SUBMITTED TO:
Paine Field/Snohomish
County Airport
3220 100th Street SW, Suite A
Everett, WA 98204-1303

BY:
Shannon & Wilson
400 N. 34th Street, Suite 100
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SAMPLING DATA REPORT

Big Gulch Creek Drainage Sub-Basin 9 and Swamp Creek Drainage Sub-Basin 8

PAINE FIELD, WASHINGTON

SHANNON & WILSON

September 6, 2022

Shannon & Wilson No: 102986-002

Submitted To: Paine Field/Snohomish County Airport
3220 100th Street SW, Suite A
Everett, WA 98204-1303
Attn: Mr. Andrew Rardin

Subject: SAMPLING DATA REPORT, BIG GULCH CREEK DRAINAGE SUB-BASIN 9 AND SWAMP CREEK DRAINAGE SUB-BASIN 8, PAINE FIELD, WASHINGTON

Shannon & Wilson prepared this report and participated in this project as a consultant to Snohomish County Public Works under our on-call contract for geotechnical and environmental services (Agreement No. OCC19/1-7.8[BG]). Our scope of services was specified in Task No. TA 5, approved on April 20, 2022, and amended on May 18, 2022, during a conversation with Andrew Rardin[1] and on June 8, 2022, via an email from Andrew Rardin.[2]

This report presents the results from sampling and analysis and was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

Ryan Peterson
Digitally signed by Ryan Peterson
Date: 2022.09.07 17:04:57 -07'00'

Ryan Peterson, PE
Task Order Manager

Agnes Tirao, PE
Project Manager

RBP:KRF:ACT/mrh:rbp

[1] Peterson, Ryan, 2022, RE: Sampling at BFGoodrich Site on May 18, 2022: Email from Ryan Peterson, Shannon & Wilson, Seattle, Wash., to Andrew Rardin, Snohomish County Airport, Everett, Wash., May 23.
[2] Rardin, Andrew, 2022, RE: PFAS Analytical Results for BFGoodrich Site: Email from Andrew Rardin, Snohomish County Airport, Everett, Wash., to Ryan Peterson, Shannon & Wilson, Seattle, Wash, June 8.

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1 INTRODUCTION

On behalf of Snohomish County Public Works, Shannon & Wilson prepared this Data Report to document sampling conducted at two stormwater drainage areas located at Paine Field/Snohomish County Airport (Paine Field). Our scope of services included collection of soil samples in two sampling areas, analysis of samples for perfluoroalkyl and polyfluoroalkyl substances (PFAS), review of laboratory data, and preparation of this report.

The sampling locations were selected to evaluate for the presence of PFAS from historical releases of Aqueous Film Forming Foam in the 1990s and 2000s from the fire suppression system at a large aviation hangar formerly named Goodrich Hangar 3 and currently named the Boeing Everett Modification Center (EMC). The Boeing EMC is leased by The Boeing Company. Former tenants of the Boeing EMC included Tramco, BFGoodrich, and Aviation Technical Services.[3]

The two sampling areas are referred to as "Big Gulch Creek Drainage Sub-Basin 9" and "Swamp Creek Drainage Sub-Basin 8." Big Gulch Creek Drainage Sub-Basin 9 is located adjacent to and southwest of Falcon Drive and Navajo Road to the south of the Boeing EMC. Swamp Creek Drainage Sub-Basin 8 is located to the south of the intersection of Minuteman Drive and Airport Road. Both areas receive stormwater drainage from the Boeing EMC according to Andrew Rardin, the Snohomish County Airport Environmental and Wildlife Manager. A map of the vicinity of the sampling areas is provided as Figure 1.

Methods and results are discussed in the following sections.

2 METHODS

Standard investigation methods, including sample collection, sample handling, decontamination methods, and investigation-derived waste (IDW), are described in the following subsections. Sample collection and documentation were completed in accordance with Shannon & Wilson's PFAS standard operating procedures.

[3] Aviation Technical Services, 2022, History: Available: https://www.atsmro.com/about/history/, accessed August 19, 2022.

2.1 Health and Safety

A site-specific Health and Safety Plan (HSP) was prepared consistent with the requirements of the Washington State Division of Occupational Safety and Health Hazardous Waste Operations Regulation (Washington Administrative Code 296 843). The HSP included a description of the project team, the scope of work, site control, site hazard information, site hazard control, decontamination, and emergency response. Information about the nearest hospital, including a map, was also provided.

2.2 Collection Methods

On May 18, 2022, Mr. Ryan Peterson and Mr. Mitchell Hatfield of Shannon & Wilson collected soil samples from three locations in the Big Gulch Creek Drainage Sub-Basin 9 (Figure 2). On June 15, 2022, Mr. Peterson collected one soil sample from the Swamp Creek Drainage Sub-Basin 8 (Figure 3). Samples were collected at locations where soil may have been impacted by discharges from stormwater outfalls.

2.2.1 Soil Samples

A decontaminated hand-auger or shovel was used to collect soil samples. A hand-auger was used when the depth of water was greater than 1 foot to limit the disturbance of the sample during collection. A summary of sample locations is provided in Exhibit 2-1.

Exhibit 2-1: Summary of Sample Locations

Location ID	Sample ID	Sampling Method	Sample Depth (feet bgs)	Observations
Big Gulch Creek Drainage Sub-Basin 9				
BFG-HA1	BFG-HA1:0.5	Hand-Auger	0.5	The sample was collected approximately 4 feet downstream of a stormwater outfall. The location was covered by approximately 2 feet of water.
BFG-SH1	BFG-SH1:0.5	Shovel	0.5	The sample was collected approximately 6 feet downstream from a stormwater outfall. The location was covered by 6 inches of water.
	BFG-SH1:1.0	Shovel	1.0	
BF-SH2	BFG-SH2:0.5	Shovel	0.5	The sample was collected at approximately 75 feet downstream from the stormwater outfall that was near sample BFG-SH1. The location was covered by 6 inches of water.
	BFG-SH2:1.0	Shovel	1.0	
Swamp Creek Drainage Sub-Basin 8				
BFG-HA2	BFG-HA2:0.8	Hand-Auger	0.8	The sample was collected at approximately 8 feet downstream from the stormwater outfall. The location was covered by 1 foot of water.

bgs = below ground surface

Sample locations were recorded using a cell phone global positioning system and are shown in Figures 2 and 3. Representative photos of the sampling activities are provided in Appendix A.

2.2.2 Equipment Blank Samples

Two equipment blank samples (rinsate) were collected after decontamination of the reusable sampling equipment. The samples were collected by pouring laboratory-provided PFAS-free water over the equipment. The analytical results were used to evaluate for the effectiveness of decontamination procedures (Section 2.4) and the potential for cross-contamination. A summary of the equipment blank samples is provided in Exhibit 2-2.

Exhibit 2-2: Summary of Equipment Blank Samples

Sample ID	Collection Date	Description
BFG-EB	5/18/2022	Collected from water poured over the shovel after decontamination of the shovel.
BFG-EB2	6/15/2022	Collected from water poured over the hand-auger after decontamination of the hand-auger.

2.3 Sample Handling

Soil was transferred from the shovel or hand-auger to sample containers using decontaminated stainless steel sampling spoons. New nitrile gloves were worn by the sample handler during collection of each sample. Non-disposable sampling equipment, including the shovel and hand-auger, were decontaminated between sample locations to reduce potential for cross-contamination.

Soil samples collected for laboratory analysis were placed into pre-cleaned, laboratory-provided bottles. The sample container labels were completed using indelible ink. The samples were sealed in plastic bags, and then placed into a cooler and maintained at 0 to 6 degrees Celsius with ice.

2.4 Decontamination Methods

The primary objective of the decontamination process was to reduce the potential for the accidental introduction of contaminants to non-contaminated areas and samples.

Equipment used during soil activities was cleaned prior to use and after each use. Sampling equipment used during the field activities was decontaminated as follows:

- Removed gross contamination and particulate matter.
- Washed thoroughly with Alconox® detergent plus tap water.
- Rinsed equipment thoroughly with distilled or deionized water.
- Triple-rinsed equipment with laboratory certified PFAS-free water.

Following decontamination, caution was taken to keep the equipment off the ground by placing the equipment on clean plastic sheeting or equivalent.

2.5 Laboratory Analysis and Data Validation

Sample information was recorded on chain-of-custody forms and these forms accompanied the samples to the laboratory. Coolers were sealed using custody seals and shipped via FedEx to Eurofins TestAmerica in Sacramento, California. Samples were maintained under chain of custody until delivered to the laboratory.

Samples were analyzed for PFAS (standard list of 18 analytes) by Method 537 (modified) with a standard turnaround time of 15 workdays. The laboratory reports are provided in Appendix B.

The laboratory data was reviewed and validated relative to the project standards. Based on the results of the data validation, all data were evaluated to be of known quality and acceptable for use as qualified. There was a usable result for all requested analytes for every sample. Data qualifiers assigned during validation by the validator were incorporated into the results tables (Tables 1 and 2). The Data Validation Summary is provided in Appendix C.

2.6 Investigation-Derived Waste

IDW is waste generated during sampling activities and includes disposable sampling materials and decontamination water. Disposal sampling materials consisted of used personal protective equipment (PPE) and disposable sampling equipment (spoons, etc.). This IDW was placed in doubled, heavy-duty plastic bags. The waste PPE and disposable sampling equipment were disposed of in a dumpster at the Shannon & Wilson office.

Decontamination water was placed into a 55-gallon metal drum and temporarily stored on Paine Field pending waste profiling. The drum will be transferred to an appropriately licensed disposal facility on receipt of the IDW analytical results and approved waste profile.

3 RESULTS

Several PFAS compounds were detected in the soil samples above the laboratory reporting limits. A summary of the analytical results is provided in Table 1.

PFAS were not detected in the equipment blank samples. A summary of the analytical results for equipment blank samples is provided in Table 2.

4 CLOSURE

Shannon & Wilson provided the environmental services described herein using the level of skill normally exercised for similar projects under similar conditions by reputable and competent environmental consultants currently practicing in the area. Shannon & Wilson is not responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the letter was prepared.

The sampling was performed to evaluate soil for the presence of PFAS. Our observations are specific to the locations, depths, and times of collection as noted in this report and may not be applicable to all areas of the site. No amount of explorations or testing can precisely predict the characteristics, quality, or distribution of subsurface and site conditions.

This report was prepared for the exclusive use of Snohomish County. Shannon & Wilson has prepared the document "Important Information About Your Environmental Site Assessment/Evaluation Report" to assist you and others in understanding the use and limitations of our proposals.

Table 1: Summary of Analytical Results for Soil

Analyte	Units	Exploration Location	BFG-HA1	BFG-HA2	BFG-SH1		BFG-SH2	
		Sample ID	BFG-HA1:0.5	BFG-HA2:0.8	BFG-SH1:0.5	BFG-SH1:1.0	BFG-SH2:0.5	BFG-SH2:1.0
		Depth (feet)	0.5	0.8	0.5	1.0	0.5	1.0
Perfluorohexanesulfonic acid (PFHxS)	ug/kg		0.046 J	<0.23	<0.24	<0.35	<0.30	0.096 J
Perfluorohexanoic acid (PFHxA)	ug/kg		0.081 J	0.12 J	<0.24	<0.35	0.053 J	0.17 J
Perfluoroheptanoic acid (PFHpA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	0.062 J
Perfluorononanoic acid (PFNA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	0.047 J
Perfluorobutanesulfonic acid (PFBS)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	<0.31
Perfluorodecanoic acid (PFDA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	0.11 J
Perfluoroundecanoic acid (PFUnA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	0.098 J
Perfluorododecanoic acid (PFDoA)	ug/kg		<0.23	<0.23	<0.24	0.072 J	<0.30	0.073 J
Perfluorotridecanoic acid (PFTrDA)	ug/kg		<0.23	<0.23	<0.24	0.084 J	<0.30	<0.31
Perfluorotetradecanoic acid (PFTeA)	ug/kg		<0.23	<0.23	<0.24	0.081 J	<0.30	<0.31
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	ug/kg		<0.23	<0.23	<0.24	0.85	0.12 J	0.31
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	ug/kg		<0.23	<0.23	0.075 J	2.1	0.20 J	0.68
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	<0.31
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	<0.31
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	<0.31
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	<0.31
Perfluorooctanesulfonic acid (PFOS)	ug/kg		0.11 J	<0.23	<0.24	0.70	0.37 J*	1.6
Perfluorooctanoic acid (PFOA)	ug/kg		<0.23	<0.23	<0.24	<0.35	<0.30	0.096 J

NOTES:

Results reported from Eurofins Sacramento work order 320-88145-1 and 320-89132-1.

Bold = The reported analyte was detected.

J = Estimated concentration, detected greater than the detection limit and less than the RL. Flag applied by the laboratory.

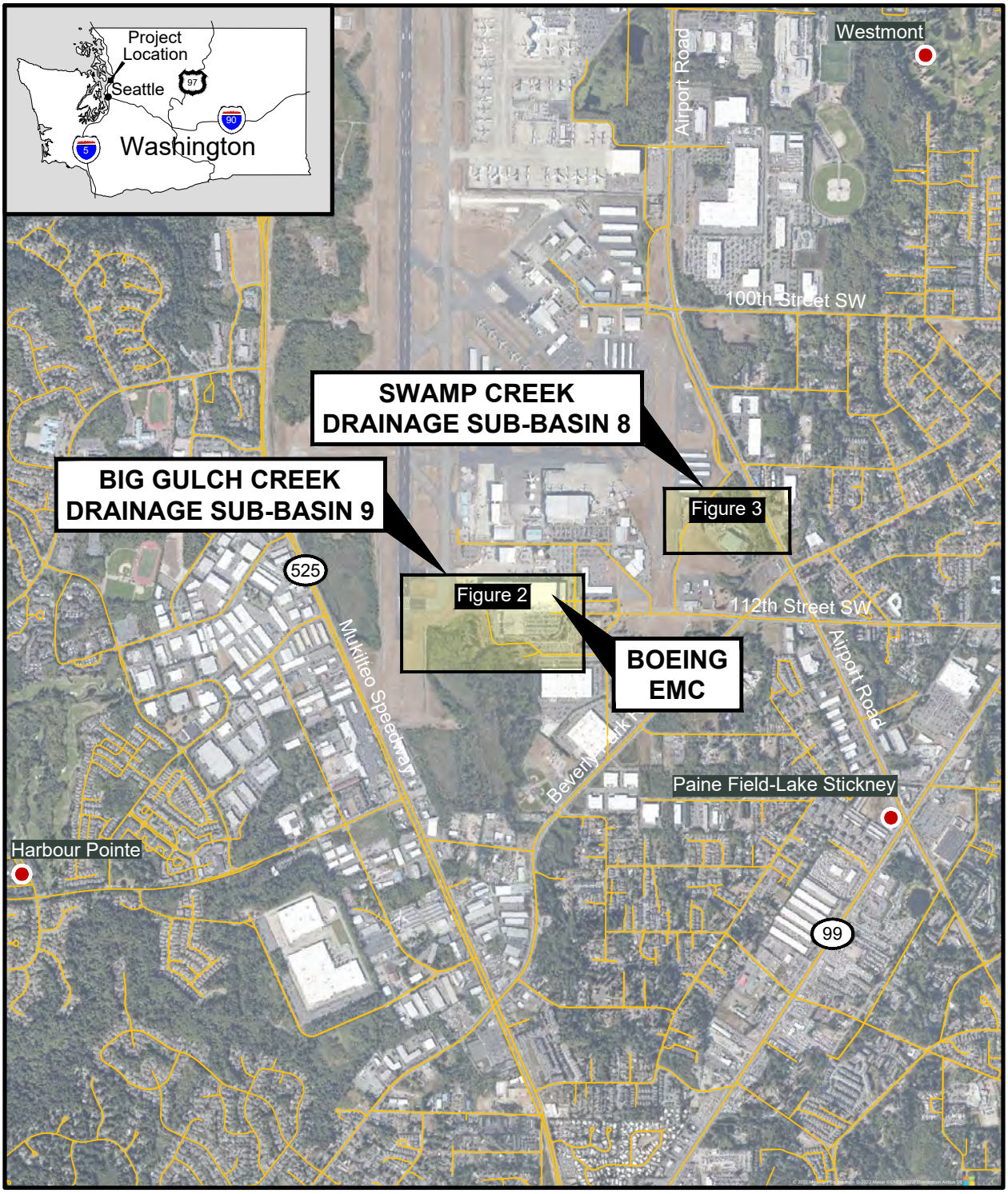
j* = Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson (*).

< = analyte not detected; listed as less than the reporting limit (RL); ug/kg = micrograms per kilogram; PFAS = per- and poly-fluoroalkyl substances

Table 2: Summary of Analytical Results for Equipment Blanks

Analyte	Sample ID	BFG-EB	BFG-EB2
	Description	Collected from water poured over the shovel after decontamination of the shovel.	Collected from water poured over the hand-auger after decontamination of the hand- auger.
	Units		
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.0018	< 0.0020
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.0018	< 0.0020
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.0018	< 0.0020
Perfluorononanoic acid (PFNA)	ug/L	< 0.0018	< 0.0020
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.0018	< 0.0020
Perfluorodecanoic acid (PFDA)	ug/L	< 0.0018	< 0.0020
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.0018	< 0.0020
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.0018	< 0.0020
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.0018	< 0.0020
Perfluorotetradecanoic acid (PFTeA)	ug/L	< 0.0018	< 0.0020
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.0044	< 0.0050
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.0044	< 0.0050
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	ug/L	< 0.0018	< 0.0020
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	ug/L	< 0.0018	< 0.0020
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	ug/L	< 0.0018	< 0.0020
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ug/L	< 0.0036	< 0.0040
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.0018	< 0.0020
Perfluorooctanoic acid (PFOA)	ug/L	< 0.0018	< 0.0020

NOTE:
Units are micrograms per liter (µg/L).



0 2,000 4,000

Approximate Scale in Feet

Sampling Data Report
Big Gulch Creek Drainage Sub-Basin 9 and
Swamp Creek Drainage Sub-Basin 8
Paine Field, Washington

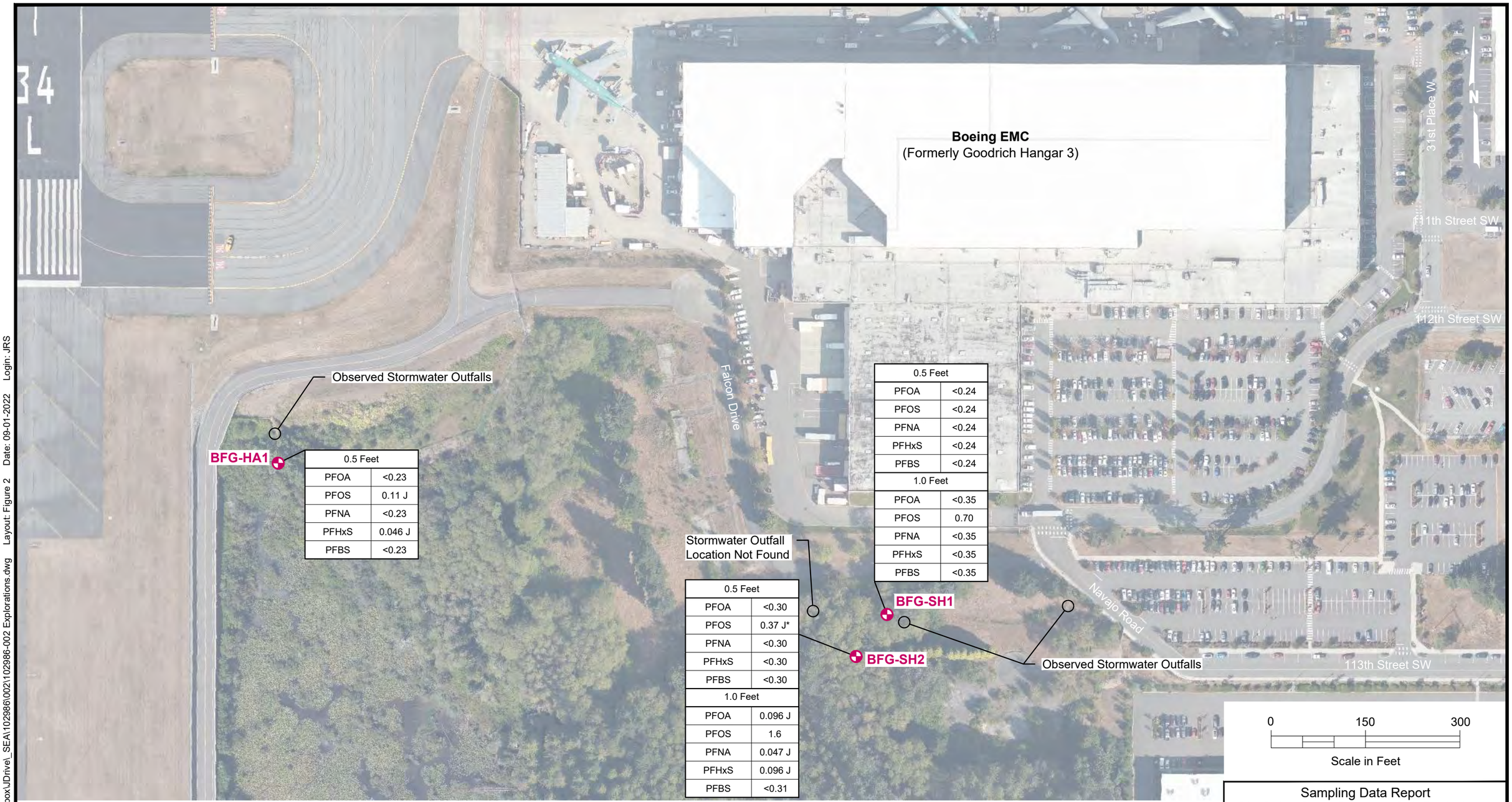
VICINITY MAP

September 2022 102986-002

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive_SEA\102986\002\102986-002 Vicinity Map.dwg Date: 09-01-2022 Login: JRS



NOTES

1. Exploration locations were recorded via cell phone GPS.
2. Concentrations reported in micrograms per kilograms (µg/kg).
3. Concentrations are displayed for PFOA, PFOS, PFNA, PFHxS, and PFBS. Results for other analytes are summarized in Table 1.

LEGEND

BFG-HA1 — Exploration Designation and Approximate Location

ABBREVIATIONS

J = Result is less than the reporting level but greater than or equal to the method detection limit and the concentration is an approximate value.
J* = Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)

Sampling Data Report
Big Gulch Creek Drainage Sub-Basin 9 and
Swamp Creek Drainage Sub-Basin 8
Paine Field, Washington

EXPLORATION MAP FOR BIG GULCH CREEK DRAINAGE SUB-BASIN 9

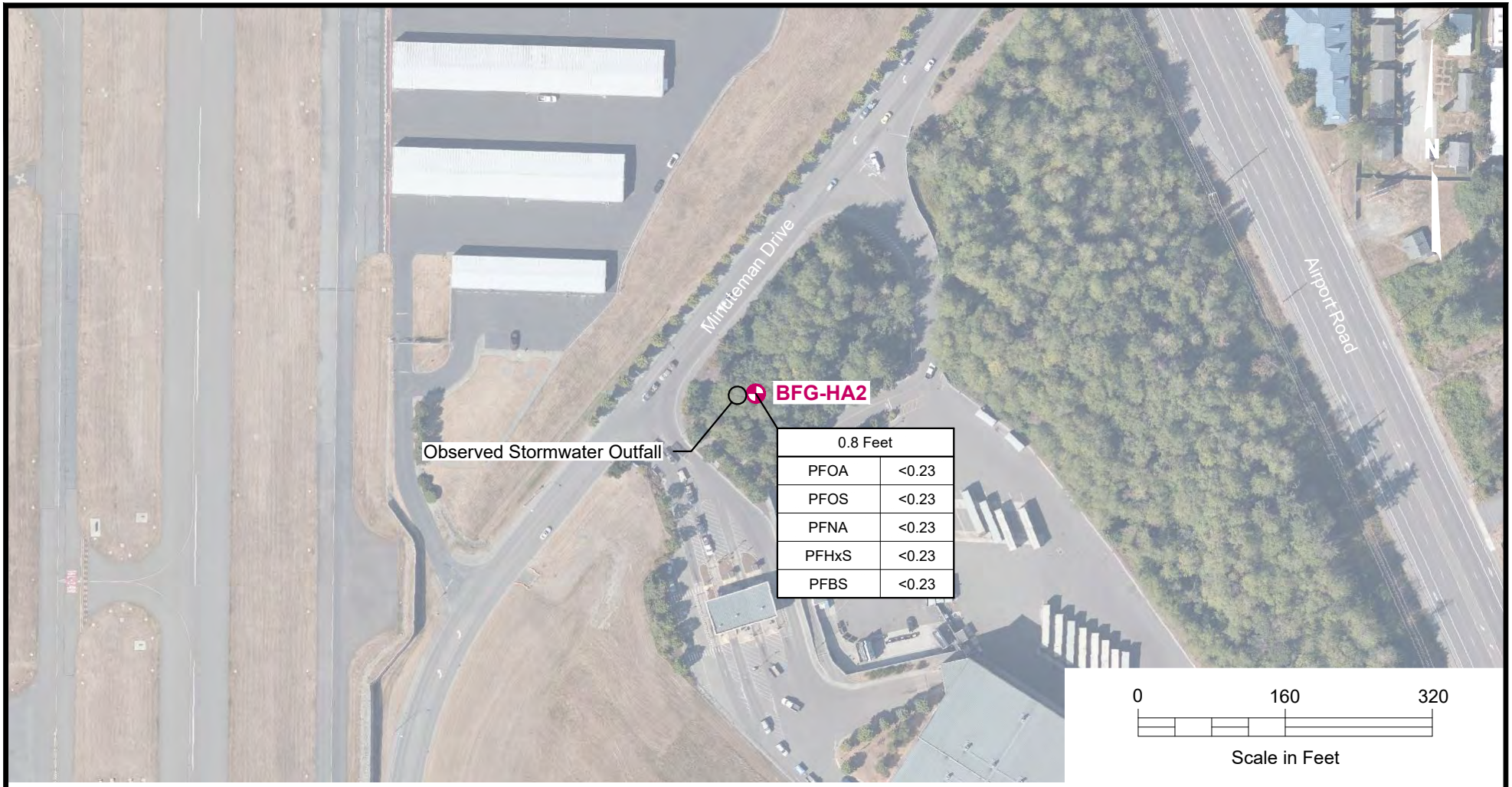
September 2022 102986-002

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive_SEA\102986\002\102986-002 Explorations.dwg Layout: Figure 2 Date: 09-01-2022 Login: JRS

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive_SEA\102986\002\102986-002 Explorations.dwg Layout: Figure 3 Date: 09-01-2022 Login: JRS



NOTES

1. Exploration locations were recorded via cell phone GPS.
2. Concentrations reported in micrograms per kilograms (µg/kg).
3. Concentrations are displayed for PFOA, PFOS, PFNA, PFHxS, and PFBS. Results for other analytes are summarized in Table 1.

LEGEND

BFG-HA1 Exploration Designation and Approximate Location

Sampling Data Report
Big Gulch Creek Drainage Sub-Basin 9 and
Swamp Creek Drainage Sub-Basin 8
Paine Field, Washington

EXPLORATION MAP FOR SWAMP CREEK DRAINAGE SUB-BASIN 8

September 2022 102986-002

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FIG. 3

FIG. 3

APPENDIX A: REPRESENTATIVE PHOTOS

Appendix A

Representative Photos

APPENDIX A: REPRESENTATIVE PHOTOS

Exhibit A-1: Photo of Sampling at Location BFG-HA1 (See Hand-Auger Handle) on May 18, 2022. View Direction is Southwest.

Exhibit A-2: Photo of Sampling at Location BFG-SH1 on May 18, 2022. View Direction is Northwest.

APPENDIX A: REPRESENTATIVE PHOTOS

Exhibit A-3: Photo of Sampling at Location BFG-SH2 (See Shovel Handle) on May 18, 2022. View Direction is North.

Exhibit A-4: Photo of Sampling at Location BFG-HA2 (See Hand-Auger) on June 15, 2022. View Direction is West.

APPENDIX B: LABORATORY REPORTS

Appendix B

Laboratory Reports

CONTENTS

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

Laboratory Job ID: 320-88145-1
Client Project/Site: Paine Field

For:
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Attn: Ryan Peterson

Authorized for release by:
6/2/2022 12:56:13 PM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@et.eurofinsus.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Qualifiers

LCMS

Qualifier	Qualifier Description
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Job ID: 320-88145-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-88145-1

Receipt
The samples were received on 5/20/2022 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.0º C.

LCMS
Method 537 (modified): The "I" qualifier means the transition mass ratio for the indicated analyte was below the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgment was used to positively identify the analyte. BFG-SH2:0.5 (320-88145-4)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-591507.

Method SHAKE: The following samples in preparation batch 320-590251 were yellow in color following extraction: BFG-SH1:1.0 (320-88145-3).
preparation batch 320-590251

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Client Sample ID: BFG-HA1:0.5 — Lab Sample ID: 320-88145-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.081	J	0.23	0.035	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.046	J	0.23	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.11	J	0.23	0.049	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: BFG-SH1:0.5 — Lab Sample ID: 320-88145-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.075	J	0.24	0.059	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: BFG-SH1:1.0 — Lab Sample ID: 320-88145-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorododecanoic acid (PFDoA)	0.072	J	0.35	0.053	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorotridecanoic acid (PFTriA)	0.084	J	0.35	0.037	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorotetradecanoic acid (PFTeA)	0.081	J	0.35	0.065	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.70		0.35	0.075	ug/Kg	1	☼	537 (modified)	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.85		0.35	0.040	ug/Kg	1	☼	537 (modified)	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.1		0.35	0.084	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: BFG-SH2:0.5 — Lab Sample ID: 320-88145-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.053	J	0.30	0.046	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.37	I	0.30	0.064	ug/Kg	1	☼	537 (modified)	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.12	J	0.30	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.20	J	0.30	0.071	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: BFG-SH2:1.0 — Lab Sample ID: 320-88145-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.17	J	0.31	0.049	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.062	J	0.31	0.060	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.096	J	0.31	0.083	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.047	J	0.31	0.035	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.11	J	0.31	0.075	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.098	J	0.31	0.066	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorododecanoic acid (PFDoA)	0.073	J	0.31	0.047	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.096	J	0.31	0.046	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.6		0.31	0.068	ug/Kg	1	☼	537 (modified)	Total/NA
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.31		0.31	0.036	ug/Kg	1	☼	537 (modified)	Total/NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.68		0.31	0.075	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: BFG-EB — Lab Sample ID: 320-88145-6

No Detections.

This Detection Summary does not include radiochemical test results.

Eurofins Sacramento

Client Sample ID: BFG-HA1:0.5

Lab Sample ID: 320-88145-1
Date Collected: 05/18/22 13:15
Matrix: Solid
Date Received: 05/20/22 10:00
Percent Solids: 82.7

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.081**	**J**	0.23	0.035	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.043	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.060	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.025	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.055	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.048	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.034	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorotridecanoic acid (PFTriA)	ND		0.23	0.024	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.042	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.043	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorohexanesulfonic acid (PFHxS)	**0.046**	**J**	0.23	0.033	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
Perfluorooctanesulfonic acid (PFOS)	**0.11**	**J**	0.23	0.049	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.23	0.026	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.23	0.055	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
F-53B Major	ND		0.23	0.040	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
HFPO-DA (GenX)	ND		0.23	0.047	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
F-53B Minor	ND		0.23	0.035	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1
DONA	ND		0.23	0.044	ug/Kg	☼	05/24/22 04:55	05/26/22 18:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C2 PFDA	*112*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C4 PFOS	*103*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
d3-NMeFOSAA	*111*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
d5-NEtFOSAA	*118*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C3 HFPO-DA	*83*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
18O2 PFHxS	*99*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C3 PFBS	*105*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C2 PFDoA	*106*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C2 PFTeDA	*108*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C5 PFNA	*105*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C4 PFOA	*91*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C2 PFUnA	*106*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*
13C4 PFHpA	*84*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:21*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**17.3**		0.1	0.1	%			05/23/22 13:00	1
Percent Solids	**82.7**		0.1	0.1	%			05/23/22 13:00	1

Client Sample ID: BFG-SH1:0.5

Lab Sample ID: 320-88145-2
Date Collected: 05/18/22 13:30
Matrix: Solid
Date Received: 05/20/22 10:00
Percent Solids: 80.1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.24	0.038	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluoroheptanoic acid (PFHpA)	ND		0.24	0.046	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1

Client Sample ID: BFG-SH1:0.5

Date Collected: 05/18/22 13:30
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-2

Matrix: Solid
Percent Solids: 80.1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.24	0.065	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorononanoic acid (PFNA)	ND		0.24	0.027	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorodecanoic acid (PFDA)	ND		0.24	0.059	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluoroundecanoic acid (PFUnA)	ND		0.24	0.051	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorododecanoic acid (PFDoA)	ND		0.24	0.037	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorotridecanoic acid (PFTriA)	ND		0.24	0.026	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.24	0.045	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.24	0.046	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.24	0.035	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.24	0.052	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.24	0.028	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.075**	**J**	0.24	0.059	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
F-53B Major	ND		0.24	0.043	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
HFPO-DA (GenX)	ND		0.24	0.050	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
F-53B Minor	ND		0.24	0.038	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1
DONA	ND		0.24	0.048	ug/Kg	☼	05/24/22 04:55	05/26/22 18:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C2 PFDA	*110*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C4 PFOS	*102*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
d3-NMeFOSAA	*109*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
d5-NEtFOSAA	*121*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C3 HFPO-DA	*81*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
18O2 PFHxS	*95*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C3 PFBS	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C2 PFDoA	*103*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C2 PFTeDA	*106*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C5 PFNA	*99*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C4 PFOA	*89*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C2 PFUnA	*100*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*
13C4 PFHpA	*81*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:32*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**19.9**		0.1	0.1	%			05/23/22 13:00	1
Percent Solids	**80.1**		0.1	0.1	%			05/23/22 13:00	1

Client Sample ID: BFG-SH1:1.0

Date Collected: 05/18/22 13:35
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-3

Matrix: Solid
Percent Solids: 53.1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.35	0.054	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluoroheptanoic acid (PFHpA)	ND		0.35	0.067	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorooctanoic acid (PFOA)	ND		0.35	0.093	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorononanoic acid (PFNA)	ND		0.35	0.039	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorodecanoic acid (PFDA)	ND		0.35	0.084	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1

Client Sample ID: BFG-SH1:1.0

Date Collected: 05/18/22 13:35
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-3

Matrix: Solid
Percent Solids: 53.1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroundecanoic acid (PFUnA)	ND		0.35	0.074	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorododecanoic acid (PFDoA)	**0.072**	**J**	0.35	0.053	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorotridecanoic acid (PFTriA)	**0.084**	**J**	0.35	0.037	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorotetradecanoic acid (PFTeA)	**0.081**	**J**	0.35	0.065	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.35	0.067	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.35	0.051	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
Perfluorooctanesulfonic acid (PFOS)	**0.70**		0.35	0.075	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**0.85**		0.35	0.040	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**2.1**		0.35	0.084	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
F-53B Major	ND		0.35	0.061	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
HFPO-DA (GenX)	ND		0.35	0.072	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
F-53B Minor	ND		0.35	0.054	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1
DONA	ND		0.35	0.068	ug/Kg	☼	05/24/22 04:55	05/26/22 18:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C2 PFDA	*100*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C4 PFOS	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
d3-NMeFOSAA	*102*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
d5-NEtFOSAA	*99*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C3 HFPO-DA	*77*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
18O2 PFHxS	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C3 PFBS	*98*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C2 PFDoA	*92*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C2 PFTeDA	*70*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C5 PFNA	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C4 PFOA	*87*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C2 PFUnA	*90*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*
13C4 PFHpA	*81*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:42*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**46.9**		0.1	0.1	%			05/23/22 13:00	1
Percent Solids	**53.1**		0.1	0.1	%			05/23/22 13:00	1

Client Sample ID: BFG-SH2:0.5

Date Collected: 05/18/22 14:15
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-4

Matrix: Solid
Percent Solids: 66.3

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.053**	**J**	0.30	0.046	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluoroheptanoic acid (PFHpA)	ND		0.30	0.057	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorooctanoic acid (PFOA)	ND		0.30	0.079	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorononanoic acid (PFNA)	ND		0.30	0.033	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorodecanoic acid (PFDA)	ND		0.30	0.071	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluoroundecanoic acid (PFUnA)	ND		0.30	0.063	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1

Client Sample ID: BFG-SH2:0.5

Date Collected: 05/18/22 14:15
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-4

Matrix: Solid
Percent Solids: 66.3

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorododecanoic acid (PFDoA)	ND		0.30	0.045	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorotridecanoic acid (PFTriA)	ND		0.30	0.031	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.30	0.055	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.30	0.057	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.30	0.043	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
Perfluorooctanesulfonic acid (PFOS)	**0.37**	**I**	0.30	0.064	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**0.12**	**J**	0.30	0.034	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.20**	**J**	0.30	0.071	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
F-53B Major	ND		0.30	0.052	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
HFPO-DA (GenX)	ND		0.30	0.061	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
F-53B Minor	ND		0.30	0.046	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1
DONA	ND		0.30	0.058	ug/Kg	☼	05/24/22 04:55	05/26/22 18:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C2 PFDA	*114*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C4 PFOS	*108*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
d3-NMeFOSAA	*116*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
d5-NEtFOSAA	*127*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C3 HFPO-DA	*79*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
18O2 PFHxS	*105*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C3 PFBS	*107*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C2 PFDoA	*107*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C2 PFTeDA	*109*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C5 PFNA	*105*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C4 PFOA	*92*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C2 PFUnA	*109*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*
13C4 PFHpA	*82*		*25 - 150*	*05/24/22 04:55*	*05/26/22 18:52*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**33.7**		0.1	0.1	%			05/23/22 13:00	1
Percent Solids	**66.3**		0.1	0.1	%			05/23/22 13:00	1

Client Sample ID: BFG-SH2:1.0

Date Collected: 05/18/22 14:20
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-5

Matrix: Solid
Percent Solids: 60.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.17**	**J**	0.31	0.049	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluoroheptanoic acid (PFHpA)	**0.062**	**J**	0.31	0.060	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorooctanoic acid (PFOA)	**0.096**	**J**	0.31	0.083	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorononanoic acid (PFNA)	**0.047**	**J**	0.31	0.035	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorodecanoic acid (PFDA)	**0.11**	**J**	0.31	0.075	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluoroundecanoic acid (PFUnA)	**0.098**	**J**	0.31	0.066	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorododecanoic acid (PFDoA)	**0.073**	**J**	0.31	0.047	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1

Client Sample ID: BFG-SH2:1.0

Lab Sample ID: 320-88145-5

Date Collected: 05/18/22 14:20
Matrix: Solid
Date Received: 05/20/22 10:00
Percent Solids: 60.0

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic acid (PFTriA)	ND		0.31	0.033	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.31	0.058	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.31	0.060	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorohexanesulfonic acid (PFHxS)	**0.096**	**J**	0.31	0.046	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
Perfluorooctanesulfonic acid (PFOS)	**1.6**		0.31	0.068	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**0.31**		0.31	0.036	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**0.68**		0.31	0.075	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
F-53B Major	ND		0.31	0.055	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
HFPO-DA (GenX)	ND		0.31	0.064	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
F-53B Minor	ND		0.31	0.049	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1
DONA	ND		0.31	0.061	ug/Kg	☼	05/24/22 04:55	05/26/22 19:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*77*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C2 PFDA	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C4 PFOS	*89*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
d3-NMeFOSAA	*90*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C3 HFPO-DA	*69*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
18O2 PFHxS	*87*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C3 PFBS	*87*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C2 PFDoA	*94*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C2 PFTeDA	*94*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C5 PFNA	*90*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C4 PFOA	*78*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C2 PFUnA	*89*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*
13C4 PFHpA	*72*		*25 - 150*	*05/24/22 04:55*	*05/26/22 19:02*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**40.0**		0.1	0.1	%			05/23/22 13:00	1
Percent Solids	**60.0**		0.1	0.1	%			05/23/22 13:00	1

Client Sample ID: BFG-EB

Lab Sample ID: 320-88145-6

Date Collected: 05/18/22 14:30
Matrix: Water
Date Received: 05/20/22 10:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.52	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorooctanoic acid (PFOA)	ND		1.8	0.76	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		05/31/22 12:09	06/01/22 14:46	1

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Client Sample ID: BFG-EB
Date Collected: 05/18/22 14:30
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-6
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		05/31/22 12:09	06/01/22 14:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.48	ng/L		05/31/22 12:09	06/01/22 14:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		05/31/22 12:09	06/01/22 14:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		05/31/22 12:09	06/01/22 14:46	1
F-53B Major	ND		1.8	0.21	ng/L		05/31/22 12:09	06/01/22 14:46	1
F-53B Minor	ND		1.8	0.28	ng/L		05/31/22 12:09	06/01/22 14:46	1
HFPO-DA (GenX)	ND		3.6	1.3	ng/L		05/31/22 12:09	06/01/22 14:46	1
DONA	ND		1.8	0.36	ng/L		05/31/22 12:09	06/01/22 14:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*101*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C2 PFDA	*98*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C3 HFPO-DA	*92*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C4 PFOS	*90*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
d3-NMeFOSAA	*86*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
18O2 PFHxS	*97*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C3 PFBS	*90*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C2 PFDoA	*92*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C2 PFTeDA	*80*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C5 PFNA	*90*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C4 PFOA	*95*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C2 PFUnA	*91*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*
13C4 PFHpA	*97*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:46*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (25-150)	PFDA (25-150)	d5NEFOS (25-150)	HFPODA (25-150)	PFOS (25-150)	d3NMFOS (25-150)	PFHxS (25-150)	C3PFBS (25-150)
180-138294-H-9-B MS	Matrix Spike	85	110	116	76	94	108	91	95
180-138294-H-9-C MSD	Matrix Spike Duplicate	87	109	119	77	94	108	90	93
320-88145-1	BFG-HA1:0.5	88	112	118	83	103	111	99	105
320-88145-2	BFG-SH1:0.5	93	110	121	81	102	109	95	97
320-88145-3	BFG-SH1:1.0	92	100	99	77	97	102	97	98
320-88145-4	BFG-SH2:0.5	92	114	127	79	108	116	105	107
320-88145-5	BFG-SH2:1.0	77	97	96	69	89	90	87	87
LCS 320-590251/2-A	Lab Control Sample	92	109	107	80	97	107	95	97
MB 320-590251/1-A	Method Blank	88	112	109	78	99	106	97	101

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDoA (25-150)	PFTDA (25-150)	PFNA (25-150)	PFOA (25-150)	PFUnA (25-150)	C4PFHA (25-150)		
180-138294-H-9-B MS	Matrix Spike	96	105	99	88	100	80		
180-138294-H-9-C MSD	Matrix Spike Duplicate	96	100	98	89	101	84		
320-88145-1	BFG-HA1:0.5	106	108	105	91	106	84		
320-88145-2	BFG-SH1:0.5	103	106	99	89	100	81		
320-88145-3	BFG-SH1:1.0	92	70	97	87	90	81		
320-88145-4	BFG-SH2:0.5	107	109	105	92	109	82		
320-88145-5	BFG-SH2:1.0	94	94	90	78	89	72		
LCS 320-590251/2-A	Lab Control Sample	100	101	97	87	102	79		
MB 320-590251/1-A	Method Blank	101	101	93	91	103	85		

Surrogate Legend

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
PFHxS = 18O2 PFHxS
C3PFBS = 13C3 PFBS
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFUnA = 13C2 PFUnA
C4PFHA = 13C4 PFHpA

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (25-150)	PFDA (25-150)	d5NEFOS (25-150)	HFPODA (25-150)	PFOS (25-150)	d3NMFOS (25-150)	PFHxS (25-150)	C3PFBS (25-150)
320-88145-6	BFG-EB	101	98	96	92	90	86	97	90
LCS 320-591507/2-A	Lab Control Sample	114	107	96	105	101	99	105	109
LCSD 320-591507/3-A	Lab Control Sample Dup	85	81	71	81	79	75	87	81
MB 320-591507/1-A	Method Blank	105	107	93	107	101	93	109	101

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	PFDoA (25-150)	PFTDA (25-150)	PFNA (25-150)	PFOA (25-150)	PFUnA (25-150)	C4PFHA (25-150)
320-88145-6	BFG-EB	92	80	90	95	91	97
LCS 320-591507/2-A	Lab Control Sample	102	93	107	104	99	111
LCSD 320-591507/3-A	Lab Control Sample Dup	77	69	81	81	74	84
MB 320-591507/1-A	Method Blank	102	94	98	104	98	112

Surrogate Legend

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
PFHxS = 18O2 PFHxS
C3PFBS = 13C3 PFBS
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFUnA = 13C2 PFUnA
C4PFHA = 13C4 PFHpA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-590251/1-A
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 590251

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorotridecanoic acid (PFTriA)	ND		0.20	0.021	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		0.20	0.023	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		0.20	0.048	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
F-53B Major	ND		0.20	0.035	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
HFPO-DA (GenX)	ND		0.20	0.041	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
F-53B Minor	ND		0.20	0.031	ug/Kg		05/24/22 04:55	05/26/22 16:20	1
DONA	ND		0.20	0.039	ug/Kg		05/24/22 04:55	05/26/22 16:20	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C2 PFDA	*112*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
d5-NEtFOSAA	*109*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C3 HFPO-DA	*78*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C4 PFOS	*99*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
18O2 PFHxS	*97*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C3 PFBS	*101*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C2 PFDoA	*101*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C2 PFTeDA	*101*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C5 PFNA	*93*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C4 PFOA	*91*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C2 PFUnA	*103*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*
13C4 PFHpA	*85*		*25 - 150*	*05/24/22 04:55*	*05/26/22 16:20*	*1*

Lab Sample ID: LCS 320-590251/2-A
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 590251

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	1.81		ug/Kg		90	71 - 131
Perfluoroheptanoic acid (PFHpA)	2.00	1.99		ug/Kg		99	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	1.86		ug/Kg		93	72 - 132
Perfluorononanoic acid (PFNA)	2.00	1.90		ug/Kg		95	73 - 133
Perfluorodecanoic acid (PFDA)	2.00	1.97		ug/Kg		98	72 - 132
Perfluoroundecanoic acid (PFUnA)	2.00	1.93		ug/Kg		97	66 - 126

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-590251/2-A
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 590251

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Perfluorododecanoic acid (PFDoA)			2.00	1.88		ug/Kg		94	71 - 131		
Perfluorotridecanoic acid (PFTriA)			2.00	1.92		ug/Kg		96	71 - 131		
Perfluorotetradecanoic acid (PFTeA)			2.00	1.72		ug/Kg		86	67 - 127		
Perfluorobutanesulfonic acid (PFBS)			1.77	1.71		ug/Kg		97	69 - 129		
Perfluorohexanesulfonic acid (PFHxS)			1.82	1.81		ug/Kg		100	62 - 122		
Perfluorooctanesulfonic acid (PFOS)			1.86	1.84		ug/Kg		99	68 - 141		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			2.00	2.03		ug/Kg		101	72 - 132		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			2.00	2.03		ug/Kg		102	72 - 132		
F-53B Major			1.86	1.65		ug/Kg		88	74 - 134		
HFPO-DA (GenX)			2.00	2.09		ug/Kg		104	53 - 158		
F-53B Minor			1.88	1.68		ug/Kg		89	66 - 136		
DONA			1.88	1.57		ug/Kg		84	79 - 139		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*92*		*25 - 150*
13C2 PFDA	*109*		*25 - 150*
d5-NEtFOSAA	*107*		*25 - 150*
13C3 HFPO-DA	*80*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
d3-NMeFOSAA	*107*		*25 - 150*
18O2 PFHxS	*95*		*25 - 150*
13C3 PFBS	*97*		*25 - 150*
13C2 PFDoA	*100*		*25 - 150*
13C2 PFTeDA	*101*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*
13C4 PFOA	*87*		*25 - 150*
13C2 PFUnA	*102*		*25 - 150*
13C4 PFHpA	*79*		*25 - 150*

Lab Sample ID: 180-138294-H-9-B MS
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 590251

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Perfluorohexanoic acid (PFHxA)	ND		2.10	1.94		ug/Kg	☼	92	71 - 131		
Perfluoroheptanoic acid (PFHpA)	ND		2.10	2.03		ug/Kg	☼	97	71 - 131		
Perfluorooctanoic acid (PFOA)	0.089	J	2.10	1.97		ug/Kg	☼	90	72 - 132		
Perfluorononanoic acid (PFNA)	0.11	J	2.10	2.04		ug/Kg	☼	92	73 - 133		
Perfluorodecanoic acid (PFDA)	0.11	J	2.10	2.15		ug/Kg	☼	97	72 - 132		
Perfluoroundecanoic acid (PFUnA)	1.1		2.10	2.91		ug/Kg	☼	87	66 - 126		
Perfluorododecanoic acid (PFDoA)	0.087	J	2.10	2.04		ug/Kg	☼	93	71 - 131		

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 180-138294-H-9-B MS
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 590251

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorotridecanoic acid (PFTriA)	0.67		2.10	2.72		ug/Kg	☼	97	71 - 131
Perfluorotetradecanoic acid (PFTeA)	0.053	J	2.10	1.85		ug/Kg	☼	86	67 - 127
Perfluorobutanesulfonic acid (PFBS)	ND		1.86	1.75		ug/Kg	☼	94	69 - 129
Perfluorohexanesulfonic acid (PFHxS)	0.078	J	1.91	1.79		ug/Kg	☼	90	62 - 122
Perfluorooctanesulfonic acid (PFOS)	1.3	I	1.95	3.05		ug/Kg	☼	87	68 - 141
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.10	2.18		ug/Kg	☼	104	72 - 132
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.10	2.10		ug/Kg	☼	100	72 - 132
F-53B Major	ND		1.96	1.70		ug/Kg	☼	87	74 - 134
HFPO-DA (GenX)	ND		2.10	2.09		ug/Kg	☼	99	53 - 158
F-53B Minor	ND		1.98	1.75		ug/Kg	☼	89	66 - 136
DONA	ND		1.98	1.60		ug/Kg	☼	81	79 - 139

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFHxA	*85*		*25 - 150*
13C2 PFDA	*110*		*25 - 150*
d5-NEtFOSAA	*116*		*25 - 150*
13C3 HFPO-DA	*76*		*25 - 150*
13C4 PFOS	*94*		*25 - 150*
d3-NMeFOSAA	*108*		*25 - 150*
18O2 PFHxS	*91*		*25 - 150*
13C3 PFBS	*95*		*25 - 150*
13C2 PFDoA	*96*		*25 - 150*
13C2 PFTeDA	*105*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C4 PFOA	*88*		*25 - 150*
13C2 PFUnA	*100*		*25 - 150*
13C4 PFHpA	*80*		*25 - 150*

Lab Sample ID: 180-138294-H-9-C MSD
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 590251

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	ND		2.00	1.89		ug/Kg	☼	95	71 - 131	2	30
Perfluoroheptanoic acid (PFHpA)	ND		2.00	1.91		ug/Kg	☼	96	71 - 131	6	30
Perfluorooctanoic acid (PFOA)	0.089	J	2.00	1.91		ug/Kg	☼	91	72 - 132	4	30
Perfluorononanoic acid (PFNA)	0.11	J	2.00	1.96		ug/Kg	☼	93	73 - 133	4	30
Perfluorodecanoic acid (PFDA)	0.11	J	2.00	2.15		ug/Kg	☼	102	72 - 132	0	30
Perfluoroundecanoic acid (PFUnA)	1.1		2.00	2.76		ug/Kg	☼	83	66 - 126	5	30
Perfluorododecanoic acid (PFDoA)	0.087	J	2.00	1.94		ug/Kg	☼	93	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)	0.67		2.00	2.60		ug/Kg	☼	97	71 - 131	4	30

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 180-138294-H-9-C MSD
Matrix: Solid
Analysis Batch: 590747

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 590251

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorotetradecanoic acid (PFTeA)	0.053	J	2.00	1.87		ug/Kg	☼	91	67 - 127	1	30
Perfluorobutanesulfonic acid (PFBS)	ND		1.77	1.71		ug/Kg	☼	97	69 - 129	2	30
Perfluorohexanesulfonic acid (PFHxS)	0.078	J	1.82	1.80		ug/Kg	☼	95	62 - 122	0	30
Perfluorooctanesulfonic acid (PFOS)	1.3	I	1.85	2.89		ug/Kg	☼	83	68 - 141	5	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		2.00	2.08		ug/Kg	☼	104	72 - 132	5	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		2.00	1.97		ug/Kg	☼	99	72 - 132	6	30
F-53B Major	ND		1.86	1.64		ug/Kg	☼	88	74 - 134	4	30
HFPO-DA (GenX)	ND		2.00	2.06		ug/Kg	☼	103	53 - 158	2	30
F-53B Minor	ND		1.88	1.66		ug/Kg	☼	88	66 - 136	6	30
DONA	ND		1.88	1.57		ug/Kg	☼	83	79 - 139	2	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C2 PFHxA	*87*		*25 - 150*
13C2 PFDA	*109*		*25 - 150*
d5-NEtFOSAA	*119*		*25 - 150*
13C3 HFPO-DA	*77*		*25 - 150*
13C4 PFOS	*94*		*25 - 150*
d3-NMeFOSAA	*108*		*25 - 150*
18O2 PFHxS	*90*		*25 - 150*
13C3 PFBS	*93*		*25 - 150*
13C2 PFDoA	*96*		*25 - 150*
13C2 PFTeDA	*100*		*25 - 150*
13C5 PFNA	*98*		*25 - 150*
13C4 PFOA	*89*		*25 - 150*
13C2 PFUnA	*101*		*25 - 150*
13C4 PFHpA	*84*		*25 - 150*

Lab Sample ID: MB 320-591507/1-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 591507

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		05/31/22 12:09	06/01/22 14:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		05/31/22 12:09	06/01/22 14:15	1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-591507/1-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 591507

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		05/31/22 12:09	06/01/22 14:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		05/31/22 12:09	06/01/22 14:15	1
F-53B Major	ND		2.0	0.24	ng/L		05/31/22 12:09	06/01/22 14:15	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		05/31/22 12:09	06/01/22 14:15	1
F-53B Minor	ND		2.0	0.32	ng/L		05/31/22 12:09	06/01/22 14:15	1
DONA	ND		2.0	0.40	ng/L		05/31/22 12:09	06/01/22 14:15	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C2 PFDA	*107*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
d5-NEtFOSAA	*93*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C3 HFPO-DA	*107*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C4 PFOS	*101*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
d3-NMeFOSAA	*93*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
18O2 PFHxS	*109*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C3 PFBS	*101*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C2 PFDoA	*102*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C2 PFTeDA	*94*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C5 PFNA	*98*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C4 PFOA	*104*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C2 PFUnA	*98*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*
13C4 PFHpA	*112*		*25 - 150*	*05/31/22 12:09*	*06/01/22 14:15*	*1*

Lab Sample ID: LCS 320-591507/2-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 591507

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	38.0		ng/L		95	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	49.0		ng/L		122	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	42.7		ng/L		107	70 - 130
Perfluorononanoic acid (PFNA)	40.0	44.5		ng/L		111	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	32.9		ng/L		82	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	46.8		ng/L		117	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	42.0		ng/L		105	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	42.8		ng/L		107	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	44.1		ng/L		110	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	32.5		ng/L		92	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	36.0		ng/L		99	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.4		ng/L		106	70 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	40.6		ng/L		101	76 - 136

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-591507/2-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 591507

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	44.6		ng/L		112	76 - 136
F-53B Major	37.3	42.0		ng/L		113	75 - 135
HFPO-DA (GenX)	40.0	53.6		ng/L		134	51 - 173
F-53B Minor	37.7	41.3		ng/L		110	54 - 114
DONA	37.7	44.9		ng/L		119	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*114*		*25 - 150*
13C2 PFDA	*107*		*25 - 150*
d5-NEtFOSAA	*96*		*25 - 150*
13C3 HFPO-DA	*105*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
d3-NMeFOSAA	*99*		*25 - 150*
18O2 PFHxS	*105*		*25 - 150*
13C3 PFBS	*109*		*25 - 150*
13C2 PFDoA	*102*		*25 - 150*
13C2 PFTeDA	*93*		*25 - 150*
13C5 PFNA	*107*		*25 - 150*
13C4 PFOA	*104*		*25 - 150*
13C2 PFUnA	*99*		*25 - 150*
13C4 PFHpA	*111*		*25 - 150*

Lab Sample ID: LCSD 320-591507/3-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 591507

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	37.2		ng/L		93	73 - 133	2	30
Perfluoroheptanoic acid (PFHpA)	40.0	43.8		ng/L		109	72 - 132	11	30
Perfluorooctanoic acid (PFOA)	40.0	42.1		ng/L		105	70 - 130	1	30
Perfluorononanoic acid (PFNA)	40.0	45.0		ng/L		112	75 - 135	1	30
Perfluorodecanoic acid (PFDA)	40.0	31.5		ng/L		79	76 - 136	4	30
Perfluoroundecanoic acid (PFUnA)	40.0	45.2		ng/L		113	68 - 128	3	30
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	71 - 131	4	30
Perfluorotridecanoic acid (PFTriA)	40.0	39.3		ng/L		98	71 - 131	9	30
Perfluorotetradecanoic acid (PFTeA)	40.0	40.6		ng/L		101	70 - 130	8	30
Perfluorobutanesulfonic acid (PFBS)	35.4	31.8		ng/L		90	67 - 127	2	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.3		ng/L		91	59 - 119	8	30
Perfluorooctanesulfonic acid (PFOS)	37.1	39.5		ng/L		106	70 - 130	0	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.1		ng/L		105	76 - 136	4	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	42.4		ng/L		106	76 - 136	5	30

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-591507/3-A
Matrix: Water
Analysis Batch: 591865

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 591507

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
F-53B Major			37.3	42.3		ng/L		114	75 - 135	1	30
HFPO-DA (GenX)			40.0	41.5		ng/L		104	51 - 173	26	30
F-53B Minor			37.7	40.3		ng/L		107	54 - 114	3	30
DONA			37.7	43.4		ng/L		115	79 - 139	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*85*		*25 - 150*
13C2 PFDA	*81*		*25 - 150*
d5-NEtFOSAA	*71*		*25 - 150*
13C3 HFPO-DA	*81*		*25 - 150*
13C4 PFOS	*79*		*25 - 150*
d3-NMeFOSAA	*75*		*25 - 150*
18O2 PFHxS	*87*		*25 - 150*
13C3 PFBS	*81*		*25 - 150*
13C2 PFDoA	*77*		*25 - 150*
13C2 PFTeDA	*69*		*25 - 150*
13C5 PFNA	*81*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C2 PFUnA	*74*		*25 - 150*
13C4 PFHpA	*84*		*25 - 150*

Method: D 2216 - Percent Moisture

Lab Sample ID: 320-88145-1 DU
Matrix: Solid
Analysis Batch: 589728

Client Sample ID: BFG-HA1:0.5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	17.3			18.0		%				4	20
Percent Solids	82.7			82.0		%				0.8	20

LCMS

Prep Batch: 590251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88145-1	BFG-HA1:0.5	Total/NA	Solid	SHAKE	
320-88145-2	BFG-SH1:0.5	Total/NA	Solid	SHAKE	
320-88145-3	BFG-SH1:1.0	Total/NA	Solid	SHAKE	
320-88145-4	BFG-SH2:0.5	Total/NA	Solid	SHAKE	
320-88145-5	BFG-SH2:1.0	Total/NA	Solid	SHAKE	
MB 320-590251/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-590251/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
180-138294-H-9-B MS	Matrix Spike	Total/NA	Solid	SHAKE	
180-138294-H-9-C MSD	Matrix Spike Duplicate	Total/NA	Solid	SHAKE	

Analysis Batch: 590747

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88145-1	BFG-HA1:0.5	Total/NA	Solid	537 (modified)	590251
320-88145-2	BFG-SH1:0.5	Total/NA	Solid	537 (modified)	590251
320-88145-3	BFG-SH1:1.0	Total/NA	Solid	537 (modified)	590251
320-88145-4	BFG-SH2:0.5	Total/NA	Solid	537 (modified)	590251
320-88145-5	BFG-SH2:1.0	Total/NA	Solid	537 (modified)	590251
MB 320-590251/1-A	Method Blank	Total/NA	Solid	537 (modified)	590251
LCS 320-590251/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	590251
180-138294-H-9-B MS	Matrix Spike	Total/NA	Solid	537 (modified)	590251
180-138294-H-9-C MSD	Matrix Spike Duplicate	Total/NA	Solid	537 (modified)	590251

Prep Batch: 591507

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88145-6	BFG-EB	Total/NA	Water	3535	
MB 320-591507/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-591507/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-591507/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 591865

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88145-6	BFG-EB	Total/NA	Water	537 (modified)	591507
MB 320-591507/1-A	Method Blank	Total/NA	Water	537 (modified)	591507
LCS 320-591507/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	591507
LCSD 320-591507/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	591507

General Chemistry

Analysis Batch: 589728

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-88145-1	BFG-HA1:0.5	Total/NA	Solid	D 2216	
320-88145-2	BFG-SH1:0.5	Total/NA	Solid	D 2216	
320-88145-3	BFG-SH1:1.0	Total/NA	Solid	D 2216	
320-88145-4	BFG-SH2:0.5	Total/NA	Solid	D 2216	
320-88145-5	BFG-SH2:1.0	Total/NA	Solid	D 2216	
320-88145-1 DU	BFG-HA1:0.5	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Client Sample ID: BFG-HA1:0.5
Date Collected: 05/18/22 13:15
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			589728	05/23/22 13:00	TCS	TAL SAC

Client Sample ID: BFG-HA1:0.5
Date Collected: 05/18/22 13:15
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-1
Matrix: Solid
Percent Solids: 82.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.31 g	10.0 mL	590251	05/24/22 04:55	FX	TAL SAC
Total/NA	Analysis	537 (modified)		1			590747	05/26/22 18:21	D1R	TAL SAC

Client Sample ID: BFG-SH1:0.5
Date Collected: 05/18/22 13:30
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			589728	05/23/22 13:00	TCS	TAL SAC

Client Sample ID: BFG-SH1:0.5
Date Collected: 05/18/22 13:30
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-2
Matrix: Solid
Percent Solids: 80.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.12 g	10.0 mL	590251	05/24/22 04:55	FX	TAL SAC
Total/NA	Analysis	537 (modified)		1			590747	05/26/22 18:32	D1R	TAL SAC

Client Sample ID: BFG-SH1:1.0
Date Collected: 05/18/22 13:35
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			589728	05/23/22 13:00	TCS	TAL SAC

Client Sample ID: BFG-SH1:1.0
Date Collected: 05/18/22 13:35
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-3
Matrix: Solid
Percent Solids: 53.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.37 g	10.0 mL	590251	05/24/22 04:55	FX	TAL SAC
Total/NA	Analysis	537 (modified)		1			590747	05/26/22 18:42	D1R	TAL SAC

Client Sample ID: BFG-SH2:0.5
Date Collected: 05/18/22 14:15
Date Received: 05/20/22 10:00

Lab Sample ID: 320-88145-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			589728	05/23/22 13:00	TCS	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Client Sample ID: BFG-SH2:0.5

Lab Sample ID: 320-88145-4
Date Collected: 05/18/22 14:15
Matrix: Solid
Date Received: 05/20/22 10:00
Percent Solids: 66.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.06 g	10.0 mL	590251	05/24/22 04:55	FX	TAL SAC
Total/NA	Analysis	537 (modified)		1			590747	05/26/22 18:52	D1R	TAL SAC

Client Sample ID: BFG-SH2:1.0

Lab Sample ID: 320-88145-5
Date Collected: 05/18/22 14:20
Matrix: Solid
Date Received: 05/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			589728	05/23/22 13:00	TCS	TAL SAC

Client Sample ID: BFG-SH2:1.0

Lab Sample ID: 320-88145-5
Date Collected: 05/18/22 14:20
Matrix: Solid
Date Received: 05/20/22 10:00
Percent Solids: 60.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.30 g	10.0 mL	590251	05/24/22 04:55	FX	TAL SAC
Total/NA	Analysis	537 (modified)		1			590747	05/26/22 19:02	D1R	TAL SAC

Client Sample ID: BFG-EB

Lab Sample ID: 320-88145-6
Date Collected: 05/18/22 14:30
Matrix: Water
Date Received: 05/20/22 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			281 mL	10.0 mL	591507	05/31/22 12:09	DVC	TAL SAC
Total/NA	Analysis	537 (modified)		1			591865	06/01/22 14:46	RS1	TAL SAC

Laboratory References:

TAL SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Laboratory: Eurofins Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4040	01-29-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-88145-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-88145-1	BFG-HA1:0.5	Solid	05/18/22 13:15	05/20/22 10:00
320-88145-2	BFG-SH1:0.5	Solid	05/18/22 13:30	05/20/22 10:00
320-88145-3	BFG-SH1:1.0	Solid	05/18/22 13:35	05/20/22 10:00
320-88145-4	BFG-SH2:0.5	Solid	05/18/22 14:15	05/20/22 10:00
320-88145-5	BFG-SH2:1.0	Solid	05/18/22 14:20	05/20/22 10:00
320-88145-6	BFG-EB	Water	05/18/22 14:30	05/20/22 10:00

Address: _____

Chain of Custody Record 602616

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Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: WA State Dept. of Ecology

TAL-8210

Client Contact	Project Manager: Ryan Peterson	Site Contact: Ryan Peterson	Date: 5/19/22	COC No:
Company Name: Shannon & Wilson	Tel/Email: Ryan.Peterson@shanwil.com	Lab Contact: David Alltucker	Carrier: FedEx	_____ of _____ COCs
Address: 400 N. 34th St., Suite 100	Analysis Turnaround Time			Sampler:
City/State/Zip: Tukwila, WA 98103	☐ CALENDAR DAYS ☒ WORKING DAYS			For Lab Use Only:
Phone: 206-632-8020	TAT if different from Below 15 days			Walk-in Client:
Fax:	☐ 2 weeks			Lab Sampling:
Project Name: Paine Field	☐ 1 week			Job / SDG No.:
Site: Paine Field	☐ 2 days			
P O # 102986	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	PFAS, 537.1, 18 Analytes	Sample Specific Notes:
BFG-HA1:0.5	5/18	1315	G	Soil	1	N	N	X	
BFG-SH1:0.5	5/18	1330	G	Soil	1	N	N	X	
BFG-SH1:1.0	5/18	1335	G	Soil	1	N	N	X	
BFG-SH2:0.5	5/18	1415	G	Soil	1	N	N	X	
BFG-SH2:1.0	5/18	1420	G	Soil	1	N	N	X	
BFG-EB	5/18	1430	G	Water	2	N	N	X	

320-88145 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:
PFAS will likely be detected >1ppb in each sample, except BFG-EB.

Custody Seals Intact: ☑ Yes ☐ No | Custody Seal No.: 1685387 | Cooler Temp. (°C): Obs'd: 1.0 Corr'd: 1.0 | Therm ID No.: 006

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
RYAN PETERSON	Shannon & Wilson	5/19/22 1000		EETSAL	5-20-22 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

6/2/2022

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-88145-1

Login Number: 88145
List Number: 1
Creator: Oropeza, Salvador

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1685387
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

Laboratory Job ID: 320-89132-1
Client Project/Site: Paine Field

For:
Shannon & Wilson, Inc
400 N. 34th Suite 100
PO BOX 300303
Seattle, Washington 98103

Attn: Ryan Peterson

Authorized for release by:
7/7/2022 2:19:54 PM

David Alltucker, Project Manager I
(916)374-4383
David.Alltucker@et.eurofinsus.com

Table of Contents

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Qualifiers

LCMS

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Job ID: 320-89132-1

Laboratory: Eurofins Sacramento

Narrative

Job Narrative
320-89132-1

Receipt
The samples were received on 6/16/2022 9:15 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.7º C.

LCMS
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-598547.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Client Sample ID: BFG-EB2 — Lab Sample ID: 320-89132-1

No Detections.

Client Sample ID: BFG-HA2:0.8 — Lab Sample ID: 320-89132-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	0.12	J	0.23	0.036	ug/Kg	1	☼	537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: BFG-EB2

Lab Sample ID: 320-89132-1

Date Collected: 06/15/22 11:45

Matrix: Water

Date Received: 06/16/22 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.86	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorotridecanoic acid (PFTrDA)	ND		2.0	1.3	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/25/22 05:29	06/30/22 16:24	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/25/22 05:29	06/30/22 16:24	1
NEtFOSAA	ND		5.0	1.3	ng/L		06/25/22 05:29	06/30/22 16:24	1
NMeFOSAA	ND		5.0	1.2	ng/L		06/25/22 05:29	06/30/22 16:24	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		06/25/22 05:29	06/30/22 16:24	1
9Cl-PF3ONS	ND		2.0	0.24	ng/L		06/25/22 05:29	06/30/22 16:24	1
11Cl-PF3OUdS	ND		2.0	0.32	ng/L		06/25/22 05:29	06/30/22 16:24	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/25/22 05:29	06/30/22 16:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*92*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C4 PFHpA	*96*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C4 PFOA	*100*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C5 PFNA	*99*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C2 PFDA	*106*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C2 PFUnA	*112*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C2 PFDoA	*98*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C2 PFTeDA	*95*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C3 PFBS	*91*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
18O2 PFHxS	*97*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C4 PFOS	*93*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
d3-NMeFOSAA	*89*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
d5-NEtFOSAA	*110*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*
13C3 HFPO-DA	*90*		*25 - 150*	*06/25/22 05:29*	*06/30/22 16:24*	*1*

Client Sample ID: BFG-HA2:0.8

Lab Sample ID: 320-89132-2

Date Collected: 06/15/22 12:00

Matrix: Solid

Date Received: 06/16/22 09:15

Percent Solids: 85.5

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**0.12**	**J**	0.23	0.036	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluoroheptanoic acid (PFHpA)	ND		0.23	0.044	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorooctanoic acid (PFOA)	ND		0.23	0.062	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorononanoic acid (PFNA)	ND		0.23	0.026	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorodecanoic acid (PFDA)	ND		0.23	0.056	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluoroundecanoic acid (PFUnA)	ND		0.23	0.049	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.035	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorotridecanoic acid (PFTrDA)	ND		0.23	0.024	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.043	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Client Sample ID: BFG-HA2:0.8
Date Collected: 06/15/22 12:00
Date Received: 06/16/22 09:15

Lab Sample ID: 320-89132-2
Matrix: Solid
Percent Solids: 85.5

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		0.23	0.044	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.23	0.034	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.23	0.050	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
NEtFOSAA	ND		0.23	0.056	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
NMeFOSAA	ND		0.23	0.027	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
HFPO-DA (GenX)	ND		0.23	0.048	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
9Cl-PF3ONS	ND		0.23	0.041	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
11Cl-PF3OUdS	ND		0.23	0.036	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.23	0.045	ug/Kg	☼	06/21/22 19:11	06/23/22 00:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*81*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C4 PFHpA	*89*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C4 PFOA	*86*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C5 PFNA	*87*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C2 PFDA	*87*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C2 PFUnA	*93*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C2 PFDoA	*85*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C2 PFTeDA	*91*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C3 PFBS	*72*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
18O2 PFHxS	*77*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C4 PFOS	*75*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
d3-NMeFOSAA	*81*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
d5-NEtFOSAA	*82*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*
13C3 HFPO-DA	*83*		*25 - 150*	*06/21/22 19:11*	*06/23/22 00:33*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**14.5**		0.1	0.1	%			06/17/22 16:17	1
Percent Solids	**85.5**		0.1	0.1	%			06/17/22 16:17	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDoA (25-150)	PFTDA (25-150)
320-89132-2	BFG-HA2:0.8	81	89	86	87	87	93	85	91
LCS 320-597514/2-A	Lab Control Sample	91	97	90	92	93	99	93	91
MB 320-597514/1-A	Method Blank	87	91	87	92	89	94	92	91

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	d5NEFOS (25-150)	HFPODA (25-150)		
320-89132-2	BFG-HA2:0.8	72	77	75	81	82	83		
LCS 320-597514/2-A	Lab Control Sample	81	86	86	83	85	87		
MB 320-597514/1-A	Method Blank	80	88	82	78	85	85		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxA (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDoA (25-150)	PFTDA (25-150)
320-89132-1	BFG-EB2	92	96	100	99	106	112	98	95
LCS 320-598547/2-A	Lab Control Sample	97	101	103	104	97	101	94	94
LCSD 320-598547/3-A	Lab Control Sample Dup	95	100	100	102	93	99	91	93
MB 320-598547/1-A	Method Blank	96	100	103	101	89	102	92	98

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d3NMFOS (25-150)	d5NEFOS (25-150)	HFPODA (25-150)		
320-89132-1	BFG-EB2	91	97	93	89	110	90		
LCS 320-598547/2-A	Lab Control Sample	96	100	95	90	86	99		
LCSD 320-598547/3-A	Lab Control Sample Dup	95	95	87	92	91	98		
MB 320-598547/1-A	Method Blank	96	98	93	93	94	95		

Surrogate Legend

PFHxA = 13C2 PFHxA
C4PFHA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
C3PFBS = 13C3 PFBS
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
d3NMFOS = d3-NMeFOSAA
d5NEFOS = d5-NEtFOSAA
HFPODA = 13C3 HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-597514/1-A
Matrix: Solid
Analysis Batch: 597810

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 597514

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.031	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.038	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.053	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.022	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.048	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.042	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.030	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorotridecanoic acid (PFTrDA)	ND		0.20	0.021	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.037	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.038	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.029	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.20	0.043	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
NEtFOSAA	ND		0.20	0.048	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
NMeFOSAA	ND		0.20	0.023	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
HFPO-DA (GenX)	ND		0.20	0.041	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
9Cl-PF3ONS	ND		0.20	0.035	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
11Cl-PF3OUdS	ND		0.20	0.031	ug/Kg		06/21/22 19:11	06/22/22 23:32	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		0.20	0.039	ug/Kg		06/21/22 19:11	06/22/22 23:32	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*87*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C4 PFHpA	*91*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C4 PFOA	*87*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C5 PFNA	*92*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C2 PFDA	*89*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C2 PFUnA	*94*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C2 PFDoA	*92*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C2 PFTeDA	*91*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C3 PFBS	*80*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
18O2 PFHxS	*88*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C4 PFOS	*82*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
d3-NMeFOSAA	*78*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
d5-NEtFOSAA	*85*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*
13C3 HFPO-DA	*85*		*25 - 150*	*06/21/22 19:11*	*06/22/22 23:32*	*1*

Lab Sample ID: LCS 320-597514/2-A
Matrix: Solid
Analysis Batch: 597810

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 597514

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	2.00	1.97		ug/Kg		99	71 - 131
Perfluoroheptanoic acid (PFHpA)	2.00	1.99		ug/Kg		100	71 - 131
Perfluorooctanoic acid (PFOA)	2.00	1.98		ug/Kg		99	72 - 132
Perfluorononanoic acid (PFNA)	2.00	2.00		ug/Kg		100	73 - 133
Perfluorodecanoic acid (PFDA)	2.00	1.96		ug/Kg		98	72 - 132
Perfluoroundecanoic acid (PFUnA)	2.00	1.87		ug/Kg		93	66 - 126

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-597514/2-A
Matrix: Solid
Analysis Batch: 597810

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 597514

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanoic acid (PFDoA)	2.00	1.99		ug/Kg		99	71 - 131
Perfluorotridecanoic acid (PFTrDA)	2.00	1.94		ug/Kg		97	71 - 131
Perfluorotetradecanoic acid (PFTeA)	2.00	1.95		ug/Kg		97	67 - 127
Perfluorobutanesulfonic acid (PFBS)	1.78	1.74		ug/Kg		98	69 - 129
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.69		ug/Kg		92	62 - 122
Perfluorooctanesulfonic acid (PFOS)	1.86	1.85		ug/Kg		100	68 - 141
NEtFOSAA	2.00	2.12		ug/Kg		106	72 - 132
NMeFOSAA	2.00	2.12		ug/Kg		106	72 - 132
HFPO-DA (GenX)	2.00	1.98		ug/Kg		99	53 - 158
9Cl-PF3ONS	1.87	1.79		ug/Kg		96	74 - 134
11Cl-PF3OUdS	1.89	1.92		ug/Kg		102	66 - 136
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	2.13		ug/Kg		113	79 - 139

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*91*		*25 - 150*
13C4 PFHpA	*97*		*25 - 150*
13C4 PFOA	*90*		*25 - 150*
13C5 PFNA	*92*		*25 - 150*
13C2 PFDA	*93*		*25 - 150*
13C2 PFUnA	*99*		*25 - 150*
13C2 PFDoA	*93*		*25 - 150*
13C2 PFTeDA	*91*		*25 - 150*
13C3 PFBS	*81*		*25 - 150*
18O2 PFHxS	*86*		*25 - 150*
13C4 PFOS	*86*		*25 - 150*
d3-NMeFOSAA	*83*		*25 - 150*
d5-NEtFOSAA	*85*		*25 - 150*
13C3 HFPO-DA	*87*		*25 - 150*

Lab Sample ID: MB 320-598547/1-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 598547

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorotridecanoic acid (PFTrDA)	ND		2.0	1.3	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		06/25/22 05:29	06/30/22 12:12	1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-598547/1-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 598547

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		06/25/22 05:29	06/30/22 12:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		06/25/22 05:29	06/30/22 12:12	1
NEtFOSAA	ND		5.0	1.3	ng/L		06/25/22 05:29	06/30/22 12:12	1
NMeFOSAA	ND		5.0	1.2	ng/L		06/25/22 05:29	06/30/22 12:12	1
HFPO-DA (GenX)	ND		4.0	1.5	ng/L		06/25/22 05:29	06/30/22 12:12	1
9Cl-PF3ONS	ND		2.0	0.24	ng/L		06/25/22 05:29	06/30/22 12:12	1
11Cl-PF3OUdS	ND		2.0	0.32	ng/L		06/25/22 05:29	06/30/22 12:12	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		06/25/22 05:29	06/30/22 12:12	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*96*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C4 PFHpA	*100*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C4 PFOA	*103*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C5 PFNA	*101*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C2 PFDA	*89*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C2 PFUnA	*102*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C2 PFDoA	*92*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C2 PFTeDA	*98*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C3 PFBS	*96*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
18O2 PFHxS	*98*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C4 PFOS	*93*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
d3-NMeFOSAA	*93*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
d5-NEtFOSAA	*94*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*
13C3 HFPO-DA	*95*		*25 - 150*	*06/25/22 05:29*	*06/30/22 12:12*	*1*

Lab Sample ID: LCS 320-598547/2-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 598547

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorohexanoic acid (PFHxA)	40.0	40.9		ng/L		102	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	42.1		ng/L		105	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	42.3		ng/L		106	70 - 130
Perfluorononanoic acid (PFNA)	40.0	42.7		ng/L		107	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	41.5		ng/L		104	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	38.9		ng/L		97	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	41.7		ng/L		104	71 - 131
Perfluorotridecanoic acid (PFTrDA)	40.0	41.8		ng/L		104	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	40.3		ng/L		101	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.5	37.8		ng/L		106	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.5	35.4		ng/L		97	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.2	40.6		ng/L		109	70 - 130
NEtFOSAA	40.0	46.6		ng/L		116	76 - 136

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-598547/2-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 598547

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
NMeFOSAA			40.0	36.8		ng/L		92	76 - 136		
HFPO-DA (GenX)			40.0	42.2		ng/L		106	51 - 173		
9Cl-PF3ONS			37.4	40.4		ng/L		108	75 - 135		
11Cl-PF3OUdS			37.8	39.1		ng/L		104	54 - 114		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	44.4		ng/L		118	79 - 139		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*97*		*25 - 150*
13C4 PFHpA	*101*		*25 - 150*
13C4 PFOA	*103*		*25 - 150*
13C5 PFNA	*104*		*25 - 150*
13C2 PFDA	*97*		*25 - 150*
13C2 PFUnA	*101*		*25 - 150*
13C2 PFDoA	*94*		*25 - 150*
13C2 PFTeDA	*94*		*25 - 150*
13C3 PFBS	*96*		*25 - 150*
18O2 PFHxS	*100*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
d3-NMeFOSAA	*90*		*25 - 150*
d5-NEtFOSAA	*86*		*25 - 150*
13C3 HFPO-DA	*99*		*25 - 150*

Lab Sample ID: LCSD 320-598547/3-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 598547

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)			40.0	40.3		ng/L		101	73 - 133	2	30
Perfluoroheptanoic acid (PFHpA)			40.0	40.5		ng/L		101	72 - 132	4	30
Perfluorooctanoic acid (PFOA)			40.0	41.1		ng/L		103	70 - 130	3	30
Perfluorononanoic acid (PFNA)			40.0	40.7		ng/L		102	75 - 135	5	30
Perfluorodecanoic acid (PFDA)			40.0	42.7		ng/L		107	76 - 136	3	30
Perfluoroundecanoic acid (PFUnA)			40.0	38.4		ng/L		96	68 - 128	1	30
Perfluorododecanoic acid (PFDoA)			40.0	41.8		ng/L		105	71 - 131	0	30
Perfluorotridecanoic acid (PFTrDA)			40.0	42.3		ng/L		106	71 - 131	1	30
Perfluorotetradecanoic acid (PFTeA)			40.0	38.2		ng/L		95	70 - 130	5	30
Perfluorobutanesulfonic acid (PFBS)			35.5	35.1		ng/L		99	67 - 127	7	30
Perfluorohexanesulfonic acid (PFHxS)			36.5	34.7		ng/L		95	59 - 119	2	30
Perfluorooctanesulfonic acid (PFOS)			37.2	41.7		ng/L		112	70 - 130	3	30
NEtFOSAA			40.0	43.0		ng/L		107	76 - 136	8	30
NMeFOSAA			40.0	39.4		ng/L		99	76 - 136	7	30
HFPO-DA (GenX)			40.0	40.5		ng/L		101	51 - 173	4	30
9Cl-PF3ONS			37.4	41.3		ng/L		111	75 - 135	2	30

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-598547/3-A
Matrix: Water
Analysis Batch: 600306

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 598547

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
11Cl-PF3OUdS			37.8	41.0		ng/L		109	54 - 114	5	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.8	45.7		ng/L		121	79 - 139	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*95*		*25 - 150*
13C4 PFHpA	*100*		*25 - 150*
13C4 PFOA	*100*		*25 - 150*
13C5 PFNA	*102*		*25 - 150*
13C2 PFDA	*93*		*25 - 150*
13C2 PFUnA	*99*		*25 - 150*
13C2 PFDoA	*91*		*25 - 150*
13C2 PFTeDA	*93*		*25 - 150*
13C3 PFBS	*95*		*25 - 150*
18O2 PFHxS	*95*		*25 - 150*
13C4 PFOS	*87*		*25 - 150*
d3-NMeFOSAA	*92*		*25 - 150*
d5-NEtFOSAA	*91*		*25 - 150*
13C3 HFPO-DA	*98*		*25 - 150*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

LCMS

Prep Batch: 597514

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-89132-2	BFG-HA2:0.8	Total/NA	Solid	SHAKE	
MB 320-597514/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-597514/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	

Analysis Batch: 597810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-89132-2	BFG-HA2:0.8	Total/NA	Solid	537 (modified)	597514
MB 320-597514/1-A	Method Blank	Total/NA	Solid	537 (modified)	597514
LCS 320-597514/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	597514

Prep Batch: 598547

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-89132-1	BFG-EB2	Total/NA	Water	3535	
MB 320-598547/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-598547/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-598547/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 600306

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-89132-1	BFG-EB2	Total/NA	Water	537 (modified)	598547
MB 320-598547/1-A	Method Blank	Total/NA	Water	537 (modified)	598547
LCS 320-598547/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	598547
LCSD 320-598547/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	598547

General Chemistry

Analysis Batch: 596386

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-89132-2	BFG-HA2:0.8	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Client Sample ID: BFG-EB2

Lab Sample ID: 320-89132-1

Date Collected: 06/15/22 11:45

Matrix: Water

Date Received: 06/16/22 09:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.5 mL	10.0 mL	598547	06/25/22 05:29	NSS	TAL SAC
Total/NA	Analysis	537 (modified)		1			600306	06/30/22 16:24	D1R	TAL SAC

Client Sample ID: BFG-HA2:0.8

Lab Sample ID: 320-89132-2

Date Collected: 06/15/22 12:00

Matrix: Solid

Date Received: 06/16/22 09:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			596386	06/17/22 16:17	KMW	TAL SAC

Client Sample ID: BFG-HA2:0.8

Lab Sample ID: 320-89132-2

Date Collected: 06/15/22 12:00

Matrix: Solid

Date Received: 06/16/22 09:15

Percent Solids: 85.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.03 g	10.0 mL	597514	06/21/22 19:11	PV	TAL SAC
Total/NA	Analysis	537 (modified)		1			597810	06/23/22 00:33	S1M	TAL SAC

Laboratory References:

TAL SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Laboratory: Eurofins Sacramento

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4040	01-29-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Washington	State		C581	05-05-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAC = Eurofins Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Paine Field

Job ID: 320-89132-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-89132-1	BFG-EB2	Water	06/15/22 11:45	06/16/22 09:15
320-89132-2	BFG-HA2:0.8	Solid	06/15/22 12:00	06/16/22 09:15

Eurofins TestAmerica, Sacramento

Chain of Custody Record

eurofins Environment Testing America

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other: WA State Dept. of Ecology

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Ryan Peterson	Site Contact: Ryan Peterson	Date: 6/15/22	TALS Project #:
Your Company Name here: Shannon & Wilson	Email: Ryan.Peterson@shanwil.com	Lab Contact: David Alltucker	Carrier:	COC No:
Address: 400 N. 34th St. Suite 100	Tel/Fax:			1 of 1 COCs
City/State/Zip: Seattle, WA 98103	**Analysis Turnaround Time**			[1] Sampler: Ryan Peterson
(xxx) xxx-xxxx Phone: 2066956673	☐ CALENDAR DAYS ☒ WORKING DAYS			[1] Refer to note below.
(xxx) xxx-xxxx FAX:	TAT if different from Below 15			**For Lab Use Only:**
Project Name: Paine Field	☐ 2 weeks			Walk-in Client:
Site: Paine Field	☐ 1 week			Lab Sampling:
P O # 102486	☐ 2 days			Job / SDG No.:
	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	PFAS, 537 mod (18 Analytes)	Sample Specific Notes:
BFG-EB2	6/15/22	1145	G	Water	2	N	N	X	
BFG-HA2:0.5	6/15/22	1200	G	Soil	1		N	X	

320-89132 Chain of Custody

[1] I attest to the validity and authenticity of this (these) sample(s). I am aware that tampering with or intentionally mislabeling the sample(s) location, date or time of collection may be considered fraud and subject to legal action (NAC445.0636)
Signature:_____ Date_____

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

May contain PFAS >1ppb

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.: 165380	Cooler Temp. (°C): Obs'd: 1.7	Corr'd: 1.7	Therm ID No.: IR03
Relinquished by: Ryan Peterson	Company: Shannon & Wilson	Date/Time: 6/15/22	Received by:	Company: BSTSEA	Date/Time: 6/16/22 9:15
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-004, Rev. 1.28, dated 10/6/2020

7/7/2022

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-89132-1

Login Number: 89132
List Number: 1
Creator: Oropeza, Salvador

List Source: Eurofins Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1685380
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX C: DATA VALIDATION SUMMARY

Appendix C

Data Validation Summary

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEPTEMBER 1, 2022

Project Name:	**Big Gulch Creek Drainage Sub-Basin 9 and Swamp Creek Drainage Sub-Basin 8**
Client:	**Paine Field/Snohomish County Airport**
S&W Project Number:	**102986-002**
Subject:	**Data Validation Summary**

INTRODUCTION

This document summarizes our review and validation of the analytical sample results for the above referenced project. We reviewed the Eurofins Sacramento laboratory reports 320-88145-1 and 320-89132-1 to evaluate compliance with project data quality objectives (DQOs). Our internal data validation program includes the completion of a laboratory data review checklist (LDRC). Our findings are summarized below, and additional details are included in the attached LDRCs.

ANALYTICAL QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance (QA)/quality control (QC) procedures assist in producing data of acceptable quality and reliability. We reviewed analytical results for laboratory QC samples and conducted a QA assessment of the data as they were generated. Our QA review procedures provided documentation of the accuracy and precision of the analytical data and assessed if the analyses were sufficiently sensitive to detect analytes at levels below suggested action levels or regulatory standards, where such standards exist. We applied data-quality flags to the analytical results, as summarized below and detailed in the associated LDRCs.

Sample Handling

Soil samples collected by Shannon & Wilson, Inc. (SWI) were shipped to the Eurofins Sacramento laboratory in West Sacramento, California to perform the requested analyses, using the methods specified in the Chain-of-Custody (COC) records. We reviewed sample-receipt forms to verify samples were received in good condition and within the acceptable temperature range. We consider samples received free of ice and at temperatures between 0 °C and 6 °C as acceptable. Samples were received in good condition, properly preserved, and within the acceptable temperature range upon arrival at the laboratory.

We also reviewed COC records to confirm information was complete, custody was not breached, and samples were analyzed within the acceptable holding time. COC records were complete and correct and samples were analyzed within their method required holding times.

Analytical Sensitivity and Blanks

Reporting limits were considered to be sufficient for project objectives.

Laboratory method blanks (MBs) were analyzed in association with samples collected for this project to check for contributions to the analytical results possibly attributable to laboratory-based contamination. Project analytes were not detected in the method blanks and the results were not affected by the method blank analysis.

Laboratory QC Samples

To evaluate the accuracy and precision of the analytical method, the laboratory analyzed QC samples for each preparation batch. These QC samples consist of laboratory control samples (LCS) and LCS duplicates (LCSD), matrix spikes (MS) and MS duplicate (MSD) samples. We reviewed the results of the laboratory QC samples to verify that the reported accuracy and precision were within acceptable limits. LCS/LCSD and MS/MSD results were within laboratory limits and the sample results were not affected.

The case narrative for work order 320-88145-1 identified a QC failure that affected the data. The laboratory applied an 'I' flag due to a transition mass ratio failure. Due to the degree of uncertainty, we consider the PFOS result for sample *BFG-SH2:0.5* to be estimated. The results is flagged with a 'J' (Table 1).

Isotope Dilution Analyte Recovery

The laboratory spiked the samples analyzed for PFAS with a known quantity of an isotope dilutions analyte (IDA). IDAs are similar to the target analytes. The recoveries of these IDAs are reported with the sample results in the associated laboratory report. We reviewed the IDA recovery information to verify that the recoveries were within the control limits for the given method.

DATA QUALITY SUMMARY

Based on the methods outlined in our sampling program and the samples detailed in Eurofins Sacramento laboratory reports 320-488145-1 and 320-89132-1, we consider the results to be representative of site conditions at the locations and times they were obtained. In general, the

quality of the analytical data for this sample batch does not appear to have been compromised by analytical irregularities and results affected by QC anomalies are qualified with the appropriate data flags.

We appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions regarding this information.

Sincerely,

SHANNON & WILSON

Kristen Freiburger
Chemist; Associate

Enc: WA State Department of Ecology Laboratory Data Review Checklist 320-88145-1
WA State Department of Ecology Laboratory Data Review Checklist 320-89132-1

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

LABORATORY DATA REVIEW CHECKLIST

WORK ORDER 320-88145-1

400 N 34th St. #100
SEATTLE, WASHINGTON 98103
206-632-8020
www.shannonwilson.com

Laboratory Data Review Checklist

Completed By:

Reviewed by Mason Craker; Validated by Kristen Freiburger

Title:

Geology; Environmental Chemist

Date:

July 12, 2022

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins Sacramento

Laboratory Report Number:

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

Project Number

102968-002

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

Note: Any N/A or No box checked must have an explanation in the comments box.

1. Laboratory

   a. Did a WA State Ecology approved laboratory receive and perform all of the submitted sample analyses?

   Yes☒ No☐ N/A☐ Comments:

   The project samples were submitted to Eurofins Sacramento of Sacramento, California, a WA State Department of Ecology approved laboratory for the requested analyses.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses WA State Ecology approved?

   Yes☐ No☐ N/A☒ Comments:

   The project samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

   a. CoC information completed, signed, and dated (including released/received by)?

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

   Yes☒ No☐ N/A☐ Comments:

   The sample/cooler temperature was measured at 1.0˚C upon receipt at the laboratory.

   b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

   Yes☐ No☐ N/A☒ Comments:

   Preservation, other than temperature, not required for PFAS samples.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes☒ No☐ N/A☐ Comments:

The samples arrived in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes☐ No☐ N/A☒ Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes☒ No☐ N/A☐ Comments:

- The "I" qualifier means the transition mass ratio for the indicated analyte was below the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgement was used to positively identify the analyte.
- Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-590251.
- The following samples in preparation batch 320-590251 were yellow in color following extraction: *BFG-SG1:1.0.*

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective actions needed.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative does not imply that data quality/usability is affected. See our assessment below for the applied qualifiers, where applicable.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☒ No☐ N/A☐ Comments:

d. Are the RLs less than the Cleanup Level or the minimum required detection level for the project?

Yes☐ No☒ N/A☐ Comments:

Non-detect results for PFOA, PFOS, PFNA, PFHxS, and PFBS were reported above the screening levels for several samples.

e. Data quality or usability affected?

It is our understanding the reporting limits for non-detect values are used to screen sample results where the laboratory is unable to meet the published screening level. We further note that the current methods available for PFAS analysis in soil are unable to achieve the sensitivity requirements for the new screening levels. We do not consider the results to be affected by this discrepancy and consider the data usable for the purposes of assessing the site.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

ii. All method blank results less than RL or project specified objectives?

Yes☒ No☐ N/A☐ Comments:

iii. If above RL or project specified objectives, what samples are affected?

Comments:

No samples are affected; target analytes were not detected in the method blank samples.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

An LCS with an MS/MSD was reported for prep batch 590251 and an LCS and LCSD were reported for prep batch 591507.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/Inorganics were not analyzed.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☒ No☐ N/A☐ Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate.

Yes☒ No☐ N/A☐ Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

See above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability are unaffected.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

An MS and MSD were reported for prep batch 590251.

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/Inorganics were not analyzed.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☒ No☐ N/A☐ Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☒ No☐ N/A☐ Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

N/A, see above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and usability are unaffected.

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

There were no IDA recovery failures for the reported samples.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes☐ No☐ N/A☒ Comments:

PFAS sampling does not require a trip blank.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?

Yes☐ No☐ N/A☒ Comments:

See above.

iii. All results less than RL and project specified objectives?

Yes☐ No☐ N/A☒ Comments:

See above.

iv. If above RL or project specified objectives, what samples are affected?

Comments:

N/A, see above.

v. Data quality or usability affected?

Comments:

N/A; see above.

320-88145-1

Laboratory Report Date:

June 2, 2022

Report Name:

Paine Field

f. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples or required frequency for the project?

Yes☐ No☒ N/A☐ Comments:

A field duplicate was not submitted with this work order.

ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

See above.

iii. Precision – All relative percent differences (RPD) less than specified project objectives? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☐ No☐ N/A☒ Comments:

See above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

N/A; see above.

g. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below)?

Yes☒ No☐ N/A☐ Comments:

i. All results less than RLs and project specified objectives?

Yes☒ No☐ N/A☐ Comments:

No analytes were detected.

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ii. If above RL or project specified objectives, what samples are affected?

Comments:

N/A, see above.

iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

The 'I' flag applied by the lab was reported for PFOS for sample *BFG-SH2:0.5*. We consider this result estimated, flagged with a 'J' for reporting purposes.

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

LABORATORY DATA REVIEW CHECKLIST

WORK ORDER 320-89132-1

400 N 34th St. #100
SEATTLE, WASHINGTON 98103
206-632-8020
www.shannonwilson.com

Laboratory Data Review Checklist

Completed By:

Reviewed by Mason Craker; Validated by Kristen Freiburger

Title:

Geology Staff; Environmental Chemist

Date:

July 12, 2022

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins Sacramento

Laboratory Report Number:

320-89132-1

Laboratory Report Date:

July 7, 2022

Report Name:

Paine Field

Project Number

102986-002

320-89132-1

Laboratory Report Date:

July 7, 2022

Report Name:

Paine Field

Note: Any N/A or No box checked must have an explanation in the comments box.

1. Laboratory

   a. Did a WA State Ecology approved laboratory receive and perform all of the submitted sample analyses?

   Yes☒ No☐ N/A☐ Comments:

   The project samples were submitted to Eurofins Sacramento of Sacramento, California, a WA State Department of Ecology approved laboratory for the requested analyses.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses WA State Ecology approved?

   Yes☐ No☐ N/A☒ Comments:

   The project samples were not transferred to another laboratory.

2. Chain of Custody (CoC)

   a. CoC information completed, signed, and dated (including released/received by)?

   Yes☒ No☐ N/A☐ Comments:

   b. Correct analyses requested?

   Yes☒ No☐ N/A☐ Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

   Yes☒ No☐ N/A☐ Comments:

   The sample/cooler temperature was measured at 1.7˚C upon receipt at the laboratory.

   b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

   Yes☐ No☐ N/A☒ Comments:

   PFAS samples do not require preservation other than temperature.

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c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes☒ No☐ N/A☐ Comments:

The samples arrived in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes☐ No☐ N/A☒ Comments:

No discrepancies were noted by the laboratory in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes☐ No☒ N/A☐ Comments:

Method 3535: Insufficient Sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-598547.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

No corrective action needed.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative does not imply that data quality and usability are affected.

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5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes☒ No☐ N/A☐ Comments:

b. All applicable holding times met?

Yes☒ No☐ N/A☐ Comments:

c. All soils reported on a dry weight basis?

Yes☒ No☐ N/A☐ Comments:

d. Are the RLs less than the Cleanup Level or the minimum required detection level for the project?

Yes☐ No☒ N/A☐ Comments:

The non-detect results for PFOA, PFOS, PFNA, PFHxS, and PFBS were reported above the screening levels.

e. Data quality or usability affected?

It is our understanding the reporting limits for non-detect values are used to screen sample results where the laboratory is unable to meet the published screening level. We further note that the current methods available for PFAS analysis in soil are unable to achieve the sensitivity requirements for the new screening levels. We do not consider the results to be affected by this discrepancy and consider the data usable for the purposes of assessing the site.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

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ii. All method blank results less than RL or project specified objectives?

Yes☒ No☐ N/A☐ Comments:

iii. If above RL or project specified objectives, what samples are affected?

Comments:

No samples are affected; target analytes were not detected in the method blank samples.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

v. Data quality or usability affected?

Comments:

The data quality/usability is not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS reported per matrix, analysis and 20 samples?

Yes☒ No☐ N/A☐ Comments:

An LCS was reported for prep batch 597514. We do not have a measure of precision for this prep batch. An LCS and LCSD were reported for prep batch 598547.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/inorganics were not analyzed.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☒ No☐ N/A☐ Comments:

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iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate.

Yes☒ No☐ N/A☐ Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

See above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability are unaffected.

c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes☐ No☐ N/A☒ Comments:

Metals/Inorganics were not analyzed.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable?

Yes☐ No☐ N/A☒ Comments:

See LCS/LCSD section.

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iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate.

Yes☐ No☐ N/A☒ Comments:

See LCS/LCSD section.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

See above.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

See above.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

N/A, see above.

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes☒ No☐ N/A☐ Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R for field samples and 60-120 %R for QC samples; all other analyses see the laboratory report pages)

Yes☒ No☐ N/A☐ Comments:

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes☐ No☐ N/A☒ Comments:

There were no IDA recovery failures for the reported samples.

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iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

e. Trip Blanks

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes☐ No☒ N/A☐ Comments:

Trip blanks are not required for PFAS sampling.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?

Yes☐ No☐ N/A☒ Comments:

See above.

iii. All results less than RL and project specified objectives?

Yes☐ No☐ N/A☒ Comments:

See above.

iv. If above RL or project specified objectives, what samples are affected?

Comments:

N/A; see above.

v. Data quality or usability affected?

Comments:

N/A; see above.

f. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples or required frequency for the project?

Yes☐ No☒ N/A☐ Comments:

Field duplicates were not submitted with this work order.

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ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

See above.

iii. Precision – All relative percent differences (RPD) less than specified project objectives? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☐ No☐ N/A☒ Comments:

See above.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and usability are unaffected.

g. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below)?

Yes☒ No☐ N/A☐ Comments:

i. All results less than RLs and project specified objectives?

Yes☒ No☐ N/A☐ Comments:

ii. If above RL or project specified objectives, what samples are affected?

Comments:

N/A; results were non-detect.

iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes☐ No☐ N/A☒ Comments:

Additional data flags/qualifiers are not required.

IMPORTANT INFORMATION

Important Information

About Your Environmental Site Assessment/Evaluation Report

IMPORTANT INFORMATION

ENVIRONMENTAL SITE ASSESSMENTS/EVALUATIONS ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

This report was prepared to meet the needs you specified with respect to your specific site and your risk management preferences. Unless indicated otherwise, we prepared your report expressly for you and for the purposes you indicated. No one other than you should use this report for any purpose without first conferring with us. No one is authorized to use this report for any purpose other than that originally contemplated without our prior written consent.

The findings and conclusions documented in this site assessment/evaluation have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in this area. The conclusions presented are based on interpretation of information currently available to us and are made within the operational scope, budget, and schedule constraints of this project. No warranty, express or implied, is made.

OUR REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

Our environmental site assessment is based on several factors and may include (but not be limited to) reviewing public documents to chronicle site ownership for the past 30, 40, or more years; investigating the site's regulatory history to learn about permits granted or citations issued; determining prior uses of the site and those adjacent to it; reviewing available topographic and real estate maps, historical aerial photos, geologic information, and hydrologic data; reviewing readily available published information about surface and subsurface conditions; reviewing federal and state lists of known and potentially contaminated sites; evaluating the potential for naturally occurring hazards; and interviewing public officials, owners/operators, and/or adjacent owners with respect to local concerns and environmental conditions.

Except as noted within the text of the report, no sampling or quantitative laboratory testing was performed by us as part of this site assessment. Where such analyses were conducted by an outside laboratory, Shannon & Wilson relied upon the data provided and did not conduct an independent evaluation regarding the reliability of the data.

CONDITIONS CAN CHANGE.

Site conditions, both surface and subsurface, may be affected as a result of natural processes or human influence. An environmental site assessment/evaluation is based on conditions that existed at the time of the evaluation. Because so many aspects of a historical review rely on Third-party information, most consultants will refuse to certify (warrant) that a site is free of contaminants, as it is impossible to know with absolute certainty if such a condition exists. Contaminants may be present in areas that were not surveyed or sampled or may migrate to areas that showed no signs of contamination at the time they were studied.

Unless your consultant indicates otherwise, your report should not be construed to represent geotechnical subsurface conditions at or adjacent to the site and does not provide sufficient information for construction-related activities. Your report also should not be used following floods, earthquakes, or other acts of nature; if the size or configuration of the site is altered; if the location of the site is modified; or if there is a change of ownership and/or use of the property.

IMPORTANT INFORMATION

INCIDENTAL DAMAGE MAY OCCUR DURING SAMPLING ACTIVITIES.

Incidental damage to a facility may occur during sampling activities. Asbestos and lead-containing paint sampling often require destructive sampling of pipe insulation, floor tile, walls, doors, ceiling tile, roofing, and other building materials. Shannon & Wilson does not provide for paint repair. Limited repair of asbestos sample locations is provided. However, Shannon & Wilson neither warranties repairs made by our field personnel, nor are we held liable for injuries or damages as a result of those repairs. If you desire a specific form of repair, such as those provided by a licensed roofing contractor, you need to request the specific repair at the time of the proposal. The owner is responsible for repair methods that are not specified in the proposal.

READ RESPONSIBILITY CLAUSES CAREFULLY.

Environmental site assessments/evaluations are less exact than other design disciplines because they are based extensively on judgment and opinion and there may not have been any (or very limited) investigation of actual subsurface conditions. Wholly unwarranted claims have been lodged against consultants. To limit this exposure, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses may appear in this report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

Consultants cannot accept responsibility for problems that may develop if they are not consulted after factors considered in their reports have changed or conditions at the site have changed. Therefore, it is incumbent upon you to notify your consultant of any factors that may have changed prior to submission of the final assessment/evaluation.

An assessment/evaluation of a site helps reduce your risk but does not eliminate it. Even the most rigorous professional assessment may fail to identify all existing conditions.

ONE OF THE OBLIGATIONS OF YOUR CONSULTANT IS TO PROTECT THE SAFETY, HEALTH, PROPERTY, AND WELFARE OF THE PUBLIC.

If our environmental site assessment/evaluation discloses the existence of conditions that may endanger the safety, health, property, or welfare of the public, we may be obligated under rules of professional conduct, statutory law, or common law to notify you and others of these conditions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland