOP-00894	EPA537 m
PFOS and PFOA in soil by SPE/LCMS (1)	15	2017/10/10	2017/10/18	CAM SOP-00894	EPA537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: B02623
Your Project #: 1709723
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/10/18
Report #: R4790410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7L3940
Received: 2017/09/28, 16:04

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephanie Pollen, Project Manager
Email: SPollen@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL325	FFL326	FFL327	FFL328	FFL329	FFL330			
Sampling Date		2017/09/26 08:10	2017/09/26 08:15	2017/09/26 08:50	2017/09/26 09:00	2017/09/26 09:15	2017/09/26 09:25			
COC Number		na	na	na	na	na	na			
	UNITS	1709723-01	1709723-02	1709723-03	1709723-04	1709723-05	1709723-06	RDL	MDL	QC Batch
Inorganics										
Moisture	%	4.3	2.2	4.4	2.8	9.3	2.8	1.0	0.50	5191056
Miscellaneous Parameters										
6:2 Fluorotelomer sulfonate	ug/kg	0.23 U	0.57 J	1.5	1.0	7.8	0.23 U	1.0	0.23	5203646
8:2 Fluorotelomer sulfonate	ug/kg	0.32 U	0.32 U	1.0	1.1	14	0.32 U	1.0	0.32	5203646
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	1.0	0.17	5203646
Perfluorobutanoic acid	ug/kg	0.23 U	0.23 U	0.23 U	0.23 U	1.4	0.23 U	1.0	0.23	5203646
Perfluorodecane Sulfonate	ug/kg	0.23 U	0.23 U	0.23 U	0.86 J	0.23 U	0.23 U	1.0	0.23	5203646
Perfluorodecanoic Acid (PFDA)	ug/kg	0.13 U	0.13 U	0.13 U	0.13 U	1.8	0.13 U	1.0	0.13	5203646
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.22 U	0.22 U	0.71 J	0.22 U	0.22 U	0.22 U	1.0	0.22	5203646
Perfluoroheptanoic Acid (PFHpA)	ug/kg	1.2	0.48 J	0.17 U	0.17 U	2.1	0.17 U	1.0	0.17	5203646
Perfluorohexane Sulfonate (PFHxS)	ug/kg	1.3	0.59 J	0.23 U	0.23 U	0.82 J	0.23 U	1.0	0.23	5203646
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.74 J	0.19 U	0.19 U	0.19 U	2.7	0.19 U	1.0	0.19	5203646
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	4.1	0.74 J	0.26 U	0.26 U	4.7	0.26 U	1.0	0.26	5203646
Perfluorononanoic Acid (PFNA)	ug/kg	2.5	0.17 U	0.17 U	0.17 U	16	0.17 U	1.0	0.17	5203646
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	0.26 U	0.26 U	0.84 J	0.26 U	0.26 U	1.0	0.26	5203646
Perfluorooctane Sulfonate (PFOS)	ug/kg	1.5	0.21 U	0.21 U	0.21 U	29	0.21 U	1.0	0.21	5203646
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.83 J	0.18 U	0.18 U	0.18 U	3.5	0.18 U	1.0	0.18	5203646
Perfluorotetradecanoic Acid	ug/kg	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	1.0	0.11	5203646
Perfluorotridecanoic Acid	ug/kg	0.12 U	0.12 U	5.6	0.21 J	0.20 J	0.12 U	1.0	0.12	5203646
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.18 U	0.18 U	0.75 J	9.8	1.2	0.88 J	1.0	0.18	5203646
Surrogate Recovery (%)										
13C2-6:2 Fluorotelomer sulfonate	%	105	116	113	105	103	98	N/A	N/A	5203646
13C2-8:2 Fluorotelomer sulfonate	%	98	114	99	101	94	100	N/A	N/A	5203646
13C2-Perfluorodecanoic acid	%	109	111	107	101	106	98	N/A	N/A	5203646
13C2-Perfluorododecanoic acid	%	90	98	97	99	99	91	N/A	N/A	5203646
13C2-Perfluorohexanoic acid	%	98	112	100	97	105	100	N/A	N/A	5203646
13C2-perfluorotetradecanoic acid	%	80	105	109	103	85	100	N/A	N/A	5203646
13C2-Perfluoroundecanoic acid	%	101	109	101	96	108	102	N/A	N/A	5203646
13C4-Perfluorobutanoic acid	%	104	107	104	101	104	101	N/A	N/A	5203646
13C4-Perfluoroheptanoic acid	%	102	116	113	109	103	101	N/A	N/A	5203646
13C4-Perfluorooctanesulfonate	%	98	103	102	104	106	94	N/A	N/A	5203646
13C4-Perfluorooctanoic acid	%	102	120	113	106	106	102	N/A	N/A	5203646
13C5-Perfluorononanoic acid	%	101	107	99	102	106	96	N/A	N/A	5203646
13C5-Perfluoropentanoic acid	%	103	108	101	105	103	100	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL325	FFL326	FFL327	FFL328	FFL329	FFL330			
Sampling Date		2017/09/26 08:10	2017/09/26 08:15	2017/09/26 08:50	2017/09/26 09:00	2017/09/26 09:15	2017/09/26 09:25			
COC Number		na	na	na	na	na	na			
	UNITS	**1709723-01**	**1709723-02**	**1709723-03**	**1709723-04**	**1709723-05**	**1709723-06**	**RDL**	**MDL**	**QC Batch**
13C8-Perfluorooctane Sulfonamide	%	105	114	108	101	114	96	N/A	N/A	5203646
18O2-Perfluorohexanesulfonate	%	108	102	101	99	95	83	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL331			FFL332			FFL333	FFL334			
Sampling Date		2017/09/26 09:35			2017/09/26 09:45			2017/09/26 09:55	2017/09/26 10:05			
COC Number		na			na			na	na			
	UNITS	1709723-07	RDL	MDL	1709723-08	RDL	MDL	1709723-09	1709723-10	RDL	MDL	QC Batch
Inorganics												
Moisture	%	2.5	1.0	0.50	17	1.0	0.50	5.1	3.3	1.0	0.50	5191056
Miscellaneous Parameters												
6:2 Fluorotelomer sulfonate	ug/kg	1.7	1.0	0.23	62	10	2.3	0.23 U	0.23 U	1.0	0.23	5203646
8:2 Fluorotelomer sulfonate	ug/kg	0.32 U	1.0	0.32	7.0	1.0	0.32	0.32 U	0.32 U	1.0	0.32	5203646
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	1.0	0.17	0.17 U	1.0	0.17	0.17 U	0.17 U	1.0	0.17	5203646
Perfluorobutanoic acid	ug/kg	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.23 U	0.23 U	1.0	0.23	5203646
Perfluorodecane Sulfonate	ug/kg	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.23 U	0.23 U	1.0	0.23	5203646
Perfluorodecanoic Acid (PFDA)	ug/kg	0.13 U	1.0	0.13	0.66 J	1.0	0.13	0.13 U	0.13 U	1.0	0.13	5203646
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.22 U	1.0	0.22	0.22 U	1.0	0.22	0.22 U	0.22 U	1.0	0.22	5203646
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.17 U	1.0	0.17	1.2	1.0	0.17	0.40 J	0.50 J	1.0	0.17	5203646
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.49 J	0.23 U	1.0	0.23	5203646
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.19 U	1.0	0.19	1.2	1.0	0.19	0.19 U	0.19 U	1.0	0.19	5203646
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.26 U	1.0	0.26	4.6	1.0	0.26	1.6	0.26 U	1.0	0.26	5203646
Perfluorononanoic Acid (PFNA)	ug/kg	3.7	1.0	0.17	7.3	1.0	0.17	0.17 U	0.17 U	1.0	0.17	5203646
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	1.0	0.26	0.26 U	1.0	0.26	0.26 U	0.26 U	1.0	0.26	5203646
Perfluorooctane Sulfonate (PFOS)	ug/kg	0.50 J	1.0	0.21	23	1.0	0.21	0.21 U	0.21 U	1.0	0.21	5203646
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.18 U	1.0	0.18	1.6	1.0	0.18	0.18 U	0.18 U	1.0	0.18	5203646
Perfluorotetradecanoic Acid	ug/kg	0.11 U	1.0	0.11	0.11 U	1.0	0.11	0.11 U	0.11 U	1.0	0.11	5203646
Perfluorotridecanoic Acid	ug/kg	0.12 U	1.0	0.12	0.12 U	1.0	0.12	0.12 U	0.12 U	1.0	0.12	5203646
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.18 U	1.0	0.18	0.18 U	1.0	0.18	0.18 U	0.18 U	1.0	0.18	5203646
Surrogate Recovery (%)												
13C2-6:2 Fluorotelomer sulfonate	%	112	N/A	N/A	102	N/A	N/A	111	113	N/A	N/A	5203646
13C2-8:2 Fluorotelomer sulfonate	%	107	N/A	N/A	85	N/A	N/A	95	101	N/A	N/A	5203646
13C2-Perfluorodecanoic acid	%	124	N/A	N/A	104	N/A	N/A	112	105	N/A	N/A	5203646
13C2-Perfluorododecanoic acid	%	108	N/A	N/A	96	N/A	N/A	98	96	N/A	N/A	5203646
13C2-Perfluorohexanoic acid	%	109	N/A	N/A	95	N/A	N/A	101	111	N/A	N/A	5203646
13C2-perfluorotetradecanoic acid	%	112	N/A	N/A	100	N/A	N/A	103	94	N/A	N/A	5203646
13C2-Perfluoroundecanoic acid	%	116	N/A	N/A	96	N/A	N/A	103	103	N/A	N/A	5203646
13C4-Perfluorobutanoic acid	%	108	N/A	N/A	94	N/A	N/A	109	108	N/A	N/A	5203646
13C4-Perfluoroheptanoic acid	%	111	N/A	N/A	97	N/A	N/A	111	118	N/A	N/A	5203646
13C4-Perfluorooctanesulfonate	%	104	N/A	N/A	91	N/A	N/A	111	96	N/A	N/A	5203646
13C4-Perfluorooctanoic acid	%	114	N/A	N/A	98	N/A	N/A	110	115	N/A	N/A	5203646
13C5-Perfluorononanoic acid	%	106	N/A	N/A	99	N/A	N/A	106	108	N/A	N/A	5203646
13C5-Perfluoropentanoic acid	%	110	N/A	N/A	93	N/A	N/A	102	109	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL331			FFL332			FFL333	FFL334			
Sampling Date		2017/09/26 09:35			2017/09/26 09:45			2017/09/26 09:55	2017/09/26 10:05			
COC Number		na			na			na	na			
	UNITS	**1709723-07**	**RDL**	**MDL**	**1709723-08**	**RDL**	**MDL**	**1709723-09**	**1709723-10**	**RDL**	**MDL**	**QC Batch**
13C8-Perfluorooctane Sulfonamide	%	124	N/A	N/A	102	N/A	N/A	108	114	N/A	N/A	5203646
18O2-Perfluorohexanesulfonate	%	106	N/A	N/A	92	N/A	N/A	114	108	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL335			FFL336			FFL337			
Sampling Date		2017/09/26 10:35			2017/09/26 11:00			2017/09/26 11:10			
COC Number		na			na			na			
	UNITS	1709723-11	RDL	MDL	1709723-12	RDL	MDL	1709723-13	RDL	MDL	QC Batch
Inorganics											
Moisture	%	2.4	1.0	0.50	8.1	1.0	0.50	14	1.0	0.50	5191056
Miscellaneous Parameters											
6:2 Fluorotelomer sulfonate	ug/kg	900 (1)	100	23	320 (2)	10	2.3	230 (2)	10	2.3	5203646
8:2 Fluorotelomer sulfonate	ug/kg	7.9 J (2)	10	3.2	160 (2)	10	3.2	220 (2)	10	3.2	5203646
Perfluorobutane Sulfonate (PFBS)	ug/kg	1.7 U (2)	10	1.7	0.17 U	1.0	0.17	0.17 U	1.0	0.17	5203646
Perfluorobutanoic acid	ug/kg	2.3 U (2)	10	2.3	1.5	1.0	0.23	4.6	1.0	0.23	5203646
Perfluorodecane Sulfonate	ug/kg	2.3 U (2)	10	2.3	0.23 U	1.0	0.23	0.43 J	1.0	0.23	5203646
Perfluorodecanoic Acid (PFDA)	ug/kg	1.3 U (2)	10	1.3	7.4	1.0	0.13	9.6	1.0	0.13	5203646
Perfluorododecanoic Acid (PFDoA)	ug/kg	2.2 U (2)	10	2.2	0.77 J	1.0	0.22	2.1	1.0	0.22	5203646
Perfluoroheptanoic Acid (PFHpA)	ug/kg	4.7 J (2)	10	1.7	1.6	1.0	0.17	4.9	1.0	0.17	5203646
Perfluorohexane Sulfonate (PFHxS)	ug/kg	2.3 U (2)	10	2.3	0.23 U	1.0	0.23	0.71 J	1.0	0.23	5203646
Perfluorohexanoic Acid (PFHxA)	ug/kg	9.7 J (2)	10	1.9	9.4	1.0	0.19	20	1.0	0.19	5203646
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	22 (2)	10	2.6	2.4	1.0	0.26	23	1.0	0.26	5203646
Perfluorononanoic Acid (PFNA)	ug/kg	1.7 U (2)	10	1.7	1.5	1.0	0.17	10	1.0	0.17	5203646
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	2.6 U (2)	10	2.6	0.26 U	1.0	0.26	0.26 U	1.0	0.26	5203646
Perfluorooctane Sulfonate (PFOS)	ug/kg	2.1 U (2)	10	2.1	0.66 J	1.0	0.21	7.6	1.0	0.21	5203646
Perfluoropentanoic Acid (PFPeA)	ug/kg	5.3 J (2)	10	1.8	9.4	1.0	0.18	39	1.0	0.18	5203646
Perfluorotetradecanoic Acid	ug/kg	1.1 U (2)	10	1.1	0.11 U	1.0	0.11	1.1 U (3)	10	1.1	5203646
Perfluorotridecanoic Acid	ug/kg	1.2 U (2)	10	1.2	0.23 J	1.0	0.12	9.3 J (3)	10	1.2	5203646
Perfluoroundecanoic Acid (PFUnA)	ug/kg	1.8 U (2)	10	1.8	6.4	1.0	0.18	17	1.0	0.18	5203646
Surrogate Recovery (%)											
13C2-6:2 Fluorotelomer sulfonate	%	97	N/A	N/A	94	N/A	N/A	93	N/A	N/A	5203646
13C2-8:2 Fluorotelomer sulfonate	%	94	N/A	N/A	86	N/A	N/A	99	N/A	N/A	5203646
13C2-Perfluorodecanoic acid	%	107	N/A	N/A	96	N/A	N/A	111	N/A	N/A	5203646
13C2-Perfluorododecanoic acid	%	101	N/A	N/A	73	N/A	N/A	87	N/A	N/A	5203646
13C2-Perfluorohexanoic acid	%	99	N/A	N/A	102	N/A	N/A	107	N/A	N/A	5203646
13C2-perfluorotetradecanoic acid	%	102	N/A	N/A	63	N/A	N/A	100	N/A	N/A	5203646
13C2-Perfluoroundecanoic acid	%	105	N/A	N/A	86	N/A	N/A	100	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 100x dilution. Detection limit was adjusted accordingly.

(2) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

(3) Due to potential matrix interference, the extracted internal standard analyte exhibited low recovery and as such, may not have allowed for accurate recovery correction of the associated native compound. Sample was diluted 10x. Detection limit was adjusted accordingly.

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL335			FFL336			FFL337			
Sampling Date		2017/09/26 10:35			2017/09/26 11:00			2017/09/26 11:10			
COC Number		na			na			na			
	UNITS	**1709723-11**	**RDL**	**MDL**	**1709723-12**	**RDL**	**MDL**	**1709723-13**	**RDL**	**MDL**	**QC Batch**
13C4-Perfluorobutanoic acid	%	99	N/A	N/A	97	N/A	N/A	105	N/A	N/A	5203646
13C4-Perfluoroheptanoic acid	%	97	N/A	N/A	105	N/A	N/A	105	N/A	N/A	5203646
13C4-Perfluorooctanesulfonate	%	95	N/A	N/A	100	N/A	N/A	93	N/A	N/A	5203646
13C4-Perfluorooctanoic acid	%	103	N/A	N/A	96	N/A	N/A	102	N/A	N/A	5203646
13C5-Perfluorononanoic acid	%	97	N/A	N/A	95	N/A	N/A	103	N/A	N/A	5203646
13C5-Perfluoropentanoic acid	%	97	N/A	N/A	95	N/A	N/A	99	N/A	N/A	5203646
13C8-Perfluorooctane Sulfonamide	%	110	N/A	N/A	98	N/A	N/A	107	N/A	N/A	5203646
18O2-Perfluorohexanesulfonate	%	103	N/A	N/A	88	N/A	N/A	104	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL338	FFL339			FFL340			FFL341			
Sampling Date		2017/09/26 11:40	2017/09/26 11:50			2017/09/26 11:55			2017/09/26 12:05			
COC Number		na	na			na			na			
	UNITS	1709723-14	1709723-15	RDL	MDL	1709723-16	RDL	MDL	1709723-17	RDL	MDL	QC Batch
Inorganics												
Moisture	%	7.4	7.4	1.0	0.50	36	1.0	0.50	7.0	1.0	0.50	5191056
Miscellaneous Parameters												
6:2 Fluorotelomer sulfonate	ug/kg	0.74 J	1.0	1.0	0.23	2.2	1.0	0.23	0.61 J	1.0	0.23	5203646
8:2 Fluorotelomer sulfonate	ug/kg	0.87 J	0.83 J	1.0	0.32	1.7	1.0	0.32	0.50 J	1.0	0.32	5203646
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	0.17 U	1.0	0.17	0.17 U	1.0	0.17	0.17 U	1.0	0.17	5203646
Perfluorobutanoic acid	ug/kg	1.1	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.90 J	1.0	0.23	5203646
Perfluorodecane Sulfonate	ug/kg	0.23 U	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.38 J	1.0	0.23	5203646
Perfluorodecanoic Acid (PFDA)	ug/kg	1.2	0.62 J	1.0	0.13	0.13 U	1.0	0.13	1.6	1.0	0.13	5203646
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.64 J	1.3	1.0	0.22	1.2	1.0	0.22	0.22 U	1.0	0.22	5203646
Perfluoroheptanoic Acid (PFHpA)	ug/kg	1.8	0.66 J	1.0	0.17	0.60 J	1.0	0.17	0.60 J	1.0	0.17	5203646
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	0.23 U	1.0	0.23	0.23 U	1.0	0.23	0.64 J	1.0	0.23	5203646
Perfluorohexanoic Acid (PFHxA)	ug/kg	2.2	0.73 J	1.0	0.19	0.53 J	1.0	0.19	0.80 J	1.0	0.19	5203646
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	2.6	0.75 J	1.0	0.26	0.90 J	1.0	0.26	0.78 J	1.0	0.26	5203646
Perfluorononanoic Acid (PFNA)	ug/kg	5.7	1.4	1.0	0.17	0.17 U	1.0	0.17	0.91 J	1.0	0.17	5203646
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	0.26 U	1.0	0.26	0.26 U	1.0	0.26	0.26 U	1.0	0.26	5203646
Perfluorooctane Sulfonate (PFOS)	ug/kg	2.7	1.1	1.0	0.21	1.1	1.0	0.21	4.4	1.0	0.21	5203646
Perfluoropentanoic Acid (PFPeA)	ug/kg	3.4	0.97 J	1.0	0.18	0.18 U	1.0	0.18	1.3	1.0	0.18	5203646
Perfluorotetradecanoic Acid	ug/kg	0.11 U	0.49 J	1.0	0.11	2.6	1.0	0.11	0.11 U	1.0	0.11	5203646
Perfluorotridecanoic Acid	ug/kg	6.8	22	1.0	0.12	80 (1)	10	1.2	2.2	1.0	0.12	5203646
Perfluoroundecanoic Acid (PFUnA)	ug/kg	12	15	1.0	0.18	4.6	1.0	0.18	8.1	1.0	0.18	5203646
Surrogate Recovery (%)												
13C2-6:2 Fluorotelomer sulfonate	%	95	97	N/A	N/A	76	N/A	N/A	108	N/A	N/A	5203646
13C2-8:2 Fluorotelomer sulfonate	%	76	94	N/A	N/A	75	N/A	N/A	92	N/A	N/A	5203646
13C2-Perfluorodecanoic acid	%	102	101	N/A	N/A	84	N/A	N/A	108	N/A	N/A	5203646
13C2-Perfluorododecanoic acid	%	93	90	N/A	N/A	76	N/A	N/A	105	N/A	N/A	5203646
13C2-Perfluorohexanoic acid	%	87	97	N/A	N/A	84	N/A	N/A	111	N/A	N/A	5203646
13C2-perfluorotetradecanoic acid	%	91	88	N/A	N/A	99	N/A	N/A	102	N/A	N/A	5203646
13C2-Perfluoroundecanoic acid	%	98	91	N/A	N/A	82	N/A	N/A	102	N/A	N/A	5203646
13C4-Perfluorobutanoic acid	%	92	101	N/A	N/A	85	N/A	N/A	107	N/A	N/A	5203646
13C4-Perfluoroheptanoic acid	%	90	102	N/A	N/A	85	N/A	N/A	110	N/A	N/A	5203646
13C4-Perfluorooctanesulfonate	%	83	96	N/A	N/A	79	N/A	N/A	114	N/A	N/A	5203646
13C4-Perfluorooctanoic acid	%	95	98	N/A	N/A	90	N/A	N/A	111	N/A	N/A	5203646
13C5-Perfluorononanoic acid	%	96	93	N/A	N/A	86	N/A	N/A	96	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL338	FFL339			FFL340			FFL341			
Sampling Date		2017/09/26 11:40	2017/09/26 11:50			2017/09/26 11:55			2017/09/26 12:05			
COC Number		na	na			na			na			
	UNITS	**1709723-14**	**1709723-15**	**RDL**	**MDL**	**1709723-16**	**RDL**	**MDL**	**1709723-17**	**RDL**	**MDL**	**QC Batch**
13C5-Perfluoropentanoic acid	%	94	101	N/A	N/A	82	N/A	N/A	103	N/A	N/A	5203646
13C8-Perfluorooctane Sulfonamide	%	102	102	N/A	N/A	78	N/A	N/A	111	N/A	N/A	5203646
18O2-Perfluorohexanesulfonate	%	90	87	N/A	N/A	86	N/A	N/A	102	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL342	FFL342			
Sampling Date		2017/09/26 12:10	2017/09/26 12:10			
COC Number		na	na			
	UNITS	1709723-18	1709723-18 Lab-Dup	RDL	MDL	QC Batch
Inorganics						
Moisture	%	13	13	1.0	0.50	5191056
Miscellaneous Parameters						
6:2 Fluorotelomer sulfonate	ug/kg	0.65 J	N/A	1.0	0.23	5203646
8:2 Fluorotelomer sulfonate	ug/kg	0.32 U	N/A	1.0	0.32	5203646
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	N/A	1.0	0.17	5203646
Perfluorobutanoic acid	ug/kg	1.1	N/A	1.0	0.23	5203646
Perfluorodecane Sulfonate	ug/kg	0.23 U	N/A	1.0	0.23	5203646
Perfluorodecanoic Acid (PFDA)	ug/kg	0.85 J	N/A	1.0	0.13	5203646
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.22 U	N/A	1.0	0.22	5203646
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.75 J	N/A	1.0	0.17	5203646
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	N/A	1.0	0.23	5203646
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.89 J	N/A	1.0	0.19	5203646
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.97 J	N/A	1.0	0.26	5203646
Perfluorononanoic Acid (PFNA)	ug/kg	2.9	N/A	1.0	0.17	5203646
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	N/A	1.0	0.26	5203646
Perfluorooctane Sulfonate (PFOS)	ug/kg	1.0	N/A	1.0	0.21	5203646
Perfluoropentanoic Acid (PFPeA)	ug/kg	1.6	N/A	1.0	0.18	5203646
Perfluorotetradecanoic Acid	ug/kg	0.11 U	N/A	1.0	0.11	5203646
Perfluorotridecanoic Acid	ug/kg	0.25 J	N/A	1.0	0.12	5203646
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.89 J	N/A	1.0	0.18	5203646
Surrogate Recovery (%)						
13C2-6:2 Fluorotelomer sulfonate	%	90	N/A	N/A	N/A	5203646
13C2-8:2 Fluorotelomer sulfonate	%	92	N/A	N/A	N/A	5203646
13C2-Perfluorodecanoic acid	%	101	N/A	N/A	N/A	5203646
13C2-Perfluorododecanoic acid	%	98	N/A	N/A	N/A	5203646
13C2-Perfluorohexanoic acid	%	100	N/A	N/A	N/A	5203646
13C2-perfluorotetradecanoic acid	%	103	N/A	N/A	N/A	5203646
13C2-Perfluoroundecanoic acid	%	101	N/A	N/A	N/A	5203646
13C4-Perfluorobutanoic acid	%	101	N/A	N/A	N/A	5203646
13C4-Perfluoroheptanoic acid	%	108	N/A	N/A	N/A	5203646
13C4-Perfluorooctanesulfonate	%	91	N/A	N/A	N/A	5203646
13C4-Perfluorooctanoic acid	%	102	N/A	N/A	N/A	5203646
13C5-Perfluorononanoic acid	%	100	N/A	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FFL342	FFL342			
Sampling Date		2017/09/26 12:10	2017/09/26 12:10			
COC Number		na	na			
	UNITS	**1709723-18**	**1709723-18 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
13C5-Perfluoropentanoic acid	%	103	N/A	N/A	N/A	5203646
13C8-Perfluorooctane Sulfonamide	%	110	N/A	N/A	N/A	5203646
18O2-Perfluorohexanesulfonate	%	102	N/A	N/A	N/A	5203646

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: FFL325 **Collected:** 2017/09/26
Sample ID: 1709723-01 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/17	Anjan Desai

Maxxam ID: FFL326 **Collected:** 2017/09/26
Sample ID: 1709723-02 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/17	Anjan Desai

Maxxam ID: FFL327 **Collected:** 2017/09/26
Sample ID: 1709723-03 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/17	Anjan Desai

Maxxam ID: FFL328 **Collected:** 2017/09/26
Sample ID: 1709723-04 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL329 **Collected:** 2017/09/26
Sample ID: 1709723-05 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL330 **Collected:** 2017/09/26
Sample ID: 1709723-06 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

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TEST SUMMARY

Maxxam ID: FFL331 **Collected:** 2017/09/26
Sample ID: 1709723-07 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL332 **Collected:** 2017/09/26
Sample ID: 1709723-08 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL333 **Collected:** 2017/09/26
Sample ID: 1709723-09 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL334 **Collected:** 2017/09/26
Sample ID: 1709723-10 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL335 **Collected:** 2017/09/26
Sample ID: 1709723-11 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL336 **Collected:** 2017/09/26
Sample ID: 1709723-12 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

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TEST SUMMARY

Maxxam ID: FFL337 **Collected:** 2017/09/26
Sample ID: 1709723-13 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL338 **Collected:** 2017/09/26
Sample ID: 1709723-14 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL339 **Collected:** 2017/09/26
Sample ID: 1709723-15 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL340 **Collected:** 2017/09/26
Sample ID: 1709723-16 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL341 **Collected:** 2017/09/26
Sample ID: 1709723-17 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

Maxxam ID: FFL342 **Collected:** 2017/09/26
Sample ID: 1709723-18 **Shipped:**
Matrix: Soil **Received:** 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5203646	2017/10/10	2017/10/18	Anjan Desai

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Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: FFL342 Dup
Sample ID: 1709723-18
Matrix: Soil

Collected: 2017/09/26
Shipped:
Received: 2017/09/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5191056	N/A	2017/09/30	Min Yang

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5191056	CYN	RPD - Sample/Sample Dup	Moisture	2017/09/30	0.76		%	20
5203646	AD9	Matrix Spike(FFL335)	6:2 Fluorotelomer sulfonate	2017/10/17		NC	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/17		NC	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/17		NC	%	70 - 130
			Perfluorobutanoic acid	2017/10/17		NC	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/17		NC	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/10/17		NC	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/17		NC	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/17		NC	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/17		NC	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/17		NC	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/17		NC	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/17		NC	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/17		NC	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/17		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/17		NC	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/17		NC	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/17		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/17		NC	%	70 - 130
5203646	AD9	Matrix Spike DUP(FFL335)	6:2 Fluorotelomer sulfonate	2017/10/17		NC	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/17		NC	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/17		NC	%	70 - 130
			Perfluorobutanoic acid	2017/10/17		NC	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/17		NC	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/10/17		NC	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/17		NC	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/17		NC	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/17		NC	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/17		NC	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/17		NC	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/17		NC	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/17		NC	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/17		NC	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/17		NC	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/17		NC	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/17		NC	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/17		NC	%	70 - 130
5203646	AD9	MS/MSD RPD	6:2 Fluorotelomer sulfonate	2017/10/17	NC		%	30
			8:2 Fluorotelomer sulfonate	2017/10/17	NC		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/10/17	NC		%	30
			Perfluorobutanoic acid	2017/10/17	NC		%	30
			Perfluorodecane Sulfonate	2017/10/17	NC		%	30
			Perfluorodecanoic Acid (PFDA)	2017/10/17	NC		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/10/17	NC		%	30
			Perfluorononanoic Acid (PFNA)	2017/10/17	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/17	NC		%	25
			Perfluorotetradecanoic Acid	2017/10/17	NC		%	30
			Perfluorotridecanoic Acid	2017/10/17	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/10/17	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/10/17	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/10/17	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/10/17	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/17	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/10/17	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoropentanoic Acid (PFPeA)	2017/10/17	NC		%	30
5203646	AD9	Spiked Blank	13C2-6:2 Fluorotelomer sulfonate	2017/10/17		96	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/17		101	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/17		113	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/17		100	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/17		102	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/17		101	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/17		104	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/17		100	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/17		107	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/17		104	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/17		112	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/17		102	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/17		107	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/17		104	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/17		101	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/17		106	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/17		106	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/17		104	%	70 - 130
			Perfluorobutanoic acid	2017/10/17		104	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/17		88	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/10/17		100	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/17		106	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/17		102	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/17		98	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/17		107	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/17		104	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/17		100	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/17		98	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/17		96	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/17		101	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/17		94	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/17		94	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/17		99	%	70 - 130
5203646	AD9	Method Blank	13C2-6:2 Fluorotelomer sulfonate	2017/10/17		106	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/17		98	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/17		106	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/17		88	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/17		95	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/17		94	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/17		96	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/17		102	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/17		102	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/17		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/17		113	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/17		98	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/17		106	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/17		92	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/17		105	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/17	0.23 U, MDL=0.23		ug/kg	
			8:2 Fluorotelomer sulfonate	2017/10/17	0.32 U, MDL=0.32		ug/kg	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorobutane Sulfonate (PFBS)	2017/10/17	0.17 U, MDL=0.17		ug/kg	
			Perfluorobutanoic acid	2017/10/17	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecane Sulfonate	2017/10/17	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2017/10/17	0.13 U, MDL=0.13		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2017/10/17	0.22 U, MDL=0.22		ug/kg	
			Perfluorononanoic Acid (PFNA)	2017/10/17	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/17	0.26 U, MDL=0.26		ug/kg	
			Perfluorotetradecanoic Acid	2017/10/17	0.11 U, MDL=0.11		ug/kg	
			Perfluorotridecanoic Acid	2017/10/17	0.12 U, MDL=0.12		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2017/10/17	0.18 U, MDL=0.18		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2017/10/17	0.17 U, MDL=0.17		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2017/10/17	0.23 U, MDL=0.23		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2017/10/17	0.19 U, MDL=0.19		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/17	0.26 U, MDL=0.26		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2017/10/17	0.21 U, MDL=0.21		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2017/10/17	0.18 U, MDL=0.18		ug/kg	

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7L3940
Report Date: 2017/10/18

ESS Laboratory
Client Project #: 1709723
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Adam Robinson, Supervisor, LC/MS/MS

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory
Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 1709723

Turn Time X Standard Other_____

Regulatory State (MA) RI CT NH NJ NY ME Other_____

Reporting Limits - S-1/GW-1

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Electonic Deliverables (Excel) Access (PDF)

Co. Name: HORSLEY WITTEN GROUP	Project #: 17027	Project Name: BARN ON CAPE #4	
Contact Person: J Bean	Address: 90 RT 6A		
City: SANDWICH	State: MA	Zip: 02563	PO #
Tel: 508 8336600	Fax: 508 933 3150	email: jbean@horsleywitten.com	

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis: PFOSALCM-S
1	9/26/17	0810	G	S	DL-2 2'	i	1	P	250ml	X
2		0815			DL-2 4'					
3		0850			DL-3 2'					
4		0900			DL-3 4'					
5		0915			DL-11 0-1'					
6		0925			DL-4 2'					
7		0935			DL-4 4'					
8		0945			DL-12 0-1'					
9		0955			DL-5 2'					
10		1005			DL-5 4'					

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present X Yes ____No

Seals Intact ____ Yes ____No NA:___

Cooler Temperature: 4.9 Iceml

Internal Use Only
[X] Pickup
[ ] Technician___

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by : HW

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
9/26/17 1530	9/26/17 1530	9/26/17 1736	9/26/17 1835
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy
2 (Yellow) Client Receipt

PAGE 2 of 2

ESS Laboratory

Division of Thielsch Engineering, Inc.

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Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 1709723

Turn Time X Standard Other______
Regulatory State: (MA) RI CT NH NJ NY ME Other______
Is this project for any of the following:(please circle) MA-MCP Navy USACE CT DEP Other______

Reporting Limits - S-1 / GW-1
Electonic Deliverables (Excel) Access (PDF)

Co. Name: HORSLEY WITTEN GROUP	Project #: 17027	Project Name: BARN. ON CAM #4	
Contact Person: J Bean	Address: 90 RT 6A		
City: SANDWICH	State: MA	Zip: 02563	PO #
Tel.: 508 8336600	Fax: 508 833 3150	email: jbean@horsleywitten.com	

Analysis: PFAS ACM-5

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	PFAS ACM-5
11	9/26/17	1035	G	S	DL-8 4'	1	1	P	250ml	X
12	↓	1100	↓	↓	DL-13 0-1'	↓	↓	↓	↓	↓
13	↓	1110	↓	↓	DL-14 0-1'	↓	↓	↓	↓	↓
14	↓	1140	↓	↓	ARFF-1 2'	↓	↓	↓	↓	↓
15	↓	1150	↓	↓	ARFF-1 4'	↓	↓	↓	↓	↓
16	↓	1155	↓	↓	ARFF-CB 0-1'	↓	↓	↓	↓	↓
17	↓	1205	↓	↓	ARFF-3 0-1'	↓	↓	↓	↓	↓
18	↓	1210	↓	↓	ARFF-4 0-1'	↓	↓	↓	↓	↓

Container Type: (P-Poly) G-Glass AG-Amber Glass S-Sterile V-VOA
Matrix: (S-Soil) SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ___X___ Yes _____ No
Seals Intact _____ Yes _____ No NA:_____
Cooler Temperature: 4.9 ICE ON

Internal Use Only
[X] Pickup
[ ] Technician___

Preservation Code: (1-NP), 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____
Sampled by : HW
Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
9/26/17 1530	9/26/17 1530	9/26/17 1736	9/26/17 1835
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy
2 (Yellow) Client Receipt

CERTIFICATE OF ANALYSIS

Joe Longo
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: HYA (14105)
ESS Laboratory Work Order Number: 1612316

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 5:41 pm, Dec 29, 2016

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state tandards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOA, PFOS

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

SAMPLE RECEIPT

The following samples were received on December 12, 2016 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has performed and reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Data Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Lab Number	Sample Name	Matrix	Analysis
1612316-01	MCI DRILL	Soil	$
1612316-02	1991 SITE 2 ALPHA-1	Soil	$
1612316-03	ANNUAL DEPLOYMENT	Soil	$
1612316-04	FOAM MIX	Aqueous	§

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

Subcontracted Analysis

Client Sample ID: MCI DRILL
Date Sampled: 12/09/16 11:30

ESS Laboratory Sample ID: 1612316-01
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: 1991 SITE 2 ALPHA-1
Date Sampled: 12/09/16 11:00

ESS Laboratory Sample ID: 1612316-02
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: ANNUAL DEPLOYMENT
Date Sampled: 12/09/16 12:00

ESS Laboratory Sample ID: 1612316-03
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: FOAM MIX
Date Sampled: 12/09/16 14:15

ESS Laboratory Sample ID: 1612316-04
Sample Matrix: Aqueous

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

Notes and Definitions

Z-08	See Attached
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: HYA

ESS Laboratory Work Order: 1612316

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095

Your P.O. #: B02623
Your Project #: 1612316
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Avenue
Cranston, RI
USA 02910-2211

Report Date: 2016/12/29
Report #: R4306211
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6R1181
Received: 2016/12/13, 15:04

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	3	N/A	2016/12/28	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil	3	2016/12/16	2016/12/20	CAM SOP-00894	EPA537 m

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water	1	2016/12/14	2016/12/16	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your P.O. #: B02623
Your Project #: 1612316
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Avenue
Cranston, RI
USA 02910-2211

Report Date: 2016/12/29
Report #: R4306211
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6R1181
Received: 2016/12/13, 15:04

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiGrazia, Project Manager - ATUT
Email: MDiGrazia@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		DPU291		DPU292		DPU293		
Sampling Date		2016/12/09 11:30		2016/12/09 11:00		2016/12/09 12:00		
COC Number		na		na		na		
	UNITS	1612316-01	RDL	1612316-02	RDL	1612316-03	RDL	QC Batch
Inorganics								
Moisture	%	9.3	1.0	3.5	1.0	10	1.0	4807644
Miscellaneous Parameters								
6:2 Fluorotelomer sulfonate	ug/kg	270 (1)	10	0.40 U	1.0	4300 (2)	100	4796218
8:2 Fluorotelomer sulfonate	ug/kg	550 (2)	100	0.40 U	1.0	1200 (2)	100	4796218
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.40 U	1.0	0.40 U	1.0	4.0 U (1)	10	4796218
Perfluorobutanoic acid	ug/kg	2.1	1.0	0.40 U	1.0	13 (1)	10	4796218
Perfluorodecane Sulfonate	ug/kg	0.40 U	1.0	0.40 U	1.0	4.0 U (1)	10	4796218
Perfluorodecanoic Acid (PFDA)	ug/kg	20	1.0	0.40 U	1.0	69 (1)	10	4796218
Perfluorododecanoic Acid (PFDoA)	ug/kg	6.6	1.0	0.40 U	1.0	28 (1)	10	4796218
Perfluoroheptanoic Acid (PFHpA)	ug/kg	8.4	1.0	0.40 U	1.0	20 (1)	10	4796218
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.50 J	1.0	0.40 U	1.0	4.0 U (1)	10	4796218
Perfluorohexanoic Acid (PFHxA)	ug/kg	17	1.0	0.40 U	1.0	150 (1)	10	4796218
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	23	1.0	0.20 U	1.0	100 (1)	10	4796218
Perfluorononanoic Acid (PFNA)	ug/kg	14	1.0	0.20 U	1.0	31 (1)	10	4796218
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.30 J	1.0	0.40 U	1.0	4.0 U (1)	10	4796218
Perfluorooctane Sulfonate (PFOS)	ug/kg	24	1.0	0.40 U	1.0	1.9 J (1)	10	4796218
Perfluoropentanoic Acid (PFPeA)	ug/kg	6.0	1.0	0.40 U	1.0	29 (1)	10	4796218
Perfluorotetradecanoic Acid	ug/kg	2.1	1.0	0.40 U	1.0	10 (1)	10	4796218
Perfluorotridecanoic Acid	ug/kg	140 (1)	10	0.40 U	1.0	6.0 J (1)	10	4796218
Perfluoroundecanoic Acid (PFUnA)	ug/kg	440 (1)	10	0.40 U	1.0	15 (1)	10	4796218
Surrogate Recovery (%)								
13C4-Perfluorooctanesulfonate	%	72	N/A	81	N/A	88	N/A	4796218
13C4-Perfluorooctanoic acid	%	67	N/A	88	N/A	70	N/A	4796218
13C8-Perfluorooctanesulfonamide	%	75	N/A	83	N/A	91	N/A	4796218

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.
(2) Due to high concentration of the target analyte, sample required 100x dilution. Detection limit was adjusted accordingly.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

RESULTS OF ANALYSES OF WATER

Maxxam ID		DPU294		
Sampling Date		2016/12/09 14:15		
COC Number		na		
	UNITS	1612316-04	RDL	QC Batch
Miscellaneous Parameters				
6:2 Fluorotelomer sulfonate	ug/L	33 (1)	8.0	4794191
8:2 Fluorotelomer sulfonate	ug/L	5.7 J (1)	8.0	4794191
Perfluorobutane Sulfonate (PFBS)	ug/L	5.0 U (1)	8.0	4794191
Perfluorobutanoic acid	ug/L	6.8 J (1)	8.0	4794191
Perfluorodecane Sulfonate	ug/L	5.0 U (1)	8.0	4794191
Perfluorodecanoic Acid (PFDA)	ug/L	2.8 J (1)	8.0	4794191
Perfluorododecanoic Acid (PFDoA)	ug/L	5.0 U (1)	8.0	4794191
Perfluoroheptanoic Acid (PFHpA)	ug/L	3.4 J (1)	8.0	4794191
Perfluorohexane Sulfonate (PFHxS)	ug/L	2.1 J (1)	8.0	4794191
Perfluorohexanoic Acid (PFHxA)	ug/L	14 (1)	8.0	4794191
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	19 (1)	8.0	4794191
Perfluorononanoic Acid (PFNA)	ug/L	93 (1)	8.0	4794191
Perfluorooctane Sulfonamide (PFOSA)	ug/L	5.0 U (1)	8.0	4794191
Perfluorooctane Sulfonate (PFOS)	ug/L	5.0 U (1)	8.0	4794191
Perfluoropentanoic Acid (PFPeA)	ug/L	3.7 J (1)	8.0	4794191
Perfluorotetradecanoic Acid	ug/L	5.0 U (1)	8.0	4794191
Perfluorotridecanoic Acid	ug/L	10 (1)	8.0	4794191
Perfluoroundecanoic Acid (PFUnA)	ug/L	29 (1)	8.0	4794191
Surrogate Recovery (%)				
13C4-Perfluorooctanesulfonate	%	90	N/A	4794191
13C4-Perfluorooctanoic acid	%	80	N/A	4794191
13C8-Perfluorooctanesulfonamide	%	63	N/A	4794191

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to sample matrix, sample required high level analysis with 10x dilution. Detection limit was adjusted accordingly.

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Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: DPU291 **Collected:** 2016/12/09
Sample ID: 1612316-01 **Shipped:**
Matrix: Soil **Received:** 2016/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4807644	N/A	2016/12/28	Chun Yan
PFOS and PFOA in soil	LCMS	4796218	2016/12/16	2016/12/20	Colm McNamara

Maxxam ID: DPU292 **Collected:** 2016/12/09
Sample ID: 1612316-02 **Shipped:**
Matrix: Soil **Received:** 2016/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4807644	N/A	2016/12/28	Chun Yan
PFOS and PFOA in soil	LCMS	4796218	2016/12/16	2016/12/20	Colm McNamara

Maxxam ID: DPU293 **Collected:** 2016/12/09
Sample ID: 1612316-03 **Shipped:**
Matrix: Soil **Received:** 2016/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	4807644	N/A	2016/12/28	Chun Yan
PFOS and PFOA in soil	LCMS	4796218	2016/12/16	2016/12/20	Colm McNamara

Maxxam ID: DPU294 **Collected:** 2016/12/09
Sample ID: 1612316-04 **Shipped:**
Matrix: Water **Received:** 2016/12/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water	LCMS	4794191	2016/12/14	2016/12/16	Colm McNamara

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GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4794191	CM5	Matrix Spike	13C4-Perfluorooctanesulfonate	2016/12/16		91	%	70 - 130
			13C4-Perfluorooctanoic acid	2016/12/16		88	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/16		87	%	60 - 120
			6:2 Fluorotelomer sulfonate	2016/12/16		96	%	70 - 130
			8:2 Fluorotelomer sulfonate	2016/12/16		99	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2016/12/16		91	%	70 - 130
			Perfluorobutanoic acid	2016/12/16		112	%	70 - 130
			Perfluorodecane Sulfonate	2016/12/16		111	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2016/12/16		100	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2016/12/16		99	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2016/12/16		97	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2016/12/16		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/16		101	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2016/12/16		102	%	70 - 130
			Perfluorotetradecanoic Acid	2016/12/16		110	%	70 - 130
			Perfluorotridecanoic Acid	2016/12/16		105	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2016/12/16		99	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2016/12/16		105	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2016/12/16		104	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/16		101	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2016/12/16		NC	%	70 - 130
4794191	CM5	RPD	6:2 Fluorotelomer sulfonate	2016/12/16	4.7		%	30
			8:2 Fluorotelomer sulfonate	2016/12/16	7.6		%	30
			Perfluorobutane Sulfonate (PFBS)	2016/12/16	12		%	30
			Perfluorobutanoic acid	2016/12/16	1.3		%	30
			Perfluorodecane Sulfonate	2016/12/16	6.3		%	30
			Perfluoroheptanoic Acid (PFHpA)	2016/12/16	1.8		%	30
			Perfluorohexane Sulfonate (PFHxS)	2016/12/16	6.0		%	30
			Perfluorohexanoic Acid (PFHxA)	2016/12/16	4.3		%	30
			Perfluorononanoic Acid (PFNA)	2016/12/16	5.1		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/16	13		%	30
			Perfluoropentanoic Acid (PFPeA)	2016/12/16	0.35		%	30
			Perfluorotetradecanoic Acid	2016/12/16	7.5		%	30
			Perfluorotridecanoic Acid	2016/12/16	3.0		%	30
			Perfluoroundecanoic Acid (PFUnA)	2016/12/16	4.2		%	30
			Perfluorodecanoic Acid (PFDA)	2016/12/16	4.6		%	30
			Perfluorododecanoic Acid (PFDoA)	2016/12/16	4.9		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/16	2.8		%	30
			Perfluorooctane Sulfonate (PFOS)	2016/12/16	NC		%	30
4794191	CM5	Spiked Blank	13C4-Perfluorooctanesulfonate	2016/12/16		97	%	70 - 130
			13C4-Perfluorooctanoic acid	2016/12/16		98	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/16		97	%	60 - 120
			6:2 Fluorotelomer sulfonate	2016/12/16		104	%	70 - 130
			8:2 Fluorotelomer sulfonate	2016/12/16		106	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2016/12/16		111	%	70 - 130
			Perfluorobutanoic acid	2016/12/16		105	%	70 - 130
			Perfluorodecane Sulfonate	2016/12/16		104	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2016/12/16		101	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2016/12/16		110	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2016/12/16		101	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2016/12/16		110	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/16		109	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2016/12/16		106	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorotetradecanoic Acid	2016/12/16		109	%	70 - 130
			Perfluorotridecanoic Acid	2016/12/16		111	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2016/12/16		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2016/12/16		109	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2016/12/16		113	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/16		108	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2016/12/16		108	%	70 - 130
4794191	CM5	Method Blank	13C4-Perfluorooctanesulfonate	2016/12/16		106	%	70 - 130
			13C4-Perfluorooctanoic acid	2016/12/16		96	%	70 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/16		89	%	60 - 120
			6:2 Fluorotelomer sulfonate	2016/12/16	0.50 U, RDL=0.80		ug/L	
			8:2 Fluorotelomer sulfonate	2016/12/16	0.60 U, RDL=0.80		ug/L	
			Perfluorobutane Sulfonate (PFBS)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorobutanoic acid	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorodecane Sulfonate	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2016/12/16	0.60 U, RDL=0.80		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorononanoic Acid (PFNA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorotetradecanoic Acid	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorotridecanoic Acid	2016/12/16	0.60 U, RDL=0.80		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorodecanoic Acid (PFDA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/16	0.50 U, RDL=0.80		ug/L	
			Perfluorooctane Sulfonate (PFOS)	2016/12/16	0.50 U, RDL=0.80		ug/L	
4796218	CM5	Matrix Spike	13C4-Perfluorooctanesulfonate	2016/12/20		82	%	50 - 130
			13C4-Perfluorooctanoic acid	2016/12/20		88	%	50 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/20		70	%	50 - 130
			6:2 Fluorotelomer sulfonate	2016/12/20		102	%	70 - 130
			8:2 Fluorotelomer sulfonate	2016/12/20		99	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorobutane Sulfonate (PFBS)	2016/12/20		115	%	70 - 130
			Perfluorobutanoic acid	2016/12/20		120	%	70 - 130
			Perfluorodecane Sulfonate	2016/12/20		101	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2016/12/20		120	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2016/12/20		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2016/12/20		113	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/20		121	%	70 - 130
			Perfluorotetradecanoic Acid	2016/12/20		123	%	70 - 130
			Perfluorotridecanoic Acid	2016/12/20		122	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2016/12/20		110	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2016/12/20		111	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2016/12/20		116	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2016/12/20		118	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/20		117	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2016/12/20		111	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2016/12/20		105	%	70 - 130
4796218	CM5	RPD	6:2 Fluorotelomer sulfonate	2016/12/20	9.4		%	30
			8:2 Fluorotelomer sulfonate	2016/12/20	21		%	30
			Perfluorobutane Sulfonate (PFBS)	2016/12/20	2.7		%	30
			Perfluorobutanoic acid	2016/12/20	3.7		%	30
			Perfluorodecane Sulfonate	2016/12/20	8.3		%	30
			Perfluorodecanoic Acid (PFDA)	2016/12/20	1.0		%	30
			Perfluorododecanoic Acid (PFDoA)	2016/12/20	0.39		%	30
			Perfluorononanoic Acid (PFNA)	2016/12/20	11		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/20	5.4		%	25
			Perfluorotetradecanoic Acid	2016/12/20	8.1		%	30
			Perfluorotridecanoic Acid	2016/12/20	0		%	30
			Perfluoroundecanoic Acid (PFUnA)	2016/12/20	3.0		%	30
			Perfluoroheptanoic Acid (PFHpA)	2016/12/20	1.4		%	30
			Perfluorohexane Sulfonate (PFHxS)	2016/12/20	0.69		%	30
			Perfluorohexanoic Acid (PFHxA)	2016/12/20	1.0		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/20	2.4		%	30
			Perfluorooctane Sulfonate (PFOS)	2016/12/20	0.36		%	30
			Perfluoropentanoic Acid (PFPeA)	2016/12/20	1.9		%	30
4796218	CM5	Spiked Blank	13C4-Perfluorooctanesulfonate	2016/12/20		78	%	50 - 130
			13C4-Perfluorooctanoic acid	2016/12/20		84	%	50 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/20		72	%	50 - 130
			6:2 Fluorotelomer sulfonate	2016/12/20		101	%	70 - 130
			8:2 Fluorotelomer sulfonate	2016/12/20		92	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2016/12/20		107	%	70 - 130
			Perfluorobutanoic acid	2016/12/20		97	%	70 - 130
			Perfluorodecane Sulfonate	2016/12/20		99	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2016/12/20		102	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2016/12/20		90	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2016/12/20		100	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/20		105	%	70 - 130
			Perfluorotetradecanoic Acid	2016/12/20		106	%	70 - 130
			Perfluorotridecanoic Acid	2016/12/20		112	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2016/12/20		97	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2016/12/20		103	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2016/12/20		109	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2016/12/20		107	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/20		106	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonate (PFOS)	2016/12/20		99	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2016/12/20		93	%	70 - 130
4796218	CM5	Method Blank	13C4-Perfluorooctanesulfonate	2016/12/20		116	%	50 - 130
			13C4-Perfluorooctanoic acid	2016/12/20		111	%	50 - 130
			13C8-Perfluorooctanesulfonamide	2016/12/20		83	%	50 - 130
			6:2 Fluorotelomer sulfonate	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			8:2 Fluorotelomer sulfonate	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorobutane Sulfonate (PFBS)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorobutanoic acid	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorodecane Sulfonate	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorononanoic Acid (PFNA)	2016/12/20	0.20 U, RDL=1.0		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorotetradecanoic Acid	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorotridecanoic Acid	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2016/12/20	0.20 U, RDL=1.0		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2016/12/20	0.40 U, RDL=1.0		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2016/12/20	0.40 U, RDL=1.0		ug/kg	

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Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4807644	NS3	RPD	Moisture	2016/12/28	0.71		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

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Maxxam Job #: B6R1181
Report Date: 2016/12/29

ESS Laboratory
Client Project #: 1612316
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Adam Robinson, Supervisor, LC/MS/MS

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Sin Chii Chia, Scientific Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory — MAXXAM — CHAIN OF CUSTODY

Division of Thielsch Engineering, Inc.

185 Frances Avenue,Cranston RI 02910-2211
Tel. (401)461-7181 Fax (401)461-4486
www.esslaboratory.com

ESS Lab # 1612316

Turn Time Standard **DUE 12/19/16**

Regulatory State: **MA** RI CT NH NJ NY ME Other_____

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Reporting Limits - _____

Electonic Deliverables Excel Access PDF

Co. Name: **ESS Laboratory**	Project #:	Project Name: **1612316**	
Contact Person: **Shawn Morrell**	Proj. Location:		
Address:	City , State:	Zip:	PO #: B02623
Tel. ext 3083	email: smorrell@thielsch.com		

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis	PFOS/PFOA EPA 537
	12/9/16	1130	C	S	1612316-01	1	1	P			X
	12/9/16	1100	C	S	1612316-02	1	1	P			X
	12/9/16	1200	C	S	1612316-03	1	1	P			X
	12/9/16	1415	G	L	1612316-04	1	1	P			X

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present _____Yes _____No

Seals Intact ____Yes _____No NA:____

Cooler Temperature: _____

Internal Use Only

[ ] Pickup

[ ] Technician____

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by :

Comments: **see attached analytes**

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
12/12/16 1635	FedEx		
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges sampels were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

Report Method Blank & Laboratory Control Sample Results

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Page 1 of 1

Turn Time ✓ Standard Other _____
If faster than 5 days, prior approval by laboratory is required # _____

State where samples were collected from:
MA RI CT NH NJ NY ME Other _____

Is this project for any of the following:
MA-MCP Navy USACE Other EPA Health Advisory

Reporting Limits: EPA Health Advisory

ESS LAB PROJECT ID: 161236

Electronic Deliverable: Yes ✓ No ___
Format: Excel ✓ Access ___ PDF ___ Other _____

Co. Name	Project #	Project Name (20 Char. or less)
Horsley Witten	14105	H/A

Contact Person	Address
Joe Longo	

City	State	Zip	PO#
Sandwich	MA	02563	

Telephone #	Fax #	Email Address
508 833 6600		jlongo@horsleywitten.com

ESS LAB Sample #	Date	Collection Time	COMP	GRAB	MATRIX	Sample Identification (20 Char. or less)	Pres Code	Number of Containers	Type of Containers	Write Required Analysis: PFOS / PFOA	Write Required Analysis: EPA 537
1	12/9/16	11 30	X		S	MCI DRILL/		1	P	X	
2	12/9/16	11 00	X		S	1991 SITE 2 ALPHA-1		1	P	X	
3	12/9/16	1000	X		S	ANNUAL DEPLOYMENT		1	P	X	
4	12/9/16	2:15		X	L	FOAM MIX		1	P	X	

Container Type: P-Poly G-Glass S-Sterile V-VOA | Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water GW-Ground Water SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filters

Cooler Present ___ Yes ___ No
Seals Intact ___ Yes ___ No NA: ___
Cooler Temp: ice temp 1.4°

Internal Use Only
[ ] Pickup
[ ] Technicians ____

Preservation Code: 1- NP, 2- HCl, 3- H_2SO_4, 4- HNO_3, 5- NaOH, 6- MeOH, 7- Asorbic Acid, 8- ZnAct, 9- NONE

Sampled by: Joe Longo

Comments:

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
[signature]	12/12	[signature]	12/12/16 1209	[signature]	12/12/16 1623	[signature]	14/12/16 1623
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

*By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VII A

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Receipt

10/26/04 A

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1706533

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 10:59 am, Jul 18, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOS

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

SAMPLE RECEIPT

The following samples were received on June 20, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1706533-01	KMART SW	Surface Water	$
1706533-02	HW-1	Ground Water	$
1706533-03	HW-23	Ground Water	$
1706533-04	HW-19D	Ground Water	$

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

Subcontracted Analysis

Client Sample ID: KMART SW
Date Sampled: 06/20/17 08:15

ESS Laboratory Sample ID: 1706533-01
Sample Matrix: Surface Water

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: HW-1
Date Sampled: 06/20/17 11:50

ESS Laboratory Sample ID: 1706533-02
Sample Matrix: Ground Water

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: HW-23
Date Sampled: 06/20/17 13:10

ESS Laboratory Sample ID: 1706533-03
Sample Matrix: Ground Water

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

Client Sample ID: HW-19D
Date Sampled: 06/20/17 13:35

ESS Laboratory Sample ID: 1706533-04
Sample Matrix: Ground Water

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOS	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4 ESS Laboratory Work Order: 1706533

Notes and Definitions

Z-08	See Attached
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706533

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Maxxam
A Bureau Veritas Group Company

Your P.O. #: B02623
Your Project #: 1706533
Your C.O.C. #: 1706533

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/07/17
Report #: R4601135
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7D5769
Received: 2017/06/28, 14:30

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	4	2017/07/04	2017/07/06	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: B02623
Your Project #: 1706533
Your C.O.C. #: 1706533

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/07/17
Report #: R4601135
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7D5769
Received: 2017/06/28, 14:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephanie Pollen, Project Manager
Email: SPollen@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7D5769
Report Date: 2017/07/17

ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

RESULTS OF ANALYSES OF WATER

Maxxam ID		EQO625	EQO626		EQO627	EQO628			
Sampling Date		2017/06/20 08:15	2017/06/20 11:50		2017/06/20 13:10	2017/06/20 13:35			
COC Number		1706533	1706533		1706533	1706533			
	UNITS	1706533-01	1706533-02	QC Batch	1706533-03	1706533-04	RDL	MDL	QC Batch
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/L	0.0032 U	0.0032 U	5056109	0.0032 U	0.0032 U	0.020	0.0032	5056109
8:2 Fluorotelomer sulfonate	ug/L	0.0036 U	0.0036 U	5056109	0.0036 U	0.0036 U	0.020	0.0036	5056109
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0048 U	0.020	5056109	0.0051 J	0.0081 J	0.020	0.0048	5056109
Perfluorobutanoic acid	ug/L	0.0043 U	0.0088 J	5056109	0.0043 U	0.0043 U	0.020	0.0043	5056109
Perfluorodecane Sulfonate	ug/L	0.0046 U	0.0046 U	5056109	0.0046 U	0.0046 U	0.020	0.0046	5056109
Perfluorodecanoic Acid (PFDA)	ug/L	0.0040 U	0.0040 U	5056109	0.0040 U	0.0040 U	0.020	0.0040	5056109
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0028 U	0.0028 U	5067867	0.0028 U	0.0028 U	0.020	0.0028	5056109
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0033 U	0.0042 J	5056109	0.0045 J	0.0052 J	0.020	0.0033	5056109
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.0034 U	0.065	5056109	0.021	0.046	0.020	0.0034	5056109
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0070 J	0.030	5056109	0.015 J	0.017 J	0.020	0.0029	5056109
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.0046 U	0.022	5056109	0.0046 U	0.017 J	0.020	0.0046	5056109
Perfluorononanoic Acid (PFNA)	ug/L	0.0043 J	0.0057 J	5056109	0.0038 U	0.0065 J	0.020	0.0038	5056109
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0036 U	0.0036 U	5067867	0.0036 U	0.0036 U	0.020	0.0036	5056109
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0026 U	0.24	5056109	0.0079 J	0.061	0.020	0.0026	5056109
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0061 J	0.029	5056109	0.021	0.015 J	0.020	0.0027	5056109
Perfluorotetradecanoic Acid	ug/L	0.0038 U	0.0038 U	5067867	0.0038 U	0.0038 U	0.020	0.0038	5067867
Perfluorotridecanoic Acid	ug/L	0.0033 U	0.0033 U	5067867	0.0033 U	0.0033 U	0.020	0.0033	5067867
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0043 U	0.0043 U	5056109	0.0043 U	0.0043 U	0.020	0.0043	5056109
Surrogate Recovery (%)									
13C2-6:2 Fluorotelomer sulfonate	%	64	72	5056109	91	78	N/A	N/A	5056109
13C2-8:2 Fluorotelomer sulfonate	%	62	71	5056109	71	73	N/A	N/A	5056109
13C2-Perfluorodecanoic acid	%	63	55	5056109	61	67	N/A	N/A	5056109
13C2-Perfluorododecanoic acid	%	67	48 (1)	5067867	50	59	N/A	N/A	5056109
13C2-Perfluorohexanoic acid	%	70	77	5056109	66	75	N/A	N/A	5056109
13C2-perfluorotetradecanoic acid	%	71	36 (1)	5067867	30 (1)	63	N/A	N/A	5067867
13C2-Perfluoroundecanoic acid	%	51	50	5056109	56	61	N/A	N/A	5056109
13C4-Perfluorobutanoic acid	%	74	75	5056109	75	77	N/A	N/A	5056109
13C4-Perfluoroheptanoic acid	%	66	80	5056109	84	83	N/A	N/A	5056109

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked water resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be biasing the data low. Because quantitation is performed using isotope dilution techniques, any losses of the native compound that may occur during any of the sample preparation, extraction, cleanup or determinative steps will be mirrored by a similar loss of the labeled standard, and as such can be accounted for and corrected. Therefore, the quantification of these target compounds is not affected by the low extracted internal standard analyte recovery.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7D5769
Report Date: 2017/07/17

ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

RESULTS OF ANALYSES OF WATER

Maxxam ID		EQO625	EQO626		EQO627	EQO628			
Sampling Date		2017/06/20 08:15	2017/06/20 11:50		2017/06/20 13:10	2017/06/20 13:35			
COC Number		1706533	1706533		1706533	1706533			
	UNITS	**1706533-01**	**1706533-02**	**QC Batch**	**1706533-03**	**1706533-04**	**RDL**	**MDL**	**QC Batch**
13C4-Perfluorooctanesulfonate	%	69	76	5056109	75	75	N/A	N/A	5056109
13C4-Perfluorooctanoic acid	%	64	81	5056109	76	75	N/A	N/A	5056109
13C5-Perfluorononanoic acid	%	69	69	5056109	80	76	N/A	N/A	5056109
13C5-Perfluoropentanoic acid	%	71	84	5056109	77	76	N/A	N/A	5056109
13C8-Perfluorooctane Sulfonamide	%	73	64	5067867	65	52	N/A	N/A	5056109
18O2-Perfluorohexanesulfonate	%	69	73	5056109	76	70	N/A	N/A	5056109

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7D5769
Report Date: 2017/07/17

ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EQO625
Sample ID: 1706533-01
Matrix: Water

Collected: 2017/06/20
Shipped:
Received: 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5056109	2017/07/04	2017/07/06	Daniela Zupu

Maxxam ID: EQO626
Sample ID: 1706533-02
Matrix: Water

Collected: 2017/06/20
Shipped:
Received: 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5056109	2017/07/04	2017/07/06	Daniela Zupu

Maxxam ID: EQO627
Sample ID: 1706533-03
Matrix: Water

Collected: 2017/06/20
Shipped:
Received: 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5056109	2017/07/04	2017/07/06	Daniela Zupu

Maxxam ID: EQO628
Sample ID: 1706533-04
Matrix: Water

Collected: 2017/06/20
Shipped:
Received: 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5056109	2017/07/04	2017/07/06	Daniela Zupu

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7D5769
Report Date: 2017/07/17

ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

GENERAL COMMENTS

Sample EQO625, PFOS and PFOA in water by SPE/LCMS: Test repeated.
Sample EQO626, PFOS and PFOA in water by SPE/LCMS: Test repeated.
Sample EQO627, PFOS and PFOA in water by SPE/LCMS: Test repeated.
Sample EQO628, PFOS and PFOA in water by SPE/LCMS: Test repeated.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7D5769
Report Date: 2017/07/17

ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5056109	DZU	Spiked Blank	13C2-6:2 Fluorotelomer sulfonate	2017/07/06		110	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/06		86	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/06		95	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/06		88	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/06		110	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/06		85	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/06		95	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/06		93	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/06		95	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/06		107	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/06		105	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/06		102	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/06		81	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/06		97	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/06		97	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/07/06		118	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/07/06		98	%	70 - 130
			Perfluorobutanoic acid	2017/07/06		107	%	70 - 130
			Perfluorodecane Sulfonate	2017/07/06		85	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/07/06		109	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/07/06		99	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/07/06		102	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/07/06		88	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/06		97	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/07/06		88	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/06		96	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/07/06		107	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/06		87	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/06		83	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/07/06		105	%	70 - 130
5056109	DZU	Spiked Blank DUP	13C2-6:2 Fluorotelomer sulfonate	2017/07/06		83	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/06		92	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/06		84	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/06		71	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/06		87	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/06		71	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/06		91	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/06		90	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/06		82	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/06		103	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/06		94	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/06		93	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/06		69	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/06		97	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/06		98	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/07/06		94	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/07/06		85	%	70 - 130
			Perfluorobutanoic acid	2017/07/06		95	%	70 - 130
			Perfluorodecane Sulfonate	2017/07/06		77	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/07/06		105	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/07/06		98	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/07/06		109	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/07/06		90	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/06		100	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoropentanoic Acid (PFPeA)	2017/07/06		88	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/06		108	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/07/06		113	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/06		84	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/06		83	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/07/06		99	%	70 - 130
5056109	DZU	RPD	6:2 Fluorotelomer sulfonate	2017/07/06	1.8		%	30
			8:2 Fluorotelomer sulfonate	2017/07/06	22		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/07/06	14		%	30
			Perfluorobutanoic acid	2017/07/06	12		%	30
			Perfluorodecane Sulfonate	2017/07/06	9.9		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/07/06	3.4		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/07/06	0.61		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/07/06	6.6		%	30
			Perfluorononanoic Acid (PFNA)	2017/07/06	2.3		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/06	3.1		%	30
			Perfluoropentanoic Acid (PFPeA)	2017/07/06	0.23		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/07/06	11		%	30
			Perfluorodecanoic Acid (PFDA)	2017/07/06	5.5		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/07/06	3.0		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/06	0.24		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/07/06	5.5		%	30
5056109	DZU	Method Blank	13C2-6:2 Fluorotelomer sulfonate	2017/07/06		96	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/06		103	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/06		78	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/06		69	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/06		103	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/06		74	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/06		96	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/06		102	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/06		92	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/06		103	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/06		102	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/06		107	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/06		62	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/06		100	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/06	0.0032 U, MDL=0.0032		ug/L	
			8:2 Fluorotelomer sulfonate	2017/07/06	0.0036 U, MDL=0.0036		ug/L	
			Perfluorobutane Sulfonate (PFBS)	2017/07/06	0.0048 U, MDL=0.0048		ug/L	
			Perfluorobutanoic acid	2017/07/06	0.0043 U, MDL=0.0043		ug/L	
			Perfluorodecane Sulfonate	2017/07/06	0.0046 U, MDL=0.0046		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2017/07/06	0.0033 U, MDL=0.0033		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2017/07/06	0.0034 U, MDL=0.0034		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2017/07/06	0.0029 U, MDL=0.0029		ug/L	
			Perfluorononanoic Acid (PFNA)	2017/07/06	0.0038 U, MDL=0.0038		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/06	0.0036 U, MDL=0.0036		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2017/07/06	0.0027 U, MDL=0.0027		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2017/07/06	0.0043 U, MDL=0.0043		ug/L	
			Perfluorodecanoic Acid (PFDA)	2017/07/06	0.0040 U, MDL=0.0040		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2017/07/06	0.0028 U, MDL=0.0028		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/06	0.0046 U, MDL=0.0046		ug/L	
			Perfluorooctane Sulfonate (PFOS)	2017/07/06	0.0026 U, MDL=0.0026		ug/L	
5067867	DZU	Spiked Blank	13C2-Perfluorododecanoic acid	2017/07/12		66	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/12		72	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/12		79	%	50 - 150
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/12		101	%	70 - 130
			Perfluorotetradecanoic Acid	2017/07/12		96	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/12		93	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/12		108	%	70 - 130
5067867	DZU	Spiked Blank DUP	13C2-Perfluorododecanoic acid	2017/07/12		55	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/12		54	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/12		65	%	50 - 150
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/12		110	%	70 - 130
			Perfluorotetradecanoic Acid	2017/07/12		119	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/12		113	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/12		102	%	70 - 130
5067867	DZU	RPD	Perfluorooctane Sulfonamide (PFOSA)	2017/07/12	8.9		%	30
			Perfluorotetradecanoic Acid	2017/07/12	22		%	30
			Perfluorotridecanoic Acid	2017/07/12	20		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/07/12	6.3		%	30
5067867	DZU	Method Blank	13C2-Perfluorododecanoic acid	2017/07/12		54	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/12		63	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/12		68	%	50 - 150
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/12	0.0036 U, MDL=0.0036		ug/L	
			Perfluorotetradecanoic Acid	2017/07/12	0.0038 U, MDL=0.0038		ug/L	
			Perfluorotridecanoic Acid	2017/07/12	0.0033 U, MDL=0.0033		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2017/07/12	0.0028 U, MDL=0.0028		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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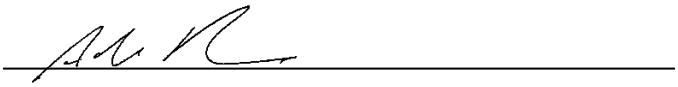
Maxxam Job #: B7D5769
Report Date: 2017/07/17

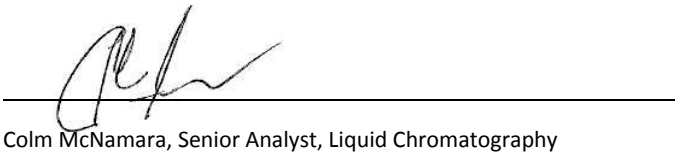
ESS Laboratory
Client Project #: 1706533
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Adam Robinson, Supervisor, LC/MS/MS



Colm McNamara, Senior Analyst, Liquid Chromatography

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory

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CHAIN OF CUSTODY

ESS Lab # 1706533

Turn Time X Standard Other_____

Regulatory State: (MA) RI CT NH NJ NY ME Other_____

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Reporting Limits - GW-1

Electonic Deliverables (Excel) Access (PDF)

Co. Name: HORSLEY WITTEN GROUP	Project #: 17027	Project Name: BAM. on-Cam #4	
Contact Person: JESSE BEAM	Address: 90 RT 6A		
City: SANDWICH	State: MA	Zip: 02563	PO #
Tel: 508 833 6600	Fax: 508 833 8150	email: jbeam@horsleywitten.com	

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis: PFOSALCM-S	Analysis: PFOS
	6/20/17	1030	G	S	ARFF BLDG 1	NP	1	P	250	X	
		1035	G	S	ARFF BLDG 2	NP	1	P	250	X	
1		0815	G	SW	KMART SW		2	P	125ml		X
2		1150	G	GW	HW-1		2	P	125		X
3		1310	G	GW	HW-23		2	P	125		X
4		1335	G	GW	HW-19D		2	P	125		X

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ____Yes ____No

Seals Intact ____ Yes ____No NA:___

Cooler Temperature: 2-3 ice mm

Internal Use Only
[ ] Pickup
[ ] Technician___

Preservation Code: (1-NP) 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by :

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
6/20/17 1445	6/20/17 1520	6/20/17 1650	6/20/17 1907
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy
2 (Yellow) Client Receipt

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1706532

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 11:50 am, Jul 20, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOA

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

SAMPLE RECEIPT

The following samples were received on June 20, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1706532-01	DL-1	Soil	§
1706532-02	DL-2	Soil	§
1706532-03	DL-3	Soil	§
1706532-04	DL-4	Soil	§
1706532-05	DL-5	Soil	§
1706532-06	DL-6	Soil	§
1706532-07	DL-7	Soil	§
1706532-08	DL-8-2'	Soil	§
1706532-09	DL-9	Soil	§
1706532-10	DL-10	Soil	§
1706532-11	ARFF BLDG 1	Soil	§
1706532-12	ARFF BLDG 2	Soil	§

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

Subcontracted Analysis

Client Sample ID: DL-1
Date Sampled: 06/20/17 09:00

ESS Laboratory Sample ID: 1706532-01
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-2
Date Sampled: 06/20/17 09:15

ESS Laboratory Sample ID: 1706532-02
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-3
Date Sampled: 06/20/17 09:30

ESS Laboratory Sample ID: 1706532-03
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-4
Date Sampled: 06/20/17 09:45

ESS Laboratory Sample ID: 1706532-04
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-5
Date Sampled: 06/20/17 09:45

ESS Laboratory Sample ID: 1706532-05
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

Subcontracted Analysis

Client Sample ID: DL-6
Date Sampled: 06/20/17 09:50

ESS Laboratory Sample ID: 1706532-06
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-7
Date Sampled: 06/20/17 10:00

ESS Laboratory Sample ID: 1706532-07
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-8-2'
Date Sampled: 06/20/17 10:05

ESS Laboratory Sample ID: 1706532-08
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-9
Date Sampled: 06/20/17 10:15

ESS Laboratory Sample ID: 1706532-09
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: DL-10
Date Sampled: 06/20/17 10:20

ESS Laboratory Sample ID: 1706532-10
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

Subcontracted Analysis

Client Sample ID: ARFF BLDG 1
Date Sampled: 06/20/17 10:30

ESS Laboratory Sample ID: 1706532-11
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: ARFF BLDG 2
Date Sampled: 06/20/17 10:35

ESS Laboratory Sample ID: 1706532-12
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4 ESS Laboratory Work Order: 1706532

Notes and Definitions

Z-08	See Attached
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1706532

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Your P.O. #: B02623
Your Project #: 1706532
Your C.O.C. #: 1706532

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/07/19
Report #: R4604701
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7D5743
Received: 2017/06/28, 14:30

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	12	N/A	2017/06/30	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	12	2017/07/04	2017/07/10	CAM SOP-00894	EPA537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: B02623
Your Project #: 1706532
Your C.O.C. #: 1706532

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/07/19
Report #: R4604701
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7D5743
Received: 2017/06/28, 14:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephanie Pollen, Project Manager
Email: SPollen@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO499	EQO500				EQO501	EQO501			
Sampling Date		2017/06/20 09:00	2017/06/20 09:15				2017/06/20 09:30	2017/06/20 09:30			
COC Number		1706532	1706532				1706532	1706532			
	UNITS	1706532-01	1706532-02	RDL	MDL	QC Batch	1706532-03	1706532-03 Lab-Dup	RDL	MDL	QC Batch
Inorganics											
Moisture	%	3.1	9.1	1.0	0.50	5053470	6.2	N/A	1.0	0.50	5053470
Miscellaneous Parameters											
6:2 Fluorotelomer sulfonate	ug/kg	0.39 J	0.23 U	1.0	0.23	5056239	3.1	3.1	1.0	0.23	5056239
8:2 Fluorotelomer sulfonate	ug/kg	2.2	0.32 U	1.0	0.32	5056239	18	13 (1)	1.0	0.32	5056239
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	0.17 U	1.0	0.17	5056239	0.17 U	0.17 U	1.0	0.17	5056239
Perfluorobutanoic acid	ug/kg	0.23 U	1.4	1.0	0.23	5056239	0.33 J	0.27 J	1.0	0.23	5056239
Perfluorodecane Sulfonate	ug/kg	0.65 J	0.23 U	1.0	0.23	5056239	0.74 J	0.73 J	1.0	0.23	5056239
Perfluorodecanoic Acid (PFDA)	ug/kg	0.63 J	0.13 U	1.0	0.13	5056239	1.4	1.3	1.0	0.13	5056239
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.37 J	0.22 U	1.0	0.22	5056239	4.1	3.4	1.0	0.22	5056239
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.30 J	1.9	1.0	0.17	5056239	0.84 J	0.79 J	1.0	0.17	5056239
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	1.8	1.0	0.23	5056239	0.34 J	0.34 J	1.0	0.23	5056239
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.19 U	2.2	1.0	0.19	5056239	0.38 J	0.29 J	1.0	0.19	5056239
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.26 U	1.6	1.0	0.26	5056239	0.80 J	0.63 J	1.0	0.26	5056239
Perfluorononanoic Acid (PFNA)	ug/kg	0.17 U	0.81 J	1.0	0.17	5056239	0.55 J	0.51 J	1.0	0.17	5056239
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	0.26 U	1.0	0.26	5056239	3.5	2.7	1.0	0.26	5056239
Perfluorooctane Sulfonate (PFOS)	ug/kg	0.40 J	12	1.0	0.21	5056239	0.51 J	0.45 J	1.0	0.21	5056239
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.18 U	2.7	1.0	0.18	5056239	1.4	0.97 J	1.0	0.18	5056239
Perfluorotetradecanoic Acid	ug/kg	0.11 U	0.11 U	1.0	0.11	5056239	0.97 J	0.87 J	1.0	0.11	5056239
Perfluorotridecanoic Acid	ug/kg	2.6	0.12 U	1.0	0.12	5056239	43 (2)	N/A	10	1.2	5071737
Perfluoroundecanoic Acid (PFUnA)	ug/kg	3.6	0.18 U	1.0	0.18	5056239	4.9	4.2	1.0	0.18	5056239
Surrogate Recovery (%)											
13C2-6:2 Fluorotelomer sulfonate	%	101	83	N/A	N/A	5056239	92	92	N/A	N/A	5056239
13C2-8:2 Fluorotelomer sulfonate	%	80	75	N/A	N/A	5056239	91	97	N/A	N/A	5056239
13C2-Perfluorodecanoic acid	%	80	64	N/A	N/A	5056239	68	63	N/A	N/A	5056239
13C2-Perfluorododecanoic acid	%	80	57	N/A	N/A	5056239	61	70	N/A	N/A	5056239
13C2-Perfluorohexanoic acid	%	88	76	N/A	N/A	5056239	79	81	N/A	N/A	5056239
13C2-perfluorotetradecanoic acid	%	72	54	N/A	N/A	5056239	55	58	N/A	N/A	5056239
13C2-Perfluoroundecanoic acid	%	79	68	N/A	N/A	5056239	70	71	N/A	N/A	5056239
13C4-Perfluorobutanoic acid	%	115	84	N/A	N/A	5056239	97	95	N/A	N/A	5056239
13C4-Perfluoroheptanoic acid	%	93	81	N/A	N/A	5056239	75	84	N/A	N/A	5056239
13C4-Perfluorooctanesulfonate	%	83	69	N/A	N/A	5056239	76	82	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.
(2) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO499	EQO500				EQO501	EQO501			
Sampling Date		2017/06/20 09:00	2017/06/20 09:15				2017/06/20 09:30	2017/06/20 09:30			
COC Number		1706532	1706532				1706532	1706532			
	UNITS	**1706532-01**	**1706532-02**	**RDL**	**MDL**	**QC Batch**	**1706532-03**	**1706532-03 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
13C4-Perfluorooctanoic acid	%	89	83	N/A	N/A	5056239	81	87	N/A	N/A	5056239
13C5-Perfluorononanoic acid	%	86	71	N/A	N/A	5056239	78	74	N/A	N/A	5056239
13C5-Perfluoropentanoic acid	%	95	95	N/A	N/A	5056239	78	81	N/A	N/A	5056239
13C8-Perfluorooctane Sulfonamide	%	72	67	N/A	N/A	5056239	63	69	N/A	N/A	5056239
18O2-Perfluorohexanesulfonate	%	106	76	N/A	N/A	5056239	72	76	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO502	EQO503		EQO504			EQO505			
Sampling Date		2017/06/20 09:45	2017/06/20 09:45		2017/06/20 09:50			2017/06/20 10:00			
COC Number		1706532	1706532		1706532			1706532			
	UNITS	1706532-04	1706532-05	QC Batch	1706532-06	RDL	MDL	1706532-07	RDL	MDL	QC Batch
Inorganics											
Moisture	%	3.0	9.5	5053470	11	1.0	0.50	6.4	1.0	0.50	5053470
Miscellaneous Parameters											
6:2 Fluorotelomer sulfonate	ug/kg	0.24 J	0.23 U	5056239	2.0	1.0	0.23	290 (1)	10	2.3	5056239
8:2 Fluorotelomer sulfonate	ug/kg	0.62 J	0.32 U	5056239	0.32 U	1.0	0.32	87 (1)	10	3.2	5056239
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	0.17 U	5056239	0.17 U	1.0	0.17	1.7 U (1)	10	1.7	5056239
Perfluorobutanoic acid	ug/kg	0.34 J	0.85 J	5056239	2.0	1.0	0.23	2.3 U (1)	10	2.3	5056239
Perfluorodecane Sulfonate	ug/kg	0.23 U	0.23 U	5056239	0.23 U	1.0	0.23	2.3 U (1)	10	2.3	5056239
Perfluorodecanoic Acid (PFDA)	ug/kg	1.3	0.13 U	5056239	0.13 U	1.0	0.13	1.3 U (1)	10	1.3	5056239
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.22 U	0.22 U	5056239	0.22 U	1.0	0.22	2.2 U (1)	10	2.2	5056239
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.31 J	2.5	5056239	5.0	1.0	0.17	2.5 J (1)	10	1.7	5056239
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	0.49 J	5056239	0.23 U	1.0	0.23	2.3 U (1)	10	2.3	5056239
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.19 U	1.2	5056239	4.8	1.0	0.19	2.3 J (1)	10	1.9	5056239
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.83 J	3.7	5056239	0.26 U	1.0	0.26	4.2 J (1)	10	2.6	5056239
Perfluorononanoic Acid (PFNA)	ug/kg	2.7	0.19 J	5056239	0.19 J	1.0	0.17	9.6 J (1)	10	1.7	5056239
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	0.26 U	5056239	0.26 U	1.0	0.26	2.6 U (1)	10	2.6	5056239
Perfluorooctane Sulfonate (PFOS)	ug/kg	2.0	0.21 U	5056239	0.21 U	1.0	0.21	3.9 J (1)	10	2.1	5056239
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.56 J	2.1	5056239	4.6	1.0	0.18	4.9 J (1)	10	1.8	5056239
Perfluorotetradecanoic Acid	ug/kg	0.11 U	0.11 U	5073733	0.11 U	1.0	0.11	1.1 U (1)	10	1.1	5056239
Perfluorotridecanoic Acid	ug/kg	0.12 U	0.12 U	5073733	0.12 U	1.0	0.12	1.2 U (1)	10	1.2	5056239
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.72 J	0.18 U	5056239	0.18 U	1.0	0.18	1.8 U (1)	10	1.8	5056239
Surrogate Recovery (%)											
13C2-6:2 Fluorotelomer sulfonate	%	119	80	5056239	94	N/A	N/A	86	N/A	N/A	5056239
13C2-8:2 Fluorotelomer sulfonate	%	89	63	5056239	100	N/A	N/A	79	N/A	N/A	5056239
13C2-Perfluorodecanoic acid	%	82	74	5056239	87	N/A	N/A	95	N/A	N/A	5056239
13C2-Perfluorododecanoic acid	%	77	71	5056239	71	N/A	N/A	72	N/A	N/A	5056239
13C2-Perfluorohexanoic acid	%	85	68	5056239	86	N/A	N/A	88	N/A	N/A	5056239
13C2-perfluorotetradecanoic acid	%	72	80	5073733	61	N/A	N/A	71	N/A	N/A	5056239
13C2-Perfluoroundecanoic acid	%	90	77	5056239	82	N/A	N/A	98	N/A	N/A	5056239
13C4-Perfluorobutanoic acid	%	106	77	5056239	94	N/A	N/A	106	N/A	N/A	5056239
13C4-Perfluoroheptanoic acid	%	87	70	5056239	83	N/A	N/A	82	N/A	N/A	5056239
13C4-Perfluorooctanesulfonate	%	87	62	5056239	81	N/A	N/A	87	N/A	N/A	5056239
13C4-Perfluorooctanoic acid	%	99	73	5056239	93	N/A	N/A	95	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limit was adjusted accordingly (10x).

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO502	EQO503		EQO504			EQO505			
Sampling Date		2017/06/20 09:45	2017/06/20 09:45		2017/06/20 09:50			2017/06/20 10:00			
COC Number		1706532	1706532		1706532			1706532			
	UNITS	**1706532-04**	**1706532-05**	**QC Batch**	**1706532-06**	**RDL**	**MDL**	**1706532-07**	**RDL**	**MDL**	**QC Batch**
13C5-Perfluorononanoic acid	%	84	61	5056239	84	N/A	N/A	72	N/A	N/A	5056239
13C5-Perfluoropentanoic acid	%	90	70	5056239	93	N/A	N/A	90	N/A	N/A	5056239
13C8-Perfluorooctane Sulfonamide	%	92	70	5056239	85	N/A	N/A	99	N/A	N/A	5056239
18O2-Perfluorohexanesulfonate	%	95	81	5056239	79	N/A	N/A	86	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO506			EQO507	EQO508			
Sampling Date		2017/06/20 10:05			2017/06/20 10:15	2017/06/20 10:20			
COC Number		1706532			1706532	1706532			
	UNITS	1706532-08	RDL	MDL	1706532-09	1706532-10	RDL	MDL	QC Batch
Inorganics									
Moisture	%	3.5	1.0	0.50	10	11	1.0	0.50	5053470
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/kg	1600 (1)	100	23	0.23 U	0.23 U	1.0	0.23	5056239
8:2 Fluorotelomer sulfonate	ug/kg	28 (2)	10	3.2	0.32 U	0.32 U	1.0	0.32	5056239
Perfluorobutane Sulfonate (PFBS)	ug/kg	1.7 U (2)	10	1.7	0.17 U	0.17 U	1.0	0.17	5056239
Perfluorobutanoic acid	ug/kg	2.3 U (2)	10	2.3	1.1	1.2	1.0	0.23	5056239
Perfluorodecane Sulfonate	ug/kg	2.3 U (2)	10	2.3	0.23 U	0.23 U	1.0	0.23	5056239
Perfluorodecanoic Acid (PFDA)	ug/kg	1.3 U (2)	10	1.3	0.13 U	0.13 U	1.0	0.13	5056239
Perfluorododecanoic Acid (PFDoA)	ug/kg	2.2 U (2)	10	2.2	0.22 U	0.22 U	1.0	0.22	5056239
Perfluoroheptanoic Acid (PFHpA)	ug/kg	2.9 J (2)	10	1.7	0.66 J	1.3	1.0	0.17	5056239
Perfluorohexane Sulfonate (PFHxS)	ug/kg	2.3 U (2)	10	2.3	0.35 J	0.94 J	1.0	0.23	5056239
Perfluorohexanoic Acid (PFHxA)	ug/kg	8.2 J (2)	10	1.9	0.99 J	1.6	1.0	0.19	5056239
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	25 (2)	10	2.6	0.68 J	1.7	1.0	0.26	5056239
Perfluorononanoic Acid (PFNA)	ug/kg	46 (2)	10	1.7	0.22 J	0.17 U	1.0	0.17	5056239
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	2.6 U (2)	10	2.6	0.26 U	0.26 U	1.0	0.26	5056239
Perfluorooctane Sulfonate (PFOS)	ug/kg	14 (2)	10	2.1	0.38 J	0.26 J	1.0	0.21	5056239
Perfluoropentanoic Acid (PFPeA)	ug/kg	3.1 J (2)	10	1.8	2.0	2.1	1.0	0.18	5056239
Perfluorotetradecanoic Acid	ug/kg	1.1 U (2)	10	1.1	0.11 U	0.11 U	1.0	0.11	5056239
Perfluorotridecanoic Acid	ug/kg	1.2 U (2)	10	1.2	0.12 U	0.12 U	1.0	0.12	5056239
Perfluoroundecanoic Acid (PFUnA)	ug/kg	1.8 U (2)	10	1.8	0.18 U	0.18 U	1.0	0.18	5056239
Surrogate Recovery (%)									
13C2-6:2 Fluorotelomer sulfonate	%	94	N/A	N/A	92	80	N/A	N/A	5056239
13C2-8:2 Fluorotelomer sulfonate	%	108	N/A	N/A	86	69	N/A	N/A	5056239
13C2-Perfluorodecanoic acid	%	104	N/A	N/A	72	67	N/A	N/A	5056239
13C2-Perfluorododecanoic acid	%	109	N/A	N/A	66	65	N/A	N/A	5056239
13C2-Perfluorohexanoic acid	%	112	N/A	N/A	87	73	N/A	N/A	5056239
13C2-perfluorotetradecanoic acid	%	100	N/A	N/A	60	66	N/A	N/A	5056239
13C2-Perfluoroundecanoic acid	%	118	N/A	N/A	77	80	N/A	N/A	5056239
13C4-Perfluorobutanoic acid	%	127	N/A	N/A	108	98	N/A	N/A	5056239
13C4-Perfluoroheptanoic acid	%	105	N/A	N/A	88	82	N/A	N/A	5056239

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limit was adjusted accordingly (100x).

(2) Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limit was adjusted accordingly (10x).

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO506			EQO507	EQO508			
Sampling Date		2017/06/20 10:05			2017/06/20 10:15	2017/06/20 10:20			
COC Number		1706532			1706532	1706532			
	UNITS	**1706532-08**	**RDL**	**MDL**	**1706532-09**	**1706532-10**	**RDL**	**MDL**	**QC Batch**
13C4-Perfluorooctanesulfonate	%	110	N/A	N/A	75	75	N/A	N/A	5056239
13C4-Perfluorooctanoic acid	%	107	N/A	N/A	89	85	N/A	N/A	5056239
13C5-Perfluorononanoic acid	%	113	N/A	N/A	84	74	N/A	N/A	5056239
13C5-Perfluoropentanoic acid	%	103	N/A	N/A	80	79	N/A	N/A	5056239
13C8-Perfluorooctane Sulfonamide	%	95	N/A	N/A	66	71	N/A	N/A	5056239
18O2-Perfluorohexanesulfonate	%	114	N/A	N/A	72	74	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO509				EQO510			
Sampling Date		2017/06/20 10:30				2017/06/20 10:35			
COC Number		1706532				1706532			
	UNITS	1706532-11	RDL	MDL	QC Batch	1706532-12	RDL	MDL	QC Batch
Inorganics									
Moisture	%	7.9	1.0	0.50	5053470	7.3	1.0	0.50	5053470
Miscellaneous Parameters									
6:2 Fluorotelomer sulfonate	ug/kg	0.93 J	1.0	0.23	5056239	0.23 U	1.0	0.23	5056239
8:2 Fluorotelomer sulfonate	ug/kg	2.0	1.0	0.32	5056239	0.32 U	1.0	0.32	5056239
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	1.0	0.17	5056239	0.17 U	1.0	0.17	5056239
Perfluorobutanoic acid	ug/kg	0.84 J	1.0	0.23	5056239	0.23 U	1.0	0.23	5056239
Perfluorodecane Sulfonate	ug/kg	0.23 U	1.0	0.23	5056239	0.23 U	1.0	0.23	5056239
Perfluorodecanoic Acid (PFDA)	ug/kg	4.4	1.0	0.13	5056239	0.13 U	1.0	0.13	5056239
Perfluorododecanoic Acid (PFDoA)	ug/kg	2.6	1.0	0.22	5056239	0.22 U	1.0	0.22	5056239
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.82 J	1.0	0.17	5056239	0.17 U	1.0	0.17	5056239
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	1.0	0.23	5056239	0.23 U	1.0	0.23	5056239
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.61 J	1.0	0.19	5056239	0.19 U	1.0	0.19	5056239
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.75 J	1.0	0.26	5056239	0.26 U	1.0	0.26	5056239
Perfluorononanoic Acid (PFNA)	ug/kg	2.5	1.0	0.17	5056239	0.20 J	1.0	0.17	5056239
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	1.0	0.26	5056239	0.26 U	1.0	0.26	5056239
Perfluorooctane Sulfonate (PFOS)	ug/kg	4.5	1.0	0.21	5056239	0.29 J	1.0	0.21	5056239
Perfluoropentanoic Acid (PFPeA)	ug/kg	1.5	1.0	0.18	5056239	0.25 J	1.0	0.18	5056239
Perfluorotetradecanoic Acid	ug/kg	0.61 J	1.0	0.11	5056239	0.11 U	1.0	0.11	5056239
Perfluorotridecanoic Acid	ug/kg	42	1.0	0.12	5071737	0.20 J	1.0	0.12	5056239
Perfluoroundecanoic Acid (PFUnA)	ug/kg	55 (1)	10	1.8	5071737	0.22 J	1.0	0.18	5056239
Surrogate Recovery (%)									
13C2-6:2 Fluorotelomer sulfonate	%	84	N/A	N/A	5056239	77	N/A	N/A	5056239
13C2-8:2 Fluorotelomer sulfonate	%	76	N/A	N/A	5056239	78	N/A	N/A	5056239
13C2-Perfluorodecanoic acid	%	57	N/A	N/A	5056239	74	N/A	N/A	5056239
13C2-Perfluorododecanoic acid	%	62	N/A	N/A	5056239	67	N/A	N/A	5056239
13C2-Perfluorohexanoic acid	%	67	N/A	N/A	5056239	76	N/A	N/A	5056239
13C2-perfluorotetradecanoic acid	%	53	N/A	N/A	5056239	60	N/A	N/A	5056239
13C2-Perfluoroundecanoic acid	%	90	N/A	N/A	5071737	72	N/A	N/A	5056239
13C4-Perfluorobutanoic acid	%	76	N/A	N/A	5056239	82	N/A	N/A	5056239
13C4-Perfluoroheptanoic acid	%	72	N/A	N/A	5056239	73	N/A	N/A	5056239
13C4-Perfluorooctanesulfonate	%	63	N/A	N/A	5056239	72	N/A	N/A	5056239
13C4-Perfluorooctanoic acid	%	68	N/A	N/A	5056239	82	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Due to high concentration of the target analyte, sample required 10x dilution. Detection limit was adjusted accordingly.

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RESULTS OF ANALYSES OF SOIL

Maxxam ID		EQO509				EQO510			
Sampling Date		2017/06/20 10:30				2017/06/20 10:35			
COC Number		1706532				1706532			
	UNITS	1706532-11	RDL	MDL	QC Batch	1706532-12	RDL	MDL	QC Batch
13C5-Perfluorononanoic acid	%	61	N/A	N/A	5056239	76	N/A	N/A	5056239
13C5-Perfluoropentanoic acid	%	86	N/A	N/A	5056239	77	N/A	N/A	5056239
13C8-Perfluorooctane Sulfonamide	%	60	N/A	N/A	5056239	63	N/A	N/A	5056239
18O2-Perfluorohexanesulfonate	%	68	N/A	N/A	5056239	78	N/A	N/A	5056239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EQO499 **Collected:** 2017/06/20
Sample ID: 1706532-01 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO500 **Collected:** 2017/06/20
Sample ID: 1706532-02 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO501 **Collected:** 2017/06/20
Sample ID: 1706532-03 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO501 Dup **Collected:** 2017/06/20
Sample ID: 1706532-03 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO502 **Collected:** 2017/06/20
Sample ID: 1706532-04 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO503 **Collected:** 2017/06/20
Sample ID: 1706532-05 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

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TEST SUMMARY

Maxxam ID: EQO504 **Collected:** 2017/06/20
Sample ID: 1706532-06 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO505 **Collected:** 2017/06/20
Sample ID: 1706532-07 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO506 **Collected:** 2017/06/20
Sample ID: 1706532-08 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO507 **Collected:** 2017/06/20
Sample ID: 1706532-09 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO508 **Collected:** 2017/06/20
Sample ID: 1706532-10 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

Maxxam ID: EQO509 **Collected:** 2017/06/20
Sample ID: 1706532-11 **Shipped:**
Matrix: Soil **Received:** 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: EQO510
Sample ID: 1706532-12
Matrix: Soil

Collected: 2017/06/20
Shipped:
Received: 2017/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5053470	N/A	2017/06/30	Min Yang
PFOS and PFOA in soil by SPE/LCMS	LCMS	5056239	2017/07/04	2017/07/10	Daniela Zupu

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

GENERAL COMMENTS

Sample EQO501, PFOS and PFOA in soil by SPE/LCMS: Test repeated.
Sample EQO502, PFOS and PFOA in soil by SPE/LCMS: Test repeated.
Sample EQO503, PFOS and PFOA in soil by SPE/LCMS: Test repeated.
Sample EQO509, PFOS and PFOA in soil by SPE/LCMS: Test repeated.

Results relate only to the items tested.

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Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5053470	NS3	RPD - Sample/Sample Dup	Moisture	2017/06/30	7.5		%	20
5056239	DZU	Matrix Spike(EQO501)	13C2-6:2 Fluorotelomer sulfonate	2017/07/10		106	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/10		106	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/10		91	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/10		106	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/10		96	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/10		81	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/10		99	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/10		104	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/10		97	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/10		90	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/10		104	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/10		91	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/10		103	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/10		86	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/10		104	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/10		106	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/07/10		73	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/07/10		102	%	70 - 130
			Perfluorobutanoic acid	2017/07/10		105	%	70 - 130
			Perfluorodecane Sulfonate	2017/07/10		102	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/07/10		104	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/10		91	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/07/10		103	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/10		111	%	70 - 130
			Perfluorotetradecanoic Acid	2017/07/10		95	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/10		52 (1)	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/10		95	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/07/10		94	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/07/10		91	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/07/10		99	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/10		102	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/07/10		95	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/07/10		101	%	70 - 130
5056239	DZU	Spiked Blank	13C2-6:2 Fluorotelomer sulfonate	2017/07/10		120	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/10		97	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/10		91	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/10		84	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/10		96	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/10		83	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/10		84	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/10		107	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/10		103	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/10		96	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/10		101	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/10		97	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/10		103	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/10		72	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/10		102	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/10		106	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/07/10		98	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/07/10		96	%	70 - 130
			Perfluorobutanoic acid	2017/07/10		87	%	70 - 130
			Perfluorodecane Sulfonate	2017/07/10		87	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorodecanoic Acid (PFDA)	2017/07/10		90	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/07/10		101	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/07/10		94	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/10		116	%	70 - 130
			Perfluorotetradecanoic Acid	2017/07/10		90	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/10		83	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/10		104	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/07/10		88	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/07/10		96	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/07/10		97	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/10		98	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/07/10		98	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/07/10		107	%	70 - 130
5056239	DZU	Method Blank	13C2-6:2 Fluorotelomer sulfonate	2017/07/10		104	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/07/10		83	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/07/10		83	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/07/10		80	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/07/10		97	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/07/10		73	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/07/10		66	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/07/10		107	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/07/10		102	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/07/10		97	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/07/10		109	%	50 - 150
			13C5-Perfluorononanoic acid	2017/07/10		97	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/07/10		91	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/07/10		75	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/07/10		106	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/07/10	0.23 U, MDL=0.23		ug/kg	
			8:2 Fluorotelomer sulfonate	2017/07/10	0.32 U, MDL=0.32		ug/kg	
			Perfluorobutane Sulfonate (PFBS)	2017/07/10	0.17 U, MDL=0.17		ug/kg	
			Perfluorobutanoic acid	2017/07/10	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecane Sulfonate	2017/07/10	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2017/07/10	0.13 U, MDL=0.13		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2017/07/10	0.22 U, MDL=0.22		ug/kg	
			Perfluorononanoic Acid (PFNA)	2017/07/10	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/10	0.26 U, MDL=0.26		ug/kg	
			Perfluorotetradecanoic Acid	2017/07/10	0.11 U, MDL=0.11		ug/kg	
			Perfluorotridecanoic Acid	2017/07/10	0.12 U, MDL=0.12		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2017/07/10	0.18 U, MDL=0.18		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2017/07/10	0.17 U, MDL=0.17		ug/kg	

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorohexane Sulfonate (PFHxS)	2017/07/10	0.23 U, MDL=0.23		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2017/07/10	0.19 U, MDL=0.19		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/10	0.26 U, MDL=0.26		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2017/07/10	0.21 U, MDL=0.21		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2017/07/10	0.18 U, MDL=0.18		ug/kg	
5056239	DZU	RPD - Sample/Sample Dup	6:2 Fluorotelomer sulfonate	2017/07/10	1.3		%	30
			8:2 Fluorotelomer sulfonate	2017/07/10	30 (2)		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/07/10	NC		%	30
			Perfluorobutanoic acid	2017/07/10	NC		%	30
			Perfluorodecane Sulfonate	2017/07/10	NC		%	30
			Perfluorodecanoic Acid (PFDA)	2017/07/10	13		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/07/10	19		%	30
			Perfluorononanoic Acid (PFNA)	2017/07/10	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/07/10	NC		%	25
			Perfluorotetradecanoic Acid	2017/07/10	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/07/10	15		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/07/10	NC		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/07/10	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/07/10	NC		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/07/10	NC		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/07/10	NC		%	30
			Perfluoropentanoic Acid (PFPeA)	2017/07/10	NC		%	30
5071737	AD9	Matrix Spike	13C2-Perfluoroundecanoic acid	2017/07/18		72	%	50 - 150
			Perfluorotridecanoic Acid	2017/07/18		123	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/18		121	%	70 - 130
5071737	AD9	Spiked Blank	13C2-Perfluoroundecanoic acid	2017/07/18		76	%	50 - 150
			Perfluorotridecanoic Acid	2017/07/18		124	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/07/18		114	%	70 - 130
5071737	AD9	Method Blank	13C2-Perfluoroundecanoic acid	2017/07/18		59	%	50 - 150
			Perfluorotridecanoic Acid	2017/07/18	0.12 U, MDL=0.12		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2017/07/18	0.18 U, MDL=0.18		ug/kg	
5071737	AD9	RPD - Sample/Sample Dup	Perfluorotridecanoic Acid	2017/07/18	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/07/18	NC		%	30
5073733	AD9	Matrix Spike	13C2-perfluorotetradecanoic acid	2017/07/19		63	%	50 - 150
			Perfluorotetradecanoic Acid	2017/07/19		120	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/19		125	%	70 - 130
5073733	AD9	Spiked Blank	13C2-perfluorotetradecanoic acid	2017/07/19		64	%	50 - 150
			Perfluorotetradecanoic Acid	2017/07/19		121	%	70 - 130
			Perfluorotridecanoic Acid	2017/07/19		126	%	70 - 130
5073733	AD9	Method Blank	13C2-perfluorotetradecanoic acid	2017/07/19		72	%	50 - 150
			Perfluorotetradecanoic Acid	2017/07/19	0.11 U, MDL=0.11		ug/kg	
			Perfluorotridecanoic Acid	2017/07/19	0.12 U, MDL=0.12		ug/kg	
5073733	AD9	RPD - Sample/Sample Dup	Perfluorotetradecanoic Acid	2017/07/19	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorotridecanoic Acid	2017/07/19	NC		%	30

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.

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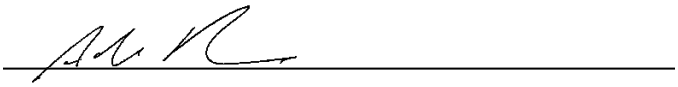
Maxxam Job #: B7D5743
Report Date: 2017/07/19

ESS Laboratory
Client Project #: 1706532
Your P.O. #: B02623

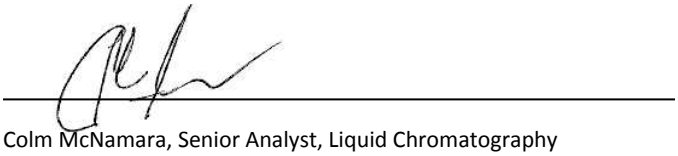
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Adam Robinson, Supervisor, LC/MS/MS

Brad Newman, Scientific Specialist



Colm McNamara, Senior Analyst, Liquid Chromatography

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 106532

Turn Time X Standard Other_____

Regulatory State: (MA) RI CT NH NJ NY ME Other_____

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Reporting Limits - GW-1

Electonic Deliverables (Excel) Access (PDF)

Co. Name	Project #	Project Name
HORSLEY WITTEN GROUP	17027	BARN. ON-CALL #4

Contact Person	Address
JESSE BEAN	90 RT 6A

City	State	Zip	PO #
SANDWICH	MA	02563	

Tel.	Fax.	email:
508 833 6600	508 833 3150	~~jbean~~ jbean@horsleywitten.com

Analysis: PFOSALL4-5

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	PFOSALL4-5
1	6/20/17	0900	G	S	DL-1	NP	1	P	250	X
2		0915			DL-2					
3		0930			DL-3					
4		0945			DL-4					
5		0945			DL-5					
6		0950			DL-6					
7		1000			DL-7					
8		1005			DL-8-2'					
9		1015			DL-9					
10		1020			DL-10					

Container Type: (P-Poly) G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: (S-Soil) SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present _____Yes _____No

Seals Intact ____ Yes _____No NA: X

Cooler Temperature: 2.9 Ice

Internal Use Only

[ ] Pickup

[ ] Technician___

Preservation Code: (1-NP) 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by : HW

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
6/20/17 1445	6/20/17 1530	6/20/17 1652	6/20/17 1907
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy
2 (Yellow) Client Receipt

ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 1706532

Turn Time X Standard Other_____

Regulatory State: MA RI CT NH NJ NY ME Other_____

Reporting Limits - GW-1

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other_____

Electonic Deliverables (Excel) Access (PDF)

Co. Name	Project #	Project Name
HORSLEY WITTEN GROUP	17027	BAMM-ON-CAM #4

Contact Person	Address
JESSE BEAM	90 Rt 6A

City	State	Zip	PO #
SANDWICH	MA	02563	

Tel.	Fax.	email:
508 833 6600	508 833 8150	jbeam@horsleywitten.com

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis: PFUSALCM-S	Analysis: PFOS
11	6/20/17	1030	G	S	ARFF BLDG 1	NP	1	P	250	X	
12		1035	G	S	ARFF BLDG 2	NP	1	P	250	X	
		0815	G	SW	KMART SW	|	2	P	125ml		X
		1150	G	GW	HW-1	|	2	P	125		X
		1310	G	GW	HW-23	|	2	P	125		X
		1335	G	GW	HW-190	X	2	P	125		X
						|					
						|					
						|					
						|					

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ✓ Yes ____ No

Seals Intact ____ Yes ____ No NA: X

Cooler Temperature: 2-3 iced

Internal Use Only

[-] Pickup

[ ] Technician___

Preservation Code: (1-NP) 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____

Sampled by :

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
6/20/17 1445	6/20/17 1520	6/20/17 1650	6/20/17 1907
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy
2 (Yellow) Client Receipt

CERTIFICATE OF ANALYSIS

Jesse Bean
Horsley & Witten
90 Route 6A
Sandwich, MA 02563

RE: Barn. On-Call #4 (17027)
ESS Laboratory Work Order Number: 1710271

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 9:20 am, Oct 17, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

Subcontracted Analyses
Maxxam Analytics - Cheektowaga, NY PFOA

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

SAMPLE RECEIPT

The following samples were received on October 11, 2017 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
1710271-01	Stockpile West	Soil	§
1710271-02	Stockpile East	Soil	§
1710271-03	Loam Pile	Soil	§

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

Subcontracted Analysis

Client Sample ID: Stockpile West
Date Sampled: 10/10/17 16:25

ESS Laboratory Sample ID: 1710271-01
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: Stockpile East
Date Sampled: 10/10/17 16:35

ESS Laboratory Sample ID: 1710271-02
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

Client Sample ID: Loam Pile
Date Sampled: 10/10/17 16:40

ESS Laboratory Sample ID: 1710271-03
Sample Matrix: Soil

Analyte	Results	Units	MRL	Method	DF	Analyst	Analyzed	I/V	F/V
PFOA	**See Attached**								

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

Notes and Definitions

Z-08	See Attached
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: Horsley & Witten
Client Project ID: Barn. On-Call #4

ESS Laboratory Work Order: 1710271

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Maxxam
A Bureau Veritas Group Company

Your P.O. #: B02623
Your Project #: 1710271
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/10/16
Report #: R4785798
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7M5459
Received: 2017/10/12, 14:44

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	3	N/A	2017/10/12	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	3	2017/10/13	2017/10/16	CAM SOP-00894	EPA537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.
E = Analyte concentration exceeds the maximum concentration level.
K = Estimated maximum possible concentration due to ion abundance ratio failure.

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Maxxam
A Bureau Veritas Group Company

Your P.O. #: B02623
Your Project #: 1710271
Your C.O.C. #: na

Attention:Shawn Morrell

ESS Laboratory
185 Frances Ave
Cranston, RI
USA 02910

Report Date: 2017/10/16
Report #: R4785798
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7M5459
Received: 2017/10/12, 14:44

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephanie Pollen, Project Manager
Email: SPollen@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7M5459
Report Date: 2017/10/16

ESS Laboratory
Client Project #: 1710271
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FHS317	FHS318	FHS319			
Sampling Date		2017/10/10 16:25	2017/10/10 16:35	2017/10/10 16:40			
COC Number		na	na	na			
	UNITS	1710271-01	1710271-02	1710271-03	RDL	MDL	QC Batch
Inorganics							
Moisture	%	3.5	4.2	16	1.0	0.50	5209150
Miscellaneous Parameters							
6:2 Fluorotelomer sulfonate	ug/kg	1.4	0.52 J	0.23 U	1.0	0.23	5210438
8:2 Fluorotelomer sulfonate	ug/kg	0.32 U	0.32 U	0.32 U	1.0	0.32	5210438
Perfluorobutane Sulfonate (PFBS)	ug/kg	0.17 U	0.17 U	0.17 U	1.0	0.17	5210438
Perfluorobutanoic acid	ug/kg	0.23 U	0.23 U	0.23 U	1.0	0.23	5210438
Perfluorodecane Sulfonate	ug/kg	0.23 U	0.23 U	0.23 U	1.0	0.23	5210438
Perfluorodecanoic Acid (PFDA)	ug/kg	0.13 U	0.13 U	0.13 U	1.0	0.13	5210438
Perfluorododecanoic Acid (PFDoA)	ug/kg	0.22 U	0.22 U	0.22 U	1.0	0.22	5210438
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.17 U	0.17 U	0.17 U	1.0	0.17	5210438
Perfluorohexane Sulfonate (PFHxS)	ug/kg	0.23 U	0.23 U	0.23 U	1.0	0.23	5210438
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.19 U	0.19 U	0.19 U	1.0	0.19	5210438
Perfluoro-n-Octanoic Acid (PFOA)	ug/kg	0.26 U	0.26 U	0.26 U	1.0	0.26	5210438
Perfluorononanoic Acid (PFNA)	ug/kg	0.17 U	0.17 U	0.17 U	1.0	0.17	5210438
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.26 U	0.26 U	0.26 U	1.0	0.26	5210438
Perfluorooctane Sulfonate (PFOS)	ug/kg	0.38 J	0.39 J	0.81 J	1.0	0.21	5210438
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.18 U	0.18 U	0.18 U	1.0	0.18	5210438
Perfluorotetradecanoic Acid	ug/kg	0.11 U	0.11 U	0.11 U	1.0	0.11	5210438
Perfluorotridecanoic Acid	ug/kg	0.12 U	0.12 U	0.12 U	1.0	0.12	5210438
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.18 U	0.18 U	0.18 U	1.0	0.18	5210438
Surrogate Recovery (%)							
13C2-6:2 Fluorotelomer sulfonate	%	76	83	77	N/A	N/A	5210438
13C2-8:2 Fluorotelomer sulfonate	%	77	88	77	N/A	N/A	5210438
13C2-Perfluorodecanoic acid	%	67	88	67	N/A	N/A	5210438
13C2-Perfluorododecanoic acid	%	65	80	64	N/A	N/A	5210438
13C2-Perfluorohexanoic acid	%	75	91	69	N/A	N/A	5210438
13C2-perfluorotetradecanoic acid	%	61	68	54	N/A	N/A	5210438
13C2-Perfluoroundecanoic acid	%	65	86	64	N/A	N/A	5210438
13C4-Perfluorobutanoic acid	%	77	90	74	N/A	N/A	5210438
13C4-Perfluoroheptanoic acid	%	78	88	73	N/A	N/A	5210438
13C4-Perfluorooctanesulfonate	%	71	91	62	N/A	N/A	5210438
13C4-Perfluorooctanoic acid	%	78	87	69	N/A	N/A	5210438
13C5-Perfluorononanoic acid	%	71	91	66	N/A	N/A	5210438
13C5-Perfluoropentanoic acid	%	79	92	74	N/A	N/A	5210438

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7M5459
Report Date: 2017/10/16

ESS Laboratory
Client Project #: 1710271
Your P.O. #: B02623

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FHS317	FHS318	FHS319			
Sampling Date		2017/10/10 16:25	2017/10/10 16:35	2017/10/10 16:40			
COC Number		na	na	na			
	UNITS	**1710271-01**	**1710271-02**	**1710271-03**	**RDL**	**MDL**	**QC Batch**
13C8-Perfluorooctane Sulfonamide	%	65	80	56	N/A	N/A	5210438
18O2-Perfluorohexanesulfonate	%	70	89	70	N/A	N/A	5210438

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B7M5459
Report Date: 2017/10/16

ESS Laboratory
Client Project #: 1710271
Your P.O. #: B02623

TEST SUMMARY

Maxxam ID: FHS317 **Collected:** 2017/10/10
Sample ID: 1710271-01 **Shipped:**
Matrix: Soil **Received:** 2017/10/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5209150	N/A	2017/10/12	Prgya Panchal
PFOS and PFOA in soil by SPE/LCMS	LCMS	5210438	2017/10/13	2017/10/16	Anjan Desai

Maxxam ID: FHS318 **Collected:** 2017/10/10
Sample ID: 1710271-02 **Shipped:**
Matrix: Soil **Received:** 2017/10/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5209150	N/A	2017/10/12	Prgya Panchal
PFOS and PFOA in soil by SPE/LCMS	LCMS	5210438	2017/10/13	2017/10/16	Anjan Desai

Maxxam ID: FHS319 **Collected:** 2017/10/10
Sample ID: 1710271-03 **Shipped:**
Matrix: Soil **Received:** 2017/10/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5209150	N/A	2017/10/12	Prgya Panchal
PFOS and PFOA in soil by SPE/LCMS	LCMS	5210438	2017/10/13	2017/10/16	Anjan Desai

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GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B7M5459
Report Date: 2017/10/16

ESS Laboratory
Client Project #: 1710271
Your P.O. #: B02623

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5209150	AUP	RPD - Sample/Sample Dup	Moisture	2017/10/12	2.1		%	20
5210438	AD9	Matrix Spike(FHS318)	13C2-6:2 Fluorotelomer sulfonate	2017/10/16		70	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/16		81	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/16		75	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/16		68	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/16		78	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/16		60	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/16		72	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/16		83	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/16		80	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/16		81	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/16		80	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/16		79	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/16		87	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/16		67	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/16		84	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/16		112	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/16		99	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/16		99	%	70 - 130
			Perfluorobutanoic acid	2017/10/16		102	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/16		105	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/10/16		109	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/16		106	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/16		108	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/16		104	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/16		92	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/16		113	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/16		108	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/16		106	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/16		94	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/16		109	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/16		103	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/16		100	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/16		96	%	70 - 130
5210438	AD9	Matrix Spike DUP(FHS318)	13C2-6:2 Fluorotelomer sulfonate	2017/10/16		66	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/16		71	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/16		81	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/16		76	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/16		81	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/16		63	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/16		77	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/16		82	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/16		78	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/16		78	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/16		83	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/16		77	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/16		82	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/16		68	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/16		67	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/16		108	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/16		106	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/16		119	%	70 - 130
			Perfluorobutanoic acid	2017/10/16		96	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/16		99	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorodecanoic Acid (PFDA)	2017/10/16		96	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/16		95	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/16		104	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/16		98	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/16		101	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/16		109	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/16		100	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/16		106	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/16		118	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/16		99	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/16		95	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/16		101	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/16		98	%	70 - 130
5210438	AD9	MS/MSD RPD	6:2 Fluorotelomer sulfonate	2017/10/16	4.1		%	30
			8:2 Fluorotelomer sulfonate	2017/10/16	6.4		%	30
			Perfluorobutane Sulfonate (PFBS)	2017/10/16	18		%	30
			Perfluorobutanoic acid	2017/10/16	5.7		%	30
			Perfluorodecane Sulfonate	2017/10/16	5.4		%	30
			Perfluorodecanoic Acid (PFDA)	2017/10/16	13		%	30
			Perfluorododecanoic Acid (PFDoA)	2017/10/16	11		%	30
			Perfluorononanoic Acid (PFNA)	2017/10/16	3.7		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/16	6.3		%	25
			Perfluorotetradecanoic Acid	2017/10/16	9.8		%	30
			Perfluorotridecanoic Acid	2017/10/16	4.0		%	30
			Perfluoroundecanoic Acid (PFUnA)	2017/10/16	7.0		%	30
			Perfluoroheptanoic Acid (PFHpA)	2017/10/16	0.29		%	30
			Perfluorohexane Sulfonate (PFHxS)	2017/10/16	22		%	30
			Perfluorohexanoic Acid (PFHxA)	2017/10/16	9.8		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/16	8.2		%	30
			Perfluorooctane Sulfonate (PFOS)	2017/10/16	0.53		%	30
			Perfluoropentanoic Acid (PFPeA)	2017/10/16	2.4		%	30
5210438	AD9	Spiked Blank	13C2-6:2 Fluorotelomer sulfonate	2017/10/16		83	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/16		83	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/16		76	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/16		72	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/16		84	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/16		62	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/16		74	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/16		84	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/16		85	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/16		86	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/16		81	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/16		81	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/16		90	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/16		69	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/16		90	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/16		110	%	70 - 130
			8:2 Fluorotelomer sulfonate	2017/10/16		109	%	70 - 130
			Perfluorobutane Sulfonate (PFBS)	2017/10/16		95	%	70 - 130
			Perfluorobutanoic acid	2017/10/16		106	%	70 - 130
			Perfluorodecane Sulfonate	2017/10/16		114	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2017/10/16		112	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2017/10/16		113	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2017/10/16		108	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/16		109	%	70 - 130
			Perfluorotetradecanoic Acid	2017/10/16		113	%	70 - 130
			Perfluorotridecanoic Acid	2017/10/16		128	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2017/10/16		112	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2017/10/16		104	%	70 - 130
			Perfluorohexane Sulfonate (PFHxS)	2017/10/16		96	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2017/10/16		107	%	70 - 130
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/16		108	%	70 - 130
			Perfluorooctane Sulfonate (PFOS)	2017/10/16		99	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2017/10/16		100	%	70 - 130
5210438	AD9	Method Blank	13C2-6:2 Fluorotelomer sulfonate	2017/10/16		88	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2017/10/16		78	%	50 - 150
			13C2-Perfluorodecanoic acid	2017/10/16		77	%	50 - 150
			13C2-Perfluorododecanoic acid	2017/10/16		73	%	50 - 150
			13C2-Perfluorohexanoic acid	2017/10/16		74	%	50 - 150
			13C2-perfluorotetradecanoic acid	2017/10/16		58	%	50 - 150
			13C2-Perfluoroundecanoic acid	2017/10/16		72	%	50 - 150
			13C4-Perfluorobutanoic acid	2017/10/16		78	%	50 - 150
			13C4-Perfluoroheptanoic acid	2017/10/16		80	%	50 - 150
			13C4-Perfluorooctanesulfonate	2017/10/16		71	%	50 - 150
			13C4-Perfluorooctanoic acid	2017/10/16		80	%	50 - 150
			13C5-Perfluorononanoic acid	2017/10/16		77	%	50 - 150
			13C5-Perfluoropentanoic acid	2017/10/16		78	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2017/10/16		61	%	50 - 150
			18O2-Perfluorohexanesulfonate	2017/10/16		80	%	50 - 150
			6:2 Fluorotelomer sulfonate	2017/10/16	0.23 U, MDL=0.23		ug/kg	
			8:2 Fluorotelomer sulfonate	2017/10/16	0.32 U, MDL=0.32		ug/kg	
			Perfluorobutane Sulfonate (PFBS)	2017/10/16	0.17 U, MDL=0.17		ug/kg	
			Perfluorobutanoic acid	2017/10/16	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecane Sulfonate	2017/10/16	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2017/10/16	0.13 U, MDL=0.13		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2017/10/16	0.22 U, MDL=0.22		ug/kg	
			Perfluorononanoic Acid (PFNA)	2017/10/16	0.17 U, MDL=0.17		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2017/10/16	0.26 U, MDL=0.26		ug/kg	
			Perfluorotetradecanoic Acid	2017/10/16	0.11 U, MDL=0.11		ug/kg	
			Perfluorotridecanoic Acid	2017/10/16	0.12 U, MDL=0.12		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2017/10/16	0.18 U, MDL=0.18		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2017/10/16	0.17 U, MDL=0.17		ug/kg	
			Perfluorohexane Sulfonate (PFHxS)	2017/10/16	0.23 U, MDL=0.23		ug/kg	

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorohexanoic Acid (PFHxA)	2017/10/16	0.19 U, MDL=0.19		ug/kg	
			Perfluoro-n-Octanoic Acid (PFOA)	2017/10/16	0.26 U, MDL=0.26		ug/kg	
			Perfluorooctane Sulfonate (PFOS)	2017/10/16	0.21 U, MDL=0.21		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2017/10/16	0.18 U, MDL=0.18		ug/kg	

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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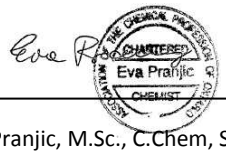
Maxxam Job #: B7M5459
Report Date: 2017/10/16

ESS Laboratory
Client Project #: 1710271
Your P.O. #: B02623

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Sin Chii Chia, Scientific Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211
Tel. (401)461-7181 Fax (401)461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 1710271

Turn Time ______Standard Other RUSH (3 DAY)

Regulatory State: (MA) RI CT NH NJ NY ME Other______

Is this project for any of the following:(please circle)
MA-MCP Navy USACE CT DEP Other________

Reporting Limits - GW-1

Electonic Deliverables (Excel) Access (PDF)

Co. Name: HORSLEY WITTEN GROUP

Project #: 17027

Project Name: BARN. ON CALL #4

Contact Person: J BEAN

Proj. Location: BARNSTABLE MUNICIPAL AIRPORT

Address: 90 RT 6A

City, State: SANDWICH

Zip: 02563 ~~02673~~

PO #: —

Tel. 508 833 6600

email: jbean@horsleywitten.com

Analysis: PFOSAL CM-5; PFAS

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	PFOSAL CM-5	PFAS							
1	10/10/17	1625	G	SOIL	STOCKPILE WEST	–	1	P		X								
2	|	1635	G	SOIL	STOCKPILE EAST	–	1	P		X								
3	|	1640	G	SOIL	LOAM PILE	–	1	P		X								
	↓	1645	G	AQUEOUS	AFFF 3%	–	1	P			X							

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present __X__ Yes _____No

Seals Intact ____ Yes _____No NA: ✓

Cooler Temperature: 5.1°C Ia 1401 10/11/17

Internal Use Only
[ ] Pickup
[ ] Technician____

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-______

Sampled by: JESSE BEAN

Comments:

Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)
[signature] 10/11/17 1245	[signature] 10/11/17 1245	[signature] 10/11/17 1400	[signature] 10/11/17 1444
Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

* By circling MA-MCP, client acknowledges sampels were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

Report Method Blank & Laboratory Control Sample Results