SHANNON & WILSON

MEMORANDUM

TO: Sammy Cummings

FROM: Shannon & Wilson, Inc.

DATE: May 21, 2021

PROJECT: Gustavus Runway Resurfacing – Asphalt Sampling – SPLP Results

PROJ. #: 102599-008

SUBJECT: Asphalt SPLP Data Quality Review

1 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) report summarizes our technical review of analytical results generated from asphalt samples collected by the Alaska Department of Environmental Conservation (DEC) at the Gustavus Airport (GST) in April 2021. The analytical reports, associated DEC Laboratory Data Review Checklists (LDRCs), and an analytical results table are enclosed.

Shannon & Wilson, Inc. reviewed the analytical data to assess whether the data met the designated quality objectives and were acceptable for project use as detailed in our data-validation program plan (DVPP) for Alaska Department of Transportation & Public Facilities (DOT&PF) per- and polyfluoroalkyl substances (PFAS) Sites. This DVPP plan was incorporated as a part of the *DOT&PF Statewide PFAS General Work Plan*, approved by DEC on August 10, 2020. QC deviations that do not impact data quality are generally not discussed in this summary. More elaborate data quality descriptions are reported in the enclosed DEC LDRCs.

1.1 Summary of Asphalt Samples and Timeline

For this data set, a total of seven asphalt samples were analyzed for Synthetic Precipitation Leaching Procedure (SPLP) analysis using method 537(Mod). These samples were collected by DEC at the GST on April 6, 2021. Samples were shipped by DEC to Eurofins TestAmerica of West Sacramento, California for the requested analysis. The laboratory was approved by the State of Alaska through the Contaminated Sites Program for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018 by method 537(Mod).

The following is a timeline of the sample processing for this data set:

- April 6, 2021 – 37 asphalt samples (*GST-01-AS* through *GST-37-AS*) were submitted for PFAS analysis via EPA Method 537(Mod). A subset of five of these samples was

also analyzed for SPLP analysis (samples *GST-09-AS*, *GST-31-AS*, *GST-33-AS*, *GST-35-AS*, and *GST-37-AS*).

- April 15, 2021 and April 19, 2021 – Results were received for the 37 asphalt samples submitted for PFAS analysis. For the five samples subject to SPLP analysis, results showed PFOS (the main PFAS analyte at the GST) was not detected in samples *GST-09-AS*, *GST-31-AS*, and *GST-33-AS* and was detected above DEC migration-to-groundwater levels in samples *GST-35-AS* and *GST-37-AS.*

- April 28, 2021 – The laboratory contacted Shannon & Wilson to report analyte detections in the leaching blank with some project samples also having detections for the same analytes. They noted the leaching blank detections were due to laboratory contamination in the SPLP leaching containers used to prepare the samples. A follow-up email indicated the following analytes were detected in the SPLP leaching blank: PFHpA, PFHxA, PFNA, and PFOA (see below sections and LDRCs for additional details).

- April 29, 2021 – Shannon & Wilson contacted the laboratory to request samples *GST-35-AS* and *GST-37-AS* be re-extracted out of hold for SPLP analysis. We also requested samples *GST-09*, *GST-31-AS*, and *GST-33-AS* be canceled for the SPLP analysis, as we were aware of the non-detect PFAS results reported for the asphalt samples. During this time we also requested the laboratory complete out-of-hold SPLP analysis on samples *GST-05-AS* and *GST-23-AS* in an attempt to target SPLP analysis on samples with detectable PFOS concentrations below the migration-to-groundwater cleanup level. These decisions were made following communications with the project team and DEC based on the leaching blank detections, sensitivity and use of this data set, available budget, the reported PFAS results for asphalt samples *GST-01-AS* through *GST-37-AS*, and the desire to report data that provides the project team with a clear direction for handling contaminated materials.

- May 7, 2021 – Laboratory reported the SPLP results to Shannon & Wilson under laboratory work order numbers 320-72243-2 and 320-72244-2. During our review we discovered the laboratory reported the original run for the canceled samples (*GST-09-AS*, *GST-31-AS*, and *GST-33-AS*), out-of-hold results for the newly requested samples (*GST-05-AS* and *GST-23-AS*), and both the original run and out-of-hold run for samples *GST-35-AS* and *GST-37-AS.*

Analytical laboratory reports, associated LDRCs and an analytical results table are enclosed.

2 ASPHALT SPLP DATA QUALITY REVIEW

This section presents the findings of the data quality review and the resulting data qualifications for asphalt samples.

2.1 Sample Handling

The laboratory noted samples arrived in good condition, properly preserved and on ice. Hold time exceedances were noted and are described below.

- WO 320-72243-2: Due to high concentrations of target analytes PFHxA, PFHpA, PFOA, and PFNA in the associated leaching blanks and project samples for the initial extraction, reanalysis for samples *GST-35-AS* and *GST-37-AS* was conducted 29 days past collection. The laboratory determined the leaching blank detections were due to contamination present in their materials used to complete the SPLP analysis. The out of hold results for these analytes are used for reporting purposes. Per discussions with DEC, PFAS data usability is unaffected by the holding time exceedance. The out of hold results are used for reporting purposes, with the appropriate flags applied. The detected and non-detect results are considered tentatively identified/unidentified, flagged "N" in the analytical database.
- SPLP analysis for sample *GST-23-AS* (WO 320-72243-2) and *GST-05-AS (*WO 320-72244-2) were requested 29 days past collection. The out-of-hold results are used for reporting purposes. The detected and non-detect results are considered tentatively identified/unidentified, flagged "N" in the analytical database.

2.2 Blanks

Method blanks and leaching blanks (LBs) were utilized to detect potential for laboratory cross-contamination of project samples. The following leaching blank detections were noted.

- WO 320-72243-2: PFHxA, PFHpA, PFNA, and PFOA were detected in both leaching blanks associated with preparatory batches 320-479806 and 320-482194. The laboratory noted this was due to internal contamination. Where results are detected for these analytes, the re-analyzed sample results will be used for reporting purposes (*GST-35-AS* and *GST-37-AS*). Where re-analysis data is not available, the following flags have been applied to the original data set. Sample *GST-31-AS* had a detection for PFHxA within five times the LB detection. Sample *GST-33-AS* had a detection for PFOA within five times the LB detection. These sample results are considered non-detect and flagged "B" at the reporting limit (RL).
- WO 320-72244-2: PFHxA, PFHpA, PFNA, and PFOA were detected in the leaching blank for preparatory batch 320-482194 for this work order. Sample *GST-09-AS* is associated with this leaching blank and had detections for PFHxA, PFHpA, and PFOA

within five times the LB detection. These sample results are considered non-detect and flagged "B" at the RL or the detected result, whichever value is greater.

After laboratory investigation of the LB detections, it was determined that the LB concentrations were due to new equipment used for SPLP extraction that had not gone through PFAS QC checks prior to use. Reanalysis using equipment previously QC'd for PFAS resulted in non-detect results for the newly reported LB. For analytes affected by the LB detections (PFHxA, PFHpA, PFNA, and PFOA), the out-of-hold re-analysis data is used for samples *GST-35-AS* and *GST-37-AS* reporting purposes, with one exception. PFNA was not detected in the original or re-analysis run for sample *GST-37-AS* and therefore is unaffected by the LB; the within-hold-time data is used for reporting this analyte for sample *GST-37-AS*.

Please note, where two runs of SPLP data are available for a given sample (*GST-35-AS* and *GST-37-AS*), and the analyte data is not associated with a leaching blank detection, the results of the two runs were compared. The higher detected result of the two runs were reported, with the appropriate holding-time flag added for data reported outside of hold time from preparatory batch 320-486399.

2.3 Laboratory Control Samples

Laboratory control samples were used to assess laboratory extraction and instrumentation performance. The accuracy and precision for laboratory control samples were within laboratory limits for the reported data set.

2.4 Isotope Dilution Analyte Recovery

Isotope dilution analytes (IDA) are used to measure the efficiency of the laboratory's analytical extraction process. IDA recoveries were within laboratory QC limits.

2.5 Analytical Sensitivity

There is no applicable DEC action level for PFAS leaching from asphalt. Therefore, results and RLs for non-detect results were compared to the DEC action levels for PFOS and PFOA in water. RLs for non-detect results are less than their applicable DEC action levels for PFOS and PFOA in water.

2.6 Additional Quality Control Discrepancies

The "I" qualifier is a laboratory applied flag indicating the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of

the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. We consider data flagged "I" by the laboratory to be an estimate with no direction of bias. However, affected samples have previously been flagged for other QC related discrepancies, and no additional flags are required.

2.7 Data Quality Summary

Overall, the review process deemed the asphalt SPLP project data acceptable for use and representative of site conditions at the locations and times they were obtained. Based on our review, no samples were rejected as unusable due to QC failures. In general, the quality of the analytical data for this project does not appear to have been compromised by analytical irregularities and is adequate for the purposes of our assessment.

Table 1 - Summary of Asphalt SPLP Analytical Results

Sample Name	GST-5-AS	GST-9-AS	GST-23-AS	GST-31-AS	GST-33-AS	GST-35-AS	GST-37-AS
Description	Asphalt SPLP	Asphalt SPLP	Asphalt SPLP	Asphalt SPLP	Asphalt SPLP	Asphalt SPLP	Asphalt SPLP
Sample Date	4/6/21	4/6/21	4/6/21	4/6/21	4/6/21	4/6/21	4/6/21
Analyte / Units	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorohexanesulfonic acid (PFHxS)	4.4 N*	2.7	9.0 N*	0.84 J	<1.8	23 N* †	250 N* †
Perfluorohexanoic acid (PFHxA)	2.8 N*	<4.2 B*	2.5 N*	<1.7 B*	<1.8	21 N*	71 N*
Perfluoroheptanoic acid (PFHpA)	0.41 N*	<1.8 B*	0.41 N*	<1.7	<1.8	2.6 N*	17 N*
Perfluorononanoic acid (PFNA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.7 N*	<1.8
Perfluorobutanesulfonic acid (PFBS)	0.69 N*	<1.8	0.45 N*	<1.7	<1.8	4.1 N* †	54 N* †
Perfluorodecanoic acid (PFDA)	0.35 N*	<1.8	<1.7 N*	<1.7	<1.8	0.31 N* †	0.33 N* †
Perfluoroundecanoic acid (PFUnA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
Perfluorododecanoic acid (PFDoA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
Perfluorotridecanoic acid (PFTrDA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
Perfluorotetradecanoic acid (PFTeA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
N-Methyl perfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	<4.3 N*	<4.6	<4.3 N*	<4.4	<4.4	<4.5	<4.5
N-Ethyl perfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	<4.3 N*	<4.6	<4.3 N*	<4.4	<4.4	<4.5	<4.5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	<1.7 N*	<1.8	<1.7 N*	<1.7	<1.8	<1.8	<1.8
Hexafluoropropylene oxide dimer acid (HFPO-DA)	<3.4 N*	<3.7	<3.4 N*	<3.5	<3.6	<3.6	<3.6
Perfluoro-octane sulfonate (PFOS)	29 N*	8.5	13 N*	1.8	0.88 J	53 N* †	690 N* †
Perfluoro-octanoic acid (PFOA)	0.98 N*	<1.8 B*	<1.7 N*	<1.7	<1.8 B*	3.5 N*	26 N*

Notes:

ng/L nanograms per liter

< Analyte not detected; listed as less than the reporting limit (RL) unless otherwise flagged due to quality-control (QC) failures.

J Estimated concentration, detected greater than the method detection limit (MDL) and less than the RL. Flag applied by the laboratory.

B* Result considered not detected due to contamination in a laboratory blank, reported "<RL" or detected concentration, whichever is greater. Flag applied by Shannon & Wilson, Inc.

† A higher analyte concentration was reported for the out-of-hold time analysis. This result was used for reporting purposes.

N* Analyte result is considered tentetivly unidentified (non-detects)/identified (detects) due to analysis outside of hold time. Flag applied by Shannon & Wilson, Inc.

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-72243-2
Client Project/Site: PFAS

For:
Shannon & Wilson, Inc
2355 Hill Rd.
Fairbanks, Alaska 99709-5244

Attn: Kristen Freiburger

Authorized for release by:
5/7/2021 4:53:07 PM

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

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 6
Client Sample Results 8
Isotope Dilution Summary 15
QC Sample Results 17
QC Association Summary 28
Lab Chronicle 30
Certification Summary 32
Method Summary 33
Sample Summary 34
Chain of Custody 35
Receipt Checklists 39

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Qualifiers

LCMS

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
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

Job ID: 320-72243-2

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-72243-2

Receipt
The samples were received on 4/8/2021 3:18 PM. 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 4.5º C.

Receipt Exceptions

The lab received the cooler with the Seal broken. Content inside the cooler did not seem to have been disturbed. GST-21-AS (320-72243-1), GST-22-AS (320-72243-2), GST-23-AS (320-72243-3), GST-24-AS (320-72243-4), GST-25-AS (320-72243-5), GST-26-AS (320-72243-6), GST-27-AS (320-72243-7), GST-28-AS (320-72243-8), GST-29-AS (320-72243-9), GST-30-AS (320-72243-10), GST-31-AS (320-72243-11), GST-32-AS (320-72243-12), GST-33-AS (320-72243-13), GST-34-AS (320-72243-14), GST-35-AS (320-72243-15), GST-36-AS (320-72243-16), GST-37-AS (320-72243-17), GST-38-SW (320-72243-18) and GST-39-SW (320-72243-19)

LCMS
Method EPA 537(Mod): Results for sample GST-37-AS (320-72243-17) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method EPA 537(Mod): The laboratory control sample (LCS) for preparation batch 320-478624 and 320-479806 and analytical batch 320-480518 recovered outside control limits for the following analyte: Perfluorobutanesulfonic acid (PFBS). This analyte was biased high in the LCS and was not detected in the associated samples; therefore, the data have been reported.GST-31-AS (320-72243-11), GST-33-AS (320-72243-13) and (LCS 320-479806/2-A)

Method EPA 537(Mod): The leachate blank (LB) for preparation batch 320-478624 and 320-479806 and analytical batch 320-480518 contained several analytes above the reporting limit. The target analyte concentrations in the following samples GST-31-AS (320-72243-11), GST-33-AS (320-72243-13) and (LB 320-478624/1-B) were less that the reporting limit (RL) therefore, re-extraction and/or re-analysis of samples was not performed.The client was contacted and permission was given to report the samples.

Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte:

Method EPA 537(Mod): The laboratory control sample (LCS) for preparation batch 320-478624 and 320-479806 and analytical batch 320-480518 recovered outside control limits for the following analytes: Perfluorobutanesulfonic acid (PFBS). The associated samples were re-prepared outside holding time. Both sets of data have been reported.

Method EPA 537(Mod): Several analytes were detected above the reporting limit (RL) in the leachate blank (LB) associated with preparation batch 320-478624 and 320-479806 and analytical batch 320-480518. The following affected samples were re-extracted outside of holding time at client request: GST-35-AS (320-72243-15), GST-37-AS (320-72243-17) and (LB 320-478624/1-B). Both sets of data have been reported.

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

Organic Prep
Method 1312: The following sample was activated past preparation holding time: GST-23-AS (320-72243-3).

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624 and 320-479806.

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624 and 320-482194.

Job ID: 320-72243-2 (Continued)

Laboratory: Eurofins TestAmerica, Sacramento (Continued)

Method 3535: The following samples were prepared outside of preparation holding time due to high recovery for PFBS and LB hit: GST-31-AS (320-72243-11), GST-33-AS (320-72243-13), GST-35-AS (320-72243-15) and GST-37-AS (320-72243-17).

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: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-23-AS — Lab Sample ID: 320-72243-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.5	H	1.7	0.50	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA)	0.41	J H	1.7	0.21	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorobutanesulfonic acid (PFBS)	0.45	J H I	1.7	0.17	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	9.0	H	1.7	0.49	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	13	H	1.7	0.46	ng/L	1		EPA 537(Mod)	SPLP West

Client Sample ID: GST-31-AS — Lab Sample ID: 320-72243-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	1.3	J B	1.7	0.51	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	0.84	J	1.7	0.50	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	1.8		1.7	0.47	ng/L	1		EPA 537(Mod)	SPLP West

Client Sample ID: GST-33-AS — Lab Sample ID: 320-72243-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.2	J B	1.8	0.76	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	0.88	J	1.8	0.48	ng/L	1		EPA 537(Mod)	SPLP West

Client Sample ID: GST-35-AS — Lab Sample ID: 320-72243-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	84	B	1.8	0.53	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA)	28	B	1.8	0.23	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA)	11	B	1.8	0.77	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorononanoic acid (PFNA)	1.9	B	1.8	0.25	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorobutanesulfonic acid (PFBS)	3.5	*+	1.8	0.18	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	15		1.8	0.52	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	41		1.8	0.49	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanoic acid (PFHxA) - RE	21	H	1.7	0.50	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA) - RE	2.6	H	1.7	0.22	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA) - RE	3.5	H	1.7	0.74	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorodecanoic acid (PFDA) - RE	0.31	J H	1.7	0.27	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorobutanesulfonic acid (PFBS) - RE	4.1	H	1.7	0.17	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS) - RE	23	H	1.7	0.50	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS) - RE	53	H	1.7	0.47	ng/L	1		EPA 537(Mod)	SPLP West

Client Sample ID: GST-37-AS — Lab Sample ID: 320-72243-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	71	B	1.8	0.52	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA)	14	B	1.8	0.22	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA)	26	B	1.8	0.76	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorobutanesulfonic acid (PFBS)	46		1.8	0.18	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	230		1.8	0.51	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS) - DL	630		8.9	2.4	ng/L	5		EPA 537(Mod)	SPLP West
Perfluorohexanoic acid (PFHxA) - RE	71	H	1.7	0.49	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA) - RE	17	H	1.7	0.21	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA) - RE	26	H	1.7	0.72	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorodecanoic acid (PFDA) - RE	0.33	J H	1.7	0.26	ng/L	1		EPA 537(Mod)	SPLP West

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Sacramento

Client Sample ID: GST-37-AS (Continued)

Lab Sample ID: 320-72243-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS) - RE	54	H	1.7	0.17	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS) - RE	250	H	1.7	0.48	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS) - REDL	690	H	17	4.6	ng/L	10		EPA 537(Mod)	SPLP West

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-23-AS

Date Collected: 04/06/21 17:03
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-3

Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.5**	**H**	1.7	0.50	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluoroheptanoic acid (PFHpA)	**0.41**	**J H**	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorooctanoic acid (PFOA)	ND	H	1.7	0.73	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorononanoic acid (PFNA)	ND	H	1.7	0.23	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorodecanoic acid (PFDA)	ND	H	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluoroundecanoic acid (PFUnA)	ND	H	1.7	0.94	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorododecanoic acid (PFDoA)	ND	H	1.7	0.47	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorotridecanoic acid (PFTriA)	ND	H	1.7	1.1	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorotetradecanoic acid (PFTeA)	ND	H	1.7	0.63	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorobutanesulfonic acid (PFBS)	**0.45**	**J H I**	1.7	0.17	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorohexanesulfonic acid (PFHxS)	**9.0**	**H**	1.7	0.49	ng/L		05/05/21 19:29	05/06/21 09:35	1
Perfluorooctanesulfonic acid (PFOS)	**13**	**H**	1.7	0.46	ng/L		05/05/21 19:29	05/06/21 09:35	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	H	4.3	1.1	ng/L		05/05/21 19:29	05/06/21 09:35	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	H	4.3	1.0	ng/L		05/05/21 19:29	05/06/21 09:35	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND	H	3.4	1.3	ng/L		05/05/21 19:29	05/06/21 09:35	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	H	1.7	0.34	ng/L		05/05/21 19:29	05/06/21 09:35	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	H	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:35	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	H	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C4 PFHpA	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C4 PFOA	*85*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C5 PFNA	*88*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C2 PFDA	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C2 PFUnA	*80*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C2 PFDoA	*77*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C2 PFTeDA	*74*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C3 PFBS	*76*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
18O2 PFHxS	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C4 PFOS	*77*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
d5-NEtFOSAA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
d3-NMeFOSAA	*68*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*
13C3 HFPO-DA	*74*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:35*	*1*

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-31-AS

Date Collected: 04/06/21 17:45
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-11

Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**1.3**	**J B**	1.7	0.51	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorobutanesulfonic acid (PFBS)	ND	*+	1.7	0.17	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorohexanesulfonic acid (PFHxS)	**0.84**	**J**	1.7	0.50	ng/L		04/15/21 12:37	04/16/21 23:58	1
Perfluorooctanesulfonic acid (PFOS)	**1.8**		1.7	0.47	ng/L		04/15/21 12:37	04/16/21 23:58	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.1	ng/L		04/15/21 12:37	04/16/21 23:58	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.0	ng/L		04/15/21 12:37	04/16/21 23:58	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/15/21 12:37	04/16/21 23:58	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/15/21 12:37	04/16/21 23:58	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/15/21 12:37	04/16/21 23:58	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/15/21 12:37	04/16/21 23:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*71*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C4 PFHpA	*73*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C4 PFOA	*83*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C5 PFNA	*86*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C2 PFDA	*82*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C2 PFUnA	*69*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C2 PFDoA	*70*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C2 PFTeDA	*80*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C3 PFBS	*66*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
18O2 PFHxS	*80*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C4 PFOS	*77*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
d5-NEtFOSAA	*86*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
d3-NMeFOSAA	*83*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*
13C3 HFPO-DA	*63*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:58*	*1*

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-33-AS
Date Collected: 04/06/21 18:00
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-13
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.8	0.52	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluoroheptanoic acid (PFHpA)	ND		1.8	0.22	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorooctanoic acid (PFOA)	**1.2**	**J B**	1.8	0.76	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorobutanesulfonic acid (PFBS)	ND	*+	1.8	0.18	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		04/15/21 12:37	04/17/21 00:07	1
Perfluorooctanesulfonic acid (PFOS)	**0.88**	**J**	1.8	0.48	ng/L		04/15/21 12:37	04/17/21 00:07	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.4	1.2	ng/L		04/15/21 12:37	04/17/21 00:07	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.4	1.1	ng/L		04/15/21 12:37	04/17/21 00:07	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		04/15/21 12:37	04/17/21 00:07	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/15/21 12:37	04/17/21 00:07	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		04/15/21 12:37	04/17/21 00:07	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.28	ng/L		04/15/21 12:37	04/17/21 00:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*65*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C4 PFHpA	*72*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C4 PFOA	*78*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C5 PFNA	*86*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C2 PFDA	*71*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C2 PFUnA	*72*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C2 PFDoA	*65*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C2 PFTeDA	*78*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C3 PFBS	*61*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
18O2 PFHxS	*72*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C4 PFOS	*71*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
d5-NEtFOSAA	*92*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
d3-NMeFOSAA	*86*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*
13C3 HFPO-DA	*59*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:07*	*1*

Client Sample ID: GST-35-AS
Date Collected: 04/06/21 18:19
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-15
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**84**	**B**	1.8	0.53	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluoroheptanoic acid (PFHpA)	**28**	**B**	1.8	0.23	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorooctanoic acid (PFOA)	**11**	**B**	1.8	0.77	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorononanoic acid (PFNA)	**1.9**	**B**	1.8	0.25	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorobutanesulfonic acid (PFBS)	**3.5**	***+**	1.8	0.18	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorohexanesulfonic acid (PFHxS)	**15**		1.8	0.52	ng/L		04/15/21 12:37	04/17/21 00:16	1
Perfluorooctanesulfonic acid (PFOS)	**41**		1.8	0.49	ng/L		04/15/21 12:37	04/17/21 00:16	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		04/15/21 12:37	04/17/21 00:16	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		04/15/21 12:37	04/17/21 00:16	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		04/15/21 12:37	04/17/21 00:16	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/15/21 12:37	04/17/21 00:16	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/15/21 12:37	04/17/21 00:16	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/15/21 12:37	04/17/21 00:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*89*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C4 PFHpA	*91*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C4 PFOA	*98*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C5 PFNA	*104*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C2 PFDA	*91*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C2 PFUnA	*94*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C2 PFDoA	*84*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C2 PFTeDA	*108*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C3 PFBS	*79*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
18O2 PFHxS	*92*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C4 PFOS	*96*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
d3-NMeFOSAA	*100*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*
13C3 HFPO-DA	*75*		*25 - 150*	*04/15/21 12:37*	*04/17/21 00:16*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**21**	**H**	1.7	0.50	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluoroheptanoic acid (PFHpA)	**2.6**	**H**	1.7	0.22	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorooctanoic acid (PFOA)	**3.5**	**H**	1.7	0.74	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorononanoic acid (PFNA)	ND	H	1.7	0.23	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorodecanoic acid (PFDA)	**0.31**	**J H**	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluoroundecanoic acid (PFUnA)	ND	H	1.7	0.96	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorododecanoic acid (PFDoA)	ND	H	1.7	0.48	ng/L		05/05/21 19:29	05/06/21 09:44	1

Client Sample ID: GST-35-AS
Date Collected: 04/06/21 18:19
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-15
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - RE (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic acid (PFTriA)	ND	H	1.7	1.1	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorotetradecanoic acid (PFTeA)	ND	H	1.7	0.63	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorobutanesulfonic acid (PFBS)	**4.1**	**H**	1.7	0.17	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorohexanesulfonic acid (PFHxS)	**23**	**H**	1.7	0.50	ng/L		05/05/21 19:29	05/06/21 09:44	1
Perfluorooctanesulfonic acid (PFOS)	**53**	**H**	1.7	0.47	ng/L		05/05/21 19:29	05/06/21 09:44	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	H	4.3	1.1	ng/L		05/05/21 19:29	05/06/21 09:44	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	H	4.3	1.0	ng/L		05/05/21 19:29	05/06/21 09:44	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND	H	3.5	1.3	ng/L		05/05/21 19:29	05/06/21 09:44	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	H	1.7	0.35	ng/L		05/05/21 19:29	05/06/21 09:44	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	H	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:44	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	H	1.7	0.28	ng/L		05/05/21 19:29	05/06/21 09:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*85*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C4 PFHpA	*86*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C4 PFOA	*94*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C5 PFNA	*86*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C2 PFDA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C2 PFUnA	*84*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C2 PFDoA	*78*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C2 PFTeDA	*76*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C3 PFBS	*76*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
18O2 PFHxS	*75*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C4 PFOS	*80*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
d5-NEtFOSAA	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
d3-NMeFOSAA	*70*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*
13C3 HFPO-DA	*73*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:44*	*1*

Client Sample ID: GST-37-AS

Date Collected: 04/06/21 18:34
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-17

Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**71**	**B**	1.8	0.52	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluoroheptanoic acid (PFHpA)	**14**	**B**	1.8	0.22	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorooctanoic acid (PFOA)	**26**	**B**	1.8	0.76	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.98	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.49	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.65	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorobutanesulfonic acid (PFBS)	**46**		1.8	0.18	ng/L		04/22/21 12:27	04/23/21 12:27	1
Perfluorohexanesulfonic acid (PFHxS)	**230**		1.8	0.51	ng/L		04/22/21 12:27	04/23/21 12:27	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		04/22/21 12:27	04/23/21 12:27	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		04/22/21 12:27	04/23/21 12:27	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.3	ng/L		04/22/21 12:27	04/23/21 12:27	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/22/21 12:27	04/23/21 12:27	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.21	ng/L		04/22/21 12:27	04/23/21 12:27	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/22/21 12:27	04/23/21 12:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*88*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C4 PFHpA	*79*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C4 PFOA	*86*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C5 PFNA	*99*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C2 PFDA	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C2 PFUnA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C2 PFDoA	*86*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C2 PFTeDA	*84*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C3 PFBS	*90*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
18O2 PFHxS	*74*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C4 PFOS	*78*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
d5-NEtFOSAA	*98*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
d3-NMeFOSAA	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*
13C3 HFPO-DA	*79*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:27*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**630**		8.9	2.4	ng/L		04/22/21 12:27	04/24/21 03:25	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*79*		*25 - 150*	*04/22/21 12:27*	*04/24/21 03:25*	*5*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**71**	**H**	1.7	0.49	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluoroheptanoic acid (PFHpA)	**17**	**H**	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:54	1

Client Sample ID: GST-37-AS
Date Collected: 04/06/21 18:34
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-17
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - RE (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**26**	**H**	1.7	0.72	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorononanoic acid (PFNA)	ND	H	1.7	0.23	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorodecanoic acid (PFDA)	**0.33**	**J H**	1.7	0.26	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluoroundecanoic acid (PFUnA)	ND	H	1.7	0.93	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorododecanoic acid (PFDoA)	ND	H	1.7	0.47	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorotridecanoic acid (PFTriA)	ND	H	1.7	1.1	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorotetradecanoic acid (PFTeA)	ND	H	1.7	0.62	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorobutanesulfonic acid (PFBS)	**54**	**H**	1.7	0.17	ng/L		05/05/21 19:29	05/06/21 09:54	1
Perfluorohexanesulfonic acid (PFHxS)	**250**	**H**	1.7	0.48	ng/L		05/05/21 19:29	05/06/21 09:54	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	H	4.2	1.1	ng/L		05/05/21 19:29	05/06/21 09:54	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	H	4.2	1.0	ng/L		05/05/21 19:29	05/06/21 09:54	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND	H	3.4	1.3	ng/L		05/05/21 19:29	05/06/21 09:54	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	H	1.7	0.34	ng/L		05/05/21 19:29	05/06/21 09:54	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	H	1.7	0.20	ng/L		05/05/21 19:29	05/06/21 09:54	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	H	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*104*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C4 PFHpA	*86*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C4 PFOA	*97*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C5 PFNA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C2 PFDA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C2 PFUnA	*98*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C2 PFDoA	*91*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C2 PFTeDA	*85*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C3 PFBS	*81*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
18O2 PFHxS	*84*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C4 PFOS	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
d5-NEtFOSAA	*94*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
d3-NMeFOSAA	*59*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*
13C3 HFPO-DA	*86*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:54*	*1*

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West - REDL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**690**	**H**	17	4.6	ng/L		05/05/21 19:29	05/06/21 13:58	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*84*		*25 - 150*	*05/05/21 19:29*	*05/06/21 13:58*	*10*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

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)
LCS 320-479806/2-A	Lab Control Sample	79	84	91	94	85	78	82	91
LCS 320-482194/2-A	Lab Control Sample	93	99	97	97	94	88	93	84
LCS 320-486399/2-A	Lab Control Sample	84	76	78	77	69	78	76	68
LCSD 320-479806/3-A	Lab Control Sample Dup	77	78	84	92	80	71	72	81
LCSD 320-482194/3-A	Lab Control Sample Dup	89	93	91	95	95	92	86	86
MB 320-479806/1-A	Method Blank	86	87	94	92	86	77	72	89
MB 320-482194/1-A	Method Blank	91	90	91	94	89	93	86	87
MB 320-486399/1-A	Method Blank	93	92	96	92	83	97	87	82

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d5NEFOS (25-150)	d3NMFOS (25-150)	HFPODA (25-150)		
LCS 320-479806/2-A	Lab Control Sample	73	89	90	92	87	75		
LCS 320-482194/2-A	Lab Control Sample	96	98	95	91	84	91		
LCS 320-486399/2-A	Lab Control Sample	72	71	72	77	76	73		
LCSD 320-479806/3-A	Lab Control Sample Dup	71	83	83	85	84	74		
LCSD 320-482194/3-A	Lab Control Sample Dup	90	98	97	87	81	94		
MB 320-479806/1-A	Method Blank	76	90	84	91	91	77		
MB 320-482194/1-A	Method Blank	93	88	94	92	88	93		
MB 320-486399/1-A	Method Blank	85	92	81	96	87	87		

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
d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Solid

Prep Type: SPLP West

		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)
320-72243-3	GST-23-AS	82	83	85	88	83	80	77	74
320-72243-11	GST-31-AS	71	73	83	86	82	69	70	80
320-72243-13	GST-33-AS	65	72	78	86	71	72	65	78
320-72243-15	GST-35-AS	89	91	98	104	91	94	84	108
320-72243-15 - RE	GST-35-AS	85	86	94	86	82	84	78	76
320-72243-17	GST-37-AS	88	79	86	99	85	93	86	84
320-72243-17 - DL	GST-37-AS								
320-72243-17 - RE	GST-37-AS	104	86	97	92	96	98	91	85

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Job ID: 320-72243-2
Project/Site: PFAS

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Matrix: Solid
Prep Type: SPLP West

		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)
320-72243-17 - REDL	GST-37-AS								
LB 320-478624/1-B	Method Blank	90	91	92	98	91	90	87	102
LB 320-478624/1-C	Method Blank	94	91	92	102	97	100	101	101
LB 320-485389/1-B	Method Blank	97	95	99	90	89	94	87	82

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d5NEFOS (25-150)	d3NMFOS (25-150)	HFPODA (25-150)		
320-72243-3	GST-23-AS	76	82	77	82	68	74		
320-72243-11	GST-31-AS	66	80	77	86	83	63		
320-72243-13	GST-33-AS	61	72	71	92	86	59		
320-72243-15	GST-35-AS	79	92	96	106	100	75		
320-72243-15 - RE	GST-35-AS	76	75	80	83	70	73		
320-72243-17	GST-37-AS	90	74	78	98	85	79		
320-72243-17 - DL	GST-37-AS			79					
320-72243-17 - RE	GST-37-AS	81	84	89	94	59	86		
320-72243-17 - REDL	GST-37-AS			84					
LB 320-478624/1-B	Method Blank	71	95	96	102	98	80		
LB 320-478624/1-C	Method Blank	95	94	98	98	97	105		
LB 320-485389/1-B	Method Blank	83	89	89	104	91	82		

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
d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-479806/1-A
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 479806

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		04/15/21 12:37	04/16/21 23:20	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/15/21 12:37	04/16/21 23:20	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/15/21 12:37	04/16/21 23:20	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/15/21 12:37	04/16/21 23:20	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/15/21 12:37	04/16/21 23:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/15/21 12:37	04/16/21 23:20	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/15/21 12:37	04/16/21 23:20	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/15/21 12:37	04/16/21 23:20	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*86*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C4 PFHpA	*87*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C4 PFOA	*94*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C5 PFNA	*92*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C2 PFDA	*86*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C2 PFUnA	*77*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C2 PFDoA	*72*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C2 PFTeDA	*89*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C3 PFBS	*76*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
18O2 PFHxS	*90*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C4 PFOS	*84*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
d5-NEtFOSAA	*91*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
d3-NMeFOSAA	*91*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*
13C3 HFPO-DA	*77*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:20*	*1*

Lab Sample ID: LCS 320-479806/2-A
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 479806

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	47.1		ng/L		118	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	43.8		ng/L		109	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	42.3		ng/L		106	70 - 130
Perfluorononanoic acid (PFNA)	40.0	42.4		ng/L		106	75 - 135

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-479806/2-A
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 479806

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	42.6		ng/L		107	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	43.5		ng/L		109	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	44.7		ng/L		112	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	42.4		ng/L		106	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	37.6		ng/L		94	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	46.3	*+	ng/L		131	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	39.6		ng/L		109	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.2		ng/L		106	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.6		ng/L		102	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	39.4		ng/L		99	76 - 136
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	44.8		ng/L		112	51 - 173
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	39.5		ng/L		105	79 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.7		ng/L		109	75 - 135
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	37.9		ng/L		101	54 - 114

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*79*		*25 - 150*
13C4 PFHpA	*84*		*25 - 150*
13C4 PFOA	*91*		*25 - 150*
13C5 PFNA	*94*		*25 - 150*
13C2 PFDA	*85*		*25 - 150*
13C2 PFUnA	*78*		*25 - 150*
13C2 PFDoA	*82*		*25 - 150*
13C2 PFTeDA	*91*		*25 - 150*
13C3 PFBS	*73*		*25 - 150*
18O2 PFHxS	*89*		*25 - 150*
13C4 PFOS	*90*		*25 - 150*
d5-NEtFOSAA	*92*		*25 - 150*
d3-NMeFOSAA	*87*		*25 - 150*
13C3 HFPO-DA	*75*		*25 - 150*

Lab Sample ID: LCSD 320-479806/3-A
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 479806

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	46.0		ng/L		115	73 - 133	12	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.9		ng/L		107	72 - 132	6	30
Perfluorooctanoic acid (PFOA)	40.0	42.3		ng/L		106	70 - 130	6	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-479806/3-A
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 479806

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	42.2		ng/L		105	75 - 135	2	30
Perfluorodecanoic acid (PFDA)			40.0	42.1		ng/L		105	76 - 136	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	46.3		ng/L		116	68 - 128	2	30
Perfluorododecanoic acid (PFDoA)			40.0	44.1		ng/L		110	71 - 131	3	30
Perfluorotridecanoic acid (PFTriA)			40.0	42.9		ng/L		107	71 - 131	10	30
Perfluorotetradecanoic acid (PFTeA)			40.0	41.7		ng/L		104	70 - 130	0	30
Perfluorobutanesulfonic acid (PFBS)			35.4	41.8		ng/L		118	67 - 127	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	40.7		ng/L		112	59 - 119	4	30
Perfluorooctanesulfonic acid (PFOS)			37.1	39.8		ng/L		107	70 - 130	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	36.9		ng/L		92	76 - 136	17	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	37.4		ng/L		94	76 - 136	14	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	44.3		ng/L		111	51 - 173	2	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	40.3		ng/L		107	79 - 139	4	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	41.5		ng/L		111	75 - 135	4	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	38.2		ng/L		101	54 - 114	8	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*77*		*25 - 150*
13C4 PFHpA	*78*		*25 - 150*
13C4 PFOA	*84*		*25 - 150*
13C5 PFNA	*92*		*25 - 150*
13C2 PFDA	*80*		*25 - 150*
13C2 PFUnA	*71*		*25 - 150*
13C2 PFDoA	*72*		*25 - 150*
13C2 PFTeDA	*81*		*25 - 150*
13C3 PFBS	*71*		*25 - 150*
18O2 PFHxS	*83*		*25 - 150*
13C4 PFOS	*83*		*25 - 150*
d5-NEtFOSAA	*85*		*25 - 150*
d3-NMeFOSAA	*84*		*25 - 150*
13C3 HFPO-DA	*74*		*25 - 150*

Lab Sample ID: MB 320-482194/1-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 482194

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/22/21 12:27	04/23/21 11:22	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-482194/1-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 482194

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/22/21 12:27	04/23/21 11:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/22/21 12:27	04/23/21 11:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/22/21 12:27	04/23/21 11:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/22/21 12:27	04/23/21 11:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/22/21 12:27	04/23/21 11:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/22/21 12:27	04/23/21 11:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/22/21 12:27	04/23/21 11:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFHpA	*90*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFOA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C5 PFNA	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFDA	*89*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFUnA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFDoA	*86*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFTeDA	*87*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C3 PFBS	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
18O2 PFHxS	*88*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFOS	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
d5-NEtFOSAA	*92*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
d3-NMeFOSAA	*88*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C3 HFPO-DA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*

Lab Sample ID: LCS 320-482194/2-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.9		ng/L		110	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	39.6		ng/L		99	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		100	70 - 130
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	38.5		ng/L		96	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	39.2		ng/L		98	68 - 128

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-482194/2-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	37.4		ng/L		94	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	42.8		ng/L		107	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	34.8		ng/L		98	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.2		ng/L		91	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	36.2		ng/L		97	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.2		ng/L		93	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	41.3		ng/L		103	76 - 136
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	40.2		ng/L		100	51 - 173
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	37.0		ng/L		98	79 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.1		ng/L		107	75 - 135
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	35.2		ng/L		94	54 - 114

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*93*		*25 - 150*
13C4 PFHpA	*99*		*25 - 150*
13C4 PFOA	*97*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*
13C2 PFDA	*94*		*25 - 150*
13C2 PFUnA	*88*		*25 - 150*
13C2 PFDoA	*93*		*25 - 150*
13C2 PFTeDA	*84*		*25 - 150*
13C3 PFBS	*96*		*25 - 150*
18O2 PFHxS	*98*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
d5-NEtFOSAA	*91*		*25 - 150*
d3-NMeFOSAA	*84*		*25 - 150*
13C3 HFPO-DA	*91*		*25 - 150*

Lab Sample ID: LCSD 320-482194/3-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	45.6		ng/L		114	73 - 133	4	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.3		ng/L		106	72 - 132	6	30
Perfluorooctanoic acid (PFOA)	40.0	40.4		ng/L		101	70 - 130	1	30
Perfluorononanoic acid (PFNA)	40.0	41.6		ng/L		104	75 - 135	2	30
Perfluorodecanoic acid (PFDA)	40.0	38.7		ng/L		97	76 - 136	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-482194/3-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 482194

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroundecanoic acid (PFUnA)			40.0	41.3		ng/L		103	68 - 128	5	30
Perfluorododecanoic acid (PFDoA)			40.0	42.5		ng/L		106	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)			40.0	42.1		ng/L		105	71 - 131	12	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.8		ng/L		102	70 - 130	5	30
Perfluorobutanesulfonic acid (PFBS)			35.4	36.0		ng/L		102	67 - 127	3	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.9		ng/L		90	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.1	36.4		ng/L		98	70 - 130	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	38.0		ng/L		95	76 - 136	2	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	46.1		ng/L		115	76 - 136	11	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.7		ng/L		102	51 - 173	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	36.5		ng/L		97	79 - 139	1	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	36.4		ng/L		98	75 - 135	10	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	33.1		ng/L		88	54 - 114	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*89*		*25 - 150*
13C4 PFHpA	*93*		*25 - 150*
13C4 PFOA	*91*		*25 - 150*
13C5 PFNA	*95*		*25 - 150*
13C2 PFDA	*95*		*25 - 150*
13C2 PFUnA	*92*		*25 - 150*
13C2 PFDoA	*86*		*25 - 150*
13C2 PFTeDA	*86*		*25 - 150*
13C3 PFBS	*90*		*25 - 150*
18O2 PFHxS	*98*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
d5-NEtFOSAA	*87*		*25 - 150*
d3-NMeFOSAA	*81*		*25 - 150*
13C3 HFPO-DA	*94*		*25 - 150*

Lab Sample ID: MB 320-486399/1-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486399

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		05/05/21 19:29	05/06/21 07:33	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-486399/1-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486399

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		05/05/21 19:29	05/06/21 07:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		05/05/21 19:29	05/06/21 07:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		05/05/21 19:29	05/06/21 07:33	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		05/05/21 19:29	05/06/21 07:33	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		05/05/21 19:29	05/06/21 07:33	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		05/05/21 19:29	05/06/21 07:33	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		05/05/21 19:29	05/06/21 07:33	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFHpA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFOA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C5 PFNA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFDA	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFUnA	*97*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFDoA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFTeDA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C3 PFBS	*85*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
18O2 PFHxS	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFOS	*81*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
d3-NMeFOSAA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C3 HFPO-DA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*

Lab Sample ID: LCS 320-486399/2-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486399

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	38.8		ng/L		97	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	50.8		ng/L		127	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	44.3		ng/L		111	70 - 130
Perfluorononanoic acid (PFNA)	40.0	43.7		ng/L		109	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	42.6		ng/L		106	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	39.8		ng/L		100	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	37.7		ng/L		94	71 - 131

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-486399/2-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486399

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorotridecanoic acid (PFTriA)	40.0	37.4		ng/L		94	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	42.7		ng/L		107	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	35.1		ng/L		99	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	35.8		ng/L		98	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.8		ng/L		107	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	41.3		ng/L		103	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	44.4		ng/L		111	76 - 136
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.8		ng/L		105	51 - 173
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	45.9		ng/L		122	79 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	43.2		ng/L		116	75 - 135
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	38.8		ng/L		103	54 - 114

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*84*		*25 - 150*
13C4 PFHpA	*76*		*25 - 150*
13C4 PFOA	*78*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*
13C2 PFDA	*69*		*25 - 150*
13C2 PFUnA	*78*		*25 - 150*
13C2 PFDoA	*76*		*25 - 150*
13C2 PFTeDA	*68*		*25 - 150*
13C3 PFBS	*72*		*25 - 150*
18O2 PFHxS	*71*		*25 - 150*
13C4 PFOS	*72*		*25 - 150*
d5-NEtFOSAA	*77*		*25 - 150*
d3-NMeFOSAA	*76*		*25 - 150*
13C3 HFPO-DA	*73*		*25 - 150*

Lab Sample ID: LB 320-478624/1-B
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 479806

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	69.5		1.7	0.50	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluoroheptanoic acid (PFHpA)	35.4		1.7	0.22	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorooctanoic acid (PFOA)	14.5		1.7	0.74	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorononanoic acid (PFNA)	3.69		1.7	0.23	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		04/15/21 12:37	04/16/21 23:48	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LB 320-478624/1-B
Matrix: Solid
Analysis Batch: 480518

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 479806

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.64	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		04/15/21 12:37	04/16/21 23:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		04/15/21 12:37	04/16/21 23:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		04/15/21 12:37	04/16/21 23:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		04/15/21 12:37	04/16/21 23:48	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		04/15/21 12:37	04/16/21 23:48	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		04/15/21 12:37	04/16/21 23:48	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		04/15/21 12:37	04/16/21 23:48	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		04/15/21 12:37	04/16/21 23:48	1

Isotope Dilution	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*90*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C4 PFHpA	*91*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C4 PFOA	*92*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C5 PFNA	*98*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C2 PFDA	*91*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C2 PFUnA	*90*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C2 PFDoA	*87*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C2 PFTeDA	*102*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C3 PFBS	*71*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
18O2 PFHxS	*95*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C4 PFOS	*96*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
d5-NEtFOSAA	*102*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
d3-NMeFOSAA	*98*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*
13C3 HFPO-DA	*80*		*25 - 150*	*04/15/21 12:37*	*04/16/21 23:48*	*1*

Lab Sample ID: LB 320-478624/1-C
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 482194

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	67.0		1.8	0.52	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluoroheptanoic acid (PFHpA)	34.0		1.8	0.23	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorooctanoic acid (PFOA)	13.6		1.8	0.77	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorononanoic acid (PFNA)	3.65		1.8	0.24	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		04/22/21 12:27	04/23/21 11:50	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LB 320-478624/1-C
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 482194

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		04/22/21 12:27	04/23/21 11:50	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		04/22/21 12:27	04/23/21 11:50	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		04/22/21 12:27	04/23/21 11:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/22/21 12:27	04/23/21 11:50	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/22/21 12:27	04/23/21 11:50	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/22/21 12:27	04/23/21 11:50	1

Isotope Dilution	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFHpA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFOA	*92*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C5 PFNA	*102*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFDA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFUnA	*100*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFDoA	*101*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFTeDA	*101*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C3 PFBS	*95*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
18O2 PFHxS	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFOS	*98*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
d5-NEtFOSAA	*98*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
d3-NMeFOSAA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C3 HFPO-DA	*105*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*

Lab Sample ID: LB 320-485389/1-B
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 486399

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.50	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		05/05/21 19:29	05/06/21 08:10	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		05/05/21 19:29	05/06/21 08:10	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		05/05/21 19:29	05/06/21 08:10	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LB 320-485389/1-B
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 486399

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		05/05/21 19:29	05/06/21 08:10	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		05/05/21 19:29	05/06/21 08:10	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		05/05/21 19:29	05/06/21 08:10	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		05/05/21 19:29	05/06/21 08:10	1

Isotope Dilution	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFHpA	*95*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFOA	*99*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C5 PFNA	*90*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFDA	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFUnA	*94*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFDoA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFTeDA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C3 PFBS	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
18O2 PFHxS	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFOS	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
d5-NEtFOSAA	*104*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
d3-NMeFOSAA	*91*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C3 HFPO-DA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

LCMS

Leach Batch: 478624

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-11	GST-31-AS	SPLP West	Solid	1312	
320-72243-13	GST-33-AS	SPLP West	Solid	1312	
320-72243-15	GST-35-AS	SPLP West	Solid	1312	
320-72243-17	GST-37-AS	SPLP West	Solid	1312	
320-72243-17 - DL	GST-37-AS	SPLP West	Solid	1312	
LB 320-478624/1-B	Method Blank	SPLP West	Solid	1312	
LB 320-478624/1-C	Method Blank	SPLP West	Solid	1312	

Prep Batch: 479806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-11	GST-31-AS	SPLP West	Solid	3535	478624
320-72243-13	GST-33-AS	SPLP West	Solid	3535	478624
320-72243-15	GST-35-AS	SPLP West	Solid	3535	478624
LB 320-478624/1-B	Method Blank	SPLP West	Solid	3535	478624
MB 320-479806/1-A	Method Blank	Total/NA	Solid	3535	
LCS 320-479806/2-A	Lab Control Sample	Total/NA	Solid	3535	
LCSD 320-479806/3-A	Lab Control Sample Dup	Total/NA	Solid	3535	

Analysis Batch: 480518

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-11	GST-31-AS	SPLP West	Solid	EPA 537(Mod)	479806
320-72243-13	GST-33-AS	SPLP West	Solid	EPA 537(Mod)	479806
320-72243-15	GST-35-AS	SPLP West	Solid	EPA 537(Mod)	479806
LB 320-478624/1-B	Method Blank	SPLP West	Solid	EPA 537(Mod)	479806
MB 320-479806/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	479806
LCS 320-479806/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	479806
LCSD 320-479806/3-A	Lab Control Sample Dup	Total/NA	Solid	EPA 537(Mod)	479806

Prep Batch: 482194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-17	GST-37-AS	SPLP West	Solid	3535	478624
320-72243-17 - DL	GST-37-AS	SPLP West	Solid	3535	478624
LB 320-478624/1-C	Method Blank	SPLP West	Solid	3535	478624
MB 320-482194/1-A	Method Blank	Total/NA	Solid	3535	
LCS 320-482194/2-A	Lab Control Sample	Total/NA	Solid	3535	
LCSD 320-482194/3-A	Lab Control Sample Dup	Total/NA	Solid	3535	

Analysis Batch: 482562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-17	GST-37-AS	SPLP West	Solid	EPA 537(Mod)	482194
LB 320-478624/1-C	Method Blank	SPLP West	Solid	EPA 537(Mod)	482194
MB 320-482194/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	482194
LCS 320-482194/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	482194
LCSD 320-482194/3-A	Lab Control Sample Dup	Total/NA	Solid	EPA 537(Mod)	482194

Analysis Batch: 482687

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-17 - DL	GST-37-AS	SPLP West	Solid	EPA 537(Mod)	482194

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

LCMS

Leach Batch: 485389

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-3	GST-23-AS	SPLP West	Solid	1312	
320-72243-15 - RE	GST-35-AS	SPLP West	Solid	1312	
320-72243-17 - RE	GST-37-AS	SPLP West	Solid	1312	
320-72243-17 - REDL	GST-37-AS	SPLP West	Solid	1312	
LB 320-485389/1-B	Method Blank	SPLP West	Solid	1312	

Prep Batch: 486399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-3	GST-23-AS	SPLP West	Solid	3535	485389
320-72243-15 - RE	GST-35-AS	SPLP West	Solid	3535	485389
320-72243-17 - RE	GST-37-AS	SPLP West	Solid	3535	485389
320-72243-17 - REDL	GST-37-AS	SPLP West	Solid	3535	485389
LB 320-485389/1-B	Method Blank	SPLP West	Solid	3535	485389
MB 320-486399/1-A	Method Blank	Total/NA	Solid	3535	
LCS 320-486399/2-A	Lab Control Sample	Total/NA	Solid	3535	

Analysis Batch: 486477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 320-485389/1-B	Method Blank	SPLP West	Solid	EPA 537(Mod)	486399
MB 320-486399/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	486399
LCS 320-486399/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	486399

Analysis Batch: 486625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-3	GST-23-AS	SPLP West	Solid	EPA 537(Mod)	486399
320-72243-15 - RE	GST-35-AS	SPLP West	Solid	EPA 537(Mod)	486399
320-72243-17 - RE	GST-37-AS	SPLP West	Solid	EPA 537(Mod)	486399

Analysis Batch: 486748

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72243-17 - REDL	GST-37-AS	SPLP West	Solid	EPA 537(Mod)	486399

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-23-AS
Date Collected: 04/06/21 17:03
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.65 g	2000 mL	485389	05/03/21 17:10	DPM	TAL SAC
SPLP West	Prep	3535			291.3 mL	10.00 mL	486399	05/05/21 19:29	PV	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			486625	05/06/21 09:35	MNV	TAL SAC

Client Sample ID: GST-31-AS
Date Collected: 04/06/21 17:45
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-11
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.28 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535			286.3 mL	10.0 mL	479806	04/15/21 12:37	LN	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			480518	04/16/21 23:58	K1S	TAL SAC

Client Sample ID: GST-33-AS
Date Collected: 04/06/21 18:00
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-13
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.55 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535			281 mL	10.0 mL	479806	04/15/21 12:37	LN	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			480518	04/17/21 00:07	K1S	TAL SAC

Client Sample ID: GST-35-AS
Date Collected: 04/06/21 18:19
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-15
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312	RE		100.41 g	2000 mL	485389	05/03/21 17:10	DPM	TAL SAC
SPLP West	Prep	3535	RE		287.8 mL	10.00 mL	486399	05/05/21 19:29	PV	TAL SAC
SPLP West	Analysis	EPA 537(Mod)	RE	1			486625	05/06/21 09:44	MNV	TAL SAC
SPLP West	Leach	1312			100.79 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535			274.8 mL	10.0 mL	479806	04/15/21 12:37	LN	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			480518	04/17/21 00:16	K1S	TAL SAC

Client Sample ID: GST-37-AS
Date Collected: 04/06/21 18:34
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-17
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312	RE		100.33 g	2000 mL	485389	05/03/21 17:10	DPM	TAL SAC
SPLP West	Prep	3535	RE		295.2 mL	10.00 mL	486399	05/05/21 19:29	PV	TAL SAC
SPLP West	Analysis	EPA 537(Mod)	RE	1			486625	05/06/21 09:54	MNV	TAL SAC
SPLP West	Leach	1312	REDL		100.33 g	2000 mL	485389	05/03/21 17:10	DPM	TAL SAC
SPLP West	Prep	3535	REDL		295.2 mL	10.00 mL	486399	05/05/21 19:29	PV	TAL SAC
SPLP West	Analysis	EPA 537(Mod)	REDL	10			486748	05/06/21 13:58	S1M	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Client Sample ID: GST-37-AS

Date Collected: 04/06/21 18:34
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72243-17

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.91 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535			280.5 mL	10.00 mL	482194	04/22/21 12:27	LA	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			482562	04/23/21 12:27	S1M	TAL SAC
SPLP West	Leach	1312	DL		100.91 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535	DL		280.5 mL	10.00 mL	482194	04/22/21 12:27	LA	TAL SAC
SPLP West	Analysis	EPA 537(Mod)	DL	5			482687	04/24/21 03:25	K1S	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Laboratory: Eurofins TestAmerica, Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	TAL SAC
1312	SPLP Extraction	SW846	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

Protocol References:

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 TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72243-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-72243-3	GST-23-AS	Solid	04/06/21 17:03	04/08/21 15:18	
320-72243-11	GST-31-AS	Solid	04/06/21 17:45	04/08/21 15:18	
320-72243-13	GST-33-AS	Solid	04/06/21 18:00	04/08/21 15:18	
320-72243-15	GST-35-AS	Solid	04/06/21 18:19	04/08/21 15:18	
320-72243-17	GST-37-AS	Solid	04/06/21 18:34	04/08/21 15:18	

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

CHAIN-OF-CUSTODY RECORD

Laboratory Eurofins/TestAmerica
Attn: David Althicker

Turn Around Time: ☐ Normal ☒ Rush — Please Specify

Quote No:

J-Flags: ☐ Yes ☐ No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS 537.1 MOD SPLP	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
GST-21-AS		16:50	04/06/21	X	1	asphalt, grab
GST-22-AS		17:00		X	1	asphalt, grab
GST-23-AS		17:03		X	1	asphalt, grab
GST-24-AS		17:11		X	1	asphalt, grab
GST-25-AS		17:13		X	1	asphalt, grab
GST-26-AS		17:13		X	1	asphalt, grab
GST-27-AS		17:19		X	1	asphalt, grab
GST-28-AS		17:27		X	1	asphalt, grab
GST-29-AS		17:33		X	1	asphalt, grab
GST-30-AS		17:40		X	1	asphalt, grab

320-72243 Chain of Custody

Project Information	
Number:	102591-006
Name:	
Contact:	KRF
Ongoing Project?	Yes ☐ No ☐
Sampler:	AnneMariePalmieri

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

Notes:
email to: krf@shannonwil.com

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: AMPalmieri Time: 9:20	Signature: Time:	Signature: Time:
Printed Name: AMPalmieri Date: 4/8/21	Printed Name: Date:	Printed Name: Date:
Company: AECOM	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1514	Signature: Time:	Signature: Time:
Printed Name: David Althicker Date: 4/8/21	Printed Name: Date:	Printed Name: Date:
Company: ETAS	Company:	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - job file

No. 36305

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

Laboratory Eurofins/Test America
Attn: David Alltucker

Turn Around Time: ☐ Normal ☒ Rush — Please Specify

Quote No:

J-Flags: ☐ Yes ☐ No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS 537.1 MOD	SPLP	PFAS 537.1					Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
GST-31-AS		17:45	04/06/21	X	X						2	asphalt, grab
GST-32-AS		17:54		X							1	asphalt, grab
GST-33-AS		18:00		X	X						2	asphalt, grab
GST-34-AS		18:10		X							1	asphalt, grab
GST-35-AS		18:19		X	X						2	asphalt, grab
GST-36-AS		18:19		X							1	asphalt, grab
GST-37-AS		18:34		X	X						2	asphalt, grab
GST-38-SW		09:00	4/7/21			X					1	surface water, grab
GST-39-SW		09:00	4/7/21			X					1	surface water, grab

Project Information	
Number:	102599-008
Name:	
Contact:	KRF
Ongoing Project?	Yes ☐ No ☐
Sampler:	Anne Marie Palmieri

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

Notes:

email to: KRF@shanwil.com

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 09:30	Signature: Time:	Signature: Time:
Printed Name: Anne Palmieri Date: 4/7/21	Printed Name: Date:	Printed Name: Date:
Company: ADEC	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 1518	Signature: Time:	Signature: Time:
Printed Name: David Alltucker Date: 4/8/21	Printed Name: Date:	Printed Name: Date:
Company: ETAS	Company:	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - job file

No. 36241

5/7/2021

eurofins | Environment Testing TestAmerica

Sacramento Sample Receiving Notes

8027-8149 0765

Tracking # : _____ DV 4/8/21


320-72243 Field Sheet

Job:__

SO / PO / FO / SAT / 2-Day / Ground / UPS / CDO / Courier

GSO / OnTrac / Goldstreak / USPS / Other_____

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations. File in the job folder with the COC.

Therm. ID: L-05 Corr. Factor: (+ / -) _____ °C

Ice DV 4/8/21 Wet _____ Gel 0 Other _____

Cooler Custody Seal: Seal

Cooler ID: —

Temp Observed: 4.5 °C Corrected: 4.5 °C

From: Temp Blank ☐ Sample ☐

Opening/Processing The Shipment	Yes	No	NA
Cooler compromised/tampered with?	☐	☐	☐
Cooler Temperature is acceptable?	☐	☐	☐
Frozen samples show signs of thaw?	☐	☐	☐

4/8/21

Initials: DV Date: 4/8/21

Unpacking/Labeling The Samples	Yes	No	NA
CoC is complete w/o discrepancies?	☑	☐	☐
Samples compromised/tampered with?	☐	☑	☐
Sample containers have legible labels?	☑	☐	☐
Sample custody seal?	☐	☐	☑
Containers are not broken or leaking?	☑	☐	☐
Sample date/times are provided?	☑	☐	☐
Appropriate containers are used?	☑	☐	☐
Sample bottles are completely filled?	☑	☐	☐
Sample preservatives verified?	☐	☐	☑
Samples w/o discrepancies?	☑	☐	☐
Zero headspace?*	☐	☐	☑
Alkalinity has no headspace?	☐	☐	☑
Perchlorate has headspace? (Methods 314, 331, 6850)	☐	☐	☑
Multiphasic samples are not present?	☑	☐	☐

NC 4-8-21

*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Initials: NC Date: 4-8-21

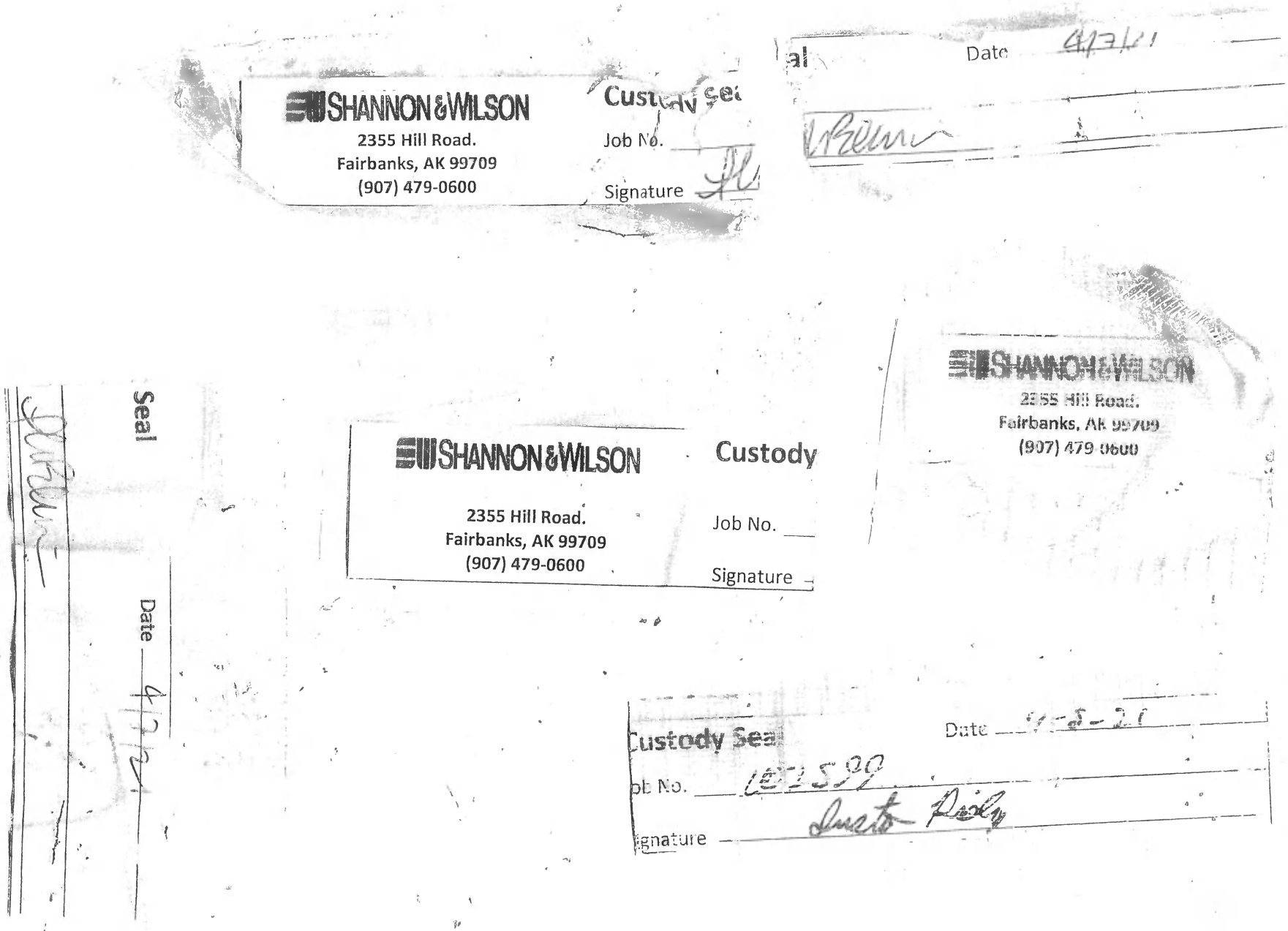
Notes:_____

Trizma Lot #(s): _____

Login Completion	Yes	No	NA
Receipt Temperature on COC?	☑	☐	☐
Samples received within hold time?	☑	☐	☐
NCM Filed?	☐	☐	☑
Log Release checked in TALS?	☑	☐	☐

Initials: DV Date: 4/8/21

WR3 18E



SHANNON & WILSON
2355 Hill Road.
Fairbanks, AK 99709
(907) 479-0600

Custody Seal
Job No.
Signature
Date

SHANNON & WILSON
2355 Hill Road.
Fairbanks, AK 99709
(907) 479-0600

Custody Seal
Job No.
Signature
Date

SHANNON & WILSON
2355 Hill Road.
Fairbanks, AK 99709
(907) 479-0600

Custody Seal
Job No.
Signature
Date

SHANNON & WILSON
2355 Hill Road.
Fairbanks, AK 99709
(907) 479-0600

Custody Seal
Job No.
Signature
Date

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-72243-2

Login Number: 72243
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, 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	SEALS
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	False	Seals present but have been tampered with.
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	

Laboratory Data Review Checklist

Completed By:

Michael Jaramillo/Ashley Jaramillo – Reviewed by Kristen Freiburger

Title:

Senior Chemist/Senior Chemist - Associate

Date:

May 20, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc. (TestAmerica)

Laboratory Report Number:

320-72243-2

Laboratory Report Date:

May 7, 2021

CS Site Name:

DOT&PF Gustavus Airport Statewide PFAS

ADEC File Number:

2569.38.033

Hazard Identification Number:

26981

320-72243-2

Laboratory Report Date:

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

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all the submitted sample analyses?

   Yes☒ No☐ N/A☐ Comments:

   The DEC certified TestAmerica of West Sacramento, CA for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018 by method 537(M). These compounds were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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

   Yes☐ No☐ N/A☒ Comments:

   The requested analyses were conducted by TestAmerica of West Sacramento, CA.

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:

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

   Yes☐ No☐ N/A☒ Comments:

   Samples did not require preservation other than temperature.

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

   Yes☒ No☐ N/A☐ Comments:

   The sample receipt form noted the samples arrived in good condition at a temperature of 4.5 °C.

Laboratory Report Date:

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:

The sample receipt form notes the custody seals were severed; the case narrative states that the samples do not appear to have been disturbed as the packing materials and COC record remained in place. Pictures provided by the laboratory strongly suggest that the packing tape covering the custody seals was caught on something during transit causing the seals to rip. The seals appear weathered and torn in a manner inconsistent with intentional cutting or removal. We do not consider the results to be affected by this anomaly.

e. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

4. Case Narrative

a. Present and understandable?

Yes☒ No☐ N/A☐ Comments:

Analytical results for sample *GST-37-AS* were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits. Results are not affected.

The laboratory control sample (LCS) for preparation batches 320-478624 and 320-479806 were recovered outside control limits for perfluorobutanesulfonic acid (PFBS). This analyte was biased high in the LCS and was not detected in the associated samples; therefore, the data have been reported. Refer to Section 6.b. for further assessment.

The leachate blank (LB) for preparation batches 320-478624 and 320-479806 contained several analytes above the reporting limit. The target analyte concentrations in samples *GST-31-AS* and *GST-33-AS* were less that the reporting limit (RL) therefore, re-extraction and/or re-analysis of samples was not performed. The client was contacted and permission was given to report the samples. Refer to Section 6.a. for further assessment.

The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. The PFBS result for sample *GST-23-AS* is considered estimated, no direction of bias. However, this sample was requested and prepared outside the method recognized hold time. Refer to Section 5.b. for further assessment and qualification of the data.

Laboratory Report Date:

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

Yes☒ No☐ N/A☐ Comments:

The LCS for preparation batches 320-478624 and 320-479806 was recovered outside control limits for PFBS. The associated samples were re-prepared outside holding time. Both sets of data have been reported. Refer to Section 6.b. for further assessment.

Several analytes were detected above the RL in the LB associated with preparation batches 320-478624 and 320-479806. The samples *GST-35-AS* and *GST-37-AS* were re-extracted outside of holding time at client request. Both sets of data have been reported. Refer to Section 6.a. for further assessment.

SPLP analysis for sample *GST-23-AS* was requested past preparation holding time. Refer to Section 5.b. for further assessment.

Insufficient volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624, 320-479806, and 320-482194. Refer to the LCS/LCSD for assessment of laboratory accuracy and precision requirements.

Samples *GST-31-AS*, *GST-33-AS*, *GST-35-AS*, and *GST-37-AS* were prepared outside of preparation holding time due to high LCS recovery for PFBS and detections for this analyte in the LB.

c. Were all corrective actions documented?

Yes☒ No☐ N/A☐ Comments:

PFAS results for samples *GST-24-AS* and *GST-37-AS* were reported from the analysis of a diluted extract. These samples were diluted due to high concentrations of one or more target analytes in the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Samples *GST-31-AS*, *GST-33-AS*, *GST-35-AS*, and *GST-37-AS* were prepared outside of preparation holding time due to high LCS recovery for PFBS and detections for this analyte in the LB.

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

Comments:

The laboratory assigned the I-flag to the PFBS result of sample *GST-23-AS* due to the transition mass ratios being outside the established limits. However, this sample was requested and extracted outside the method recognized hold time. Refer to Section 5.b. for further assessment.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

However, after review of the PFAS results for sample *GST-23-AS*, SPLP analysis was requested past the method holding time. The SPLP analysis for this sample was not initially identified on the COC.

Laboratory Report Date:

b. All applicable holding times met?

Yes☐ No☒ N/A☐ Comments:

SPLP analysis for sample *GST-23-AS* was requested 29 days past collection, which is twice the method hold time of 14 days. Per discussions with DEC, PFAS data usability is unaffected by the holding time exceedance. The out of hold results are used for reporting purposes, with the appropriate flags applied. The detected and non-detect results are considered tentatively identified/unidentified and flagged "N" in the analytical database.

In addition, reanalysis 29 days past collection of samples *GST-35-AS* and *GST-37-AS* due to high concentrations of target analytes perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), and perfluorononanoic acid (PFNA) in the associated leaching blanks and project samples. The out of hold results for these analytes are used for reporting purposes. The detected and non-detect results are considered tentatively identified/unidentified and flagged "N" in the analytical database. Please note, PFNA was not detected in sample *GST-37-AS* and is not affected by the leaching blank detection. The original run for this sample is reported and does not require flagging due to hold time.

Please note, for sample results not associated with the leaching blank failures noted below, the detected results for the first and second runs were compared, where applicable for samples *GST-35-AS* and *GST-37-AS.* The higher result of the two runs were reported. Where the out-of-hold time run results were used, the data have been flagged for hold time exceedance. The detected results are considered tentatively identified and flagged "N" in the analytical database.
This applies to the following samples and analytes:
Sample *GST-35-AS* – PFDA, PFBS, PFHxS, and PFOS.
Samples *GST-37-AS* – PFDA, PFBS, PFHxS and PFOS.

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order. Asphalt samples were reported on a dry weight basis.

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

Yes☒ No☐ N/A☐ Comments:

There is no applicable DEC action level for asphalt. LOQs (TA reports as Reporting Limits [RLs]) for non-detect results are less than their applicable DEC action levels for perfluorooctanesulfonic acid (PFOS) and PFOA in soil.

e. Data quality or usability affected?

Yes; see above.

320-72243-2

Laboratory Report Date:

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

Leaching blanks (LBs) are also evaluated as method blanks for SPLP analysis.

ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

Yes☐ No☒ N/A☐ Comments:

The LBs associated with preparation bath 320-479806 and 320-482194 had detections for PFHxA, PFHpA, PFOA, and PFNA above their respective LOQs.

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

Comments:

Samples *GST-31-AS*, *GST-33-AS*, *GST-35-AS*, and *GST-37-AS* are associated with the LB detections. Due to the high concentrations observed in samples *GST-35-AS* and *GST-37-AS*, these samples were re-extracted out of hold time with no detections in the method blank and leaching blank samples. The out-of-hold results for PFHxA, PFHpA, PFOA, and PFNA are used for reporting purposes and are not affected by the LB detections for these analytes. Please note, PFNA was not detected in sample *GST-37-AS* and is not affected by the leaching blank detection. The original run for this sample is reported and does not require flagging due to the leaching blank detection.

Sample *GST-31-AS* had a detection for PFHxA within five times the LB detection. The sample result is considered non-detect and flagged "B" at the LOQ.

Sample *GST-33-AS* had a detection for PFOA within five times the LB detection. The sample result is considered non-detect and flagged "B" at the LOQ.

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:

Yes; see above.

Laboratory Report Date:

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

LCS/LCSD samples were reported for SPLP PFAS analysis for preparation batches 320-479806 and 320-482194.

An LCS sample was reported for SPLP PFAS analysis for preparation batch 320-486399. We have no measure of laboratory precision for this analysis.

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

Yes☐ No☐ N/A☒ Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☐ No☒ N/A☐ Comments:

The LCS associated with preparation batch 320-479806 had a high recovery for PFBS.

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. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Samples *GST-31-AS*, *GST-33-AS*, and *GST-35-AS* are associated with preparation batch 320-479806. Samples *GST-31-AS* and *GST-33-AS* did not have detections for PFBS and are not considered affected by the high recovery failure for this analyte.

Sample *GST-35-AS* had a detection for PFBS and the result is considered estimated, biased high, and is flagged "JH" in the analytical database. However, due to a higher concentration being reported for PFBS in secondary run (batch 320-486399), the secondary run results are used for reporting purposes. The original run is not being used for reporting purposes, and therefore is unaffected by the PFBS LCS recovery failure.

Laboratory Report Date:

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:

No; see above.

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

Note: Leave blank if not required for project

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:

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:

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

Yes☐ No☐ N/A☐ Comments:

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

Comments:

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:

IDA recoveries were within laboratory acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

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 are not volatile compounds. A trip blank is not required for the requested analysis.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes☐ No☐ N/A☒ Comments:

A trip blank is not required for the requested analysis.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

N/A; see above

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes☐ No☐ N/A☒ Comments:

A field duplicate was not requested for SPLP analysis.

ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

A field duplicate was not requested for SPLP analysis.

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

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

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

Yes☐ No☐ N/A☒ Comments:

A field duplicate was not requested for SPLP analysis.

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

Comments:

The data quality/usability was not affected; see above.

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

Yes☐ No☐ N/A☒ Comments:

Project samples were not collected with reusable equipment, so the prospect of foreign contaminants being introduced through equipment contamination is not plausible.

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

Yes☐ No☐ N/A☒ Comments:

See above.

Laboratory Report Date:

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

The data quality/usability was not affected; see above.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

The PFBS result of sample *GST-23-AS* are considered estimated due to the transition mass ratios being outside the established limits. However, the sample was analyzed past hold time and was qualified as described in Section 5.b. Further flagging has not been applied.

KRF

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 320-72244-2
Client Project/Site: PFAS

For:
Shannon & Wilson, Inc
2355 Hill Rd.
Fairbanks, Alaska 99709-5244

Attn: Kristen Freiburger

Authorized for release by:
5/7/2021 4:55:07 PM

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

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 5
Client Sample Results 6
Isotope Dilution Summary 8
QC Sample Results 10
QC Association Summary 17
Lab Chronicle 18
Certification Summary 19
Method Summary 20
Sample Summary 21
Chain of Custody 22
Receipt Checklists 24

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
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: PFAS

Job ID: 320-72244-2

Job ID: 320-72244-2

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

Job Narrative
320-72244-2

Receipt
The samples were received on 4/8/2021 3:18 PM. 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 4.5º C.

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

LCMS
Method EPA 537(Mod): The "I" qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte:

Method EPA 537(Mod): Several analytes were detected above the reporting limit (RL) in the leachate blank (LB) associated with preparation batch 320-478624 and 320-482194 and analytical batch 320-482562. The following affected sample was not re-extracted outside of holding time per client request: GST-09-AS (320-72244-9) and (LB 320-478624/1-C). The original data was reported.

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

Organic Prep
Method 1312: The following sample was activated past preparation holding time: GST-05-AS (320-72244-5).

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624 and 320-479806.

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624 and 320-482194.

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: PFAS

Job ID: 320-72244-2

Client Sample ID: GST-05-AS — Lab Sample ID: 320-72244-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	2.8	H	1.7	0.50	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA)	0.41	J H	1.7	0.21	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA)	0.98	J H	1.7	0.73	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorodecanoic acid (PFDA)	0.35	J H	1.7	0.27	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorobutanesulfonic acid (PFBS)	0.69	J H I	1.7	0.17	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	4.4	H	1.7	0.49	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	29	H	1.7	0.46	ng/L	1		EPA 537(Mod)	SPLP West

Client Sample ID: GST-09-AS — Lab Sample ID: 320-72244-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	4.2	B	1.8	0.53	ng/L	1		EPA 537(Mod)	SPLP West
Perfluoroheptanoic acid (PFHpA)	1.1	J B	1.8	0.23	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanoic acid (PFOA)	0.82	J B	1.8	0.78	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorohexanesulfonic acid (PFHxS)	2.7		1.8	0.52	ng/L	1		EPA 537(Mod)	SPLP West
Perfluorooctanesulfonic acid (PFOS)	8.5		1.8	0.50	ng/L	1		EPA 537(Mod)	SPLP West

This Detection Summary does not include radiochemical test results.

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Client Sample ID: GST-05-AS
Date Collected: 04/06/21 15:11
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72244-5
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**2.8**	**H**	1.7	0.50	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluoroheptanoic acid (PFHpA)	**0.41**	**J H**	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorooctanoic acid (PFOA)	**0.98**	**J H**	1.7	0.73	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorononanoic acid (PFNA)	ND	H	1.7	0.23	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorodecanoic acid (PFDA)	**0.35**	**J H**	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluoroundecanoic acid (PFUnA)	ND	H	1.7	0.95	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorododecanoic acid (PFDoA)	ND	H	1.7	0.47	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorotridecanoic acid (PFTriA)	ND	H	1.7	1.1	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorotetradecanoic acid (PFTeA)	ND	H	1.7	0.63	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorobutanesulfonic acid (PFBS)	**0.69**	**J H I**	1.7	0.17	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorohexanesulfonic acid (PFHxS)	**4.4**	**H**	1.7	0.49	ng/L		05/05/21 19:29	05/06/21 09:25	1
Perfluorooctanesulfonic acid (PFOS)	**29**	**H**	1.7	0.46	ng/L		05/05/21 19:29	05/06/21 09:25	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	H	4.3	1.1	ng/L		05/05/21 19:29	05/06/21 09:25	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	H	4.3	1.0	ng/L		05/05/21 19:29	05/06/21 09:25	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND	H	3.4	1.3	ng/L		05/05/21 19:29	05/06/21 09:25	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	H	1.7	0.34	ng/L		05/05/21 19:29	05/06/21 09:25	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND	H	1.7	0.21	ng/L		05/05/21 19:29	05/06/21 09:25	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	H	1.7	0.27	ng/L		05/05/21 19:29	05/06/21 09:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*99*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C4 PFHpA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C4 PFOA	*100*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C5 PFNA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C2 PFDA	*91*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C2 PFUnA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C2 PFDoA	*79*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C2 PFTeDA	*68*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C3 PFBS	*80*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
18O2 PFHxS	*88*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C4 PFOS	*90*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
d5-NEtFOSAA	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
d3-NMeFOSAA	*59*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*
13C3 HFPO-DA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 09:25*	*1*

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Client Sample ID: GST-09-AS
Date Collected: 04/06/21 15:38
Date Received: 04/08/21 15:18

Lab Sample ID: 320-72244-9
Matrix: Solid

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 - SPLP West

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**4.2**	**B**	1.8	0.53	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluoroheptanoic acid (PFHpA)	**1.1**	**J B**	1.8	0.23	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorooctanoic acid (PFOA)	**0.82**	**J B**	1.8	0.78	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.25	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.29	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	1.0	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.51	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.67	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorohexanesulfonic acid (PFHxS)	**2.7**		1.8	0.52	ng/L		04/22/21 12:27	04/23/21 12:37	1
Perfluorooctanesulfonic acid (PFOS)	**8.5**		1.8	0.50	ng/L		04/22/21 12:27	04/23/21 12:37	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.6	1.2	ng/L		04/22/21 12:27	04/23/21 12:37	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.6	1.1	ng/L		04/22/21 12:27	04/23/21 12:37	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.7	1.4	ng/L		04/22/21 12:27	04/23/21 12:37	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.37	ng/L		04/22/21 12:27	04/23/21 12:37	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/22/21 12:27	04/23/21 12:37	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/22/21 12:27	04/23/21 12:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*84*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C4 PFHpA	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C4 PFOA	*84*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C5 PFNA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C2 PFDA	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C2 PFUnA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C2 PFDoA	*80*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C2 PFTeDA	*77*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C3 PFBS	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
18O2 PFHxS	*83*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C4 PFOS	*85*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
d5-NEtFOSAA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
d3-NMeFOSAA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*
13C3 HFPO-DA	*84*		*25 - 150*	*04/22/21 12:27*	*04/23/21 12:37*	*1*

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

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)
LCS 320-482194/2-A	Lab Control Sample	93	99	97	97	94	88	93	84
LCS 320-486399/2-A	Lab Control Sample	84	76	78	77	69	78	76	68
LCSD 320-482194/3-A	Lab Control Sample Dup	89	93	91	95	95	92	86	86
MB 320-482194/1-A	Method Blank	91	90	91	94	89	93	86	87
MB 320-486399/1-A	Method Blank	93	92	96	92	83	97	87	82

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d5NEFOS (25-150)	d3NMFOS (25-150)	HFPODA (25-150)
LCS 320-482194/2-A	Lab Control Sample	96	98	95	91	84	91
LCS 320-486399/2-A	Lab Control Sample	72	71	72	77	76	73
LCSD 320-482194/3-A	Lab Control Sample Dup	90	98	97	87	81	94
MB 320-482194/1-A	Method Blank	93	88	94	92	88	93
MB 320-486399/1-A	Method Blank	85	92	81	96	87	87

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
d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Matrix: Solid

Prep Type: SPLP West

		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)
320-72244-5	GST-05-AS	99	92	100	96	91	92	79	68
320-72244-9	GST-09-AS	84	85	84	97	85	93	80	77
LB 320-478624/1-C	Method Blank	94	91	92	102	97	100	101	101
LB 320-485389/1-B	Method Blank	97	95	99	90	89	94	87	82

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	d5NEFOS (25-150)	d3NMFOS (25-150)	HFPODA (25-150)
320-72244-5	GST-05-AS	80	88	90	89	59	82
320-72244-9	GST-09-AS	85	83	85	97	93	84
LB 320-478624/1-C	Method Blank	95	94	98	98	97	105
LB 320-485389/1-B	Method Blank	83	89	89	104	91	82

Surrogate Legend

PFHxA = 13C2 PFHxA

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

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
d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
HFPODA = 13C3 HFPO-DA

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15

Lab Sample ID: MB 320-482194/1-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 482194

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		04/22/21 12:27	04/23/21 11:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		04/22/21 12:27	04/23/21 11:22	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		04/22/21 12:27	04/23/21 11:22	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		04/22/21 12:27	04/23/21 11:22	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		04/22/21 12:27	04/23/21 11:22	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		04/22/21 12:27	04/23/21 11:22	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		04/22/21 12:27	04/23/21 11:22	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		04/22/21 12:27	04/23/21 11:22	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFHpA	*90*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFOA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C5 PFNA	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFDA	*89*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFUnA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFDoA	*86*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C2 PFTeDA	*87*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C3 PFBS	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
18O2 PFHxS	*88*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C4 PFOS	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
d5-NEtFOSAA	*92*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
d3-NMeFOSAA	*88*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*
13C3 HFPO-DA	*93*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:22*	*1*

Lab Sample ID: LCS 320-482194/2-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	43.9		ng/L		110	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	39.6		ng/L		99	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		100	70 - 130
Perfluorononanoic acid (PFNA)	40.0	40.9		ng/L		102	75 - 135

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-482194/2-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorodecanoic acid (PFDA)	40.0	38.5		ng/L		96	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	39.2		ng/L		98	68 - 128
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	37.4		ng/L		94	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	42.8		ng/L		107	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	34.8		ng/L		98	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.2		ng/L		91	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	36.2		ng/L		97	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	37.2		ng/L		93	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	41.3		ng/L		103	76 - 136
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	40.2		ng/L		100	51 - 173
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	37.0		ng/L		98	79 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	40.1		ng/L		107	75 - 135
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	35.2		ng/L		94	54 - 114

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*93*		*25 - 150*
13C4 PFHpA	*99*		*25 - 150*
13C4 PFOA	*97*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*
13C2 PFDA	*94*		*25 - 150*
13C2 PFUnA	*88*		*25 - 150*
13C2 PFDoA	*93*		*25 - 150*
13C2 PFTeDA	*84*		*25 - 150*
13C3 PFBS	*96*		*25 - 150*
18O2 PFHxS	*98*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
d5-NEtFOSAA	*91*		*25 - 150*
d3-NMeFOSAA	*84*		*25 - 150*
13C3 HFPO-DA	*91*		*25 - 150*

Lab Sample ID: LCSD 320-482194/3-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 482194

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorohexanoic acid (PFHxA)	40.0	45.6		ng/L		114	73 - 133	4	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.3		ng/L		106	72 - 132	6	30
Perfluorooctanoic acid (PFOA)	40.0	40.4		ng/L		101	70 - 130	1	30

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCSD 320-482194/3-A
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 482194

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorononanoic acid (PFNA)			40.0	41.6		ng/L		104	75 - 135	2	30
Perfluorodecanoic acid (PFDA)			40.0	38.7		ng/L		97	76 - 136	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	41.3		ng/L		103	68 - 128	5	30
Perfluorododecanoic acid (PFDoA)			40.0	42.5		ng/L		106	71 - 131	5	30
Perfluorotridecanoic acid (PFTriA)			40.0	42.1		ng/L		105	71 - 131	12	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.8		ng/L		102	70 - 130	5	30
Perfluorobutanesulfonic acid (PFBS)			35.4	36.0		ng/L		102	67 - 127	3	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.9		ng/L		90	59 - 119	1	30
Perfluorooctanesulfonic acid (PFOS)			37.1	36.4		ng/L		98	70 - 130	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	38.0		ng/L		95	76 - 136	2	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	46.1		ng/L		115	76 - 136	11	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)			40.0	40.7		ng/L		102	51 - 173	1	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	36.5		ng/L		97	79 - 139	1	30
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			37.3	36.4		ng/L		98	75 - 135	10	30
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			37.7	33.1		ng/L		88	54 - 114	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFHxA	*89*		*25 - 150*
13C4 PFHpA	*93*		*25 - 150*
13C4 PFOA	*91*		*25 - 150*
13C5 PFNA	*95*		*25 - 150*
13C2 PFDA	*95*		*25 - 150*
13C2 PFUnA	*92*		*25 - 150*
13C2 PFDoA	*86*		*25 - 150*
13C2 PFTeDA	*86*		*25 - 150*
13C3 PFBS	*90*		*25 - 150*
18O2 PFHxS	*98*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
d5-NEtFOSAA	*87*		*25 - 150*
d3-NMeFOSAA	*81*		*25 - 150*
13C3 HFPO-DA	*94*		*25 - 150*

Lab Sample ID: MB 320-486399/1-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486399

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		05/05/21 19:29	05/06/21 07:33	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: MB 320-486399/1-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486399

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.73	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.57	ng/L		05/05/21 19:29	05/06/21 07:33	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		05/05/21 19:29	05/06/21 07:33	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		5.0	1.3	ng/L		05/05/21 19:29	05/06/21 07:33	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		5.0	1.2	ng/L		05/05/21 19:29	05/06/21 07:33	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		4.0	1.5	ng/L		05/05/21 19:29	05/06/21 07:33	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		2.0	0.40	ng/L		05/05/21 19:29	05/06/21 07:33	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		2.0	0.24	ng/L		05/05/21 19:29	05/06/21 07:33	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		2.0	0.32	ng/L		05/05/21 19:29	05/06/21 07:33	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*93*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFHpA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFOA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C5 PFNA	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFDA	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFUnA	*97*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFDoA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C2 PFTeDA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C3 PFBS	*85*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
18O2 PFHxS	*92*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C4 PFOS	*81*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
d3-NMeFOSAA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*
13C3 HFPO-DA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 07:33*	*1*

Lab Sample ID: LCS 320-486399/2-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486399

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanoic acid (PFHxA)	40.0	38.8		ng/L		97	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	50.8		ng/L		127	72 - 132
Perfluorooctanoic acid (PFOA)	40.0	44.3		ng/L		111	70 - 130
Perfluorononanoic acid (PFNA)	40.0	43.7		ng/L		109	75 - 135
Perfluorodecanoic acid (PFDA)	40.0	42.6		ng/L		106	76 - 136
Perfluoroundecanoic acid (PFUnA)	40.0	39.8		ng/L		100	68 - 128

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LCS 320-486399/2-A
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486399

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorododecanoic acid (PFDoA)	40.0	37.7		ng/L		94	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	37.4		ng/L		94	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	42.7		ng/L		107	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	35.1		ng/L		99	67 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	35.8		ng/L		98	59 - 119
Perfluorooctanesulfonic acid (PFOS)	37.1	39.8		ng/L		107	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	41.3		ng/L		103	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	44.4		ng/L		111	76 - 136
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	41.8		ng/L		105	51 - 173
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	45.9		ng/L		122	79 - 139
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	37.3	43.2		ng/L		116	75 - 135
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	37.7	38.8		ng/L		103	54 - 114

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFHxA	*84*		*25 - 150*
13C4 PFHpA	*76*		*25 - 150*
13C4 PFOA	*78*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*
13C2 PFDA	*69*		*25 - 150*
13C2 PFUnA	*78*		*25 - 150*
13C2 PFDoA	*76*		*25 - 150*
13C2 PFTeDA	*68*		*25 - 150*
13C3 PFBS	*72*		*25 - 150*
18O2 PFHxS	*71*		*25 - 150*
13C4 PFOS	*72*		*25 - 150*
d5-NEtFOSAA	*77*		*25 - 150*
d3-NMeFOSAA	*76*		*25 - 150*
13C3 HFPO-DA	*73*		*25 - 150*

Lab Sample ID: LB 320-478624/1-C
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 482194

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	67.0		1.8	0.52	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluoroheptanoic acid (PFHpA)	34.0		1.8	0.23	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorooctanoic acid (PFOA)	13.6		1.8	0.77	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorononanoic acid (PFNA)	3.65		1.8	0.24	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.28	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.99	ng/L		04/22/21 12:27	04/23/21 11:50	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LB 320-478624/1-C
Matrix: Solid
Analysis Batch: 482562

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 482194

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.50	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	1.2	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.66	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.8	0.18	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.8	0.51	ng/L		04/22/21 12:27	04/23/21 11:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.8	0.49	ng/L		04/22/21 12:27	04/23/21 11:50	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.5	1.2	ng/L		04/22/21 12:27	04/23/21 11:50	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.5	1.1	ng/L		04/22/21 12:27	04/23/21 11:50	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.6	1.4	ng/L		04/22/21 12:27	04/23/21 11:50	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.8	0.36	ng/L		04/22/21 12:27	04/23/21 11:50	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.8	0.22	ng/L		04/22/21 12:27	04/23/21 11:50	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.8	0.29	ng/L		04/22/21 12:27	04/23/21 11:50	1

Isotope Dilution	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFHpA	*91*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFOA	*92*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C5 PFNA	*102*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFDA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFUnA	*100*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFDoA	*101*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C2 PFTeDA	*101*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C3 PFBS	*95*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
18O2 PFHxS	*94*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C4 PFOS	*98*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
d5-NEtFOSAA	*98*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
d3-NMeFOSAA	*97*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*
13C3 HFPO-DA	*105*		*25 - 150*	*04/22/21 12:27*	*04/23/21 11:50*	*1*

Lab Sample ID: LB 320-485389/1-B
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 486399

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.50	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.22	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.74	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.23	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.27	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.96	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.48	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	1.1	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.63	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.17	ng/L		05/05/21 19:29	05/06/21 08:10	1

Method: EPA 537(Mod) - PFAS for QSM 5.3, Table B-15 (Continued)

Lab Sample ID: LB 320-485389/1-B
Matrix: Solid
Analysis Batch: 486477

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 486399

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.50	ng/L		05/05/21 19:29	05/06/21 08:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.47	ng/L		05/05/21 19:29	05/06/21 08:10	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		4.3	1.1	ng/L		05/05/21 19:29	05/06/21 08:10	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		4.3	1.0	ng/L		05/05/21 19:29	05/06/21 08:10	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ND		3.5	1.3	ng/L		05/05/21 19:29	05/06/21 08:10	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND		1.7	0.35	ng/L		05/05/21 19:29	05/06/21 08:10	1
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	ND		1.7	0.21	ng/L		05/05/21 19:29	05/06/21 08:10	1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND		1.7	0.28	ng/L		05/05/21 19:29	05/06/21 08:10	1

Isotope Dilution	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*97*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFHpA	*95*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFOA	*99*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C5 PFNA	*90*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFDA	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFUnA	*94*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFDoA	*87*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C2 PFTeDA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C3 PFBS	*83*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
18O2 PFHxS	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C4 PFOS	*89*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
d5-NEtFOSAA	*104*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
d3-NMeFOSAA	*91*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*
13C3 HFPO-DA	*82*		*25 - 150*	*05/05/21 19:29*	*05/06/21 08:10*	*1*

LCMS

Leach Batch: 478624

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-9	GST-09-AS	SPLP West	Solid	1312	
LB 320-478624/1-C	Method Blank	SPLP West	Solid	1312	

Prep Batch: 482194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-9	GST-09-AS	SPLP West	Solid	3535	478624
LB 320-478624/1-C	Method Blank	SPLP West	Solid	3535	478624
MB 320-482194/1-A	Method Blank	Total/NA	Solid	3535	
LCS 320-482194/2-A	Lab Control Sample	Total/NA	Solid	3535	
LCSD 320-482194/3-A	Lab Control Sample Dup	Total/NA	Solid	3535	

Analysis Batch: 482562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-9	GST-09-AS	SPLP West	Solid	EPA 537(Mod)	482194
LB 320-478624/1-C	Method Blank	SPLP West	Solid	EPA 537(Mod)	482194
MB 320-482194/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	482194
LCS 320-482194/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	482194
LCSD 320-482194/3-A	Lab Control Sample Dup	Total/NA	Solid	EPA 537(Mod)	482194

Leach Batch: 485389

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-5	GST-05-AS	SPLP West	Solid	1312	
LB 320-485389/1-B	Method Blank	SPLP West	Solid	1312	

Prep Batch: 486399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-5	GST-05-AS	SPLP West	Solid	3535	485389
LB 320-485389/1-B	Method Blank	SPLP West	Solid	3535	485389
MB 320-486399/1-A	Method Blank	Total/NA	Solid	3535	
LCS 320-486399/2-A	Lab Control Sample	Total/NA	Solid	3535	

Analysis Batch: 486477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 320-485389/1-B	Method Blank	SPLP West	Solid	EPA 537(Mod)	486399
MB 320-486399/1-A	Method Blank	Total/NA	Solid	EPA 537(Mod)	486399
LCS 320-486399/2-A	Lab Control Sample	Total/NA	Solid	EPA 537(Mod)	486399

Analysis Batch: 486625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-72244-5	GST-05-AS	SPLP West	Solid	EPA 537(Mod)	486399

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Client Sample ID: GST-05-AS

Lab Sample ID: 320-72244-5

Date Collected: 04/06/21 15:11

Matrix: Solid

Date Received: 04/08/21 15:18

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.03 g	2000 mL	485389	05/03/21 17:10	DPM	TAL SAC
SPLP West	Prep	3535			291 mL	10.00 mL	486399	05/05/21 19:29	PV	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			486625	05/06/21 09:25	MNV	TAL SAC

Client Sample ID: GST-09-AS

Lab Sample ID: 320-72244-9

Date Collected: 04/06/21 15:38

Matrix: Solid

Date Received: 04/08/21 15:18

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.45 g	2000 mL	478624	04/12/21 20:35	CF	TAL SAC
SPLP West	Prep	3535			271.8 mL	10.00 mL	482194	04/22/21 12:27	LA	TAL SAC
SPLP West	Analysis	EPA 537(Mod)		1			482562	04/23/21 12:37	S1M	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Laboratory: Eurofins TestAmerica, Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Method	Method Description	Protocol	Laboratory
EPA 537(Mod)	PFAS for QSM 5.3, Table B-15	EPA	TAL SAC
1312	SPLP Extraction	SW846	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

Protocol References:

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 TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: PFAS

Job ID: 320-72244-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-72244-5	GST-05-AS	Solid	04/06/21 15:11	04/08/21 15:18	
320-72244-9	GST-09-AS	Solid	04/06/21 15:38	04/08/21 15:18	

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

Laboratory: Eurofins
Attn: David Althacker

Turn Around Time: ☐ Normal ☒ Rush — Please Specify

Quote No:

J-Flags: ☐ Yes ☐ No

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS 537.1 Mod	SPLP	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
GST-01-AS		14:48	04/06/21	X		1	asphalt, grab
GST-02-AS		14:58		X		1	asphalt, grab
GST-03-AS		14:58		X		1	asphalt, grab
GST-04-AS		15:07		X		1	asphalt, grab
GST-05-AS		15:11		X		1	asphalt, grab
GST-06-AS		15:20		X		1	asphalt, grab
GST-07-AS		15:30		X		1	asphalt, grab
GST-08-AS		15:30		X		1	asphalt, grab
GST-09-AS		15:38		X	X	2	asphalt, grab
GST-10-AS		15:51		X		1	asphalt, grab.

320-72244 Chain of Custody

Project Information	
Number:	102599-002
Name:	
Contact:	KRF
Ongoing Project?	Yes ☐ No ☐
Sampler:	AnneMarie Palmieri

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

Notes:
email to:
KRF@shanwil.com

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature: [signature] Time: 9:30	Signature: Time:	Signature: Time:
Printed Name: AMPalmieri Date: 4/7/21	Printed Name: Date:	Printed Name: Date:
Company: ADEC	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - job file

No. 36306

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

CHAIN-OF-CUSTODY RECORD

Laboratory: Eurofins
Attn: David Allmaker

Turn Around Time:	Quote No:
☐ Normal ☒ Rush	J-Flags: ☐ Yes ☐ No
Please Specify	

Analytical Methods (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	PFAS 537.1 mod	SPLP	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
GST-11-AS		15:51	4/06/21	X		1	Asphalt, grab
GST-12-AS		16:02		X		1	
GST-13-AS		16:07		X		1	
GST-14-AS		16:09		X		1	
GST-15-AS		16:14		X		1	
GST-16-AS		16:19		X		1	
GST-17-AS		16:24		X		1	
GST-18-AS		16:30		X		1	
GST-19-AS		16:39		X		1	
GST-20-AS		16:45		X		1	

Project Information	
Number:	102599-006
Name:	
Contact:	KRF
Ongoing Project?	Yes ☐ No ☐
Sampler:	AMPalmieri

Sample Receipt	
Total No. of Containers:	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Temp:	
Delivery Method:	

Reliquished By: 1.	Reliquished By: 2.	Reliquished By: 3.
Signature:	Time: 9:30	Signature:	Time:	Signature:	Time:
Printed Name: AMPalmieri	Date: 4/7/21	Printed Name:	Date:	Printed Name:	Date:
Company: ADEC		Company:		Company:	

Received By: 1.	Received By: 2.	Received By: 3.
Signature:	Time:	Signature:	Time:	Signature:	Time:
Printed Name:	Date:	Printed Name:	Date:	Printed Name:	Date:
Company:		Company:		Company:	

Notes:

email to:
KRF@shanwil.com

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - job file

No. 36307

5/7/2021

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-72244-2

Login Number: 72244
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, 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.	N/A	
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	

Laboratory Data Review Checklist

Completed By:

Michael Jaramillo/Ashley Jaramillo – Reviewed by Kristen Freiburger

Title:

Senior Chemist/Senior Chemist - Associate

Date:

May 20, 2021

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

Eurofins / TestAmerica Laboratories, Inc. (TestAmerica)

Laboratory Report Number:

320-72244-2

Laboratory Report Date:

May 7, 2021

CS Site Name:

DOT&PF Gustavus Airport Statewide PFAS

ADEC File Number:

2569.38.033

Hazard Identification Number:

26981

320-72244-2

Laboratory Report Date:

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

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all the submitted sample analyses?

   Yes☒ No☐ N/A☐ Comments:

   The DEC certified TestAmerica of West Sacramento, CA for the analysis of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) on February 6, 2018 by method 537(M). These compounds were included in the DEC's Contaminated Sites Laboratory Approval 17-020.

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

   Yes☐ No☐ N/A☒ Comments:

   The requested analyses were conducted by TestAmerica of West Sacramento, CA.

2. Chain of Custody (CoC)

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

   Yes☐ No☒ N/A☐ Comments:

   The laboratory did not sign the sample receipt portion of the COC. However, the case narrative notes that the samples were received at 3:18 pm on 4/8/2021.

   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:

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

   Yes☐ No☐ N/A☒ Comments:

   Samples did not require preservation other than temperature.

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

   Yes☒ No☐ N/A☐ Comments:

   The sample receipt form noted the samples arrived in good condition at a temperature of 4.5 °C.

Laboratory Report Date:

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:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

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 outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. The perfluorobutanesulfonic acid (PFBS) result for sample *GST-05-AS* is considered estimated, no direction of bias due to this transition mass ratio discrepancy. However, this sample was requested and prepared outside the method recognized hold time. Refer to Section 5.b. for further assessment and qualification of the data.

Several analytes were detected above the reporting limit (RL) in the leachate blank (LB) associated with preparation batches 320-478624 and 320-482194. Sample *GST-09-AS* was not re-extracted outside of holding time per client request. The original data was reported.

SPLP analysis for sample *GST-05-AS* was requested past preparation holding time. Refer to Section 5.b. for further assessment.

Insufficient volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-478624, 320-479806, and 320-482194. Refer to the LCS/LCSD for assessment of laboratory accuracy and precision requirements.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

Corrective actions were not required.

Laboratory Report Date:

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

Comments:

The laboratory assigned the I-flag to the PFBS result of sample *GST-05-AS* due to the transition mass ratios being outside the established limits. However, this sample was requested and extracted outside the method recognized hold time. Refer to Section 5.b. for further assessment.

5. Samples Results

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

Yes☒ No☐ N/A☐ Comments:

However, after review of the PFAS results for sample *GST-05-AS*, SPLP analysis was requested past the method holding time. The SPLP analysis for this sample was not initially identified on the COC.

b. All applicable holding times met?

Yes☐ No☒ N/A☐ Comments:

SPLP PFAS analysis for sample *GST-05-AS* was requested 29 days past collection, which is twice the method hold time of 14 days. Per discussions with DEC, PFAS data usability is unaffected by the holding time exceedance. The out of hold results are used for reporting purposes, with the appropriate flags applied. The detected and non-detect results are considered tentatively identified/unidentified and flagged "N" in the analytical database.

c. All soils reported on a dry weight basis?

Yes☐ No☐ N/A☒ Comments:

Soil samples were not submitted with this work order. Asphalt samples were reported on a dry weight basis.

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

Yes☒ No☐ N/A☐ Comments:

There is no applicable DEC action level for asphalt. LOQs (TA reports as Reporting Limits [RLs]) for non-detect results are less than their applicable DEC action levels for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) in soil.

e. Data quality or usability affected?

Yes; see above.

6. QC Samples

a. Method Blank

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

Yes☒ No☐ N/A☐ Comments:

Leaching blanks (LBs) are also evaluated as method blanks for SPLP analysis.

Laboratory Report Date:

ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

Yes☐ No☒ N/A☐ Comments:

The LBs associated with preparation bath 320-482194 had detections for perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), PFOA, and perfluorononanoic acid (PFNA) above the LOQ.

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

Comments:

Sample *GST-09-AS* is associated with the LB detections. Sample *GST-09-AS* had detections for PFHxA, PFHpA, and PFOA within five times the LB detection. The sample results are considered non-detect and flagged "B" at the LOQ or the detected result, whichever value is greater.

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:

Yes; see above.

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

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes☒ No☐ N/A☐ Comments:

LCS/LCSD samples were reported for SPLP PFAS analysis for preparation batch 320-482194

An LCS sample was reported for SPLP PFAS analysis for preparation batch 320-486399. We have no measure of laboratory precision for this analysis.

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

Yes☐ No☐ N/A☒ Comments:

Metals and/or inorganics were not analyzed as part of this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

Laboratory Report Date:

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. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes☒ No☐ N/A☐ Comments:

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

Comments:

Laboratory precision and accuracy were demonstrated within acceptance criteria. Sample results were not affected.

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 were not affected; see above.

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

Note: Leave blank if not required for project

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:

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

Yes☐ No☐ N/A☐ Comments:

Laboratory Report Date:

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:

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

Yes☐ No☐ N/A☐ Comments:

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

Comments:

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:

IDA recoveries were within laboratory acceptance criteria.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

Laboratory Report Date:

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 are not volatile compounds. A trip blank is not required for the requested analysis.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes☐ No☐ N/A☒ Comments:

A trip blank is not required for the requested analysis.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

N/A; see above

v. Data quality or usability affected?

Comments:

The data quality and/or usability was not affected; see above.

f. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes☐ No☐ N/A☒ Comments:

A field duplicate was not requested for SPLP analysis.

ii. Submitted blind to lab?

Yes☐ No☐ N/A☒ Comments:

A field duplicate was not requested for SPLP analysis.

Laboratory Report Date:

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:

A field duplicate was not requested for SPLP analysis.

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

Comments:

The data quality/usability was not affected; see above.

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

Yes☐ No☐ N/A☒ Comments:

Project samples were not collected with reusable equipment, so the prospect of foreign contaminants being introduced through equipment contamination is not plausible.

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

Yes☐ No☐ N/A☒ Comments:

See above.

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

Comments:

N/A; see above.

iii. Data quality or usability affected?

Comments:

The data quality/usability was not affected; see above.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

The PFBS result of sample *GST-05-AS* are considered estimated due to the transition mass ratios being outside the established limits. However, the sample was analyzed past hold time and was qualified as described in Section 5.b.

KRF KRF