

**Summary Report
July 2017 to February 2018 Private Well Sampling
City of Fairbanks Regional Fire Training Center
Fairbanks, Alaska
ADEC File Number 102.38.182**

April 2018



Excellence. Innovation. Service. Value.

Since 1954.

Submitted To:
City of Fairbanks
800 Cushman Street
Fairbanks, Alaska 99701

Submitted By:
Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709-5326

31-1-11735-011

**SUMMARY REPORT
JULY 2017 TO FEBRUARY 2018 PRIVATE WELL SAMPLING
CITY OF FAIRBANKS REGIONAL FIRE TRAINING CENTER
FAIRBANKS, ALASKA**


April 26, 2018

Prepared by:

Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709-5326



Project Manager: Marcy Nadel
Geologist



Reviewed by: Christopher Darrah, C.P.G., CPESC
Vice President

Prepared for:

City of Fairbanks
800 Cushman Street
Fairbanks, Alaska 99701

31-1-11735-011

EXECUTIVE SUMMARY

The Regional Fire Training Center (RFTC) burn pit is an active Alaska Department of Environmental Conservation (ADEC) contaminated site due to the presence of perfluorinated compounds (PFCs) in soil and groundwater (File Number 102.38.182). On behalf of the City of Fairbanks (CoF), Shannon & Wilson has identified and sampled offsite private wells near and downgradient of the RFTC beginning in January 2016 (Figure 1). This report documents our sampling efforts from July 2017 to February 2018, and is the fourth in a series of private well sampling summary reports we have prepared since 2016.

This report discusses three well monitoring network sampling events: the July/August 2017 sampling event included 25 wells, the October/November event included 27 wells, and the January 2018 event included 10 wells. We assessed temporal data for select well monitoring network.

The primary contaminants of concern near and downgradient of the RFTC are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). The U.S. Environmental Protection Agency (EPA) has established a Lifetime Health Advisory (LHA) level for drinking water of 70 nanograms per liter (ng/L) for PFOS, PFOA, or the sum of the two. Following ADEC guidance, we consider combined concentrations greater than or equal to 65 ng/L to be exceedances of the LHA level.

To date we have sampled 142 private wells, 15 groundwater monitoring wells (MWs), and collected five surface-water samples (Figure 6). There are 50 private well, six MW, and two surface-water sample locations with LHA combined concentrations exceeding 65 ng/L (Figures 7 through 9). The CoF has offered municipal water connections to owners and occupants whose category 1 or 2 well water exceeds the LHA level and additional properties (Section 2.8, Alternate Water Sources).

TABLE OF CONTENTS

	Page
Executive Summary.....	i
1.0 INTRODUCTION.....	1
1.1 Purpose and Objectives	1
1.2 Background	1
1.3 Geology and Hydrology	3
1.4 Contaminant of Concern and Regulatory Levels	3
1.5 Scope of Services	4
2.0 FIELD ACTIVITIES.....	5
2.1 Private Well Sampling	5
2.2 Monitoring Well Sampling.....	6
2.3 Well Monitoring Network.....	7
2.3.1 July 2017 Well Monitoring.....	8
2.3.2 October 2017 Well Monitoring.....	10
2.3.3 January 2018 Well Monitoring.....	11
2.4 First-Time Samples	11
2.5 TOP Assay.....	12
2.6 Sample Custody, Storage, and Transport	13
2.7 Notification of Results	13
2.8 Alternate Water Sources.....	14
2.9 Public Information.....	15
2.10 Deviations.....	16
3.0 ANALYTICAL RESULTS.....	17
3.1 July/August 2017 Well Monitoring Network Samples	17
3.2 TOP Assay Samples	17
3.3 October/November 2017 Well Monitoring Network Samples	18
3.4 January 2018 Well Monitoring Network Samples	18
3.5 First-Time Private Well Samples	19
4.0 QUALITY ASSURANCE/QUALITY CONTROL.....	19
5.0 DISCUSSION AND RECOMMENDATIONS	20
5.1 Trend Analysis	21
5.2 Modifications to Well Monitoring Network	22
5.3 Recommendations	23
6.0 REFERENCES.....	26

TABLES

1	Applicable Regulatory Levels.....	4
2	Summary of July and August 2017 Well Monitoring Network Analytical Results	
3	Summary of July 2017 Total Oxidizable Precursor (TOP) Assay Analytical Results	
4	Summary of October and November 2017 Well Monitoring Network Analytical Results	
5	Summary of January 2018 Well Monitoring Network Analytical Results	
6	Summary of Other July 2017 to February 2018 Private Well Analytical Results	
7	Comparison of Quarterly Analytical Results	

FIGURES

1	Private Well Search and Sample Areas
2	Quarterly Well Monitoring Network
3	Areas 1 and 3 Quarterly Sampling Network Results
4	Areas 2, 3, and 5 Quarterly Sampling Network Results
5	Area 8 Quarterly Sampling Network Results
6	PFOS and PFOA Sample Results
7	Areas 1, 2, 3, and 5 LHA Level Exceedances and Municipal Water Connections
8	Areas 5 and 8 LHA Level Exceedances (1 of 2)
9	Areas 5 and 8 LHA Level Exceedances (2 of 2)

APPENDICES

A	Public Information
B	Completed Private Well Inventory Survey Forms
C	Copy of Private and Monitoring Well Sampling Logs
D	Project Photographs
E	Analytical Laboratory Reports and ADEC Data Review Checklists
F	<i>Important Information about Your Geotechnical/Environmental Report</i>

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADOT&PF	Alaska Department of Transportation & Public Facilities
AFFF	aqueous film-forming foam
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
°C	degrees Celsius
COC	chain of custody
CoF	City of Fairbanks
CUC	College Utilities Corporation
DHSS	Alaska Department of Health and Social Services
DNR	Alaska Department of Natural Resources
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
FNSB	Fairbanks North Star Borough
GAC	granular activated carbon
GHSA	Golden Heart Softball Association
GHU	Golden Heart Utilities
LHA	Lifetime Health Advisory
mg/L	milligram per liter
mV	millivolts
MW	monitoring well
ng/L	nanogram per liter
ORP	oxidation reduction potential
PAN	parcel account number
PFAS	per- and polyfluoroalkyl substance
PFC	perfluorinated compound
PFCA	perfluorinated carboxylic acid
PFHxA	perfluorohexanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
QA	quality assurance
QC	quality control
RFTC	Regional Fire Training Center
TestAmerica	TestAmerica Laboratories, Inc.
TOC	top of casing
TOP	Total Oxidizable Precursor
UCMR	EPA Unregulated Contaminant Monitoring Rule
USGS	United States Geological Survey
WELTS	Well Log Tracking System
WO	work order
YSI	multiprobe water quality meter

**SUMMARY REPORT
JULY 2017 TO FEBRUARY 2018 PRIVATE WELL SAMPLING
CITY OF FAIRBANKS REGIONAL FIRE TRAINING CENTER
FAIRBANKS, ALASKA**

1.0 INTRODUCTION

Shannon & Wilson, Inc. has prepared this report to document our private well sampling effort proximal to the Regional Fire Training Center (RFTC) at 1710 30th Avenue in Fairbanks, Alaska. The RFTC burn pit is an active Alaska Department of Environmental Conservation (ADEC) contaminated site, File Number 102.38.182.

This report was prepared for the CoF in accordance with the terms and conditions of our City of Fairbanks (CoF) Regional Fire Training Center Burn Pit Site Investigation services contract (Project No. FB-14-25), relevant ADEC guidance documents, and 18 Alaska Administrative Code (AAC) 75.335. The tasks described herein were conducted as authorized by our Professional Services Contract and in response to proposal numbers 31-2-16864-020, -021, and -023.

1.1 Purpose and Objectives

The purpose of the services described in this report was to evaluate the potential for human exposure to perfluorinated compound- (PFC-) containing water in private water-supply wells. The objective of tasks described herein was to collect quarterly samples from a subset of mainly private wells (i.e., quarterly well monitoring network). The secondary objective was to collect first-time well samples from properties where well status was unknown, our initial request to sample was declined, or upon request by owners or occupants.

1.2 Background

The CoF RFTC burn pit, or “combustible liquids pit,” was constructed in 1984 and used for fire-fighting exercises for approximately 20 years. Fire-fighting agents used during training in the CoF burn pit include water, protein-based foam, and aqueous film-forming foam (AFFF). AFFF has since been found to contain PFCs, a category of persistent organic compounds that are considered emerging contaminants. Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are two PFCs commonly found at sites where AFFFs were used. Due to their persistence, toxicity, and bioaccumulative potential, these compounds are of increasing concern to environmental and health agencies.

The RFTC is located at 1710 30th Avenue, in Fairbanks, Alaska (Figure 1). The RFTC site occupies the eastern portion of the 21.24-acre Tract K, Alaska State Land Survey 80-64, owned by the CoF. Its geographic coordinates are approximately latitude 64.8211, longitude -147.7502. We first sampled onsite groundwater in July 2015, and encountered PFOS and PFOA concentrations above present-day ADEC groundwater cleanup levels. In November 2015, we collected PFC water samples from wells 0.2 mile and 0.8 mile northwest of the RFTC. PFCs were detected in both offsite samples up to 63 nanograms per liter (ng/L) PFOS and 21 ng/L PFOA.

On behalf of the CoF, we began to identify offsite private wells in January 2016 and collected our first private well samples from properties on 30th Avenue in February 2016. Our sampling efforts progressed through a series of well searches and water sampling tasks in ten search areas to date (Figure 1). Area descriptions and sampling results for Areas 1 through 3 are discussed in our *February to May 2016 Private Well Sampling Summary Report*, published in August 2016. Areas 4 through 8 are discussed in our *June to October 2016 Private Well Sampling Summary Report*, published in December 2016. Areas 9 and 10 are discussed in our *November 2016 to June 2017 Private Well Sampling Summary Report*, published in July 2017.

We did not encounter combined PFOS and PFOA concentrations greater than or equal to 35 ng/L in Area 10. Therefore, our ongoing sampling effort has focused on Areas 1 through 9. Although we have continued to follow up with some properties where well status is unknown, the Area 1 through 9 well search effort was completed in June 2018. The well search and sampling areas are depicted in Figure 1, Private Well Search and Sample Areas.

We used information obtained during the well search to categorize wells based on their use. These category designations were developed in coordination with the CoF and ADEC, and are described as follows:

- Category 1: wells that are used for drinking or cooking, as reported by owners or occupants.
- Category 2: wells that are used for dish washing and other domestic purposes. Homes or businesses where the occupants report that they do not drink the water, but where water-supply wells lead to kitchen or bathroom faucets, are considered category 2 wells.
- Category 3: wells that are used for vegetable gardening, and are not connected to indoor plumbing. These wells are considered non-drinking-water wells.
- Category 4: wells that are used for industrial and outdoor purposes only, such as irrigation or cleaning, or wells that are no longer in use. These wells are considered non-drinking-water wells.

1.3 Geology and Hydrology

Fairbanks lies at the northern edge of the Tanana Lowlands physiographic province that forms a large, arcuate band of alluvial sediments between the Alaska Range and the Yukon-Tanana Uplands. The lowland subsurface typically consist of interbedded alluvial sand and gravel, covered in some locations by silty overbank deposits.

The unconsolidated sand and gravel of the Lowlands generally has a high transmissivity, where ice-free, resulting in unconfined groundwater flow. Depth to groundwater at the RFTC and other portions of the RFTC study area ranges from approximately 7 to 12 feet below ground surface (bgs), depending on local topographic changes.

Based on our experience and knowledge of hydrogeology in the Fairbanks area, the horizontal gradient in this area is relatively flat, typically averaging two to four feet per mile. According to a review of existing hydraulic conductivity literature for the Tanana Valley aquifer conducted in 2012, the geometric mean of groundwater velocity for the Fairbanks and Fort Wainwright area is 1.5 feet per day (Geomega Inc., 2012). Over short distances, however, the hydraulic conductivity can vary by several orders of magnitude, depending on the local grain size of the alluvium and the presence of permafrost.

A 1996 U.S. Geologic Survey (USGS) study measured groundwater elevations in 120 wells in the alluvial plain between the Tanana and Chena Rivers periodically between 1986 and 1988. The USGS found that groundwater-flow direction fluctuates seasonally and is dependent on the relative levels of the Tanana River and Chena River. Groundwater is typically recharged by the Tanana River and drained by the Chena River, causing a northwesterly groundwater flow. Depending on various seasonal factors, groundwater may be recharged by both rivers, causing a westerly or northerly flow (Glass et. al., 1996).

The Fairbanks area is in a subarctic zone underlain by discontinuous permafrost. The maximum depth of permafrost measured in the Fairbanks area is in excess of 200 feet. Permafrost, where present, acts as a confining layer and impedes groundwater movement in some areas. In the RFTC study area permafrost and seasonally frozen soils have been identified between the surface and 195 feet, depending on the location.

1.4 Contaminant of Concern and Regulatory Levels

The primary contaminants of concern in offsite wells are PFOS and PFOA. The U.S. Environmental Protection Agency (EPA) has established a Lifetime Health Advisory (LHA) level for drinking water of 70 ng/L for PFOS, PFOA, or the sum of the two. Following ADEC

guidance, we consider combined concentrations greater than or equal to 65 ng/L to be exceedances of the LHA level.

City Council Ordinance 6060, passed in September 2017, states that the CoF will provide municipal water connections to “properties [that] have wells... [whose combined PFOS and PFOA concentration falls] above 85% of the EPA’s LHA Level” and meet other criteria (Appendix A, Public Information). The CoF has provided an interim alternate source of drinking water to the residents of properties with concentrations about the effective LHA of 65 ng/L, and is in the process of providing a permanent alternate water source to those with concentrations above 59.5 ng/L.

The ADEC Contaminated Sites Program groundwater-cleanup levels for PFOS and PFOA were promulgated on November 6, 2016. Prior to the publication of these levels there were no state-level cleanup levels established for PFOS, PFOA, or other PFCs. Applicable regulatory levels are included in Table 1, below.

TABLE 1
APPLICABLE REGULATORY LEVELS

Agency	Media	PFOS	PFOA
U.S. EPA	Drinking water	70 ng/L	70 ng/L
ADEC Contaminated Sites Program	Groundwater	400 ng/L	400 ng/L

1.5 Scope of Services

The scope of our services summarized in this report includes three quarterly sampling events of wells in Areas 1 through 8 and limited first-time well sampling in Areas 1 through 10 (Figure 1). The three quarterly sampling efforts were conducted in July/August 2017, October/November 2017 and January 2018 (Figure 2). The first-time well sampling reported herein were performed during the same time period. We reported analytical results to residents, the CoF, and ADEC as they became available, and prepared and mailed fact sheets and other supporting information as part of the City’s public-outreach efforts.

For the purposes of this project a private well is defined as a privately owned water-supply well, typically leading to a home or business but in some cases supplying irrigation systems. Groundwater monitoring wells (MWs) are not considered private wells. Please note that this definition of private well does not match the ADEC Drinking Water Program regulatory

classification of a private water system, “a potable water system serving one single-family residence or duplex” (18 AAC 80, 2014).

We collected analytical water samples for determination of PFCs from private wells and select groundwater MWs. We submitted these water samples to TestAmerica Laboratories, Inc. (TestAmerica) for quantitation of PFOS and PFOA or the six EPA Unregulated Contaminant Monitoring Rule (UCMR) PFCs by Method WS-LC-0025. In addition, we submitted two water samples for the total oxidizable precursor (TOP) assay analysis package.

This report was prepared for the exclusive use of the CoF and their representatives for evaluating the RFTC site and vicinity. This work presents our professional judgment as to the conditions in the site. Information presented here is based on the sampling and analyses we performed. This report should not be used for other purposes without our approval or if any of the following occurs:

- Project details change or new information becomes available, such as revised regulatory levels or the discovery of additional source areas.
- Conditions change due to natural forces or human activity at, under, or adjacent to the project site.
- Assumptions stated in this report have changed.
- If the site ownership or land use has changed.
- Regulations, laws, or cleanup levels change.
- If the site’s regulatory status has changed.

If any of these occur, we should be retained to review the applicability of our recommendations. This report should not be used for other purposes without Shannon & Wilson’s review. If a service is not specifically indicated in this report, do not assume that it was performed.

2.0 FIELD ACTIVITIES

This section summarizes field activities performed between July 10, 2017 and February 21, 2018, primarily sampling private water-supply wells in the well monitoring network.

2.1 Private Well Sampling

We have conducted multiple private well and MW sampling events between July 2017 and February 2018. Shannon & Wilson personnel Marcy Nadel, Geologist; Tiffany Green, Environmental Scientist; Kevin Chancy, Environmental Engineering Staff; Sheila Hinckley, Environmental Scientist; Adam Wyborny, Environmental Engineering Staff; and Craig Beebe,

Geologist collected analytical water samples from private wells and MWs during the time period covered in this report. These individuals are State of Alaska Qualified Environmental Professionals as defined in 18 AAC 75.333[b].

Completed Private Well Inventory Survey Forms received since preparation of the last private well summary report are included in Appendix B. Copies of the original *Private Well Sampling Logs* and *Monitoring Well Sampling Logs* are included in Appendix C.

We collected private well samples from locations in the plumbing upstream of water-treatment systems or water softeners, where possible. Samples collected downstream of water softeners or other in-home treatment systems are listed in Section 2.10, Deviations. For the purposes of this project we do not consider small (i.e., less than 18 inches in height) particulate filters to be treatment systems.

We purged the systems prior to sampling by allowing the water to run until water parameters stabilized and the water appeared clear. We measured these parameters using a multiprobe water quality meter (YSI) and recorded pH, temperature, and conductivity approximately once every three minutes until sample collection. The following values were used to indicate stability for a minimum of three consecutive readings: ± 0.1 pH, ± 0.5 degrees Celsius ($^{\circ}\text{C}$) temperature, and ± 3 percent conductivity. Example private well sample locations are shown in Appendix D, Project Photographs.

For residential and commercial systems we discharged purge water to an indoor sink or to the ground surface. In some cases indoor plumbing leads to the municipal sewer system; in other cases it leads to a private septic system. Following parameter stabilization, we collected PFC water samples using laboratory-supplied containers.

2.2 Monitoring Well Sampling

For groundwater MWs, we collected analytical water samples using a peristaltic or submersible pump and disposable non-Teflon tubing. Some private well samples were also collected using a peristaltic or submersible pump because they were either temporarily or permanently out of service. To date we have collected three equipment-blank samples in adherence to the prescribed minimum 20-percent frequency for the overall project. Sample *EB-301S* was collected on August 4, 2017 following equipment decontamination after sampling MW-301S. Samples *EB-304A* and *EB-507* are described in previous reports.

The following values were used to indicate stability for MWs: ± 0.1 pH, ± 0.2 $^{\circ}\text{C}$ temperature, ± 3 percent conductivity, ± 0.10 percent milligrams per liter (mg/L) dissolved oxygen, ± 10 millivolts

(mV) oxidation reduction potential (ORP), and turbidity (visual classification). We measured the total well depth and depth to water from the top of casing (TOC) in each MW, in order to calculate well depth bgs. Where it was possible to calculate the volume of water inside of a MW, in cases where groundwater parameters were slow to stabilize we collected samples after three or more well volumes had been purged.

We treated MW purge water using a granular activated carbon (GAC) filter prior to discharge. We did not treat purge water from the Golden Heart Softball Association (GHSA) irrigation wells, unused wells, or other private wells.

2.3 Well Monitoring Network

We performed three well monitoring network sampling events during the time period covered in this report, one each in July/August 2017, October/November 2017, and January 2018. The wells included in these events are shown in Figure 2, Well Monitoring Network. The well monitoring network, per discussions with the CoF and ADEC, includes drinking-water wells (category 1) or possible future drinking-water wells (category 2) whose combined PFOS and PFOA concentration exceeds 35 ng/L, or half of the EPA LHA level. The monitoring network also includes active private wells (categories 1, 2, 3, and 4) that are adjacent to or near wells whose combined concentration exceeds 35 ng/L. The network does not include wells on properties where connection to the municipal water system is planned, or that were already connected to municipal water by the CoF. The network includes wells that are active for at least one month per year, or where connection to a structure is planned. The network includes select groundwater MWs but does not include unused wells.

Near is defined as within two residential parcels or within one commercial or industrial parcel, not including roadways, in Area 1 south of the Mitchell Expressway. Near is defined as within two residential parcels, one residential and one commercial or industrial parcel, or one commercial or industrial parcel, not including roadways, in Areas 2 and 4 through 10. We do not apply this criteria to the immediate vicinity of the FNSB Parks and Recreation complex in the north portion of Area 1 and Area 3, as these parcels are considerably larger than those in other search areas. Robert Burgess, the ADEC project manager for the RFTC, indicated ADEC's concurrence with these criteria by e-mail on July 12, 2016.

The network includes three groundwater MWs: Alaska Department of Transportation & Public Facilities (ADOT&PF) MW-507, included due to its strategic location in an area with few private wells, 39 feet deep; MW-1701-13, installed 70 feet down gradient of the RFTC burn pit in April 2017, 13 feet deep; and MW-1701-35: MW adjacent to MW-1701-13, 35 feet deep.

Per e-mail communication with the ADEC on September 8, 2017, the re-sampling frequency was decreased to once every six months after wells have been included in the quarterly monitoring network for one year or more. While we have attempted sampling at these locations for one year or more, in some cases we have been unable to collect four quarterly samples. The shift from quarterly to bi-annual sampling began in 2018.

The fifth quarterly sampling event occurred in July/August 2017 and included 25 wells. The sixth sampling event occurred in October/November 2017 and included 27 wells. The seventh sampling event occurred in January 2018 and included 10 wells. In some cases we were unable to sample wells that meet the above-listed criteria.

2.3.1 July 2017 Well Monitoring

The July/August 2017 monitoring sampling event included wells that were sampled as part of the quarterly well monitoring network in April/May 2017. These locations are as follows:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]

The following wells were removed from the network between April and July 2017 because connection to the municipal water system was planned:

[REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]

The July/August 2017 sampling event added four additional wells to the well monitoring network. The locations of these wells are as follows:

- MW-1701-13: onsite RFTC groundwater MW installed in April 2017, 13 feet deep
- MW-1701-35: MW adjacent to MW-1701-13, 35 feet deep
- [REDACTED] business rental and residential, category 1, within three commercial or industrial parcels from PAN 169048 but one parcel is 40 feet wide and properties are mixed use
- [REDACTED]: business and residential, Gas & Diesel Doctor, category 1, within two commercial or industrial parcels from PANs 167983 and 169048 but properties are mixed use

We did not sample the following well because it was inaccessible due to the structure being remodeled:

[REDACTED]

2.3.2 October 2017 Well Monitoring

The October/November 2017 sampling event added the following wells to the well monitoring network:

- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]

The following wells were removed from the network between July and October 2017 because connection to the municipal water system was planned:

- I [REDACTED]
- I [REDACTED]
- I [REDACTED]

We did not sample the following well because the well is currently not in use:

- I [REDACTED]
- I [REDACTED]

We did not sample the following well that meets the above-listed criteria, because the well was winterized in early September 2016:

- I [REDACTED]

2.3.3 January 2018 Well Monitoring

The January 2018 sampling event added the following wells to the well monitoring network:

- █ [REDACTED]
- █ [REDACTED]

The following well was removed from the network because it is no longer in use:

- █ [REDACTED]

As of January 2018, the well monitoring network includes 31 locations. However, this sampling event included only wells that have not been included in the quarterly monitoring network for one year or more. We did not sample the following wells that meet the above-listed criteria, because the wells were winterized:

- █ [REDACTED]
- █ [REDACTED]
- █ [REDACTED]

2.4 First-Time Samples

We have continued to follow up properties where well status was unknown, our initial request to sample was declined, or upon request by the property owner or occupant. Our scope of services calls for sampling category 3 and 4 wells where requested by the owner or occupant.

Between July 25, 2017 and February 21, 2018 we collected six first-time private well samples from the following locations in Areas 5 and 8. The locations of these wells are as follows:

- █ [REDACTED]
- █ [REDACTED]
- █ [REDACTED]
- █ [REDACTED]
- █ [REDACTED]
- █ [REDACTED]

Until January 2018, our scope of services called for sampling only active wells or those that are temporarily out of service. In addition to the above-listed wells, between July 25, 2017 and October 23, 2017 we sampled the following unused wells upon request by the owners or occupants:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

On August 4, 2017 we sampled the following MWs to obtain more information regarding this outlying area. MW-301D was first sampled on October 18, 2016.

- [REDACTED]
- [REDACTED]

On October 10 and 11, 2017 we attempted to sample the unused well at [REDACTED]. Our attempts were unsuccessful due to low recharge. On July 25, August 16, and/or November 7, 2017 we revisited the six parcels whose well status is or was classified as “yes – inferred well” or “unknown,” with the exception of parcels identified in our previous reports, for a change in use.

Beginning on January 31, 2018, we have attempted to sample the nine remaining locations with outdoor-only (i.e., categories 3 and 4) and unused wells that may be eligible for municipal water connections per Ordinance 6060 (Appendix A). The well at [REDACTED] listed above, was sampled as part of this effort.

2.5 TOP Assay

We submitted two July well monitoring network samples for determination of TestAmerica’s total oxidable precursor (TOP) assay analysis package, newly available in 2017. TOP assay indirectly measures the concentration of non-discrete per- and polyfluoroalkyl substances

(PFASs) and precursors that are not quantified by standard analytical methods by subjecting samples to an oxidation treatment. These samples, *MW-507* and *MW-1701-35*, were collected on July 18, 2017.

2.6 Sample Custody, Storage, and Transport

Immediately after collection, the sample jars for each location were placed in a Ziploc bags and stored in a designated sample cooler maintained between 0 °C and 6 °C with ice substitute. We separated the analytical samples from ice substitute using a 2.0-millimeter thick plastic liner bag. Shannon & Wilson maintained custody of the samples until submitting them to the laboratory for analysis. For shipping we packaged analytical samples and chain-of-custody (COC) forms in a hard plastic cooler with an adequate quantity of frozen ice substitute, packing material as necessary to prevent bottle breakage, and a laboratory-supplied liner bag. We applied Shannon & Wilson custody seals to the cooler, which were observed to be intact upon receipt by the laboratory.

We shipped sample coolers to TestAmerica in West Sacramento, California using Alaska Air Cargo priority overnight service, also known as Goldstreak. This allowed sufficient time for the laboratory to analyze the samples within holding-time requirements of the analytical method. The TestAmerica laboratory reports (WOs 29904, 29998-1, 29998-2, 30230, 30232, 30560, 30707, 31462, 32289, 32290, 32678, 32680, 33293, 35279, 35503, and 36306) are included in Appendix E.

2.7 Notification of Results

Upon completion of review of the analytical data, we prepared letters to owners and occupants informing them of the results for the sample from their well. These letters were tailored to each property and analytical sample, and included the following information:

- sample name;
- analytical result for PFOS and PFOA;
- comparison of analytical results to the LHA level;
- description of the project;
- those pages of the TestAmerica laboratory report that apply to the owner or occupant's water-well sample;
- an updated CoF fact sheet; and
- an updated regional results map.

When requested, results letters were e-mailed to owners or occupants instead of mailed in hard copy. We also contacted some owners and occupants via telephone to notify them of their results prior to letter preparation. At a minimum, we contacted the owners of those properties whose results exceeded the LHA level, and those who requested to be notified immediately.

2.8 Alternate Water Sources

The CoF has offered bottled water deliveries at no cost to owners and occupants whose category 1 or 2 well water exceeds the LHA level, until they are provided with a long-term alternate water source. Deliveries were coordinated by Andrew Ackerman of the CoF and Jim Mason of Spring Alaska until extension of the municipal water system to these properties.

City Council Ordinance 6060, passed in September 2017, offered municipal water connections to additional properties. A copy of the ordinance is included in Appendix A, Public Information. The majority of these properties were connected in the summer and fall of 2017, although additional connections are planned for 2018. These locations are shown in Figures 7 through 9, Lifetime Health Advisory Level Exceedances.

The following properties have been connected to the municipal water system to date:

- 2145 30th Avenue, PAN 87173
- 2061 30th Avenue, PAN 87190
- 2157 30th Avenue, PAN 87157
- 2051 30th Avenue, PAN 522384
- 2153 30th Avenue, PAN 87165
- 2013 30th Avenue, PAN 526576
- 2169 30th Ave, PAN 87149
- 2525 17th Avenue, PAN 127124
- 3177 19th Avenue, PAN 168017
- 3225 19th Avenue, PAN 168025
- 3325 19th Avenue, PAN 168033
- 3133 Davis Road, PAN 537268
- 2080 Hill Road, PAN 168254
- 2200 Hill Road, PAN 147460
- 3180 Holden Road, PAN 407411
- 3237 Holden Road, PAN 168271
- 3330 Holden Road, PAN 168211
- 3350 Holden Road, PAN 407429
- 2509 Alston Road, PANs 168955 and 168963, samples 168963-1 and 168963-2
- 2150 Alston Road, PAN 168645
- 2451 Alston Road, PAN 168823
- 2513 Davis Road, PAN 167754
- 3152 Davis Road, PAN 168491
- 3166 Davis Road, PAN 168513
- 3174 Davis Road, PAN 168483
- 3187 Davis Road, PAN 147486
- 3196 Davis Road, PAN 168467
- 3309 Davis Road, PAN 168564

- 3344 Davis Road, PAN 168432
- 3370 Davis Road, PAN 168424
- 2441 Hill Road, PAN 167886
- 2715 Picket Place, PAN 169099
- 2750 Picket Place, PAN 515493, samples *515493-1* and *515493-2*
- 2740 or 2750 Picket Place, PAN 515485
- 2915 Picket Place, PAN 167631
- 2990 Picket Place, PAN 167967
- 3455 or 3445 Vian Way, PAN 168831
- 3555 Vian Way, PAN 168874
- 3538 or 3416 Vian Way, PAN 168726, samples *168726* and *168726-2*
- 2100 Hill Road, PAN 168505
- 2010 Alston Road, PAN 168327
- 3536 Vian Way, PAN 168718

2.9 Public Information

The ADEC Contaminated Sites Program continues to host a webpage summarizing the RFTC project history and goals. The webpage includes a simplified regional results map depicting private well, MW, and surface-water sample locations with respect to the LHA level. This map is updated periodically following the receipt of analytical data.

In fall 2017, the CoF added a webpage describing the RFTC project response. The webpage includes an interactive map depicting the locations of properties connected to the municipal water system in response to PFCs in their well water.

On August 24, 2017 the CoF hosted the third community meeting in the City Council Chambers at 800 Cushman Street. Previous community meetings occurred on August 11 and November 17, 2016, and are discussed in previous reports. At the request of the CoF, we prepared and mailed or emailed meeting invitations and fact sheets to the owners and occupants of properties whose wells we had sampled to date in Areas 1 through 8. Where previous contact had included both owners (i.e., landlords) and occupants (i.e., tenants), we sent the meeting invitation to more than one address per sample location.

The Alaska Department of Health and Social Services (DHSS) Section of Epidemiology prepared an updated health fact sheet for the community meeting describing the health effects associated with exposure to PFOS and PFOA. The Alaska DHSS also coordinated with the U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) to develop three one-page fact sheets related to PFC exposure. The DHSS and ATSDR fact sheets refers to PFCs as PFAS; for the purposes of human health they are considered

equivalent. These fact sheet were distributed to owners and occupants who attended the meeting. The meeting invitation and fact sheets are included in Appendix A, in addition to other communication with owners and occupants.

In response to resident inquiries, on February 5, 2018, the CoF mailed a letter to properties connected to the municipal water system. The letter discussed the likelihood of residual PFCs remaining in residential water heaters or plumbing systems, and included recommendations for flushing of remnant well water (Appendix A).

2.10 Deviations

In general, we conducted our services in accordance with the approved proposals. The following are the deviations from our agreed-upon scope of services.

- The following samples were or may have been collected from a location downstream of the property's water softener or other in-home treatment system during one or more sampling event: [REDACTED]
[REDACTED]
Road.
- The following samples were collected from private wells where parameter stabilization was not achieved: [REDACTED]
[REDACTED]
- Our scope of services calls for sampling only active wells or those that are temporarily out of service. We sampled eight unused wells during the time period discussed in this report. These locations are discussed in Section 2.4, First-Time Samples.
- Our proposal dated June 23, 2017 called for sampling 27 wells as part of the well monitoring network in January. Our proposal dated September 15, 2017 called for sampling 31 wells as part of the well monitoring network in October. Our proposal dated January 4, 2018 called for sampling 12 wells as part of the well monitoring network in January. The actual number of wells sampled deviated from these targets for reasons described in Section 2.3, Well Monitoring Network.
- Our proposal dated January 4, 2018 called for sampling up to nine outdoor-only and unused wells. To date, we have sampled one of these wells; this effort is ongoing.

- Our proposals dated March 17, 2017 called for sampling *MW-301D* or *MW-301S*, Chevron MWs located near the intersection of Geist Road and Fairbanks Street. We sampled these wells during the time period covered in this report because the owner did not grant us permission in spring 2017.

3.0 ANALYTICAL RESULTS

We submitted well monitoring network water samples to TestAmerica for determination of PFOS and PFOA using Method WS-LC-0025, the laboratory's in-house method or EPA method 537 modified. We submitted first-time private well samples in July 2017 to February 2018 for determination of the six UCMR PFCs by the same method. We submitted two samples for TestAmerica's TOP assay analysis package, newly available in 2017.

The TestAmerica laboratory reports and ADEC Laboratory Data Review Checklists for each work order (WO) are included in Appendix E, listed in chronological order (WOs 29904, 29998-1, 29998-2, 30230, 30232, 30560, 30707, 31462, 32289, 32290, 32678, 32680, 33293, 35279, 35503, and 36306).

Analytical results for the well monitoring network are included in Figures 3 through 5, Quarterly Sampling Network Results. The maximum LHA level concentration for each well sampled to date are displayed in Figure 6, PFOS and PFOA Sample Results. Figures 7 through 9 depict private well and MW sample locations to date where the LHA combined concentration exceeds the effective LHA level of 65 ng/L, or where municipal water connections are planned.

3.1 July/August 2017 Well Monitoring Network Samples

Table 2 summarizes the concentrations of PFCs in July/August quarterly well monitoring network samples (WOs 29904, 29998-1, 29998-2, 30232 and 30560). Sample 593560-2 is a field duplicate of 593460-2 and sample 95730 is a field duplicate of 95630. The analytical results for two private well samples and each MW exceed the LHA level. The highest private well results are 65 ng/L PFOS and 5.7 ng/L PFOA in sample 168726, [REDACTED]. The highest MW results are 17,000 ng/L PFOS and 800 ng/L PFOA in sample *MW-1701-35*, the 35-foot deep MW located at the RFTC. Please note that sample 64751 was collected in August, but is included with the July quarterly well monitoring network results.

3.2 TOP Assay Samples

Table 3 summarizes the results of two July well monitoring network samples, *MW-1701-35* and *MW-507*, submitted for the TOP assay analysis package (WO 29998-2). There were no

field-duplicate samples submitted with this WO. PFASs are a diverse group of hundreds of compounds with similar physical properties. EPA method 537 and other analytical methods cannot quantify each discrete PFAS, PFC, and precursor. The TOP assay method was designed to indirectly measure the concentration of non-discrete and difficult-to-measure PFCs and precursors that are not determined by conventional analytical methods.

The first step in the TOP assay procedure is to analyze the project samples for PFCs. The samples are then subjected to an oxidation treatment that converts (or oxidizes) PFCs to the dead-end perfluorinated carboxylic acid (PFCA) products, including PFOA, and analyzed a second time. The difference between the pre- and post-treatment results is an indirect measurement of the PFCs precursor compounds that are not quantified by standard analytical methods. This method replicates what microbial and abiotic transformation processes would achieve over several years to decades of oxidizing environmental conditions. Oxidation is one known transformation process for PFCs; others may exist.

Table 3 includes the pre- and post-treatment results for 17 PFCs, most of which are PFCAs or carboxylates. The maximum percent increase measured in these samples following oxidation is 507% in the perfluorohexanoic acid (PFHxA) result for *MW-507*. The percent increases are generally higher in the shorter chain compounds. The percent increases for each PFCA in *MW-1701-35*, located on the RFTC property, and *MW-507*, located approximately one-half mile downgradient from the presumed source, are of the same order of magnitude. This could indicate that Fairbanks groundwater is not conducive to PFC oxidation.

3.3 October/November 2017 Well Monitoring Network Samples

Table 4 summarizes the concentrations of PFCs in October/November quarterly well monitoring network samples (WOs 32289, 32678, and 33293). Sample *167960* is a field duplicate of *167860* and sample *168273* is a field duplicate of *168173*. The analytical results for one private well sample and the three MW samples exceed the LHA level. The highest private well results are 260 ng/L PFOS and 26 ng/L PFOA in sample *168459*, the well located at [REDACTED]. The highest MW results are 11,000 ng/L PFOS and 500 ng/L PFOA in sample *MW-1701-35*. Please note that sample 95630 was collected in November, but is included with the October quarterly well monitoring network results.

3.4 January 2018 Well Monitoring Network Samples

Table 5 summarizes the concentrations of PFCs in January quarterly well monitoring network samples (WOs 35279 and 35503). Sample *515615* is a field duplicate of *515515*. The analytical

results for one MW sample exceed the LHA level. The highest results are 16,000 ng/L PFOS and 660 ng/L PFOA in sample *MW-1701-35*.

3.5 First-Time Private Well Samples

Table 6 summarizes the concentrations of PFCs in private wells sampled for the first time between July 2016 and February 2017 (WOs 29904, 30230, 30707, 30560, 31462, 32290, 32680, and 36306). There were no field-duplicate samples submitted with these WOs. Sample *EB-301S* is an equipment-blank sample collected from the submersible pump used to sample *MW-301S* and *MW-301D*. PFCs were not detected in the equipment-blank sample. The analytical results for 10 private well samples exceed the LHA level. [REDACTED]

4.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance/Quality Control (QA/QC) procedures assist in producing data of acceptable quality and reliability. We reviewed the analytical results for laboratory QC samples and conducted our own QA assessment for this project. We reviewed the COC records and laboratory-receipt forms to check that custody was not breached, sample holding-times were met, and the samples were properly handled from the point of collection through analysis by the laboratory. Our QA review procedures allowed us to document the accuracy and precision of the analytical data, as well as check the analyses were sufficiently sensitive to detect analytes at levels below regulatory standards.

The laboratory applies the letter ‘J’ to a detection less than the limit of quantitation but greater than the detection limit; this “flagged” datum is considered an estimated concentration. We reviewed the data using the current ADEC Laboratory Data Review Checklist and applied a standardized set of flags to data brought into question during the review. During our QC review we applied flags indicating estimated data or analytical bias as applicable. Our QC review encountered the following QA/QC errors that resulted in flags.

- The PFC results for samples *168734* and *168700* are considered estimated and flagged ‘J*’ in the analytical table due to sampling method (WOs 29904 and 30560, respectively). The well configuration at the time of sampling prevented us from purging these wells until parameter stabilization was achieved. Sample *168734* was also collected through a reusable hose due to restricted access.

- The pre- and/or post-treatment results for several analytes in samples *MW-507* and *MW-1701-35* are considered estimated, biased high, and flagged 'JH*', considered not detected and flagged 'B*', or considered estimated and flagged 'J*' due to laboratory control sample (LCS) and LCS duplicate (LCSD) accuracy and precision, method blank detections, and isotope dilution analyte (IDA) recovery failures (WO 29998-2).
- The PFOA results for samples *87416*, *515515*, *569356* and PFOS results for sample *87416* are considered estimated and flagged 'J*' in the analytical table due to isotope dilution analyte (IDA) recovery failures (WO 35279).

We reviewed analytical sample results (TestAmerica WOs 29904, 29998-1, 29998-2, 30230, 30232, 30560, 30707, 31462, 32289, 32290, 32678, 32680, 33293, 35279, 35503, and 36306) for this project. The laboratory reports, including the case narratives describing the laboratory QA results in detail, along with completed ADEC data-review, are included in Appendix E. Laboratory QC procedures included evaluating surrogate recovery, performing continuing calibration checks, analyzing method blanks, and checking laboratory control samples to assess accuracy. Please refer to Appendix E for details regarding the results of our QA review for these 16 WOs.

By working in general accordance with our proposed scope of services, we consider the samples we collected for this project to be representative of site conditions at the locations and times they were obtained. Based on our QA review, no samples were rejected as unusable due to QC failures, and our completeness goal of obtaining 85% useable data was met. 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.

5.0 DISCUSSION AND RECOMMENDATIONS

We present here our discussion relevant to the RFTC site and downgradient well search and sample areas. Within Areas 1 through 9 we have sampled each identified, active well with indoor plumbing (i.e., category 1 or 2 wells) that we have received permission to sample. Of the water samples discussed in this and previous reports, there are 50 private well, six MW, and two surface-water sample locations with LHA combined concentrations exceeding the effective LHA level of 65 ng/L (Figures 7 through 9). Of the 50 private well exceedances, 34 are category 1 wells, eight are category 2 wells, two are category 3 well, and six are category 4 wells.

Six private well exceedances are located on 30th Avenue to the west of the intersection with North Van Horn Court, in Area 1. Two are located directly northwest of the RFTC in the FNSB

Davis Fields area, also in Area 1. Two MWs exceedances are on the RFTC property. Three of these private wells and two MWs are located directly northwest of the RFTC in Areas 2 and 3.

The highest concentration of private well exceedances is in the vicinity of Davis Road, Hill Road Vian Way, and Alston Road to the west-northwest of the RFTC (Areas 5 and 8, Figures 7 through 9). Area 5 contains 31 private well exceedances, while Area 8 contains eight. These analytical results are summarized in Figures 6 through 9. Municipal water connections for these and other homes and businesses are discussed in Section 2.8, Alternate Water Sources.

5.1 Trend Analysis

We assessed temporal data for locations included in the well monitoring network locations using the Mann-Kendall nonparametric trend analysis at a 95% confidence level (Gilbert, 1987). This test requires data from a minimum of four sampling events to assess concentration trends. We performed the test on PFOS, PFOA, and LHA combined results using the EPA's Statistical Software ProUCL. Table 7, Comparison of Quarterly Analytical Results, compares the PFOS, PFOA, and LHA combined results for each well monitoring network sample location sampled between July 2017 and February 2018. Results are reported in order of approximate distance from the RFTC.

The trend analysis identified statistically significant increasing PFOA concentrations with time for samples 87408, 87301, 87319, MW-507, 515485, and 515493-2, each located in Area 1, 3, or the far eastern portion of Area 5. Our analysis also identified increasing PFOS concentrations for samples 87335, 95630, 515485, and 515493-2, and increasing LHA combined concentrations for the samples 87335, 515485, and 515493-2. These samples are located in the same areas as those with increasing PFOA trends.

The trend analysis identified decreasing PFOS concentrations in samples 167801 and 515515 and decreasing LHA combined concentrations in samples 167801, 168980, and 515515. These wells are located in Area 5, farther from the RFTC than those with increasing PFOA, PFOS, or LHA combined concentrations. There were no trends identified for sample locations in Area 8; however, there is generally less analytical data for locations farther from the RFTC. A no-trend determination does not necessarily equate to a stable groundwater contaminant plume; rather, it indicates a lack of discernable trend.

In most cases, percent change between consecutive sampling events is less than 25%. However, samples MW-1701-13, MW-507, and 515485 are noteworthy in that the PFOS, PFOA, or LHA combined concentration have varied by 100% or more between one or more consecutive sampling events.

Figures 3 through 5 depict the LHA combined result for these sample locations, as well as locations that were previously included in the well monitoring network. The bar graphs are colored to match each sampling quarter (i.e., July, October, January, and April) for wells sampled during and after July 2016. Please note that bar graphs are scaled for comparison of results within each sample location. For locations sampled three or more times, the summertime sample typically has the highest PFOS and LHA combined results. Previous reporting indicated that LHA combined result was generally highest in the springtime. With up to seven quarterly results available per sample location, this is no longer appears to be the case.

5.2 Modifications to Well Monitoring Network

We propose to conduct the biannual sampling events in July 2018 and January 2019. The April sampling event will include only wells that have not been included in the quarterly monitoring network for one year or more.

The City plans to connect additional homes and businesses to the municipal water system in 2018. These sample locations are not included in the well monitoring network. We therefore propose to remove the following location from the network:

■ [REDACTED]

We propose to simplify the location-based criteria for inclusion in the well monitoring network. We propose to include active, drinking-water wells (category 1) or possible future drinking-water wells (category 2) wells that are within 500 lateral feet of any private well (i.e., categories 1 through 4 wells, unused wells) whose combined PFOS and PFOA concentration is greater than or equal to 35 ng/L. Lateral distance will be measured from parcel center to parcel center. On lots with more than one well, we will test only those wells with combined concentrations exceeding 35 ng/L. This 500-foot buffer will replace our previous criterion of including wells on parcels “adjacent to or near” those with combined concentrations exceeding 35 ng/L. We therefore propose to add the following wells to the network:

■ [REDACTED]

■ [REDACTED]

However, we propose to continue to sample the following well, given its location in an area with limited private well data:

■ [REDACTED]

The well monitoring network currently includes active category 3 and 4 wells that are adjacent to or near wells whose combined concentration exceeds 35 ng/L in most locations, and where connection to the municipal water system is not planned or was not completed by the CoF. It is possible that some households connected to the municipal water system retained their wells for vegetable gardening (i.e., category 3) or other outdoor uses (i.e., category 4). The network does not include category 3 and 4 wells with concentrations exceeding 35 ng/L if they are not near other wells exceeding 35 ng/L. As these wells are located outdoors, we are typically unable to sample them during the October and January sampling events and occasionally able to sample them in April.

We propose annual sampling of category 3 wells whose combined concentration exceeds 35 ng/L, or that are within 500 feet of any private well whose concentration exceeds 35 ng/L. We propose to sample the following wells annually beginning in July 2018:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

We no longer plan to re-sample private, category 4 wells. We therefore propose to remove the following location from the network:

- [REDACTED]

Our trend analysis identified decreasing LHA combined concentrations for three private wells. We propose to remove these locations from the well monitoring network after our next sampling event if the decreasing trend remains statistically significant. Following ADEC approval, we will notify the owners or occupants of these properties via letter.

5.3 Recommendations

Based on our understanding of offsite private well data from July 2017 through February 2018, Shannon & Wilson offers the following recommendations pertaining to private well sampling. We recommend that the CoF:

- continue quarterly sampling of wells in the well monitoring network for one calendar year, in accordance with established criteria discussed in Section 2.3, Well Monitoring Network;

- biannual sampling of wells included in the well monitoring network for more than one year, beginning in July 2018, as discussed in Section 5.2, Modifications to Well Monitoring Network;
- annual sampling of category 3 wells, beginning in July 2018, as discussed in Section 5.2, Modifications to Well Monitoring Network;
- continue to implement the current plan of connecting homes or businesses with category 1 and 2 wells whose well water exceeds the LHA level to the municipal water system as a permanent alternate water source; and
- continue to work with the ADEC and DHSS to educate the public regarding the potential health effects of exposure to PFOS- and PFOA-containing water.

We further recommend preparing a plume-wide conceptual site model (CSM). In doing so, we will identify and evaluate potential data gaps for the overall RFTC site, including soil, groundwater, surface water, sediment, and biota. This document will discuss the potential scope of long-term site characterization and corrective action to fill identified data gaps.

Our groundwater sampling effort has focused primarily on private wells. Well depth is considered known for approximately 50 percent and estimated for approximately 25 percent of the private wells tested to date. Permafrost information is available for 10 percent of these wells. An understanding of the presence and absence of permafrost is necessary to evaluate the boundaries of the PFOS and PFOA groundwater plume, the flow of groundwater within the plume, and the likelihood of future exposure to PFOS- and PFOA-containing water in and downgradient of the impacted area. We therefore recommend installing clusters of offsite groundwater MWs to study groundwater flow directions, the presence of permafrost, and assess the lateral and vertical extent of the groundwater plume.

Our recommendations are based on:

- Offsite groundwater conditions inferred through private well and MW analytical water samples collected from July 10, 2017 through February 21, 2018.
- The results of testing performed on water samples we collected from the private wells and MWs on, near, and downgradient from the CoF's RFTC property.
- Our previous experience in offsite well search Areas 1 through 10 downgradient from the RFTC, and site and subsurface conditions we observed during our onsite RFTC investigations, as they existed at the time of sample collection.
- Our understanding of the project and information provided by the CoF, Fairbanks Fire Department, and other members of the project team.
- Publicly available literature including Glass et. al., 1996 and Geomega Inc., 2012.

- Well construction details reported by owners and occupants, and well logs obtained from the ADNR Well Log Tracking System (WELTS) beginning in January 2016.
- The limitations of our approved scope, schedule, and budget described in our proposals 31-2-31-2-16864-020, -021, and -023, dated June 23, 2017 through January 4, 2018.

The information included in this report is based on limited sampling and should be considered representative of the time and location at which the sampling occurred. Regulatory agencies may reach different conclusions than Shannon & Wilson. We have prepared and included in the Appendix F, *“Important Information about your Geotechnical/Environmental Report,”* to assist you and others in understanding the use and limitations of this report.

6.0 REFERENCES

- Alaska Department of Environmental Conservation (ADEC), 2017, 18 AAC 75: Oil and other hazardous substances pollution control: Juneau, Alaska, July, available: <http://dec.alaska.gov/commish/regulations/>.
- Alaska Department of Environmental Conservation (ADEC), 2017, 18 AAC 75.341 Table C, *Groundwater Cleanup Levels*.
- Alaska Department of Environmental Conservation (ADEC), 2017, Field Sampling Guidance: Juneau, Alaska, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, August, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.
- Alaska Department of Environmental Conservation (ADEC), 2017, Site characterization work plan and reporting guidance for investigation of contaminated sites: Juneau, Alaska, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, March, available: http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.
- Alaska Department of Natural Resources (ADNR), 2018, Well log tracking system (WELTS): Available: <http://dnr.alaska.gov/mapper/controller?gsid=5A0ECA50689B47945240C5ECB15F52EB.tomcat-91>, accessed July 2017 to March 2018.
- Geomega Inc., 2012, North Pole Refinery site characterization: appendix Q – groundwater model: Boulder, Colo., Geomega, Inc., July 5.
- Gilbert, R.O., 1987, Statistical methods for environmental pollution monitoring: New York, New York, John Wiley & Sons.
- Glass, R.L.; Lilly, M.R.; and Meyer, D.F., 1996, Ground-water levels in the alluvial plain between the Tanana and Chena Rivers near Fairbanks, Alaska 1986-93: Anchorage, Alaska, U.S. Geological Survey Water-Resources Investigations Report 96-4060.
- Fairbanks North Star Borough, 2008, Geographical Information System (FNSB GIS): Available: <http://gis.co.fairbanks.ak.us/>, accessed July 2017 to March 2018.
- U.S. Environmental Protection Agency (EPA), 2016, Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA), Document Number 822-R-16-005: Washington, DC, U.S. EPA Office of Water, Health and Ecological Criteria Division, May, available: https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final_508.pdf

TABLE 2
SUMMARY OF JULY AND AUGUST 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	129089	167801	167983	168173	168378	168386	168726	168980	169048	515485	515493-2
Perfluorooctanoic Acid (PFOA)	70†	ng/L	17	2.5	23	2.1	6.0	5.5	5.7	2.4	2.7	19	26
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	21	15	32	22	35	49	65	17	26	46	36
LHA Combined (PFOS + PFOA)	70†	ng/L	38	18	55	24	41	55	71	19	29	65	62

ng/L nanograms per liter
EPA Environmental Protection Agency
LHA Lifetime Health Advisory
† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.
Bold Concentration exceeds EPA LHA level

TABLE 2
SUMMARY OF JULY AND AUGUST 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	515507	515515	593460-2	593560-2	64751	669077	87301	87319	87335	87408	92924
Perfluorooctanoic Acid (PFOA)	70†	ng/L	2.2	2.2	3.6	3.7	26	3.5	3.6	4.7	3.7	6.6	5.4
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	21	18	19	18	20	37	29	27	13	43	38
LHA Combined (PFOS + PFOA)	70†	ng/L	23	20	23	22	48	41	33	32	17	50	43

Notes: Sample number 593560-2 is a field duplicate of sample 593460-2. Sample number 95730 is the field duplicate of sample 95630.
ng/L nanograms per liter
EPA Environmental Protection Agency
LHA Lifetime Health Advisory
† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.

TABLE 2
SUMMARY OF JULY AND AUGUST 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	95630	95730	MW-1701-13	MW-1701-35	MW-507
Perfluorooctanoic Acid (PFOA)	70†	ng/L	3.8	4.0	160	800	23
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	28	27	110	17,000	330
LHA Combined (PFOS + PFOA)	70†	ng/L	32	31	270	17,800	353

ng/L nanograms per liter
EPA Environmental Protection Agency
LHA Lifetime Health Advisory
† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.
Bold Concentration exceeds EPA LHA level

TABLE 3
SUMMARY OF JULY 2017 TOTAL OXIDIZABLE PRECURSOR (TOP) ASSAY ANALYTICAL RESULTS

Analyte	PFC Functional Group	Length of Carbon Chain	ADEC Groundwater Cleanup Level	Units	MW-1701-35				MW-507			
					Onsite RFTC MW, 35 feet deep				DOT&PF MW on Davis Rd, 39 feet deep			
					Pre-Treatment	Post-Treatment	Difference	Percent Increase	Pre-Treatment	Post-Treatment	Difference	Percent Increase
Perfluorobutanoic Acid (PFBA)	Carboxylate	4	—	ng/L	450	2,500	2,050	456%	9.8 JH*	45 B*	35	359%
Perfluoropentanoic acid (PFPeA)	Carboxylate	5	—	ng/L	1,500	3,700	2,200	147%	28	80	52	186%
Perfluorohexanoic Acid (PFHxA)	Carboxylate	6	—	ng/L	2,900	7,800	4,900	169%	28	170	142	507%
Perfluoroheptanoic Acid (PFHpA)	Carboxylate	7	—	ng/L	760	840 JH*	80	11%	17	20 JH*	3	18%
Perfluorooctanoic Acid (PFOA)	Carboxylate	8	400	ng/L	800	880 JH*	80	10%	23	24 JH*	1	4%
Perfluorononanoic Acid (PFNA)	Carboxylate	9	—	ng/L	140	130	N/A	N/A	57	54	N/A	N/A
Perfluorodecanoic Acid (PFDA)	Carboxylate	10	—	ng/L	3.9 J	<5.0 B*	N/A	N/A	1.5 J	<5.0	N/A	N/A
Perfluoroundecanoic Acid (PFUnA)	Carboxylate	11	—	ng/L	<5.0	<5.0	N/A	N/A	<5.0	<5.0	N/A	N/A
Perfluorododecanoic Acid (PFDoA)	Carboxylate	12	—	ng/L	<5.0	<5.0	N/A	N/A	<5.0	<5.0	N/A	N/A
Perfluorotridecanoic Acid (PFTriA)	Carboxylate	13	—	ng/L	<5.0	<5.0	N/A	N/A	<5.0	<5.0	N/A	N/A
Perfluorotetradecanoic Acid (PFTeA)	Carboxylate	14	—	ng/L	<5.0 J*	<5.0	N/A	N/A	<5.0 J*	<5.0 B*	N/A	N/A
Perfluorobutanesulfonic Acid (PFBS)	Sulfonate	4	—	ng/L	1,200	1,200	N/A	N/A	4.2 J	3.7 J	N/A	N/A
Perfluorohexanesulfonic Acid (PFHxS)	Sulfonate	6	—	ng/L	7,400	7,300	N/A	N/A	57	64	N/A	N/A
Perfluoro-1-heptanesulfonate (PFHpS)	Sulfonate	7	—	ng/L	590	930	N/A	N/A	14	14	N/A	N/A
Perfluorodecane Sulfonate (PFDS)	Sulfonate	10	—	ng/L	<5.0	<5.0	N/A	N/A	<5.0	<5.0	N/A	N/A
Perfluorooctane Sulfonate (PFOS)	Sulfonate	8	400	ng/L	17,000	16,000	N/A	N/A	330	310	N/A	N/A
Perfluorooctane Sulfonamide (FOSA)	Sulfonamide	8	—	ng/L	<40 B*	<40 B*	N/A	N/A	<40 J*	<40 B*	N/A	N/A
LHA Combined (PFOS + PFOA)	N/A	N/A	—	ng/L	17,800	16,880	N/A	N/A	353	334	N/A	N/A

Notes: Analytical samples were submitted for TestAmerica, Inc.'s Total Oxidizable Precursor (TOP) assay technique, which involves oxidizing each sample to transform PFC precursors into perfluorocarboxylic acids (PFCAs) or carboxylates.

ng/L nanograms per liter

PFC perfluorinated compound

ADEC Alaska Department of Environmental Conservation

MW monitoring well

DOT&PF Department of Transportation & Public Facilities

— ADEC groundwater cleanup level not established

Bold Concentration exceeds ADEC groundwater cleanup level.

N/A Not applicable due to a decrease following treatment or could not be calculated

< 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.

J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.

JH* Estimated concentration, biased high, due to quality control failures. Flag applied by Shannon & Wilson, Inc.

B* Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.

TABLE 4
SUMMARY OF OCTOBER AND NOVEMBER 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	129089	167801	167860	167960	167878	167983	168173	168273	168378	168386
Perfluorooctanoic Acid (PFOA)	70†	ng/L	21	3.1	3.2	3.0	2.7	24	2.6	2.6	5.4	5.1
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	20	12	15	15	16	28	21	20	30	39
LHA Combined (PFOS + PFOA)	70†	ng/L	41	15	18	15	19	52	24	23	35	44

Notes: Sample number 167960 is a field duplicate of sample 167860. Sample number 168273 is the field duplicate of sample 168173.

ng/L nanograms per liter

EPA Environmental Protection Agency

LHA Lifetime Health Advisory

† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.

TABLE 4
SUMMARY OF OCTOBER AND NOVEMBER 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	168459	168980	169048	515507	515515	521779	569356	64751	669077	87301
Perfluorooctanoic Acid (PFOA)	70†	ng/L	26	2.8	2.7	2.8	2.8	3.2	3	23	3.7	4.1
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	260	14	22	16	15	10	16	18	32	25
LHA Combined (PFOS + PFOA)	70†	ng/L	286	17	25	19	18	13	19	41	36	29

ng/L nanograms per liter

EPA Environmental Protection Agency

LHA Lifetime Health Advisory

† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.

Bold Concentration exceeds EPA LHA level

TABLE 4
SUMMARY OF OCTOBER AND NOVEMBER 2017 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	87319	87335	87408	87416	92924	95630	MW-1701-13	MW-1701-35	MW-1701-45	MW-507
Perfluorooctanoic Acid (PFOA)	70†	ng/L	4.9	3.7	5.9	4.9	5.4	4.1	100	500	450	28
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	23	12	34	21	28	22	57	11,000	11,000	270
LHA Combined (PFOS + PFOA)	70†	ng/L	28	16	40	26	33	26	157	11,500	11,450	298

Notes: Sample number MW-1701-45 is a field duplicate of sample MW-1701-35.
ng/L nanograms per liter
EPA Environmental Protection Agency
LHA Lifetime Health Advisory
† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance, results are compared to 65 ng/L.
Bold Concentration exceeds EPA LHA level

TABLE 5
SUMMARY OF JANUARY 2018 WELL MONITORING NETWORK ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	168157	168688	515469	515507	515515	515615	521779	569356	87416	MW-1701-13	MW-1701-35
Perfluorooctanoic Acid (PFOA)	70†	ng/L	5.6	2.5	2.5	2.8	2.7 J*	2.7	3.2	2.7 J*	5.0 J*	27	660
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	17	3.1	14	16	14	14	9.8	15	20 J*	14	16,000
LHA Combined (PFOS + PFOA)	70†	ng/L	23	5.6	17	19	17 J*	17	13	18 J*	25 J*	41	16,660

Notes: Sample number 515615 is a field duplicate of sample 515515.
 ng/L nanograms per liter
 EPA Environmental Protection Agency
 LHA Lifetime Health Advisory
 † EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance results are compared to 65 ng/L.
Bold Concentration exceeds EPA LHA level.
 J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.

TABLE 6
SUMMARY OF OTHER JULY 2017 TO FEBRUARY 2018 PRIVATE WELL ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	127523-2	168181	168327	168335	168459	168505	168530	168700	168718
Perfluoroheptanoic Acid (PFHpA)	—	ng/L	1.0 J	11	13	8.6	13	7.7	13	2.0 J*	4.5
Perfluorooctanoic Acid (PFOA)	70†	ng/L	1.3 J	21	21	11	28	37	20	2.1 J*	7.8
Perfluorononanoic Acid (PFNA)	—	ng/L	<2.0	58	2.0	0.83 J	<2.0	<2.0	2.1	<2.0 J*	0.66 J
Perfluorobutanesulfonic Acid (PFBS)	—	ng/L	1.9 J	13	12	7.6	21	16	12	1.9 J*	6.0
Perfluorohexanesulfonic Acid (PFHxS)	—	ng/L	8.2	72	85	41	120	76	60	8.0 J*	27
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	19	56	100	25	280	150	110	14 J*	76
LHA Combined (PFOS + PFOA)	70†	ng/L	20	77	121	36	308	187	130	16 J*	84

ng/L nanograms per liter

EPA Environmental Protection Agency

LHA Lifetime Health Advisory

† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance results are compared to 65 ng/L.

— EPA LHA level not established

Bold Concentration exceeds EPA LHA level

< 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.

J* Estimated concentration due to quality control failures or sampling method. Flag applied by Shannon & Wilson, Inc.

TABLE 6
SUMMARY OF OTHER JULY 2017 TO FEBRUARY 2018 PRIVATE WELL ANALYTICAL RESULTS

Analyte	EPA LHA Level	Units	168726-2	168734	168921	658889	95508	MW-301S	MW-301D	EB-301S
										Equipment blank
Perfluoroheptanoic Acid (PFHpA)	—	ng/L	5.1	4.8 J*	1.9 J	16	2.7	6.6	12	<2.0
Perfluorooctanoic Acid (PFOA)	70†	ng/L	10	8.9 J*	3.3	22	4.6	16	17	<2.0
Perfluorononanoic Acid (PFNA)	—	ng/L	0.83 J	0.98 J*	<2.0	<2.0	0.83 J	0.72 J	1.0 J	<2.0
Perfluorobutanesulfonic Acid (PFBS)	—	ng/L	7.4	7.0 J*	2.3	2.8	3.5	6.9	11	<2.0
Perfluorohexanesulfonic Acid (PFHxS)	—	ng/L	33	40 J*	11	16	7.8	86	84	<2.0
Perfluorooctane Sulfonate (PFOS)	70†	ng/L	75	170 J*	21	29	13	82	66	<2.0
LHA Combined (PFOS + PFOA)	70†	ng/L	85	179 J*	24	51	32	98	83	<2.0

ng/L nanograms per liter

EPA Environmental Protection Agency

LHA Lifetime Health Advisory

† EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance results are compared to 65 ng/L.

— EPA LHA level not established

Bold Concentration exceeds EPA LHA level

< 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.

J* Estimated concentration due to quality control failures or sampling method. Flag applied by Shannon & Wilson, Inc.

TABLE 7
COMPARISON OF QUARTERLY ANALYTICAL RESULTS










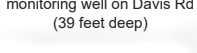












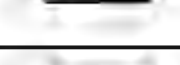







Sample Name	Sample Date	Sample Location	PFOA (ng/L)	PFOS (ng/L)	LHA Combined (PFOS+ PFOA)	Exceed LHA Level?†	Trends‡
MW-1701-13	January-18	MW-1701-13, onsite RFTC monitoring well (13 feet deep)	27	14	41	YES to NO	No trends
	October-17		100	57	157		
	July-17		160	110	270		
	May-17		48	39	87		
MW-1701-35	January-18	MW-1701-35, onsite RFTC monitoring well (35 feet deep)	660	16,000	16,660	YES	No trends
	October-17		500	11,000	11,500		
	July-17		800	17,000	17,800		
	May-17		640	13,000	13,640		
92924	October-17		5.4	28	33	NO	No trends
	July-17		5.4	38	43		
	April-17		5.7	36	42		
	January-17		5.0	34	39		
	October-16		5.1	26	31		
	July-16		5.3	34	39		
	March-16		4.6	42	47		
669077	October-17		3.7	32	36	NO	No trends
	July-17		3.5	37	41		
	April-17		3.9	35	39		
	January-17		3.7	32	36		
	October-16		2.8 J*	20	23 J*		
	July-16		3.5	32	36		
	March-16		3.9	35	39		
87408	October-17		5.9	34	40	NO	Increasing PFOA, no trend in PFOS
	July-17		6.6	43	50		
	April-17		6.4	37	43		
	January-17		5.8	35	41		
	October-16		5.2	30	35		
	July-16		5.3	31	36		
	February-16		5.0	43	48		
87416	January-18		5.0 J*	20 J*	25 J*	NO	Sample size too small
	October-17		4.9	21	26		
	July-16		4.3	21	25		
87301	October-17		4.1	25	29	NO	Increasing PFOA, no trend in PFOS
	July-17		3.6	29	33		
	April-17		4.2	28	32		
	January-17		3.7	24	28		
	October-16		3.1	20	23		
	July-16		3.5	24	28		
	February-16		2.3	30	32		
87319	October-17		4.9	23	28	NO	Increasing PFOA, no trend in PFOS
	July-17		4.7	27	32		
	April-17		4.9	26	31		
	January-17		4.3	24	28		
	October-16		3.9	19	23		
	July-16		3.8	22	26		
	February-16		3.3	32	35		
87335	October-17		3.7	12	16	NO	No trend in PFOA, increasing PFOS and LHA combined
	July-17		3.7	13	17		
	April-17		4.0	13	17		
	January-17		3.9	11	15		
	October-16		3.7	11	15		
	July-16		3.0	9.2	12		
	February-16		2.8	10	13		
95630	November-17		4.1	22	26	NO	No trend in PFOA, increasing in PFOS
	July-17		4.0	28	32		
	May-17		3.9	23	27		
	January-17		5.4	23	28		
	November-16		3.6	18	22		
	July-16		3.4	19	22		
	May-16		4.2	17	21		
MW-507	October-17	MW-507, DOT&PF monitoring well on Davis Rd (39 feet deep)	28	270	298	YES	Increasing PFOA, no trend in PFOS
	July-17		23	330	353		
	April-17		27	320	347		
	October-16		23	160	183		
	July-16		23	200	223		
	November-15		21	63	84		
593460-2	July-17		3.7	19	23	NO	Sample size too small
	May-17		4.2	17	21		
	May-16		5.5	31	37		
515485	Jul-17		19	46	65	NO to YES	Increasing PFOA, PFOS, and LHA combined
	Apr-17		8.2	29	37		
	Oct-16		8.0	25	33		
	May-16		6.1	24	30		
515493-2	July-17		26	36	62	NO	Increasing PFOA and LHA combined, no trend in PFOS
	April-17		19	37	56		
	January-17		13	32	45		
	October-16		12	22	34		

TABLE 7
COMPARISON OF QUARTERLY ANALYTICAL RESULTS

Sample Name	Sample Date	Sample Location	PFOA (ng/L)	PFOS (ng/L)	LHA Combined (PFOS+ PFOA)	Exceed LHA Level?†	Trends‡
521779	January-18		3.2	9.8	13	NO	Sample size too small
	October-17		3.2	10	13		
	May-16		2.7	9.3	12		
167801	October-17		3.1	12	15	NO	No trend in PFOA, decreasing PFOS and LHA combined
	July-17		2.5	15	18		
	April-17		3.7	15	19		
	January-17		4.9	16	21		
	August-16		3.7	19	23		
167983	October-17		24	28	52	NO	No trends
	July-17		23	32	55		
	April-17		17	31	48		
	January-17		16	29	45		
	August-16		20	41	61		
167878	October-17		2.7	16	19	NO	Sample size too small
	June-17		3.5	18	22		
167860	October-17		3.2	15	18	NO	Sample size too small
	May-17		4.4	20	24		
168980	October-17		2.8	14	17	NO	No trends in PFOS and PFOA, decreasing LHA combined
	July-17		2.4	17	19		
	April-17		2.6	16	19		
	January-17		3.0	17	20		
	August-16		2.1	19	21		
515469	Jan-18		2.5	14	17	NO	Sample size too small
	Sep-16		2.7	18	21		
515507	January-18		2.8	16	19	NO	No trends
	October-17		2.8	16	19		
	July-17		2.2	21	23		
	August-16		3.1	22	25		
	January-18		2.7 J*	14	17 J*		
515515	October-17		2.8	15	18	NO	No trend in PFOA, decreasing PFOS and LHA combined
	July-17		2.2	18	20		
	August-16		3.5	25	29		
	October-17		2.7	22	25		
	July-17		2.7	26	29		
169048	April-17		3.0	23	26	NO	No trends
	January-17		2.9	21	24		
	August-16		3.0	35	38		
	October-17		26	260	286		
	July-17		28	280	308		
168459	October-17		2.6	21	24	NO	No trends
	July-17		2.1	22	24		
	April-17		2.7	24	27		
	January-17		2.5	20	23		
	October-16		2.4 J*	17	19 J*		
569356	January-18		2.7 J*	15	18 J*	NO	Sample size too small
	October-17		3	16	19		
	November-16		2.9	17	20		
168157	January-18		5.6	17	23	NO	Sample size too small
	November-16		5.1	14	19		
168726	July-17		5.7	65	71	NO to YES	No trends
	April-17		6.2	51	57		
	January-17		5.4	43	48		
	October-16		6.5	54	61		
	January-18		2.5	3.1	5.6		
168688	April-17		3.8	3.3	7.1	NO	Sample size too small
	January-17		3.3	3.7	7.0		
	October-17		5.1	39	44		
168386	July-17		5.5	49	55	NO	No trends
	April-17		5.4	39	44		
	January-17		4.7	31	36		
	November-16		5.2	34	39		
	October-17		5.4	30	35		
168378	July-17		6.0	35	41	NO	No trends
	April-17		5.6	29	35		
	January-17		4.8	21	26		
	November-16		5.3	24	29		
	October-17		23	18	41		
64751	August-17		28	20	48	NO	No trends
	April-17		25	20	45		
	January-17		17	13	30		
	October-16		26	19	45		
	October-17		21	20	41		
129089	July-17		17	21	38	NO	Sample size too small
	October-16		19	18	37		
	October-17		19	18	37		

Notes: For field-duplicate samples the higher of the two results is reported
 ng/L nanograms per liter
 LHA Lifetime Health Advisory
 † EPA LHA level is 70 ng/L for PFOS and PFOA combined; following ADEC guidance results are compared to 65 ng/L.
 ‡ Mann-Kendall trend analysis at a 95% confidence level was calculated using the EPA statistics software ProUCL Version 5.1
Bold Concentration exceeds EPA LHA level
 J* Estimated concentration, no direction of bias, flag applied by Shannon & Wilson.
 JH* Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

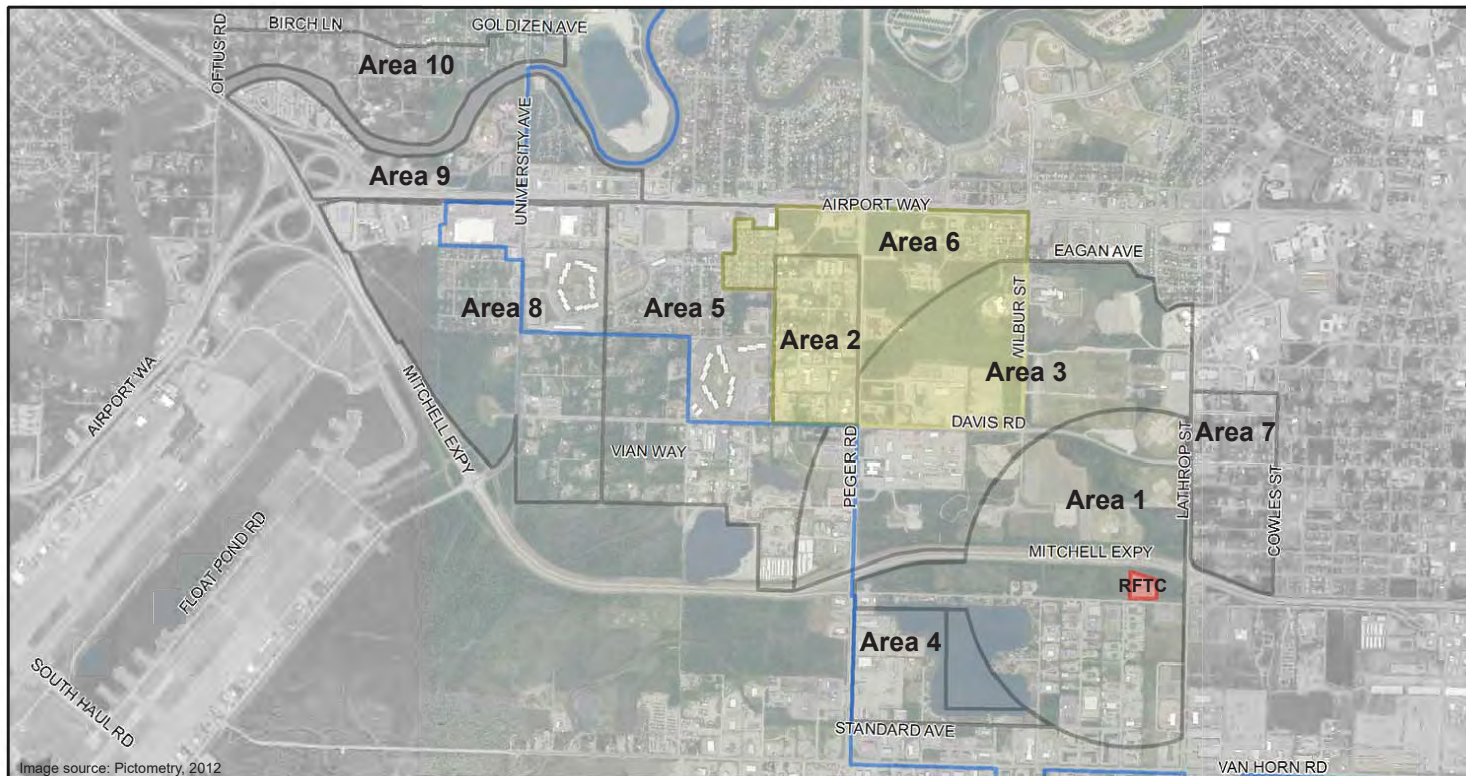
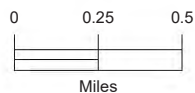


Image source: Pictometry, 2012

LEGEND

- RFTC Site
- Ahtna Private Well Search Area
- CoF Boundary
- Well Search and Sampling Area



Regional Fire Training Center
Fairbanks, Alaska

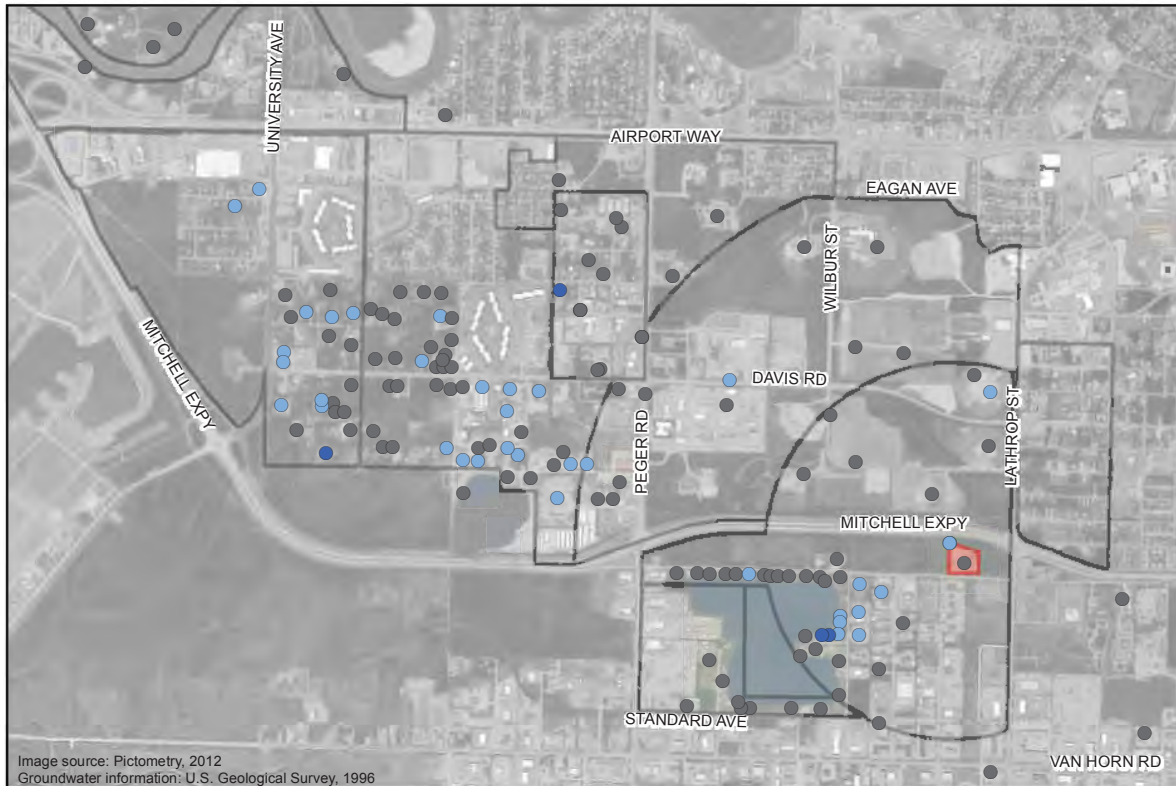
PRIVATE WELL SEARCH AND SAMPLE AREAS

April 2018

31-1-11735-011

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



LEGEND

- Well monitoring network:
- Included (July, October or January)
 - Included (future)
 - Not included
 - RFTC Site
 - Well Search and Sampling Area

Image source: Pictometry, 2012
Groundwater information: U.S. Geological Survey, 1996

Approximate regional groundwater flow direction

0 0.25 0.5
Miles

N

Regional Fire Training Center
Fairbanks, Alaska

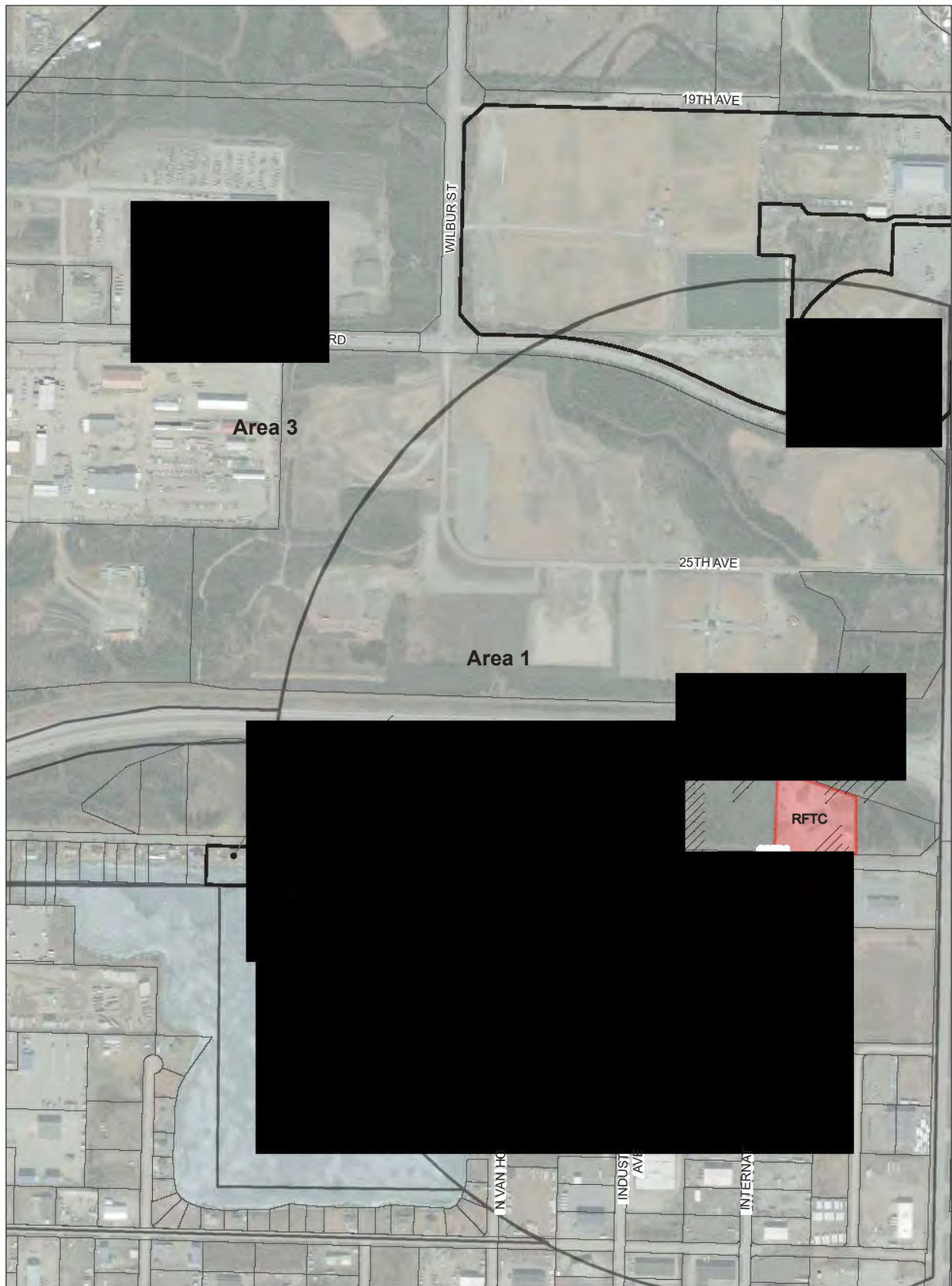
QUARTERLY MONITORING NETWORK

April 2018

31-1-11735-011





SHANNON & WILSON, INC.
GEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

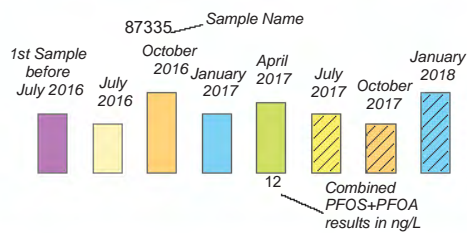
Figure 2



QUARTERLY RESULTS

LEGEND

-  Sampled Parcels
-  Other Parcels
-  Well Search and Sampling Area
-  RFTC Site



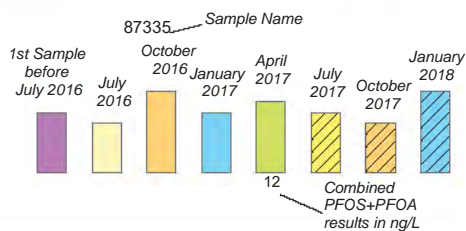
Regional Fire Training Center Fairbanks, Alaska	
AREAS 1 AND 3 QUARTERLY SAMPLING NETWORK RESULTS	
April 2018	31-1-11735-011
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure 3



QUARTERLY RESULTS

LEGEND

- Sampled Parcels
- Other Parcels
- Well Search and Sampling Area



Regional Fire Training Center
Fairbanks, Alaska

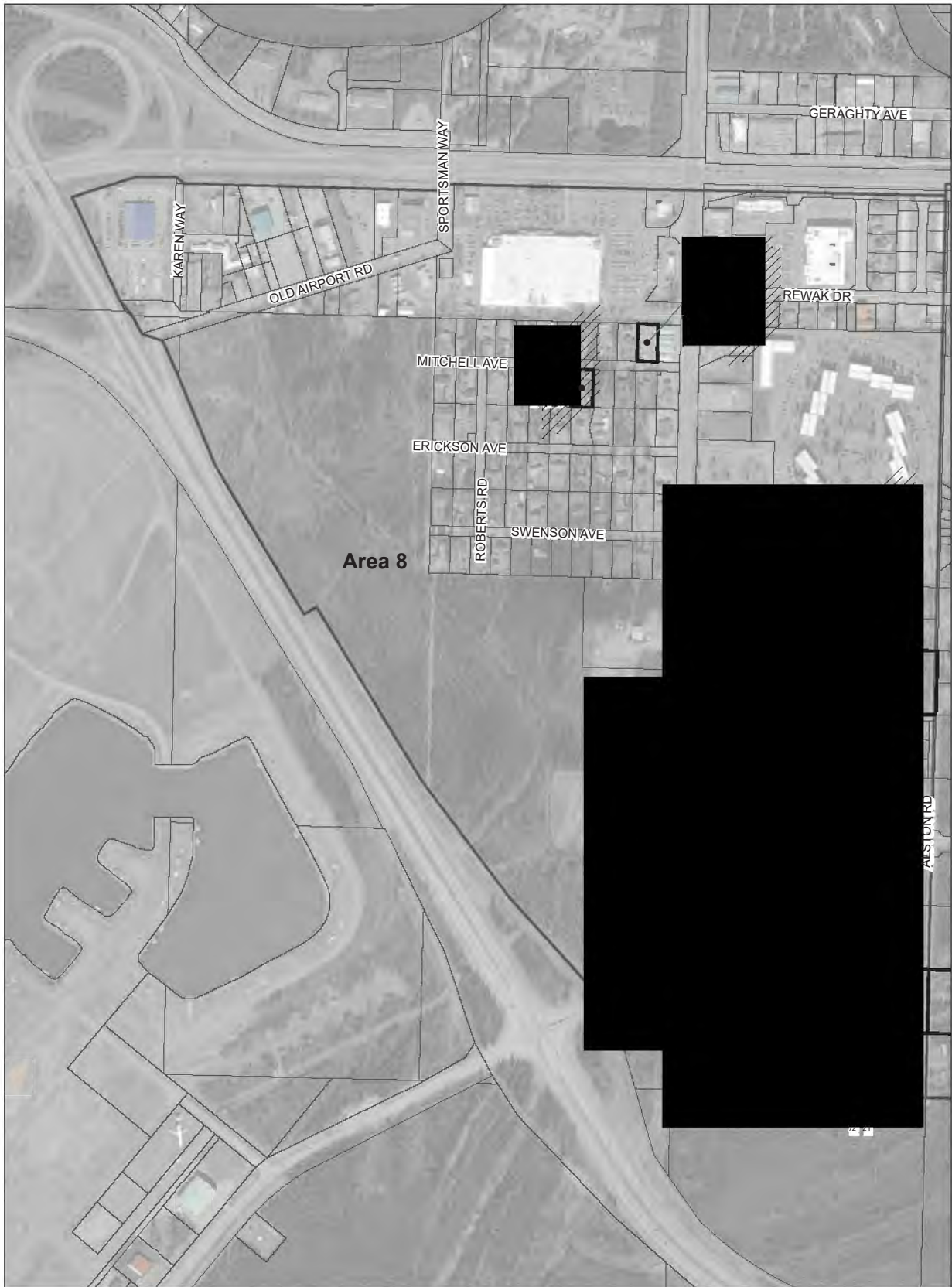
AREAS 2, 3, AND 5 QUARTERLY SAMPLING NETWORK RESULTS

April 2018

31-1-11735-011

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

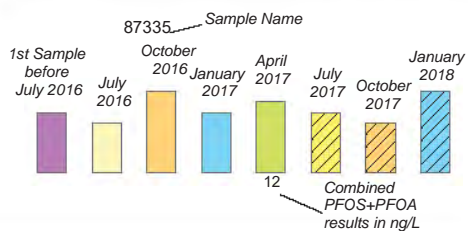
Figure 4



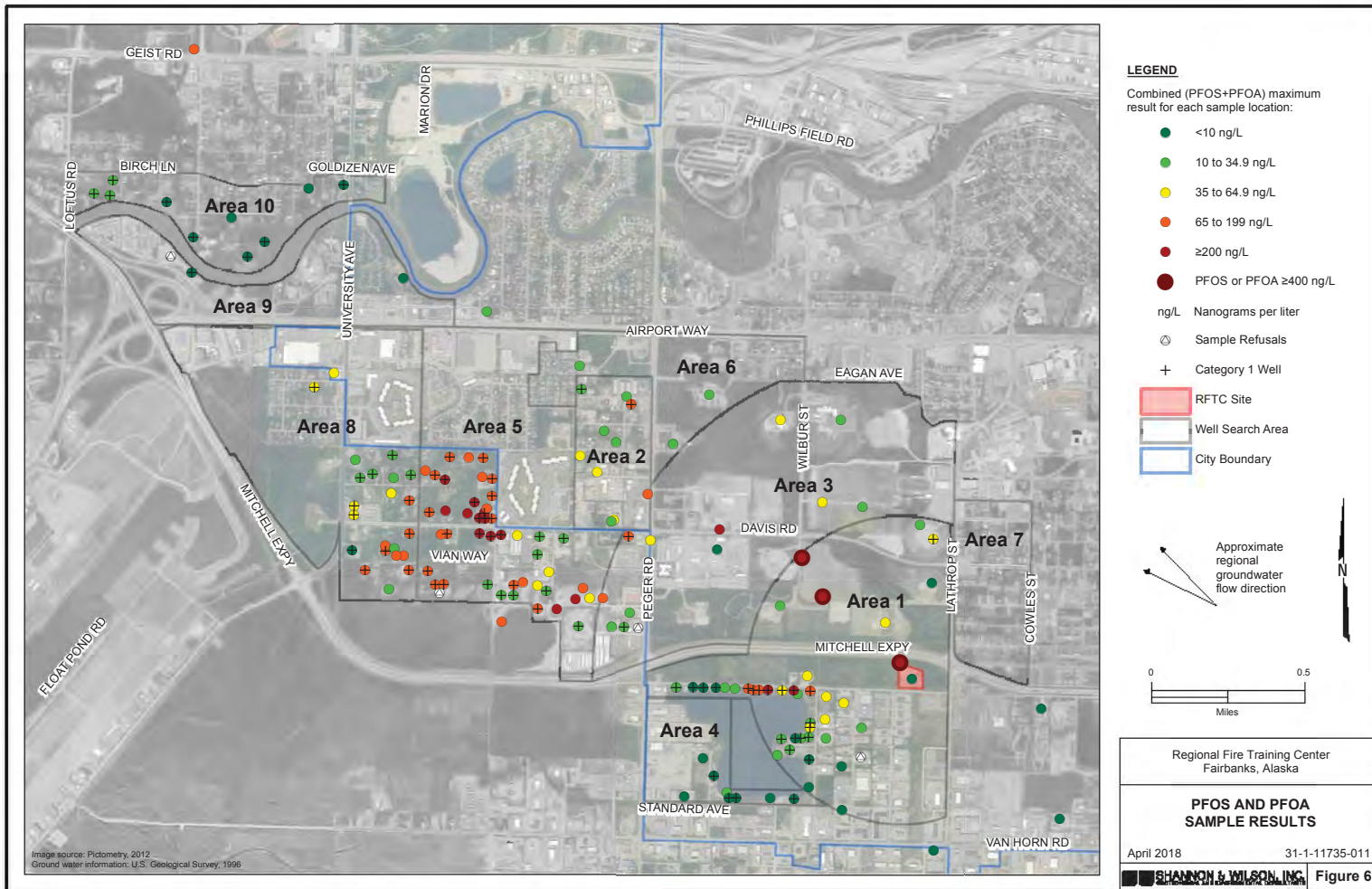
QUARTERLY RESULTS

LEGEND

- Sampled Parcels
- Other Parcels
- Well Search and Sampling Area



Regional Fire Training Center Fairbanks, Alaska	
AREA 8 QUARTERLY SAMPLING NETWORK RESULTS	
April 2018	31-1-11735-011
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure 5



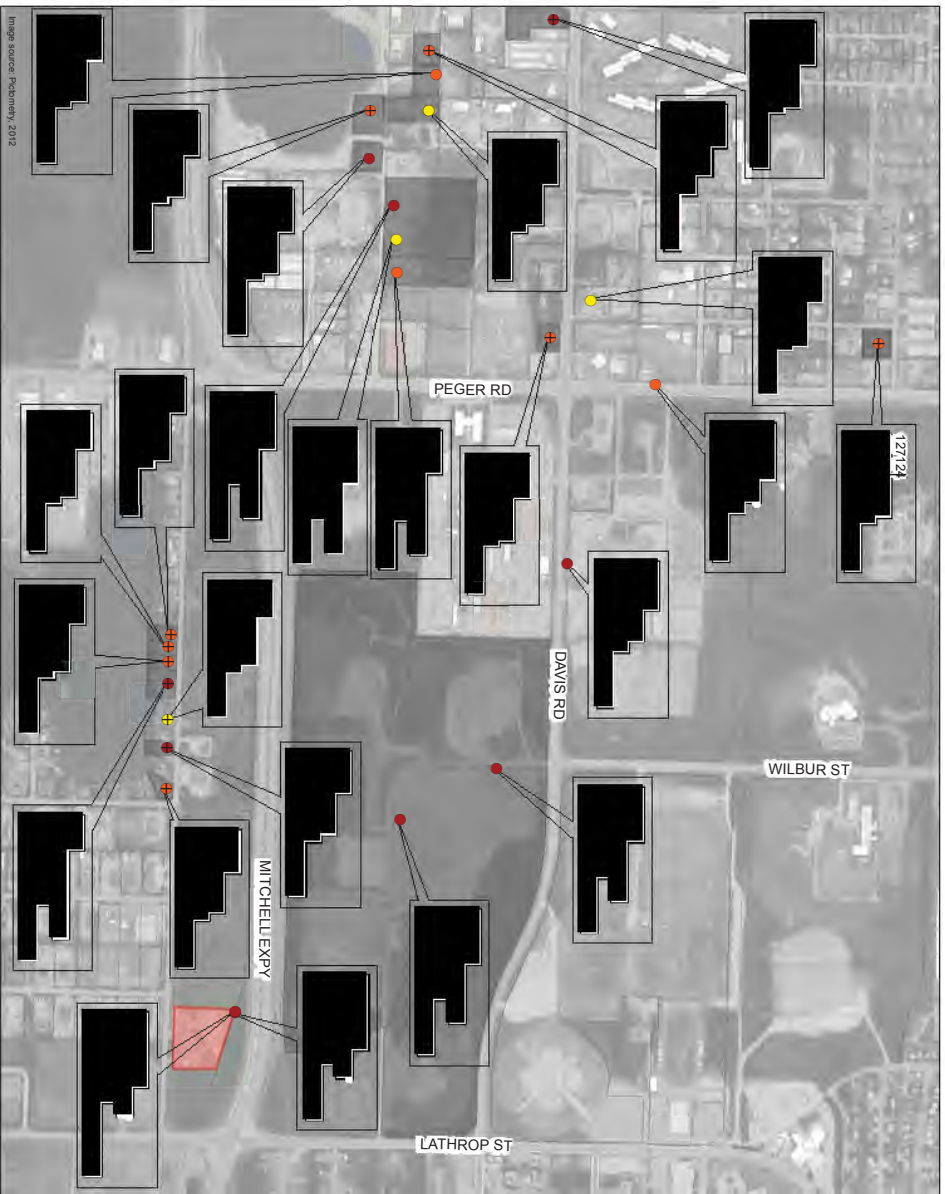


Image source: Peabody, 2012

LEGEND

Combined (PFOS+PFOA) maximum result for each sample location:

35 to 65 (Select wells)

65 to 199 ng/L

2200 ng/L

Category 1 Well

Parcel with LHA level exceedance

Parcel without LHA level exceedance

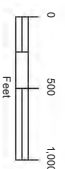
PFIC Site

Sample Name
Address
Well Category
LHA Combined Result

FYSA

Fairbanks Youth
Soccer Association

ng/L
nanograms per liter



Regional Fire Training Center
Fairbanks, Alaska

**AREAS 1, 2, 3 AND 5
LHA EXCEEDANCES AND MUNICIPAL
WATER CONNECTIONS**

April 2018 31-1-11735-011

SHANNON & WILSON, INC. Figure 7

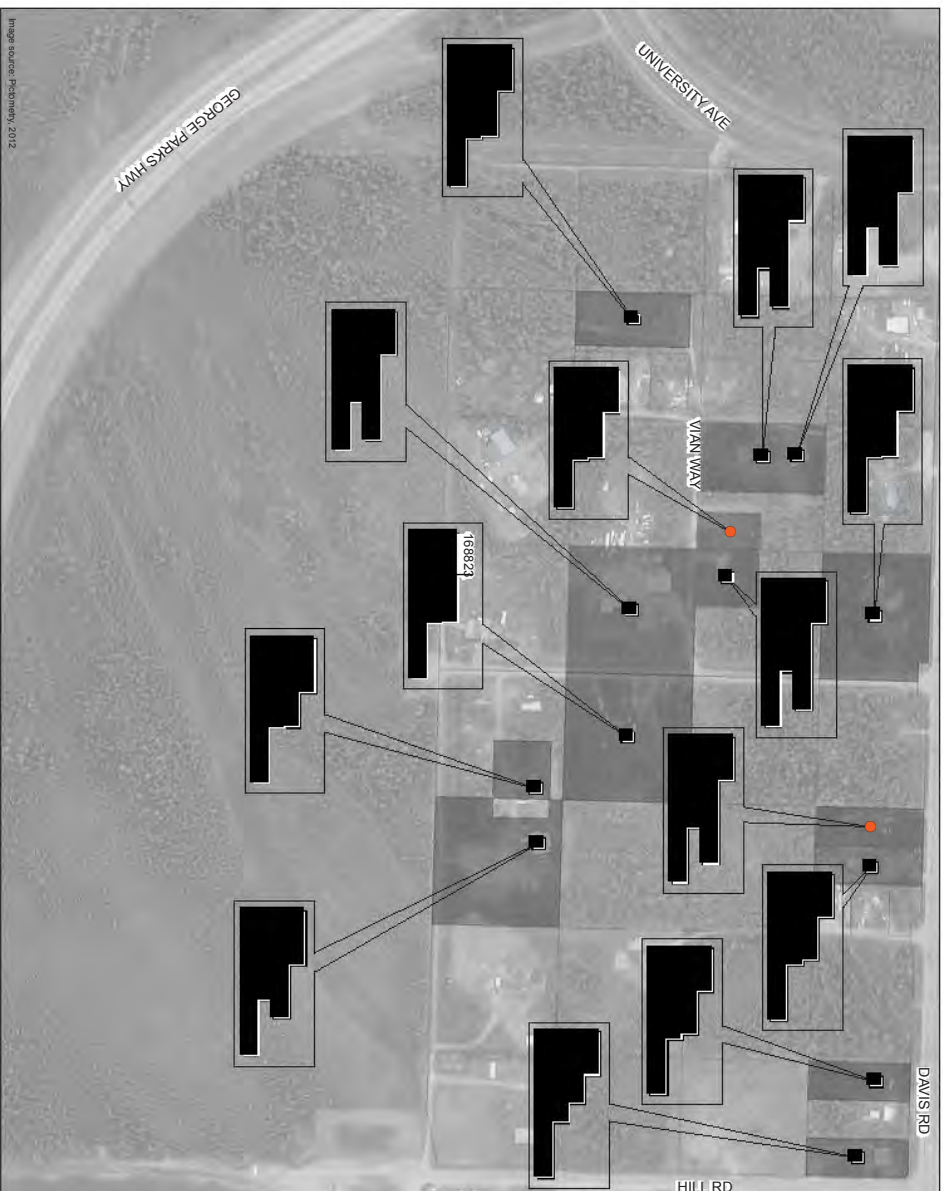
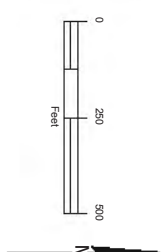


Image source: Pixabay, 2012



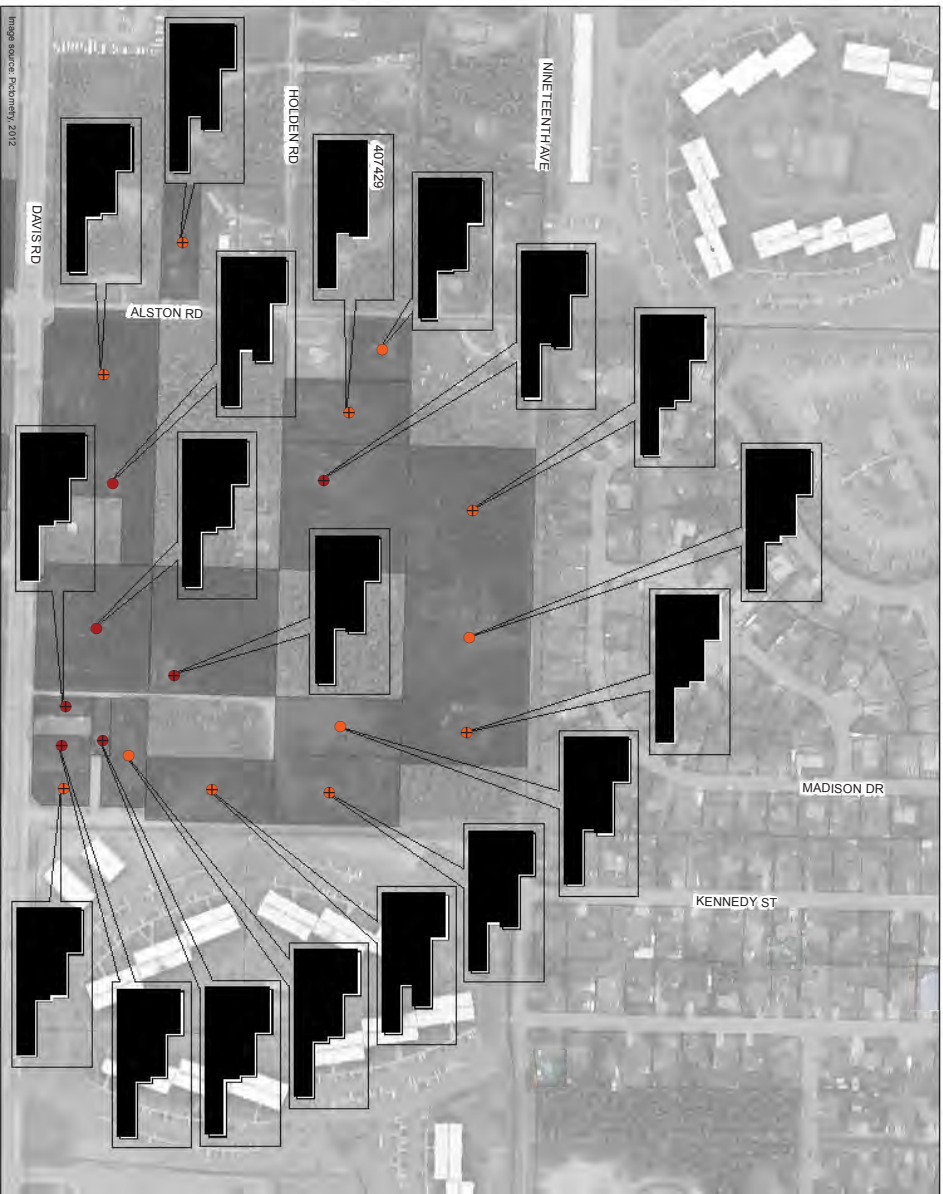
- LEGEND**
- Combined (PFOA+PFOA) maximum result for each sample location:
- 65 to 199 ng/L
 - ≥200 ng/L
- +
- Category 1 Well
- Parcel with LHA level exceedance
 - Parcel without LHA level exceedance
- Sample Name
Well Category
LHA Combined Result

Regional Fire Training Center
Fairbanks, Alaska

AREAS 5 AND 8
LHA LEVEL
EXCEEDANCES (1 OF 2)

April 2018 31-1-11735-011

SHANNON & WILSON, INC. Figure 8



LEGEND

Combined (PFOA+PFOS) maximum result for each sample location.

● 65 to 199 ng/L

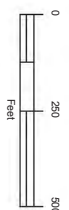
● ≥200 ng/L

+ Category 1 Well

■ Parcel with LHA level exceedance

□ Parcel without LHA level exceedance

Sample Name
Address
Well Category
LHA Combined Result



Regional Fire Training Center
Fairbanks, Alaska

AREAS 5 AND 8
LHA LEVEL
EXCEEDANCES (2 OF 2)

April 2018 31-1-11735-011

SHANNON & WILSON, INC. Figure 9

APPENDIX A
PUBLIC INFORMATION

CITY OF FAIRBANKS

800 Cushman Street
Fairbanks, AK 99701



**PUBLIC WORKS DEPARTMENT
Engineering Division**

Telephone (907) 459-6770
Fax (907) 452-5913

August 15, 2017

Dear Property Owner or Occupant:

The City of Fairbanks would like to invite you to a community meeting on Thursday, August 24 to provide an update on the presence of perfluorinated compounds (PFCs) in groundwater near the Regional Fire Training Center (RFTC) at 1730 30th Avenue. You are receiving this invitation because we have identified a water-supply well at your home or business, but other individuals who live in the RFTC area are also welcome to attend.

Regional Fire Training Center Community Meeting

Thursday, August 24

5:30 pm to 7:00 pm

City Hall, 800 Cushman Street

Council Chambers, 2nd Floor

The City is continuing to work with local environmental consulting firm Shannon & Wilson Inc. to assess the PFC-containing groundwater near the RFTC. On the reverse side of this letter is an updated Fact Sheet about PFCs, including a link to the Alaska Department of Environmental Conservation's project website. At this meeting we will summarize the current well search and sampling data, response actions taken to date, status of municipal water line connections, and answer any questions you may have.

CITY OF FAIRBANKS

Jackson C. Fox
City Engineer

City of Fairbanks

FACT SHEET – Well Testing for Perfluorinated Compounds

AUGUST 2017

Perfluorinated compounds (PFCs) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFCs are classified as emerging environmental contaminants because they do not have established regulatory standards, but evolving science has identified potential risk to human health and regulatory standards are under consideration. The City of Fairbanks has discovered PFC contamination at the Regional Fire Training Center (RFTC) at 1710 30th Avenue and is working in coordination with state regulators to take responsive action.

KEY MESSAGES & QUICK FACTS

The City has tested over 150 private wells where it believes PFCs could be present based on the known pattern of groundwater flow. Test results will typically be available within four weeks.

The U.S. Environmental Protection Agency (EPA) issued a lifetime health advisory level for PFCs in May 2016. The health advisory level has been set with a sufficient margin of protection for a lifetime of exposure to PFOA and PFOS from drinking water, including for sensitive populations such as children. PFOA refers to perfluorooctanoic acid; PFOS refers to perfluorooctane sulfonate.

The City has adopted the EPA lifetime health advisory level of **70 nanograms per liter (ng/L)** for PFOS, PFOA, or the sum of the two as the level above which action should be taken to reduce exposure in drinking water.

The health advisory level has been set based on the latest peer-reviewed science. However, the human health risks associated with PFC exposure have not been definitively established.

The City has confirmed that PFCs are present above the lifetime health advisory level in groundwater at the RFTC and in some private wells. The occupants of these homes and businesses have been offered bottled water delivery at no cost, and many have been connected to the municipal water system.

PFCs are used in a large number of products ranging from fabric waterproofing compounds, non-stick cookware, stain-resistant carpeting, some food packaging, and firefighting agents.

From 1984 to 2004, firefighters from the City of Fairbanks and other agencies used Aqueous Film Forming Foam, a firefighting agent that contained PFCs, during training to extinguish petroleum fires at the RFTC. The former burn pit has been excavated and removed from the site.

For more information, please visit:
www.dec.alaska.gov/spar/csp/sites/FairbanksFireTrainingCenter.htm

CONTACTS

For questions about well testing & study:

Shannon & Wilson Inc.

Marcy Nadel, Project Manager

Phone 907-458-3150

Email mdn@shanwil.com

For regulatory questions:

Alaska Dept of Environmental Conservation,
Contaminated Sites Program

Robert Burgess, Environmental Program
Specialist III

Phone 907-451-2153

Email robert.burgess@alaska.gov

For questions about PFC health effects:

Alaska Dept of Health & Social Services

Stacey Cooper, Health Assessor

Phone 907-269-8016

Email stacey.cooper@alaska.gov

Division of Public Health Website:

www.dhss.alaska.gov/dph/Epi/eph/Pages/default.aspx

For questions about RFTC & all other inquiries:

City of Fairbanks, Engineering Division

Jackson Fox, City Engineer

Phone 907-459-6758

Email jcfox@ci.fairbanks.ak.us



August 24, 2017

Perfluoroalkyl Substances — Regional Fire Training Center, Fairbanks, Alaska

Introduction

Recently, chemicals called perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were found at the Regional Fire Training Center (RFTC) in Fairbanks, Alaska (1710 30th Avenue) — and in water wells nearby. Contact with these chemicals — such as drinking contaminated water — may cause health problems. Below you'll find information you need to know about PFOS and PFOA.

Summary

- PFOS and PFOA are chemicals that may harm your health.
- If your well has levels of PFOS and PFOA higher than the health advisory (0.07 micrograms per liter), you should use another water source for drinking water and cooking.
- You can still use your water to bathe, clean, wash dishes, and do laundry.
- The City of Fairbanks is providing drinking water to people whose well water is above EPA's advisory level for PFOS and PFOA.

About PFOS and PFOA

What are PFOS and PFOA?

PFOS and PFOA are perfluoroalkyl substances (PFAS) — human-made chemicals that have been used for both residential and industrial purposes. PFAS have been found in some products that resist fire, stains, grease, and water such as:

- Furniture
- Carpeting
- Clothing
- Firefighting foams
- Food Packaging

At the RFTC, the source(s) of PFAS is certain firefighting foams that contained PFAS.

How could I come into contact with PFAS?

Because PFAS were widely used worldwide, stay in the environment for a long time, and travel long distances in water and air, there are small amounts in many water and some food sources. Most people have come into contact with low levels of PFAS. PFAS are also found in the blood or tissue of wildlife, like fish and marine mammals such as seals and sea lions.

Usually, people come into contact with PFAS by eating or drinking them in food and water. Additionally:

- Women who are exposed to PFAS pass it to their unborn babies during pregnancy — and to their infants through breastfeeding.
- Children may come into contact with small amounts of PFAS in the home by touching products (such as carpet) with PFAS and then putting their hands in their mouths.

How can PFAS affect my health?

Some, but not all, scientific literature suggests that certain PFAS may affect a variety of systems in the body. Additional research is needed to better understand possible human health effects from exposure to PFAS in water and food.

Scientists are not yet certain about the possible health effects resulting from human exposure to PFAS at levels typically found in our food and water. Some, but not all studies in humans have suggested that certain PFAS may affect the developing fetus and child. Potential health effects from exposure to PFAS may include:

- Affect the development of unborn babies and breastfeeding infants — including possible changes in growth, learning, and behavior
- Decrease fertility and interfere with the body's natural hormones
- Increase cholesterol
- Affect the immune system
- Increase the risk of cancer

More research is needed to confirm or rule out possible links between health effects of potential concern and exposure to PFAS. At this time, we cannot tell if drinking well water near the RFTC in Fairbanks could be causing any current health problems — or if it will cause problems in the future.

How can I tell if I have come into contact with PFAS?

PFAS can be measured in the blood, however, there are some limitations on blood tests to consider. Individuals who feel they may have been exposed to high levels of PFOA or PFOS and would like to have their blood levels measured should keep in mind that this is not a routine test that health care providers offer. The test results will not provide clear answers for existing

or possible health effects. Individuals who feel the need to be tested should consult with their health care provider, local and state health department or other health professionals on how to move forward. The body's natural elimination processes are the only way to remove PFAS from the body.

What is the health advisory for PFOS and PFOA?

The U.S. Environmental Protection Agency (EPA) has set a lifetime health advisory (LTHA) level for PFOS and PFOA — individually or combined— of no more than 0.07 micrograms per liter of water (µg/L or ppb-parts per billion). This amount is the same as 70 nanograms of PFOS or PFOA (or the 2 combined) per liter of water (ng/L or ppt-parts per trillion). The LTHA is designed to protect people from contact with PFOS and PFOA in drinking water — particularly unborn babies and infants (the populations most likely to be affected by exposure to PFOS and PFOA).

Safety Information for Fairbanks Residents

Can I drink my well water? What about my pets?

If levels of PFOS or PFOA (or the 2 combined) are at or above the health advisory level (0.07 micrograms per liter), do **not** drink your tap water or use it to prepare baby formula. Also avoid giving it to pets and other animals.

Is it safe to cook with my well water?

If your well water has levels of PFOS or PFOA (or the 2 combined) at or above the health advisory, do **not** use your well water to cook — even if you heat or boil it first. Boiling water doesn't remove PFOS and PFOA.

Is it safe to shower, take baths, and brush my teeth with my well water?

It is very unlikely that showering or taking baths with well water could cause any health problems. This is because:

- Your skin does not absorb (take in) enough PFOS and PFOA to cause problems. PFOS and PFOA also do not irritate the skin.
- PFOS and PFOA do not move easily from water to air — that means it is unlikely that you will breathe it in when using well water.

It is safe to shower and bathe in PFAS- contaminated water. If your water contains PFAS, particularly if levels exceed the LTHA, you can reduce exposure by using an alternative or treated water source for brushing teeth, and any activity that might result in ingestion of water.

Can I clean, wash dishes, wash clothes, and rinse food with my well water?

It is safe to use well water to clean your house, wash dishes, and do laundry. However, we recommend that you rinse food with clean water.

Can I breastfeed my child if I have been drinking my well water?

Breastfeeding is linked with numerous health benefits for both infants and mothers. At this time, it is recommended that nursing mothers continue to breastfeed. The science on the health effects of PFAS for mothers and babies is evolving. However, given the scientific understanding at this time, the benefits of breastfeeding outweigh any known risk. To better weigh the risks and benefits of breastfeeding, please talk to your doctor.

Is it safe to water my vegetable garden with my well water?

We do not have a clear answer to this question at this time. Some studies have shown that vegetables grown in soil with high levels of PFAS may absorb the chemicals. But this could depend on a lot of different factors (e.g., level of PFAS in water, the type of PFAS contamination, the amount of garden watering, and the type of produce grown).

One study showed that garden plants watered with water contaminated with PFAS took in only very small amounts of the chemicals. The study also noted that the health benefits of eating fresh vegetables outweigh any health risks from small amounts of PFAS.

Soil particles can stick to plants, vegetables, and fruits. Low-lying plants, leafy vegetables (e.g., spinach and lettuce) and root crops (e.g., potatoes and carrots) are more likely to have soil particles on them and possibly contribute to human exposure through incidental ingestion. Some studies show that PFAS can accumulate at low levels in plant roots. Uptake of contaminants by the roots of a plant may move into other portions of the plant but usually at even lower concentrations. Your exposure to PFAS through garden vegetables is not likely to be significant compared to other primary exposure routes such as drinking contaminated water.

In the end it is up to you. Some people living near the RFTC may feel more comfortable using a different water source with confirmed lower PFAS levels for their vegetable gardens. However, if you choose to use your well for your garden, we recommend you wash your vegetables with clean water and peel root vegetables.

Is it safe to swim in Peger Lake?

Yes. The levels of PFOS and PFOA in water tested from Peger Lake are below the health advisory. This means you can swim in the lake — and it is okay if you accidentally swallow some water during your swim.

Next Steps**How often will my well water be tested for PFAS?**

The City of Fairbanks is currently checking wells near the RFTC. How often the wells are checked will depend on how high the levels of PFAS are — and how much water people are using.

The City of Fairbanks will work with the Alaska Department of Environmental Conservation (ADEC) to make a long-term plan for tracking the wells until there is another permanent source of safe drinking water.

What is the Alaska Section of Epidemiology doing to address concerns about PFAS in drinking water?

The Section of Epidemiology is taking steps to protect Fairbanks residents, including:

- Working with ADEC and the Agency for Toxic Substances and Disease Registry (ATSDR) to understand how PFAS from well water may affect people living near the RFTC
- Finding more information about PFAS and updating our recommendations as data become available.

Where can I get more information?

- To learn more about health effects of PFAS, contact the Alaska Section of Epidemiology at **907-269-8000**.
- To learn more about well water testing, contact the Alaska Department of Environmental Conservation at **907-451-2153**.
- If you have health concerns about PFAS, please talk with your health care provider.

You can also find additional information in the following resources:

- ATSDR's PFAS web page:
<https://www.atsdr.cdc.gov/pfc/index.html>
- PFOS and PFOA Drinking Water Health Advisories (EPA)
https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf
- Alaska Environmental Public Health Program
<http://dhss.alaska.gov/dph/Epi/eph/Pages/default.aspx>

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

Frequently Asked Questions

What are PFAS?

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a large group of man-made chemicals that have been used in industry and consumer products worldwide since the 1950s.

- PFAS do not occur naturally, but are widespread in the environment.
- PFAS are found in people, wildlife and fish all over the world.
- Some PFAS can stay in people's bodies a long time.
- Some PFAS do not break down easily in the environment.

How can I be exposed to PFAS?

PFAS contamination may be in drinking water, food, indoor dust, some consumer products, and workplaces. Most non worker exposures occur through drinking contaminated water or eating food that contains PFAS.

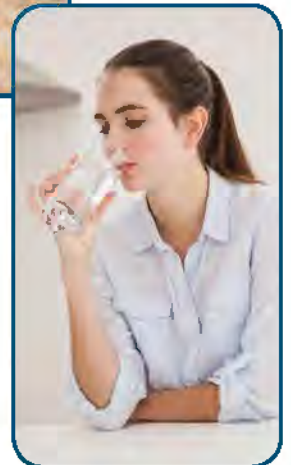
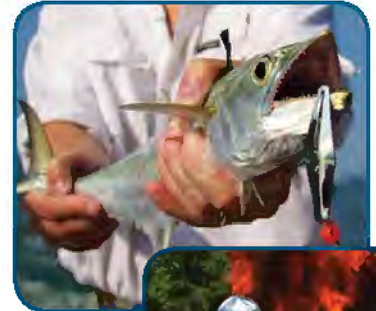
Although some types of PFAS are no longer used, some products may still contain PFAS:

- Food packaging materials
- Nonstick cookware
- Stain resistant carpet treatments
- Water resistant clothing
- Cleaning products
- Paints, varnishes and sealants
- Firefighting foam
- Some cosmetics

How can I reduce my exposure to PFAS?

PFAS are present at low levels in some food products and in the environment (air, water, soil etc.), so you probably cannot prevent PFAS exposure altogether. However, if you live near known sources of PFAS contamination, you can take steps to reduce your risk of exposure.

- If your drinking water contains PFAS above the EPA Lifetime Health Advisory, consider using an alternative or treated water source for any activity in which you might swallow water:
 - » drinking
 - » food preparation
 - » cooking
 - » brushing teeth, and
 - » preparing infant formula
- Check for fish advisories for water bodies where you fish.
 - » Follow fish advisories that tell people to stop or limit eating fish from waters contaminated with PFAS or other compounds.
 - » Research has shown the benefits of eating fish, so continue to eat fish from safe sources as part of your healthy diet.
- Read consumer product labels and avoid using those with PFAS.



How can PFAS affect people's health?

Some scientific studies suggest that certain PFAS may affect different systems in the body. NCEH/ATSDR is working with various partners to better understand how exposure to PFAS might affect people's health—especially how exposure to PFAS in water and food may be harmful. Although more research is needed, some studies in people have shown that certain PFAS may:

- affect growth, learning, and behavior of infants and older children
- lower a woman's chance of getting pregnant
- interfere with the body's natural hormones
- increase cholesterol levels
- affect the immune system and
- increase the risk of cancer

At this time, scientists are still learning about the health effects of exposures to mixtures of PFAS.

How can I learn more?

You can visit the following websites for more information:

- **CDC/ATSDR:**
 - » CDC Info: <https://www.cdc.gov/cdc-info/>, or (800) 232-4636.
 - » www.atsdr.cdc.gov/pfc/index.html
 - » <https://www.cdc.gov/exposurereport/index.html>
- **Environmental Protection Agency (EPA):**
<https://www.epa.gov/chemical-research/research-and-polyfluoroalkyl-substances-pfas>
- **Food and Drug Administration:**
<https://www.fda.gov/food/newsevents/constituentupdates/ucm479465.htm>
- **National Toxicology Program:**
<https://ntp.niehs.nih.gov/pubhealth/hat/noms/pfoa/index.html>

If you have questions about the products you use in your home, please contact the **Consumer Product Safety Commission (CPSC)** at (800) 638-2772.

List of Common PFAS and Their Abbreviations:

Abbreviation	Chemical name
PFOS	Perfluorooctane sulfonic acid
PFOA (or C8)	Perfluorooctanoic acid
PFNA	Perfluorononanoic acid
PFDA	Perfluorodecanoic acid
PFOSA (or FOSA)	Perfluorooctane sulfonamide
MeFOSAA (aka Me-PFOSA-AcOH)	2-(N-Methyl-perfluorooctane sulfonamido) acetic acid
Et-FOSAA (aka Et-PFOSA-AcOH)	2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid
PFHxS	Perfluorohexane sulfonic acid

Talking to Your Doctor about Exposure to PFAS

If you have been exposed to perfluoroalkyl and polyfluoroalkyl substances (PFAS) and are concerned about your health, you can tell your doctor.

You can share this fact sheet with your doctor to help start a conversation about how PFAS can affect your health.



1. Can exposure to PFAS cause health problems?

- Some scientific studies suggest that certain PFAS may affect different systems in the body. NCEH/ATSDR is working with various partners to better understand how exposure to PFAS might affect people's health—especially how exposure to PFAS in water and food may be harmful.
- Some (but not all) PFAS build up in the body. The levels of some PFAS go down slowly over time once exposure stops. Scientists are studying how different amounts of PFAS in the body over time may affect health.
- More research is needed, but some studies in people have shown that certain PFAS may:
 - » affect growth, learning, and behavior of infants and older children
 - » lower a woman's chance of getting pregnant
 - » interfere with the body's natural hormones
 - » increase cholesterol levels
 - » affect the immune system
 - » increase the risk of cancer

If you have any of these conditions and have been exposed to PFAS, you can tell your doctor.

2. Should my family and I be tested for any of the health conditions possibly linked to PFAS exposure?

- Laboratory test results can't tell you if PFAS exposure has caused your health condition.
- Some of the health effects possibly linked to PFAS exposure, like high cholesterol, can be checked as part of your annual physical. It is important to have regular check-ups and screenings.
- You can tell your doctor about any exposure to PFAS and any symptoms you have.

3. Should my family and I get a blood test for PFAS if we have been exposed to PFAS?

- PFAS blood test results can tell you the amount of PFAS in your blood. However, test results won't tell you how PFAS will affect your health now or in the future.
- Blood testing for PFAS is not a regular test offered by doctors or health departments.
- If you want or need to know your PFAS blood levels, you can talk to
 - » your doctor or health care provider
 - » other health professionals (for example, for concerns about babies and children contact your regional Pediatric Environmental Health Specialty Unit or PEHSU: <http://www.pehsu.net/findhelp.html>).
- **Remember** that test results will only tell you and your health care provider if you have been exposed to PFAS.
- Keep in mind that most people in the United States have one or more specific PFAS in their blood, especially PFOS and PFOA.

4. Could exposure to PFAS in drinking water harm my health in the future?

We don't know if exposure to PFAS may cause health problems in the future. You can tell your doctor if you have been exposed to PFAS and ask if you need to be monitored for symptoms or conditions that may be caused by PFAS exposure (see list in question #1) in the future.

5. How will exposure to PFAS in drinking water affect my pregnancy?

Exposure to PFAS in drinking water at levels above the EPA Lifetime Health Advisory has been associated with pregnancy-induced high blood pressure. This complication can include not only high blood pressure, but also signs of damage to other organ systems, most often the liver and kidneys.

Tell your doctor if you have been exposed to PFAS so that he/she can provide appropriate medical care. Checking for high blood pressure should be part of your routine prenatal care. It is important to go to all of your prenatal checkups and discuss with the doctor or nurse any health concerns.

6. Can I breastfeed my baby if I've been exposed to PFAS in drinking water?

Nursing mothers should continue to breastfeed.

- While we do not know a lot about the health effects of exposure to PFAS in breast milk, we do know that the benefits of breastfeeding are well documented.
- PFAS in a mother's body can move from her blood into her unborn child and from her breastmilk into her breastfed baby. However, based on current science, the benefits of breastfeeding appear to outweigh the risks for infants exposed to PFAS in breast milk.
- Breastfeeding is good for the health of both infants and mothers.
- Scientists continue to do research in this area.
- If you have concerns, talk to your doctor.
- For more information about the benefits of breastfeeding, please visit:
<https://www.womenshealth.gov/breastfeeding/breastfeeding-benefits.html>.

7. How can I learn more about PFAS?

- Contact **1-800-CDC-INFO** for updated information on PFAS.
- Visit the following websites:
 - » ATSDR website:
<http://www.atsdr.cdc.gov/pfc/index.html>
 - » ATSDR's PFAS Clinician Factsheet:
https://www.atsdr.cdc.gov/pfc/docs/pfas_clinician_fact_sheet_508.pdf
 - » Environmental Protection Agency website:
<https://www.epa.gov/chemical-research/research-and-polyfluoroalkyl-substances-pfas>
- Contact your state health department.
- Contact the Consumer Product Safety Commission at **(800)-638-2772** if you have questions about the products you use in your home.

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) in the U.S. Population

Most people in the United States have been exposed to PFAS and have PFAS in their blood, especially perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).

Since 1999, the National Health and Nutrition Examination Survey (NHANES) has measured blood PFAS in the U.S. population. NHANES is a program of studies designed by the Centers for Disease Control and Prevention (CDC) to evaluate the health and nutrition of adults and children in the United States.

Since 2002, production and use of PFOS and PFOA in the United States have declined. As the use of some PFAS has declined, some blood PFAS levels have gone down as well.

- From 1999 – 2014, blood PFOS levels have declined by more than 80%.
- From 1999 – 2014, blood PFOA levels have declined by more than 60%.

However, as PFOS and PFOA are phased out and replaced, people may be exposed to other PFAS.

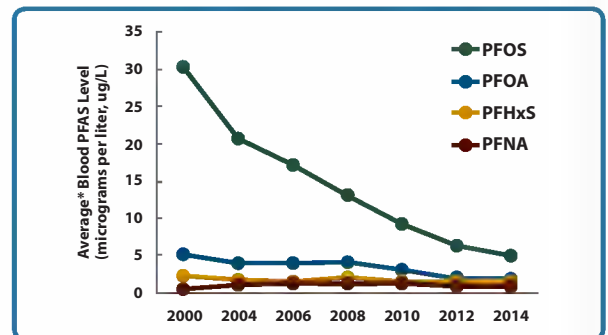
Blood PFAS levels decreased in people exposed to PFAS in drinking water after a water filtration system was installed.

In the mid-2000s, water sampling found PFAS contamination in municipal drinking water sources east of St. Paul, Minnesota. In 2006, a water filtration system was installed to reduce PFAS levels. PFOS and PFOA were reduced in the drinking water below the current EPA lifetime health advisory level for PFOS+PFOA of 70 parts per trillion.

In 2008, 2010, and 2014, the Minnesota Department of Health measured blood PFAS levels in people who had been exposed to PFAS in their drinking water before installation of the filtration system.

- PFOS, PFOA, and PFHxS blood levels went down in long-term residents after a water filtration system was installed.

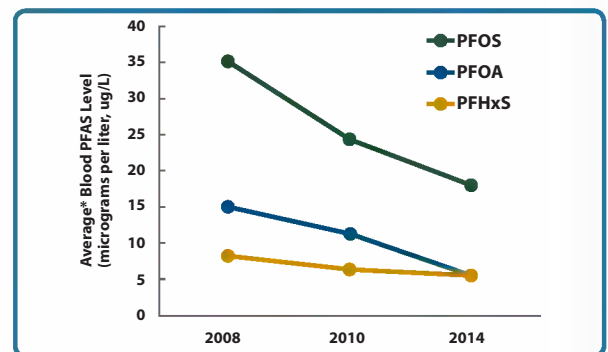
Blood Levels of the Most Common PFAS in People in the United States from 2000-2014



* Average = geometric mean

Data Source: Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Average Blood Level of Some PFAS after Installing a Water Filtration System



* Data shown are geometric means

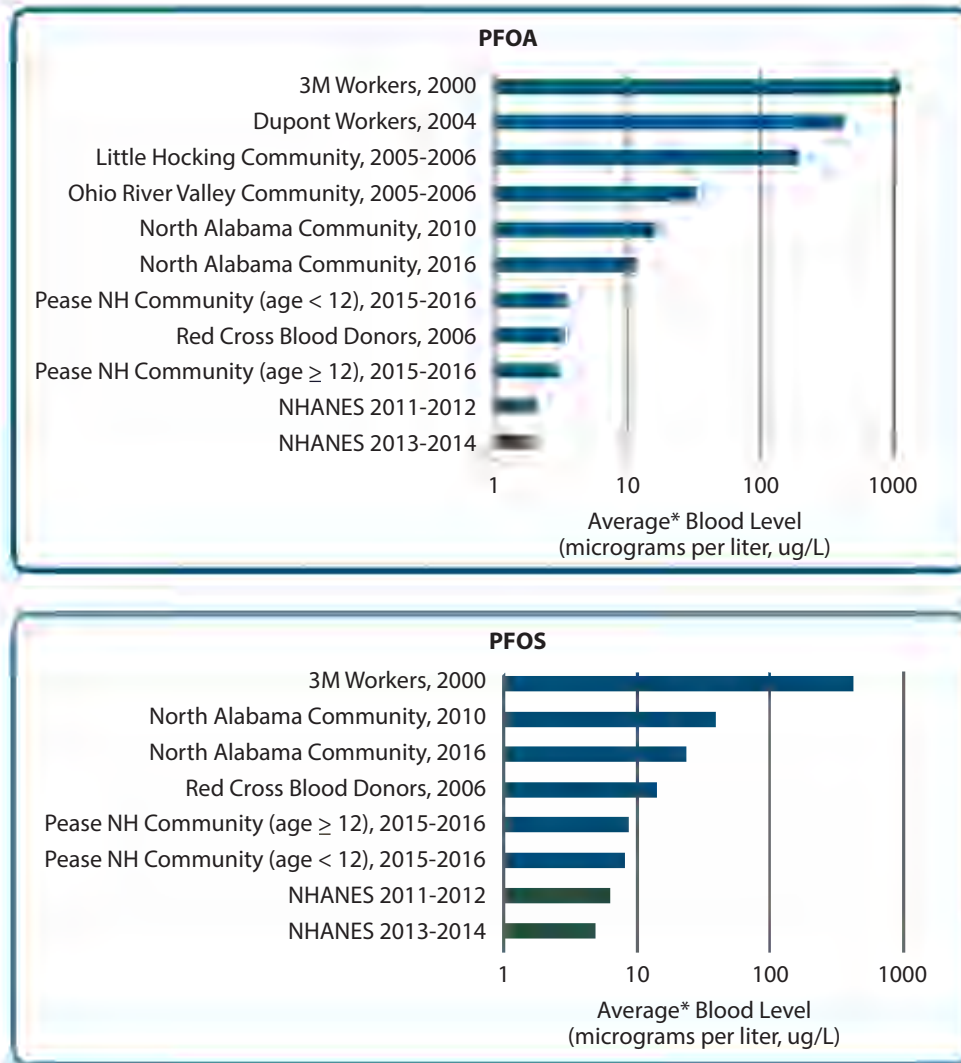
Data Source: Minnesota Department of Health, Environmental Tracking and Biomonitoring. East Metro PFC3 Biomonitoring Project, December 2015 Report to the Community.

Biomonitoring Studies have measured PFAS levels in other groups:

- Workers in PFAS manufacturing facilities,
- Communities with contaminated drinking water, and
- The general U.S. population.

The figures below show PFOA and PFOS levels measured in different exposed populations, compared to levels CDC measured in the general U.S. population in 2011-2012 and 2013-2014.

Blood Levels in People Who Were Exposed to PFAS



* Average = geometric mean

References:

www.cdc.gov/exposurereport
<http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/PFC3CommunityReport.pdf>
<http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/pfc3comrpt2009.pdf>
https://www.atsdr.cdc.gov/HAC/pha/BiologicalSampling/Biological_Sampling_of_Substances_in_Alabama_EI%20-Report_11-28-2016_508.pdf
<http://www.dhhs.nh.gov/dphs/documents/pease-pfc-blood-testing.pdf>

PFOS – Perfluorooctane sulfonic acid

PFOA – Perfluorooctanoic acid

PFHxS – Perfluorohexane sulfonic acid

PFNA – Perfluorononanoic acid

Introduced by: Council Members Pruhs and Rogers
Finance Committee: August 29, 2017
Date: September, 11 2017

ORDINANCE NO. 6060, AS AMENDED

**AN ORDINANCE TO PROVIDE A STIPEND AND RESOLUTIONS TO
RESIDENTS AND BUSINESSES WITH DRINKING WATER
CONTAMINATED BY PERFLUORINATED COMPOUNDS (PFCs)**

WHEREAS, past training activities at the Regional Fire Training Center, which is owned and operated by the City of Fairbanks (City), have resulted in ground water contamination that has migrated off the property and contaminated wells in south Fairbanks with PFCs; and

WHEREAS, the City wants to ensure residents and businesses affected by this contamination have access to clean drinking water; and

WHEREAS, there are four categories of properties in question:

Category 1 properties have wells connected to a structure's interior plumbing, the wells are the structure's only source of drinking water, and the water in the wells is contaminated above the U.S. Environmental Protection Agency's (EPA's) Lifetime Health Advisory (LHA) Level;

Category 2 properties have wells that are not connected to the structure's interior plumbing, the wells are contaminated above the EPA's LHA Level, and a holding tank is currently being used as the structure's source of drinking water;

Category 3 properties have wells that test below the EPA's LHA Level but are above 85% of the EPA's LHA Level, and the wells are the structure's only source of drinking water or a holding tank is currently being used as the structure's source of drinking water.

Category 4 properties do not have a well.

WHEREAS, the City of Fairbanks is providing valuable real estate upgrades to Category 1, 2, and 3 participants.

NOW, THEREFORE, BE IT ENACTED BY THE CITY COUNCIL OF THE CITY OF FAIRBANKS, ALASKA, as follows:

SECTION 1. For Category 1 properties, the City will fund the water service connections to water mains and will pay a stipend for water bills ~~over the next two years, not to exceed of \$2,500 for these two years,~~ with the goal of having these properties completed by December 2017.

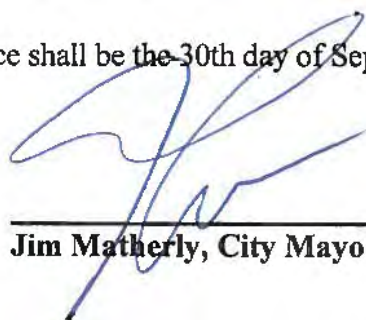
SECTION 2. For Category 2 properties, the City will fund the connection to the water mains with the goal of completion by September 2018.

SECTION 3. Category 1, 2, **and 3** participants, to receive real estate upgrades and water ~~stipended~~ to College Utilities Corp., will execute a "Waiver of Claims" with the City of Fairbanks for any/all real estate loss of value from potential (PFC's) contamination.

SECTION 4. For Category 3 properties the City will fund the connection to the water mains during the next construction season upon the 85% target being reached.

SECTION 5. For Category 4 properties **inside the City limits**, the residents will be required to connect to the water main at their expense **as already required by City Code**.

SECTION 6. That the effective date of this Ordinance shall be the 30th day of September 2017.




Jim Matherly, City Mayor

AYES: Rogers, Bagwill, Pruhs, Cleworth
NAYS: Therrien
ABSENT: Huntington
ADOPTED: September 25, 2017

ATTEST:

APPROVED AS TO FORM:



D. Danyielle Snider, CMC, City Clerk

Paul J. Ewers, City Attorney

CITY OF FAIRBANKS
FISCAL NOTE

I. REQUEST:

Ordinance or Resolution No: 6060

Abbreviated Title: STIPEND AND WATER RESOLUTIONS DUE TO PFC CONTAMINATION

Does the adoption of this ordinance or resolution authorize:

1) additional costs beyond the current adopted budget? Yes X No

2) additional support or maintenance costs? Yes X No

If yes, what is the estimate? UNKNOWN

3) additional positions beyond the current adopted budget? Yes No X

If yes, how many positions?

If yes, type of positions? (F - Full Time, P - Part Time, T - Temporary)

II. FINANCIAL DETAIL:

ESTIMATED EXPENDITURES	FY 2017	FY 2018	FY 2019	Beyond	Total
CLAIMS	\$100,000				\$100,000
					\$0
					\$0
TOTAL	\$100,000	\$0	\$0	\$0	\$100,000

ESTIMATED FUNDING SOURCES	FY 2017	FY 2018	FY 2019	Beyond	Total
Risk Fund	\$100,000				\$100,000
Other					\$0
TOTAL	\$100,000	\$0	\$0	\$0	\$100,000

EXPLANATION

To provide a \$2,500 drinking water stipend to 40 category one properties in 2017. This stipend will be paid directly to Golden Heart Utilities (GHU) upon completion of the hook up to the GHU water main/utility.

It is the intent to provide the stipend to all properties who obtain category one designation in the future.

Please see the Ordinance for more descriptive treatment of other categories of properties with potential perfluorinated compound (PFC) contamination

Reviewed by Finance Department: Initial CR Date 8/28/2017

City of Fairbanks

FACT SHEET – Well Testing for Perfluorinated Compounds

DECEMBER 2017

Perfluorinated compounds (PFCs) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFCs are classified as emerging environmental contaminants because they do not have established regulatory standards, but evolving science has identified potential risk to human health. The City of Fairbanks has discovered PFC contamination at the Regional Fire Training Center (RFTC) at 1710 30th Avenue and is working in coordination with state regulators to take responsive action.

KEY MESSAGES & QUICK FACTS

The City has tested over 150 wells where it believes PFCs could be present based on the known pattern of groundwater flow. Test results will typically be available within four weeks.

The U.S. Environmental Protection Agency (EPA) issued a lifetime health advisory level for PFCs in May 2016. The health advisory level has been set with a sufficient margin of protection for a lifetime of exposure to PFOA and PFOS from drinking water, including for sensitive populations such as children. PFOA refers to perfluorooctanoic acid; PFOS refers to perfluorooctane sulfonate.

The City has adopted the EPA lifetime health advisory level of **70 nanograms per liter (ng/L)** for PFOS, PFOA, or the sum of the two as the level above which action should be taken to reduce exposure in drinking water.

The health advisory level has been set based on the latest peer-reviewed science. However, the human health risks associated with PFC exposure have not been definitively established.

The City has confirmed that PFCs are present above the lifetime health advisory level in groundwater at the RFTC and in some private wells. The occupants of these homes and businesses have been offered bottled water delivery at no cost, and many have been connected to the municipal water system.

PFCs are used in a large number of products ranging from fabric waterproofing compounds, non-stick cookware, stain-resistant carpeting, some food packaging, and firefighting agents.

From 1984 to 2004, firefighters from the City of Fairbanks and other agencies used Aqueous Film Forming Foam, a firefighting agent that contained PFCs, during training to extinguish petroleum fires at the RFTC. The former burn pit has been excavated and removed from the site.

For more information, please visit:
www.dec.alaska.gov/spar/csp/sites/FairbanksFireTrainingCenter.htm

CONTACTS

For questions about well testing & study:

Shannon & Wilson Inc.

Marcy Nadel, Project Manager

Phone 907-458-3150

Email mdn@shanwil.com

For regulatory questions:

Alaska Dept of Environmental Conservation,
Contaminated Sites Program

Robert Burgess, Environmental Program
Specialist III

Phone 907-451-2153

Email robert.burgess@alaska.gov

For questions about PFC health effects:

Alaska Dept of Health & Social Services
Stacey Cooper, Health Assessor

Phone 907-269-8016

Email stacey.cooper@alaska.gov

Division of Public Health Website:
www.dhss.alaska.gov/dph/Epi/eph/Pages/default.aspx

For questions about RFTC & all other inquiries:

Andrew Ackerman, City of Fairbanks
Environmental Manager

Phone 907-459-6836

Email aackerman@fairbanks.us



800 Cushman Street
Fairbanks, AK 99701

Telephone (907) 459-6770
Fax (907) 452-5913

February 5, 2018

Dear Property Owner:

Over the past year, the City of Fairbanks (City) has connected 44 properties to the municipal water system in response to the presence of perfluorinated compounds (PFCs) in private water-supply wells near the Regional Fire Training Center (RFTC) at 1710 30th Avenue. These properties have PFC concentrations above the U.S. Environmental Protection Agency (US EPA) lifetime health advisory level for drinking water which is 70 nanograms per liter (ng/L) for PFOS, PFOA, or the sum of the two. Per City Council Ordinance No. 6060, municipal water service connections are also planned for properties with combined PFOS and PFOA concentrations above 85 percent (59.5 ng/L) of the lifetime health advisory level.

Certain residents are concerned that PFCs from well water could remain in their plumbing systems after connection to municipal water. This is an unlikely scenario. It is common for iron or other minerals to 'settle out' of solution in standing water, or for hard-water scale to form on plumbing fixtures and pipes. The Alaska Department of Environmental Conservation (DEC), the City, and the City's consultants each researched this question independently by reviewing literature on water heaters, PFC chemistry, and actions of other states who have connected residents to municipal water systems. The agencies concluded that under conditions typical of Fairbanks groundwater PFCs are highly soluble, therefore we would generally expect PFCs to remain dissolved in water rather than attaching to sediments or scale within water heaters or other parts of a home plumbing system.

We are aware that water heater tanks typically accumulate hard-water scale and sand or sediment particles over time, exactly how much depends on the hardness of the water and presence or absence of inlet filters. At this time the City does not plan to sample the sediment from individual water-heaters for PFCs. We suggest that home owners maintain their water heaters per manufacturer recommendations, for example, by periodically replacing the anode rod and fully draining the tank to remove accumulated sediment.

The 44 service connections to municipal water provided by the City are within the Golden Heart Utilities (GHU) or College Utilities Corporation (CUC) service areas. When GHU or CUC connects a new property to water service, standard practice is to drain and pressure test the system with the new water source. This alone removes most of the water currently in the system. Given the solubility of PFCs and the differences in flow rates and plumbing configurations, we recommend running all the taps in the house at the same time, at full volume—turning off the cold water taps after 5 minutes and just running the hot taps for an additional 15 minutes. This will ensure that you have flushed any remnant water that came from your disconnected well.

Please contact us if you have further questions regarding municipal water connections. If you have other questions, please see the list of contacts on the enclosed Fact Sheet to help direct you to the most appropriate person or agency for your inquiry. You may also visit the City of Fairbanks website, <http://www.fairbanksalaska.us/rftc-groundwater-contamination/>, or at the DEC's site summary page, <http://dec.alaska.gov/spar/csp/sites/FairbanksFireTrainingCenter.htm>, for maps and other information about the water cleanup effort.

CITY OF FAIRBANKS



Andrew Ackerman

Environmental Manager



City of Fairbanks

FACT SHEET – Well Testing for Perfluorinated Compounds

FEBRUARY 2018

Perfluorinated compounds (PFCs) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFCs are classified as emerging environmental contaminants because they do not have established regulatory standards, but evolving science has identified potential risk to human health. The City of Fairbanks has discovered PFC contamination at the Regional Fire Training Center (RFTC) at 1710 30th Avenue and is working in coordination with state regulators to take responsive action.

KEY MESSAGES & QUICK FACTS

The City has tested over 150 wells where it believes PFCs could be present based on the known pattern of groundwater flow. Test results are typically available within four weeks of sample collection.

The U.S. Environmental Protection Agency (EPA) issued a lifetime health advisory level for PFCs in May 2016. The health advisory level has been set with a sufficient margin of protection for a lifetime of exposure to PFOA and PFOS from drinking water, including for sensitive populations such as children. PFOA refers to perfluorooctanoic acid; PFOS refers to perfluorooctane sulfonate.

The City has adopted the EPA lifetime health advisory level of **70 nanograms per liter (ng/L)** for PFOS, PFOA, or the sum of the two as the level above which action should be taken to reduce exposure in drinking water.

The health advisory level has been set based on the latest peer-reviewed science. However, the human health risks associated with PFC exposure have not been definitively established.

The City has confirmed that PFCs are present above the lifetime health advisory level in groundwater at the RFTC and in some private wells. The occupants of these homes and businesses have been offered bottled water delivery at no cost, and many have been connected to the municipal water system.

PFCs are used in a large number of products ranging from fabric waterproofing compounds, non-stick cookware, stain-resistant carpeting, some food packaging, and firefighting agents.

From 1984 to 2004, firefighters from the City of Fairbanks and other agencies used Aqueous Film Forming Foam, a firefighting agent that contained PFCs, during training to extinguish petroleum fires at the RFTC. The former burn pit has been excavated and removed from the site.

For more information, please visit:

www.fairbanksalaska.us/rftc-groundwater-contamination/

CONTACTS

For questions about well testing & study:

Shannon & Wilson Inc.

[Marcy Nadel](#), Project Manager

Phone 907-458-3150

Email mdn@shanwil.com

For regulatory questions:

Alaska Dept of Environmental Conservation,
Contaminated Sites Program

[Robert Burgess](#), Environmental Program
Specialist III

Phone 907-451-2153

Email robert.burgess@alaska.gov

www.dec.alaska.gov/spar/csp/sites/FairbanksFireTrainingCenter.htm

For questions about PFC health effects:

Alaska Dept of Health & Social Services
[Stacey Cooper](#), Health Assessor

Phone 907-269-8016

Email stacey.cooper@alaska.gov

For questions about RFTC & all other inquiries:

[Andrew Ackerman](#), City of Fairbanks
Environmental Manager

Phone 907-459-6836

Email aackerman@fairbanks.us

APPENDIX B

COMPLETED PRIVATE WELL INVENTORY SURVEY FORMS

This appendix contains personal information. Content has been removed for confidentiality.

APPENDIX C

COPY OF PRIVATE AND MONITORING WELL SAMPLING LOGS

This appendix contains personal information. Content has been removed for confidentiality.

APPENDIX D
PROJECT PHOTOGRAPHS



Photo 1: Sampling MW-1703-13 at the RFTC. (October 3, 2017)



Photo 3: Example private well purge using YSI water quality meter, utility sink at 3077 Davis Road. (July 18, 2017)



Photo 2: Sampling the unused well at 3485 Holden Road using a peristaltic pump. (October 23, 2017)



Photo 4: Purging the GHSA drinking water and irrigation well at the Hez-Ray sports complex to the ground surface before sampling. (July 19, 2017)



Photo 3: Example active private well sample location, pre-treatment spigot at 2175 University Avenue. (July 17, 2017)



Photo 5: Sampling the unused well at 2604 Davis Road, located inside an insulated box outside the structure. (July 25, 2017)

APPENDIX E

**ANALYTICAL LABORATORY REPORTS
AND ADEC DATA REVIEW CHECKLISTS**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-29904-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/2/2017 3:06:10 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?

**Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1

Table of Contents 2

Definitions/Glossary 3

Case Narrative 4

Detection Summary 5

Client Sample Results 7

Isotope Dilution Summary 18

QC Sample Results 19

QC Association Summary 21

Lab Chronicle 22

Certification Summary 24

Method Summary 25

Sample Summary 26

Chain of Custody 27

Receipt Checklists 29



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Job ID: 320-29904-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-29904-1

Receipt

The samples were received on 7/17/2017 9:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 23.8° C.

Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria: 129089 (320-29904-1), 95730 (320-29904-2), 95630 (320-29904-3), 87301 (320-29904-4), 515485 (320-29904-5), 168726 (320-29904-6), 515507 (320-29904-7), 167801 (320-29904-8), 167983 (320-29904-9), 515515 (320-29904-10) and 168734 (320-29904-11). Thawed gel ice present in the cooler. The client was contacted and the lab instructed to proceed with extraction and analysis.

LCMS

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

Organic Prep

Method(s) PFAS Prep: The following samples bottles contain sediment and were decanted prior to extraction to prevent clogging of the SPE column.

129089 (320-29904-1), 95730 (320-29904-2), 95630 (320-29904-3), 87301 (320-29904-4), 515485 (320-29904-5), 168726 (320-29904-6), 515507 (320-29904-7), 167801 (320-29904-8), 167983 (320-29904-9), 515515 (320-29904-10) and 168734 (320-29904-11)

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-176147.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 129089

Lab Sample ID: 320-29904-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 95730

Lab Sample ID: 320-29904-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.0		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	27		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 95630

Lab Sample ID: 320-29904-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	28		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87301

Lab Sample ID: 320-29904-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	29		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515485

Lab Sample ID: 320-29904-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168726

Lab Sample ID: 320-29904-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	65		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515507

Lab Sample ID: 320-29904-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 167801

Lab Sample ID: 320-29904-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 167983

Lab Sample ID: 320-29904-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	23		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	32		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515515

Lab Sample ID: 320-29904-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168734

Lab Sample ID: 320-29904-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.0		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	40		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.8		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	8.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	170		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.98	J	2.0	0.65	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 129089

Date Collected: 07/10/17 10:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	17		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 02:55	1
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 02:55	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	81		25 - 150				07/26/17 18:03	07/28/17 02:55	1
13C4 PFOS	84		25 - 150				07/26/17 18:03	07/28/17 02:55	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 95730

Date Collected: 07/10/17 11:11

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-2

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	4.0		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 03:14	1
Perfluorooctanesulfonic acid (PFOS)	27		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 03:14	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	82		25 - 150				07/26/17 18:03	07/28/17 03:14	1
13C4 PFOS	85		25 - 150				07/26/17 18:03	07/28/17 03:14	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 95630

Date Collected: 07/10/17 11:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-3

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 03:32	1
Perfluorooctanesulfonic acid (PFOS)	28		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 03:32	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	78		25 - 150				07/26/17 18:03	07/28/17 03:32	1
13C4 PFOS	80		25 - 150				07/26/17 18:03	07/28/17 03:32	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 87301

Date Collected: 07/10/17 11:59

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-4

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 03:50	1
Perfluorooctanesulfonic acid (PFOS)	29		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 03:50	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	82		25 - 150				07/26/17 18:03	07/28/17 03:50	1
13C4 PFOS	83		25 - 150				07/26/17 18:03	07/28/17 03:50	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 515485

Date Collected: 07/10/17 13:50

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-5

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 04:09	1
Perfluorooctanesulfonic acid (PFOS)	46		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 04:09	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	79		25 - 150				07/26/17 18:03	07/28/17 04:09	1
13C4 PFOS	82		25 - 150				07/26/17 18:03	07/28/17 04:09	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 168726

Date Collected: 07/10/17 14:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-6

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	5.7		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 04:27	1
Perfluorooctanesulfonic acid (PFOS)	65		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 04:27	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	82		25 - 150				07/26/17 18:03	07/28/17 04:27	1
13C4 PFOS	83		25 - 150				07/26/17 18:03	07/28/17 04:27	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 515507

Date Collected: 07/10/17 15:28

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-7

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 04:46	1
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 04:46	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	76		25 - 150				07/26/17 18:03	07/28/17 04:46	1
13C4 PFOS	79		25 - 150				07/26/17 18:03	07/28/17 04:46	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 167801

Date Collected: 07/11/17 14:01

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-8

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 05:23	1
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 05:23	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	79		25 - 150				07/26/17 18:03	07/28/17 05:23	1
13C4 PFOS	83		25 - 150				07/26/17 18:03	07/28/17 05:23	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 167983

Date Collected: 07/11/17 14:34

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-9

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	23		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 05:41	1
Perfluorooctanesulfonic acid (PFOS)	32		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 05:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	81		25 - 150				07/26/17 18:03	07/28/17 05:41	1
13C4 PFOS	84		25 - 150				07/26/17 18:03	07/28/17 05:41	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 515515

Date Collected: 07/11/17 15:08

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-10

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.2		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 05:59	1
Perfluorooctanesulfonic acid (PFOS)	18		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 05:59	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	89		25 - 150				07/26/17 18:03	07/28/17 05:59	1
13C4 PFOS	91		25 - 150				07/26/17 18:03	07/28/17 05:59	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 168734

Date Collected: 07/12/17 13:47

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-11

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.0		2.0	0.92	ng/L		07/26/17 18:03	07/28/17 06:18	1
Perfluorohexanesulfonic acid (PFHxS)	40		2.0	0.87	ng/L		07/26/17 18:03	07/28/17 06:18	1
Perfluoroheptanoic acid (PFHpA)	4.8		2.0	0.80	ng/L		07/26/17 18:03	07/28/17 06:18	1
Perfluorooctanoic acid (PFOA)	8.9		2.0	0.75	ng/L		07/26/17 18:03	07/28/17 06:18	1
Perfluorooctanesulfonic acid (PFOS)	170		2.0	1.3	ng/L		07/26/17 18:03	07/28/17 06:18	1
Perfluorononanoic acid (PFNA)	0.98	J	2.0	0.65	ng/L		07/26/17 18:03	07/28/17 06:18	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	90		25 - 150				07/26/17 18:03	07/28/17 06:18	1
13C4-PFHpA	76		25 - 150				07/26/17 18:03	07/28/17 06:18	1
13C4 PFOA	84		25 - 150				07/26/17 18:03	07/28/17 06:18	1
13C4 PFOS	86		25 - 150				07/26/17 18:03	07/28/17 06:18	1
13C5 PFNA	82		25 - 150				07/26/17 18:03	07/28/17 06:18	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		3C4 PFO/ (25-150)	3C4 PFO/ (25-150)	3O2 PFHx (25-150)	3C4-PFHp (25-150)	3C5 PFNA/ (25-150)
320-29904-1	129089	81	84			
320-29904-2	95730	82	85			
320-29904-3	95630	78	80			
320-29904-4	87301	82	83			
320-29904-5	515485	79	82			
320-29904-6	168726	82	83			
320-29904-7	515507	76	79			
320-29904-8	167801	79	83			
320-29904-9	167983	81	84			
320-29904-10	515515	89	91			
320-29904-11	168734	84	86	90	76	82
LCS 320-176147/2-A	Lab Control Sample	81	83	88	76	79
LCSD 320-176147/3-A	Lab Control Sample Dup	80	86	86	76	80
MB 320-176147/1-A	Method Blank	79	84	87	77	76

Surrogate Legend

13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
18O2 PFHxS = 18O2 PFHxS
13C4-PFHpA = 13C4-PFHpA
13C5 PFNA = 13C5 PFNA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-176147/1-A

Matrix: Water

Analysis Batch: 176470

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 176147

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFOS)	. D		2L0	0L92	ng/7		05/2N15 18:03	05/28/15 02:00	1
Perfluorohe6anesulfonic acid (PFB6S)	. D		2L0	0L85	ng/7		05/2N15 18:03	05/28/15 02:00	1
Perfluorohexanoic acid (PFBxA)	. D		2L0	0L80	ng/7		05/2N15 18:03	05/28/15 02:00	1
Perfluorooctanoic acid (PFp A)	. D		2L0	0L5H	ng/7		05/2N15 18:03	05/28/15 02:00	1
Perfluorooctanesulfonic acid (PFp S)	. D		2L0	1L3	ng/7		05/2N15 18:03	05/28/15 02:00	1
Perfluorononanoic acid (PF. A)	. D		2L0	0LNH	ng/7		05/2N15 18:03	05/28/15 02:00	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	32		45 - 150	02/46712 13/0:	02/43712 04/00	1
1: S9-PFOHx	22		45 - 150	02/46712 13/0:	02/43712 04/00	1
1: S9 PFCx	2p		45 - 150	02/46712 13/0:	02/43712 04/00	1
1: S9 PFC8	39		45 - 150	02/46712 13/0:	02/43712 04/00	1
1: S5 PFNx	26		45 - 150	02/46712 13/0:	02/43712 04/00	1

Lab Sample ID: LCS 320-176147/2-A

Matrix: Water

Analysis Batch: 176470

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 176147

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFOS)	15L5	1NN		ng/7		94	52 - 1H1
Perfluorohe6anesulfonic acid (PFB6S)	18L2	15LH		ng/7		9N	53 - 1H5
Perfluorohexanoic acid (PFBxA)	20L0	18LN		ng/7		93	51 - 138
Perfluorooctanoic acid (PFp A)	20L0	19LH		ng/7		95	50 - 140
Perfluorooctanesulfonic acid (PFp S)	18LN	15L9		ng/7		95	N9 - 144
Perfluorononanoic acid (PF. A)	20L0	18L4		ng/7		92	53 - 145

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	33		45 - 150
1: S9-PFOHx	26		45 - 150
1: S9 PFCx	31		45 - 150
1: S9 PFC8	3:		45 - 150
1: S5 PFNx	2p		45 - 150

Lab Sample ID: LCSD 320-176147/3-A

Matrix: Water

Analysis Batch: 176470

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 176147

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFOS)	15L5	15L1		ng/7		95	52 - 1H1	3	30
Perfluorohe6anesulfonic acid (PFB6S)	18L2	18L2		ng/7		100	53 - 1H5	4	30
Perfluorohexanoic acid (PFBxA)	20L0	18L5		ng/7		94	51 - 138	0	30
Perfluorooctanoic acid (PFp A)	20L0	20LN		ng/7		103	50 - 140	H	30
Perfluorooctanesulfonic acid (PFp S)	18LN	18L2		ng/7		98	N9 - 144	2	30
Perfluorononanoic acid (PF. A)	20L0	18LH		ng/7		93	53 - 145	0	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc

Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C4 PFOA8</i>	36		45 - 150
<i>1: S9-PFOHx</i>	26		45 - 150
<i>1: S9 PFCx</i>	30		45 - 150
<i>1: S9 PFC8</i>	36		45 - 150
<i>1: S5 PFNx</i>	30		45 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

LCMS

Prep Batch: 176147

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29904-1	129089	Total/NA	Water	PFAS Prep	
320-29904-2	95730	Total/NA	Water	PFAS Prep	
320-29904-3	95630	Total/NA	Water	PFAS Prep	
320-29904-4	87301	Total/NA	Water	PFAS Prep	
320-29904-5	515485	Total/NA	Water	PFAS Prep	
320-29904-6	168726	Total/NA	Water	PFAS Prep	
320-29904-7	515507	Total/NA	Water	PFAS Prep	
320-29904-8	167801	Total/NA	Water	PFAS Prep	
320-29904-9	167983	Total/NA	Water	PFAS Prep	
320-29904-10	515515	Total/NA	Water	PFAS Prep	
320-29904-11	168734	Total/NA	Water	PFAS Prep	
MB 320-176147/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-176147/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-176147/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 176470

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29904-1	129089	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-2	95730	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-3	95630	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-4	87301	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-5	515485	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-6	168726	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-7	515507	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-8	167801	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-9	167983	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-10	515515	Total/NA	Water	WS-LC-0025	176147
				At1	
320-29904-11	168734	Total/NA	Water	WS-LC-0025	176147
				At1	
MB 320-176147/1-A	Method Blank	Total/NA	Water	WS-LC-0025	176147
				At1	
LCS 320-176147/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	176147
				At1	
LCSD 320-176147/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025	176147
				At1	

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 129089

Date Collected: 07/10/17 10:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 02:55	SER	TAL SAC

Client Sample ID: 95730

Date Collected: 07/10/17 11:11

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 03:14	SER	TAL SAC

Client Sample ID: 95630

Date Collected: 07/10/17 11:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 03:32	SER	TAL SAC

Client Sample ID: 87301

Date Collected: 07/10/17 11:59

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 03:50	SER	TAL SAC

Client Sample ID: 515485

Date Collected: 07/10/17 13:50

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 04:09	SER	TAL SAC

Client Sample ID: 168726

Date Collected: 07/10/17 14:21

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 04:27	SER	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Client Sample ID: 515507

Date Collected: 07/10/17 15:28

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 04:46	SER	TAL SAC

Client Sample ID: 167801

Date Collected: 07/11/17 14:01

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 05:23	SER	TAL SAC

Client Sample ID: 167983

Date Collected: 07/11/17 14:34

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 05:41	SER	TAL SAC

Client Sample ID: 515515

Date Collected: 07/11/17 15:08

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-10

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 05:59	SER	TAL SAC

Client Sample ID: 168734

Date Collected: 07/12/17 13:47

Date Received: 07/17/17 09:05

Lab Sample ID: 320-29904-11

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176147	07/26/17 18:03	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			176470	07/28/17 06:18	SER	TAL SAC

Laboratory References:

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

TestAmerica Sacramento

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-17
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-17
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-29-18
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	10-31-17
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-29-17 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29904-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-29904-1	129089	Water	07/10/17 10:21	07/17/17 09:05
320-29904-2	95730	Water	07/10/17 11:11	07/17/17 09:05
320-29904-3	95630	Water	07/10/17 11:21	07/17/17 09:05
320-29904-4	87301	Water	07/10/17 11:59	07/17/17 09:05
320-29904-5	515485	Water	07/10/17 13:50	07/17/17 09:05
320-29904-6	168726	Water	07/10/17 14:21	07/17/17 09:05
320-29904-7	515507	Water	07/10/17 15:28	07/17/17 09:05
320-29904-8	167801	Water	07/11/17 14:01	07/17/17 09:05
320-29904-9	167983	Water	07/11/17 14:34	07/17/17 09:05
320-29904-10	515515	Water	07/11/17 15:08	07/17/17 09:05
320-29904-11	168734	Water	07/12/17 13:47	07/17/17 09:05



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 2
Laboratory Test America
Attn: David Alitukker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Pres + Pres	Analysis Parameters/Sample Container Description	Total Number of Containers	Remarks/Matrix
129089		10:21	7/19/2017					2	Groundwater
95730		11:11						2	
95630		11:21						2	
87301		11:59						2	
515485		13:50						2	
168726		14:21						2	
515507		15:28						2	
167801		14:01	7/11/2017					2	
167983		14:34						2	
515515		15:08						2	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.			
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>22</u>		Signature: <u>[Signature]</u> Time: <u>0830</u>		Signature: _____ Time: _____		Signature: _____ Time: _____			
Project Name: <u>CoE Reg. Tr. Center</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Sheila Hinchey</u> Date: <u>7/13/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____			
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson Inc.</u>		Company: _____		Company: _____			
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>									
Sampler: <u>CAB</u>		(attach shipping bill, if any)									
Instructions											
Requested Turnaround Time: <u>Standard</u>											
Special Instructions: <u>Please bill to 1735-008</u>											
Distribution: _____				w/ laboratory report		Received By: 1.		Received By: 2.		Received By: 3.	
				Signature: <u>[Signature]</u> Time: <u>0905</u>		Signature: _____ Time: _____		Signature: _____ Time: _____			
				Printed Name: <u>Tracy L. Turpin</u> Date: <u>7/17/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____			
				Company: <u>TAW</u> <u>23.5°C gel ice</u> <u>AK-1</u>		Company: _____		Company: _____			



320-29904 Chain of Custody

No. 34393

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 2 of 2
Laboratory: Test America
Attn: David Alitusk

Analysis Parameters/Sample Container Description
(include preservative if used)

[illegible]

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: 31-1-11735		Total Number of Containers 22		Signature: [Signature] Time: 0830		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: CoF Reg. Tr. Center		COC Seals/Intact? Y/N/NA		Printed Name: [Signature] Date: 7/13/17		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: MDN		Received Good Cond./Cold: -		Company: [Signature]		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method:		[Signature]		[Signature]		[Signature]	
Sampler: SMH		(attach shipping bill, if any)		Shannon Wilson Inc		Shannon Wilson Inc		Shannon Wilson Inc	
Instructions				Received By: 1.		Received By: 2.		Received By: 3.	
Requested Turnaround Time: standard				Signature: [Signature] Time: 0905		Signature: _____ Time: _____		Signature: _____ Time: _____	
Special Instructions: Please Bill to 1735 -				Printed Name: [Signature] Date: 7/17/17		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File				Company: TAWS 23.8°C gel ice A12-1		Company: _____		Company: _____	

Client: Shannon & Wilson, Inc

Job Number: 320-29904-1

Login Number: 29904

List Number: 1

Creator: Turpen, Troy

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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.	False	Refer to Job Narrative for details.
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

August 02, 2017

CS Report Name:

City of Fairbanks Fire
Training Area

Report Date:

August 02, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica, Inc.

Laboratory Report Number:

320-29904-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analyses were performed by TestAmerica, Inc. in West Sacramento, California.

2. Chain of Custody (COC)

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

☒ Yes ☐ No

Comments:

- b. Correct analyses requested?

☒ Yes ☐ No

Comments:

The COC indicates that sample 168734 should be analyzed for PFOS and PFOA only. In an email dated July 24, 2017 we requested that the list of analyses for this sample be expanded to the six Unregulated Contaminant Monitoring Rule (UCMR) PFCs.

3. Laboratory Sample Receipt Documentation

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

☐ Yes ☒ No

Comments:

The temperature blank was measured outside the acceptable temperature range of 0 °C to 6 °C upon receipt at the laboratory (23.8 °C). The laboratory receipt documentation notes that the shipment was delayed in transit; melted gel packs were noted inside the cooler.

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

☐ Yes ☒ No

Comments:

Due to the high chemical and biological stability of PFCs, it is unlikely the integrity of the project samples was adversely affected by the high cooler temperature. Analysis of PFCs does not require a preservative. In an e-mail dated August 3, 2015, the ADEC project manager noted that he had spoken with their chemist, who "agrees the high temperature probably would not affect the PFC results."

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

☒ Yes ☐ No Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No Comments:

The laboratory receipt documentation notes a temperature exceedance. There were no other discrepancies reported by the laboratory.

e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

a. Present and understandable?

☒ Yes ☐ No Comments:

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

☒ Yes ☐ No Comments:

The laboratory notes that samples arrived in good condition, properly preserved, and that the temperature of the sample coolers upon receipt at the laboratory was 23.8° C. As noted in section 3.b, the samples were received outside of the recommended temperature range. The laboratory proceeded with the analyses as per our instruction.

The laboratory notes that there was sediment present in each of the water samples. The samples were decanted prior to extraction.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 176147.

c. Were all corrective actions documented?

☒ Yes ☐ No Comments:

A laboratory control sample (LCS) and LCS duplicate (LCSD) were extracted with this batch to demonstrate laboratory accuracy and precision.

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

Comments:

The laboratory did not specify any effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

The COC included in the laboratory report indicates that sample 168734 should be analyzed for PFOS and PFOA only. In an email dated July 24, 2017 we requested that analysis list for this sample be expanded to the six UCMR PFCs.

- b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

- c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

Soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC proposed groundwater cleanup levels for PFOS and PFOA.

- e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

- a. Method Blank

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

☒ Yes ☐ No

Comments:

- ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

- iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-176147/1-A.

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

☐ Yes ☒ No Comments:

Qualification of the data was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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 Comments:

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

☐ Yes ☒ No Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No Comments:

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

Comments:

N/A; the percent recoveries and RPDs were within acceptable limits.

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

☐ Yes ☒ No Comments:

Qualification of the results was not required; see above.

vii. Data quality or usability affected?

The data quality and usability were not affected.

Comments:

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

The field-duplicate pair 95730 / 95630 was submitted with this WO.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

The maximum RPD for this field-duplicate pair is 5.1%.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

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

☐ Yes ☐ No ☒ Not Applicable

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

These samples are typically not collected with reusable equipment so a practical potential for equipment based cross-contamination does not exist. For this reason, an equipment blank was not submitted. Sample 168734 was collected through a garden hose.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The analytical results for sample 168734 are flagged 'J*' to indicate estimated concentrations.

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

a. Defined and appropriate?

☐ Yes ☒ No

Comments:

We determined that there were no other necessary data flags/qualifiers.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-29998-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/3/2017 10:41:13 AM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page 1

Table of Contents 2

Definitions/Glossary 3

Case Narrative 4

Detection Summary 5

Client Sample Results 7

Isotope Dilution Summary 19

QC Sample Results 20

QC Association Summary 21

Lab Chronicle 22

Certification Summary 25

Method Summary 26

Sample Summary 27

Chain of Custody 28

Receipt Checklists 30



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Job ID: 320-29998-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-29998-1

Receipt

The samples were received on 7/20/2017 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-176266.

Method(s) PFAS Prep: Brownish color, light sediment. 168386 (320-29998-1), 169048 (320-29998-5), 87319 (320-29998-6), MW-1701-13 (320-29998-9), 669077 (320-29998-10), 87408 (320-29998-11), 87335 (320-29998-12), 593460-2 (320-29998-13) and 515493-2 (320-29998-14)

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 168386

Lab Sample ID: 320-29998-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.5		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	49		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168378

Lab Sample ID: 320-29998-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	6.0		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	35		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168980

Lab Sample ID: 320-29998-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	17		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 169048

Lab Sample ID: 320-29998-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87319

Lab Sample ID: 320-29998-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	27		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: MW-1701-13

Lab Sample ID: 320-29998-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	160		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 669077

Lab Sample ID: 320-29998-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.5		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	37		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 87408

Lab Sample ID: 320-29998-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	6.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	43		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87335

Lab Sample ID: 320-29998-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 593460-2

Lab Sample ID: 320-29998-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	19		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515493-2

Lab Sample ID: 320-29998-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	26		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	36		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 593560-2

Lab Sample ID: 320-29998-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 168386

Date Collected: 07/17/17 15:36

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	5.5		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 14:56	1
Perfluorooctanesulfonic acid (PFOS)	49		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 14:56	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	74		25 - 150				07/27/17 10:46	08/01/17 14:56	1
13C4 PFOS	85		25 - 150				07/27/17 10:46	08/01/17 14:56	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 168378

Date Collected: 07/17/17 16:03

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-2

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	6.0		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 15:33	1
Perfluorooctanesulfonic acid (PFOS)	35		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 15:33	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	70		25 - 150				07/27/17 10:46	08/01/17 15:33	1
13C4 PFOS	83		25 - 150				07/27/17 10:46	08/01/17 15:33	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 168980

Date Collected: 07/18/17 15:15

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-4

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 15:51	1
Perfluorooctanesulfonic acid (PFOS)	17		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 15:51	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	70		25 - 150				07/27/17 10:46	08/01/17 15:51	1
13C4 PFOS	86		25 - 150				07/27/17 10:46	08/01/17 15:51	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 169048

Date Collected: 07/18/17 16:25

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-5

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 16:10	1
Perfluorooctanesulfonic acid (PFOS)	26		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 16:10	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	74		25 - 150				07/27/17 10:46	08/01/17 16:10	1
13C4 PFOS	87		25 - 150				07/27/17 10:46	08/01/17 16:10	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 87319

Date Collected: 07/17/17 12:44

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-6

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	4.7		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 16:28	1
Perfluorooctanesulfonic acid (PFOS)	27		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 16:28	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	73		25 - 150				07/27/17 10:46	08/01/17 16:28	1
13C4 PFOS	87		25 - 150				07/27/17 10:46	08/01/17 16:28	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: MW-1701-13

Date Collected: 07/18/17 13:29

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-9

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	160		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 16:46	1
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 16:46	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	70		25 - 150				07/27/17 10:46	08/01/17 16:46	1
13C4 PFOS	88		25 - 150				07/27/17 10:46	08/01/17 16:46	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 669077

Date Collected: 07/18/17 15:19

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-10

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.5		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 17:05	1
Perfluorooctanesulfonic acid (PFOS)	37		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 17:05	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	67		25 - 150				07/27/17 10:46	08/01/17 17:05	1
13C4 PFOS	81		25 - 150				07/27/17 10:46	08/01/17 17:05	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 87408

Date Collected: 07/18/17 15:52

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-11

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	6.6		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 17:23	1
Perfluorooctanesulfonic acid (PFOS)	43		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 17:23	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	71		25 - 150				07/27/17 10:46	08/01/17 17:23	1
13C4 PFOS	85		25 - 150				07/27/17 10:46	08/01/17 17:23	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 87335

Date Collected: 07/18/17 16:29

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-12

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 17:41	1
Perfluorooctanesulfonic acid (PFOS)	13		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 17:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	70		25 - 150				07/27/17 10:46	08/01/17 17:41	1
13C4 PFOS	86		25 - 150				07/27/17 10:46	08/01/17 17:41	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 593460-2

Date Collected: 07/19/17 10:04

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-13

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.6		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 18:00	1
Perfluorooctanesulfonic acid (PFOS)	19		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 18:00	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	70		25 - 150				07/27/17 10:46	08/01/17 18:00	1
13C4 PFOS	83		25 - 150				07/27/17 10:46	08/01/17 18:00	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 515493-2

Date Collected: 07/19/17 10:55

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-14

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	26		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 18:18	1
Perfluorooctanesulfonic acid (PFOS)	36		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 18:18	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	74		25 - 150				07/27/17 10:46	08/01/17 18:18	1
13C4 PFOS	88		25 - 150				07/27/17 10:46	08/01/17 18:18	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 593560-2

Date Collected: 07/19/17 10:14

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-15

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 18:55	1
Perfluorooctanesulfonic acid (PFOS)	18		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 18:55	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	71		25 - 150				07/27/17 10:46	08/01/17 18:55	1
13C4 PFOS	83		25 - 150				07/27/17 10:46	08/01/17 18:55	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	3C4 PFO/ (25-150)	3C4 PFO: (25-150)
320-29998-1	168386	74	85
320-29998-2	168378	70	83
320-29998-4	168980	70	86
320-29998-5	169048	74	87
320-29998-6	87319	73	87
320-29998-9	MW-1701-13	70	88
320-29998-10	669077	67	81
320-29998-11	87408	71	85
320-29998-12	87335	70	86
320-29998-13	593460-2	70	83
320-29998-14	515493-2	74	88
320-29998-15	593560-2	71	83
LCS 320-176266/2-A	Lab Control Sample	67	78
LCSD 320-176266/3-A	Lab Control Sample Dup	67	78
MB 320-176266/1-A	Method Blank	69	82

Surrogate Legend

13C4 PFOA = 13C4 PFOA

13C4 PFOS = 13C4 PFOS

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-176266/1-A

Matrix: Water

Analysis Batch: 177103

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 176266

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		07/27/17 10:46	08/01/17 12:11	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		07/27/17 10:46	08/01/17 12:11	1
Isotope Dilution	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	69		25 - 150				07/27/17 10:46	08/01/17 12:11	1
13C4 PFOS	82		25 - 150				07/27/17 10:46	08/01/17 12:11	1

Lab Sample ID: LCS 320-176266/2-A

Matrix: Water

Analysis Batch: 177103

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 176266

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	22.2		ng/L		111	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	18.4		ng/L		99	69 - 144
Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits				
13C4 PFOA	67		25 - 150				
13C4 PFOS	78		25 - 150				

Lab Sample ID: LCSD 320-176266/3-A

Matrix: Water

Analysis Batch: 177103

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 176266

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	24.3		ng/L		122	70 - 140	9	30
Perfluorooctanesulfonic acid (PFOS)	18.6	20.6		ng/L		111	69 - 144	11	30
Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits						
13C4 PFOA	67		25 - 150						
13C4 PFOS	78		25 - 150						

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29994-1

LCMS

Prep Batch: 176266

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29994-1	184348	Total/NA	Water	PFAS Prep	
320-29994-2	184354	Total/NA	Water	PFAS Prep	
320-29994-7	184940	Total/NA	Water	PFAS Prep	
320-29994-6	189074	Total/NA	Water	PFAS Prep	
320-29994-8	45319	Total/NA	Water	PFAS Prep	
320-29994-9	MW-1501-13	Total/NA	Water	PFAS Prep	
320-29994-10	889055	Total/NA	Water	PFAS Prep	
320-29994-11	45704	Total/NA	Water	PFAS Prep	
320-29994-12	45336	Total/NA	Water	PFAS Prep	
320-29994-13	693780-2	Total/NA	Water	PFAS Prep	
320-29994-17	616793-2	Total/NA	Water	PFAS Prep	
320-29994-16	693680-2	Total/NA	Water	PFAS Prep	
MB 320-158288/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-158288/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-158288/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 177103

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29994-1	184348	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-2	184354	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-7	184940	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-6	189074	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-8	45319	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-9	MW-1501-13	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-10	889055	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-11	45704	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-12	45336	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-13	693780-2	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-17	616793-2	Total/NA	Water	WS-LC-0026 At1	158288
320-29994-16	693680-2	Total/NA	Water	WS-LC-0026 At1	158288
MB 320-158288/1-A	Method Blank	Total/NA	Water	WS-LC-0026 At1	158288
LCS 320-158288/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0026 At1	158288
LCSD 320-158288/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0026 At1	158288

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 129092

Date Collected: 37/17/17 1R02

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-1

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 14:56	SER	TAL SAC

Client Sample ID: 129079

Date Collected: 37/17/17 12:30

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-8

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 15:33	SER	TAL SAC

Client Sample ID: 129493

Date Collected: 37/19/17 1R1R

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-6

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 15:51	SER	TAL SAC

Client Sample ID: 124369

Date Collected: 37/19/17 12:8R

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-R

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 16:10	SER	TAL SAC

Client Sample ID: 97014

Date Collected: 37/17/17 18:66

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-2

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 16:28	SER	TAL SAC

Client Sample ID: MW-1731-10

Date Collected: 37/19/17 10:84

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-4

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 16:46	SER	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Client Sample ID: 224377

Date Collected: 37/19/17 1R:14

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-13

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 17:05	SER	TAL SAC

Client Sample ID: 97639

Date Collected: 37/19/17 1R:R8

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-11

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 17:23	SER	TAL SAC

Client Sample ID: 9700R

Date Collected: 37/19/17 12:84

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-18

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 17:41	SER	TAL SAC

Client Sample ID: R40623-8

Date Collected: 37/14/17 13:36

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-10

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 18:00	SER	TAL SAC

Client Sample ID: R1R640-8

Date Collected: 37/14/17 13:RR

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-16

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 18:18	SER	TAL SAC

Client Sample ID: R40R23-8

Date Collected: 37/14/17 13:16

Date v ecei5ed: 37/83/17 34:8R

Lab Sample ID: 083-84449-1R

Matrix: Water

Prep Type	Batch Type	Batch Method	v un	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	176266	07/27/17 10:46	CCB	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			177103	08/01/17 18:55	SER	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Laboratory v eferences:

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29994-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-14-18
AriZona	State Program	9	Az0804	04-11-18 Z
Arkansas DEQ	State Program	6	44-0691	06-18-14
California	State Program	9	2498	01-31-14
Colorado	State Program	4	CA000uu	04-31-18
Connecticut	State Program	1	PL-0691	06-30-19
Florida	NEGAP	u	E48580	06-30-14
Georgia	State Program	u	N/A	01-29-14
Hawaii	State Program	9	N/A	01-29-14
Illinois	NEGAP	5	200060	03-18-14
Indiana	NEGAP	8	E-10385	10-31-18
GA-M	DoD EGAP		Q2u64	01-20-14
Idaho	NEGAP	6	30612	06-30-14
Iowa	State Program	1	CA000u	0u-14-14
Michigan	State Program	5	99u8	01-31-14
Minnesota	State Program	9	CA000uu	08-31-14
New Hampshire	NEGAP	1	2998	0u-14-14
New Jersey	NEGAP	2	CA005	06-30-14
New York	NEGAP	2	11666	0u-01-14
North Carolina	NEGAP	10	u0u0	01-24-14
Pennsylvania	NEGAP	3	64-01282	03-31-14
Texas	NEGAP	6	T10u80u399	05-31-14
US Fish & Wildlife	Federal		Q1u4344-0	10-31-18
USDA	Federal		P330-11-00u36	12-30-18
USEPA UCv V	Federal	1	CA000uu	11-06-14
Utah	NEGAP	4	CA000uu	02-24-14
Virginia	NEGAP	3	u60284	03-1u-14
Washington	State Program	10	C541	05-05-14
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	4	4Tv S-G	01-29-18 Z

ZAcreditiation/Certification reneKal pending - accreditation/certification considered Valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-29998-1	168386	Water	07/17/17 15:36	07/20/17 09:25
320-29998-2	168378	Water	07/17/17 16:03	07/20/17 09:25
320-29998-4	168980	Water	07/18/17 15:15	07/20/17 09:25
320-29998-5	169048	Water	07/18/17 16:25	07/20/17 09:25
320-29998-6	87319	Water	07/17/17 12:44	07/20/17 09:25
320-29998-9	MW-1701-13	Water	07/18/17 13:29	07/20/17 09:25
320-29998-10	669077	Water	07/18/17 15:19	07/20/17 09:25
320-29998-11	87408	Water	07/18/17 15:52	07/20/17 09:25
320-29998-12	87335	Water	07/18/17 16:29	07/20/17 09:25
320-29998-13	593460-2	Water	07/19/17 10:04	07/20/17 09:25
320-29998-14	515493-2	Water	07/19/17 10:55	07/20/17 09:25
320-29998-15	593560-2	Water	07/19/17 10:14	07/20/17 09:25

CHAIN-OF-CUSTODY RECORD

Page 1 of 2

Laboratory Test America
Attn: David Altmeppen

Analysis Parameters/Sample Container Description
(include preservation)



320-29998 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOA	ONLY	TOP ASSAY	11 PEG	2	3
168386		1536	7/17/17	X	X					2	grand water
168378		1603	↓	X	X					2	
407429-D		1310	7/18/17	X	X					2	
168980		1515	↓	X	X					2	
169048		1625	↓	X	X					2	
87319		1244	7/17/17	X	X					2	
MW-507		1056	7/18/17	X		X				2	
MW-1701-35		1235	↓	X		X				2	
MW-1701-13		1329	↓	X	X					2	
669077		1519	↓	X	X					2	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>30</u>		Signature: <u>M. Hadd</u> Time: <u>1120</u>		Signature: <u>[Signature]</u> Time: <u>925</u>		Signature: _____ Time: _____	
Project Name: <u>CFR Pkg Fire Tr</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Marcy Nadel</u> Date: <u>7/19/17</u>		Printed Name: <u>Alonso Ayala</u> Date: <u>7/20/17</u>		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson</u>		Company: <u>TAW</u> <u>2-1</u>		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>		Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>MDN/CAB</u>		(attach shipping bill, if any)		Signature: _____ Time: _____		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Printed Name: _____ Date: _____		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time: <u>Standard</u>				Company: _____		Company: _____		Company: _____	
Special Instructions: <u>Please bill to 31-1-11735-008</u>									

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

No. 34459



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 2 of 2
Laboratory Test America
Attn: David Alitocker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOA Only						Total Number of Containers	Remarks/Matrix
87408		1552	7/18/17	X	X							2	Groundwater
87335		1629	7/18/17	X	X							2	Ground water
593460-2		1004	7/19/17	X	X							2	↓
515493-2		1055	7/19/17	X	X							2	↓
593560-2		1058	7/19/17	X	X							2	↓

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>30</u>		Signature: <u>M. Nadel</u> Time: <u>1120</u>		Signature: <u>[Signature]</u> Time: <u>925</u>		Signature: _____ Time: _____	
Project Name: <u>C&F Reg Fire Tr Center</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Marcy Nadel</u> Date: <u>7/19/17</u>		Printed Name: <u>Alonso Asury</u> Date: <u>7/20/17</u>		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson</u>		Company: <u>Taus</u> <u>2.1</u>		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>							
Sampler: <u>MDN/CAB</u>		(attach shipping bill, if any)							
Instructions									
Requested Turnaround Time: <u>Standard</u>									
Special Instructions: <u>Please bill to</u> <u>31-1-11735-008</u>									
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									
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: _____	

No. 34461



Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-29998-1

Login Number: 29998

List Source: TestAmerica Sacramento

List Number: 1

Creator: Edman, Connor M

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

August 03, 2017

CS Report Name:

City of Fairbanks Fire
Training Area

Report Date:

August 03, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica, Inc.

Laboratory Report Number:

320-29998-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analyses were performed by TestAmerica, Inc. in West Sacramento, California.

2. Chain of Custody (COC)

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

☐ Yes ☒ No

Comments:

The laboratory's receiving personnel signed that they had relinquished the samples rather than received them. This is a minor clerical error that is not considered to affect the samples.

- b. Correct analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The laboratory notes that samples arrived in good condition, properly preserved, and that the temperature of the sample coolers upon receipt at the laboratory was 2.1° C.

The laboratory notes that there was a brownish color and light sediment present in many of the water samples.

The laboratory noted that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 176266.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and LCS duplicate (LCSD) were extracted with this batch to demonstrate laboratory accuracy and precision.

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

Comments:

The laboratory did not specify any effect on data quality or usability.

5. Samples Results

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

☐ Yes ☒ No

Comments:

The COC included in the laboratory report includes sample 407429-D and indicates that samples MW-507 and MW-1701-35 should be analyzed by a different method. Sample 407429-D was canceled; samples MW-507 and MW-1701-35 are reported separately.

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

Soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC proposed groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-176266/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

N/A; the percent recoveries and RPDs were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

vii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No Comments:

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

☐ Yes ☒ No Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

☐ Yes ☒ No Comments:

PFCs are not volatile compounds so a trip blank is not required.

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 Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

The field-duplicate pair 593460-2 / 593560-2 was submitted with this WO.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

The maximum RPD for this field-duplicate pair is 2.7%.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

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

☐ Yes ☐ No ☒ Not Applicable

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

These samples were not collected with reusable equipment so a practical potential for equipment based cross-contamination does not exist. For this reason, an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No

Comments:

We determined that there were no other necessary data flags/qualifiers.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-29998-2

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/28/2017 11:54:01 AM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?

**Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Detection Summary	5
Client Sample Results	8
Isotope Dilution Summary	15
QC Sample Results	17
QC Association Summary	23
Lab Chronicle	24
Certification Summary	25
Method Summary	26
Sample Summary	27
Chain of Custody	28
Receipt Checklists	30



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Qualifiers

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.
*	LCS or LCSD is outside acceptance limits.
*	RPD of the LCS and LCSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Job ID: 320-29998-2

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-29998-2

Receipt

The samples were received on 7/20/2017 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

LCMS

Method(s) 537 (modified): The compound M2-4:2FTS is converted to PFBA during the oxidation step of the TOP assay. The Post-Treatment method blank's PFBA result indicates roughly how much of any field sample's Post-Treatment PFBA result is contributed by the oxidation process.

Method(s) 537 (modified): The oxidation process converts precursor PFAS compounds to end product PFCA (Per or Poly-fluorinated carboxylic acids). As the LCS and LCSD associated to this data set was fortified with precursor PFAS compounds their conversion to PFCA is demonstrated by zero recovery of these compounds (6:2 FTS, 8:2 FTS, FOSA, MeFOSAA and EtFOSAA) yet enhanced recoveries of PFCA relative to the pre-oxidation LCS and LCSD results.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples are below the method recommended limit for 13C8 FOSA: MW-507 (320-29998-7), MW-1701-35 (320-29998-8), (LCS 320-176941/2-A), (LCSD 320-176941/3-A) and (MB 320-176941/1-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

Method(s) 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for 13C2-PFTeDA in the following samples MW-1701-35 (320-29998-8), (LCS 320-176939/2-A), (LCSD 320-176939/3-A) and (MB 320-176939/1-A). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) 537 (modified): Isotope Dilution Analyte (IDA) recoveries are above the method recommended limit for 8:2FTS and 13C2-PFTeDA in the following sample: MW-507 (320-29998-7). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for M2-6:2FTS in following samples: MW-1701-35 (320-29998-8) and (CCV 320-179243/4). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) 537 (modified): The following sample was diluted to bring the concentration of target analytes within the calibration range: MW-1701-35 (320-29998-8). Elevated reporting limits (RLs) are provided.

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

Organic Prep

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

VOA Prep

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

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Lab Sample ID: 320-29998-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	9.8	B	5.0	1.1	ng/L	1			537 (modified)	Pre-Treatment
Perfluoropentanoic acid (PFPeA)	28		5.0	2.5	ng/L	1			537 (modified)	Pre-Treatment
Perfluorohexanoic acid (PFHxA)	28		5.0	2.0	ng/L	1			537 (modified)	Pre-Treatment
Perfluoroheptanoic acid (PFHpA)	17		5.0	2.0	ng/L	1			537 (modified)	Pre-Treatment
Perfluorooctanoic acid (PFOA)	23		5.0	1.9	ng/L	1			537 (modified)	Pre-Treatment
Perfluorononanoic acid (PFNA)	57		5.0	1.6	ng/L	1			537 (modified)	Pre-Treatment
Perfluorodecanoic acid (PFDA)	1.5	J	5.0	1.1	ng/L	1			537 (modified)	Pre-Treatment
Perfluorobutanesulfonic acid (PFBS)	4.2	J	5.0	2.3	ng/L	1			537 (modified)	Pre-Treatment
Perfluorohexanesulfonic acid (PFHxS)	57		5.0	2.2	ng/L	1			537 (modified)	Pre-Treatment
Perfluoroheptanesulfonic Acid (PFHpS)	14		5.0	1.8	ng/L	1			537 (modified)	Pre-Treatment
Perfluorooctanesulfonic acid (PFOS)	330		5.0	3.2	ng/L	1			537 (modified)	Pre-Treatment
6:2FTS	140		50	9.6	ng/L	1			537 (modified)	Pre-Treatment
Perfluorobutanoic acid (PFBA)	45	B	5.0	1.1	ng/L	1			537 (modified)	Post-Treatment
Perfluoropentanoic acid (PFPeA)	80		5.0	2.5	ng/L	1			537 (modified)	Post-Treatment
Perfluorohexanoic acid (PFHxA)	170		5.0	2.0	ng/L	1			537 (modified)	Post-Treatment
Perfluoroheptanoic acid (PFHpA)	20	*	5.0	2.0	ng/L	1			537 (modified)	Post-Treatment
Perfluorooctanoic acid (PFOA)	24	*	5.0	1.9	ng/L	1			537 (modified)	Post-Treatment
Perfluorononanoic acid (PFNA)	54		5.0	1.6	ng/L	1			537 (modified)	Post-Treatment
Perfluorotetradecanoic acid (PFTeA)	0.78	J B	5.0	0.50	ng/L	1			537 (modified)	Post-Treatment
Perfluorobutanesulfonic acid (PFBS)	3.7	J	5.0	2.3	ng/L	1			537 (modified)	Post-Treatment
Perfluorohexanesulfonic acid (PFHxS)	64		5.0	2.2	ng/L	1			537 (modified)	Post-Treatment
Perfluoroheptanesulfonic Acid (PFHpS)	14		5.0	1.8	ng/L	1			537 (modified)	Post-Treatment
Perfluorooctanesulfonic acid (PFOS)	310		5.0	3.2	ng/L	1			537 (modified)	Post-Treatment
Perfluorooctane Sulfonamide (FOSA)	1.6	J B *	40	1.6	ng/L	1			537 (modified)	Post-Treatment
PFBA	35				ng/L	1			Total PFCA-Dif	Total/NA
PFPA	52				ng/L	1			Total PFCA-Dif	Total/NA
PFHxA	140				ng/L	1			Total PFCA-Dif	Total/NA
PFHpA	3.1				ng/L	1			Total PFCA-Dif	Total/NA
PFOA	1.1				ng/L	1			Total PFCA-Dif	Total/NA
PFNA	0.00				ng/L	1			Total PFCA-Dif	Total/NA
Total PFCA	230				ng/L	1			Total PFCA-Dif	Total/NA
Total PFCA	160				ng/L	1			Total PFCA-Sum	Pre-Treatment

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507 (Continued)

Lab Sample ID: 320-29998-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Total PFCA	390				ng/L	1			Total PFCA-Sum	Post-Treatment

Client Sample ID: MW-1701-35

Lab Sample ID: 320-29998-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	450	B	5.0	1.1	ng/L	1			537 (modified)	Pre-Treatment
Perfluoroheptanoic acid (PFHpA)	760		5.0	2.0	ng/L	1			537 (modified)	Pre-Treatment
Perfluorooctanoic acid (PFOA)	800		5.0	1.9	ng/L	1			537 (modified)	Pre-Treatment
Perfluorononanoic acid (PFNA)	140		5.0	1.6	ng/L	1			537 (modified)	Pre-Treatment
Perfluorodecanoic acid (PFDA)	3.9	J	5.0	1.1	ng/L	1			537 (modified)	Pre-Treatment
Perfluorooctane Sulfonamide (FOSA)	2.4	J B	40	1.6	ng/L	1			537 (modified)	Pre-Treatment
8:2FTS	88		50	10	ng/L	1			537 (modified)	Pre-Treatment
Perfluoropentanoic acid (PFPeA) - DL	1500		100	50	ng/L	20			537 (modified)	Pre-Treatment
Perfluorohexanoic acid (PFHxA) - DL	2900		100	40	ng/L	20			537 (modified)	Pre-Treatment
Perfluorobutanesulfonic acid (PFBS) - DL	1200		100	46	ng/L	20			537 (modified)	Pre-Treatment
Perfluorohexanesulfonic acid (PFHxS) - DL	7400		100	44	ng/L	20			537 (modified)	Pre-Treatment
Perfluoroheptanesulfonic Acid (PFHpS) - DL	590		100	36	ng/L	20			537 (modified)	Pre-Treatment
Perfluorooctanesulfonic acid (PFOS) - DL	17000		100	64	ng/L	20			537 (modified)	Pre-Treatment
6:2FTS - DL	1900		1000	190	ng/L	20			537 (modified)	Pre-Treatment
Perfluoroheptanoic acid (PFHpA)	840	*	5.0	2.0	ng/L	1			537 (modified)	Post-Treatment
Perfluorooctanoic acid (PFOA)	880	*	5.0	1.9	ng/L	1			537 (modified)	Post-Treatment
Perfluorononanoic acid (PFNA)	130		5.0	1.6	ng/L	1			537 (modified)	Post-Treatment
Perfluorodecanoic acid (PFDA)	3.1	J B	5.0	1.1	ng/L	1			537 (modified)	Post-Treatment
Perfluoroheptanesulfonic Acid (PFHpS)	930		5.0	1.8	ng/L	1			537 (modified)	Post-Treatment
Perfluorooctane Sulfonamide (FOSA)	1.6	J B *	40	1.6	ng/L	1			537 (modified)	Post-Treatment
Perfluorobutanoic acid (PFBA) - DL	2500	B	100	22	ng/L	20			537 (modified)	Post-Treatment
Perfluoropentanoic acid (PFPeA) - DL	3700		100	50	ng/L	20			537 (modified)	Post-Treatment
Perfluorohexanoic acid (PFHxA) - DL	7800		100	40	ng/L	20			537 (modified)	Post-Treatment
Perfluorobutanesulfonic acid (PFBS) - DL	1200		100	46	ng/L	20			537 (modified)	Post-Treatment
Perfluorohexanesulfonic acid (PFHxS) - DL	7300		100	44	ng/L	20			537 (modified)	Post-Treatment

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-1701-35 (Continued)

Lab Sample ID: 320-29998-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS) - DL	16000		100	64	ng/L	20		537 (modified)	Post-Treatment
PFBA	2100				ng/L	1		Total PFCA-Dif	Total/NA
PFPA	2300				ng/L	1		Total PFCA-Dif	Total/NA
PFHxA	4900				ng/L	1		Total PFCA-Dif	Total/NA
PFHpA	76				ng/L	1		Total PFCA-Dif	Total/NA
PFOA	80				ng/L	1		Total PFCA-Dif	Total/NA
PFNA	0.00				ng/L	1		Total PFCA-Dif	Total/NA
Total PFCA	9300				ng/L	1		Total PFCA-Dif	Total/NA
Total PFCA	6600				ng/L	1		Total PFCA-Sum	Pre-Treatment
Total PFCA	16000				ng/L	1		Total PFCA-Sum	Post-Treatment

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Date Collected: 07/18/17 10:56

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-7

Matrix: Water

Method: 537 (modified) - Perfluorinated Hydrocarbons - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	9.8	B	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluoropentanoic acid (PFPeA)	28		5.0	2.5	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorohexanoic acid (PFHxA)	28		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluoroheptanoic acid (PFHpA)	17		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorooctanoic acid (PFOA)	23		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorononanoic acid (PFNA)	57		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorodecanoic acid (PFDA)	1.5	J	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorotetradecanoic acid (PFTeA)	ND		5.0	0.50	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorobutanesulfonic acid (PFBS)	4.2	J	5.0	2.3	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorohexanesulfonic acid (PFHxS)	57		5.0	2.2	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluoroheptanesulfonic Acid (PFHpS)	14		5.0	1.8	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorooctanesulfonic acid (PFOS)	330		5.0	3.2	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 17:08	1
Perfluorooctane Sulfonamide (FOSA)	ND		40	1.6	ng/L		08/01/17 13:50	08/13/17 17:08	1
6:2FTS	140		50	9.6	ng/L		08/01/17 13:50	08/13/17 17:08	1
8:2FTS	ND		50	10	ng/L		08/01/17 13:50	08/13/17 17:08	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	23	*	25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C4 PFBA	64		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C2 PFHxA	87		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C4 PFOA	104		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C5 PFNA	98		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C2 PFDA	105		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C2 PFUnA	103		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C2 PFDoA	108		25 - 150	08/01/17 13:50	08/13/17 17:08	1
18O2 PFHxS	103		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C4 PFOS	104		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C4-PFHpA	92		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C5 PFPeA	82		25 - 150	08/01/17 13:50	08/13/17 17:08	1
M2-6:2FTS	141		25 - 150	08/01/17 13:50	08/13/17 17:08	1
M2-8:2FTS	166	*	25 - 150	08/01/17 13:50	08/13/17 17:08	1
M2-4:2FTS	102		0 - 150	08/01/17 13:50	08/13/17 17:08	1
13C3-PFBS	87		25 - 150	08/01/17 13:50	08/13/17 17:08	1
13C2-PFTeDA	182	*	25 - 150	08/01/17 13:50	08/13/17 17:08	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	45	B	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluoropentanoic acid (PFPeA)	80		5.0	2.5	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorohexanoic acid (PFHxA)	170		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluoroheptanoic acid (PFHpA)	20	*	5.0	2.0	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorooctanoic acid (PFOA)	24	*	5.0	1.9	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorononanoic acid (PFNA)	54		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 18:10	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Date Collected: 07/18/17 10:56

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-7

Matrix: Water

Method: 537 (modified) - Perfluorinated Hydrocarbons - Post-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorodecanoic acid (PFDA)	ND		5.0	1.1	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorotetradecanoic acid (PFTeA)	0.78	J B	5.0	0.50	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorobutanesulfonic acid (PFBS)	3.7	J	5.0	2.3	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorohexanesulfonic acid (PFHxS)	64		5.0	2.2	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluoroheptanesulfonic Acid (PFHpS)	14		5.0	1.8	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorooctanesulfonic acid (PFOS)	310		5.0	3.2	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 18:10	1
Perfluorooctane Sulfonamide (FOSA)	1.6	J B *	40	1.6	ng/L		08/01/17 13:50	08/13/17 18:10	1
6:2FTS	ND	*	50	9.6	ng/L		08/01/17 13:50	08/13/17 18:10	1
8:2FTS	ND	*	50	10	ng/L		08/01/17 13:50	08/13/17 18:10	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	11	*	25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C4 PFBA	79		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C2 PFHxA	89		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C4 PFOA	94		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C5 PFNA	81		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C2 PFDA	70		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C2 PFUnA	65		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C2 PFDoA	54		25 - 150	08/01/17 13:50	08/13/17 18:10	1
18O2 PFHxS	96		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C4 PFOS	94		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C4-PFHpA	90		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C5 PFPeA	84		25 - 150	08/01/17 13:50	08/13/17 18:10	1
M2-6:2FTS	109		25 - 150	08/01/17 13:50	08/13/17 18:10	1
M2-8:2FTS	110		25 - 150	08/01/17 13:50	08/13/17 18:10	1
M2-4:2FTS	0		0 - 150	08/01/17 13:50	08/13/17 18:10	1
13C3-PFBS	93		25 - 150	08/01/17 13:50	08/13/17 18:10	1
13C2-PFTeDA	90		25 - 150	08/01/17 13:50	08/13/17 18:10	1

Method: Total PFCA-Dif - Total PFCA (Treatment Difference)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFBA	35				ng/L			08/25/17 16:16	1
PFPA	52				ng/L			08/25/17 16:16	1
PFHxA	140				ng/L			08/25/17 16:16	1
PFHpA	3.1				ng/L			08/25/17 16:16	1
PFOA	1.1				ng/L			08/25/17 16:16	1
PFNA	0.00				ng/L			08/25/17 16:16	1
Total PFCA	230				ng/L			08/25/17 16:16	1

Method: Total PFCA-Sum - Total PFCA (Summary) - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	160				ng/L			08/25/17 16:10	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Date Collected: 07/18/17 10:56

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-7

Matrix: Water

Method: Total PFCA-Sum - Total PFCA (Summary) - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	390				ng/L			08/25/17 16:10	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-1701-35

Date Collected: 07/18/17 12:35

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-8

Matrix: Water

Method: 537 (modified) - Perfluorinated Hydrocarbons - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	450	B	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluoroheptanoic acid (PFHpA)	760		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorooctanoic acid (PFOA)	800		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorononanoic acid (PFNA)	140		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorodecanoic acid (PFDA)	3.9	J	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorotetradecanoic acid (PFTeA)	ND		5.0	0.50	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 17:15	1
Perfluorooctane Sulfonamide (FOSA)	2.4	J B	40	1.6	ng/L		08/01/17 13:50	08/13/17 17:15	1
8:2FTS	88		50	10	ng/L		08/01/17 13:50	08/13/17 17:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C8 FOSA	16	*	25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C4 PFBA	46		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C4 PFOA	79		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C5 PFNA	44		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C2 PFDA	100		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C2 PFUnA	103		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C2 PFDoA	99		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C4 PFOS	46		25 - 150				08/01/17 13:50	08/13/17 17:15	1
13C4-PFHpA	52		25 - 150				08/01/17 13:50	08/13/17 17:15	1
M2-8:2FTS	139		25 - 150				08/01/17 13:50	08/13/17 17:15	1
M2-4:2FTS	98		0 - 150				08/01/17 13:50	08/13/17 17:15	1
13C2-PFTeDA	165	*	25 - 150				08/01/17 13:50	08/13/17 17:15	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - Pre-Treatment - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanoic acid (PFPeA)	1500		100	50	ng/L		08/01/17 13:50	08/13/17 17:01	20
Perfluorohexanoic acid (PFHxA)	2900		100	40	ng/L		08/01/17 13:50	08/13/17 17:01	20
Perfluorobutanesulfonic acid (PFBS)	1200		100	46	ng/L		08/01/17 13:50	08/13/17 17:01	20
Perfluorohexanesulfonic acid (PFHxS)	7400		100	44	ng/L		08/01/17 13:50	08/13/17 17:01	20
Perfluoroheptanesulfonic Acid (PFHpS)	590		100	36	ng/L		08/01/17 13:50	08/13/17 17:01	20
Perfluorooctanesulfonic acid (PFOS)	17000		100	64	ng/L		08/01/17 13:50	08/13/17 17:01	20
6:2FTS	1900		1000	190	ng/L		08/01/17 13:50	08/13/17 17:01	20
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	110		25 - 150				08/01/17 13:50	08/13/17 17:01	20
18O2 PFHxS	110		25 - 150				08/01/17 13:50	08/13/17 17:01	20
13C4 PFOS	102		25 - 150				08/01/17 13:50	08/13/17 17:01	20
13C5 PFPeA	107		25 - 150				08/01/17 13:50	08/13/17 17:01	20
M2-6:2FTS	241	*	25 - 150				08/01/17 13:50	08/13/17 17:01	20
13C3-PFBS	107		25 - 150				08/01/17 13:50	08/13/17 17:01	20

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-1701-35

Lab Sample ID: 320-29998-8

Date Collected: 07/18/17 12:35

Matrix: Water

Date Received: 07/20/17 09:25

Method: 537 (modified) - Perfluorinated Hydrocarbons - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	840	*	5.0	2.0	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorooctanoic acid (PFOA)	880	*	5.0	1.9	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorononanoic acid (PFNA)	130		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorodecanoic acid (PFDA)	3.1	J B	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorotetradecanoic acid (PFTeA)	ND		5.0	0.50	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluoroheptanesulfonic Acid (PFHpS)	930		5.0	1.8	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 18:17	1
Perfluorooctane Sulfonamide (FOSA)	1.6	J B *	40	1.6	ng/L		08/01/17 13:50	08/13/17 18:17	1
6:2FTS	ND	*	50	9.6	ng/L		08/01/17 13:50	08/13/17 18:17	1
8:2FTS	ND	*	50	10	ng/L		08/01/17 13:50	08/13/17 18:17	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	7	*	25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C2 PFHxA	42		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C4 PFOA	56		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C5 PFNA	26		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C2 PFDA	48		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C2 PFUnA	41		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C2 PFDoA	43		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C4 PFOS	49		25 - 150	08/01/17 13:50	08/13/17 18:17	1
13C4-PFHpa	40		25 - 150	08/01/17 13:50	08/13/17 18:17	1
M2-6:2FTS	97		25 - 150	08/01/17 13:50	08/13/17 18:17	1
M2-8:2FTS	109		25 - 150	08/01/17 13:50	08/13/17 18:17	1
M2-4:2FTS	0		0 - 150	08/01/17 13:50	08/13/17 18:17	1
13C2-PFTeDA	99		25 - 150	08/01/17 13:50	08/13/17 18:17	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - Post-Treatment - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	2500	B	100	22	ng/L		08/01/17 13:50	08/13/17 18:04	20
Perfluoropentanoic acid (PFPeA)	3700		100	50	ng/L		08/01/17 13:50	08/13/17 18:04	20
Perfluorohexanoic acid (PFHxA)	7800		100	40	ng/L		08/01/17 13:50	08/13/17 18:04	20
Perfluorobutanesulfonic acid (PFBS)	1200		100	46	ng/L		08/01/17 13:50	08/13/17 18:04	20
Perfluorohexanesulfonic acid (PFHxS)	7300		100	44	ng/L		08/01/17 13:50	08/13/17 18:04	20
Perfluorooctanesulfonic acid (PFOS)	16000		100	64	ng/L		08/01/17 13:50	08/13/17 18:04	20

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	87		25 - 150	08/01/17 13:50	08/13/17 18:04	20
18O2 PFHxS	110		25 - 150	08/01/17 13:50	08/13/17 18:04	20
13C4 PFOS	96		25 - 150	08/01/17 13:50	08/13/17 18:04	20
13C5 PFPeA	87		25 - 150	08/01/17 13:50	08/13/17 18:04	20
13C3-PFBS	105		25 - 150	08/01/17 13:50	08/13/17 18:04	20

Method: Total PFCA-Dif - Total PFCA (Treatment Difference)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFBA	2100				ng/L			08/25/17 16:16	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-1701-35

Lab Sample ID: 320-29998-8

Date Collected: 07/18/17 12:35

Matrix: Water

Date Received: 07/20/17 09:25

Method: Total PFCA-Dif - Total PFCA (Treatment Difference) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFPA	2300				ng/L			08/25/17 16:16	1
PFHxA	4900				ng/L			08/25/17 16:16	1
PFHpA	76				ng/L			08/25/17 16:16	1
PFOA	80				ng/L			08/25/17 16:16	1
PFNA	0.00				ng/L			08/25/17 16:16	1
Total PFCA	9300				ng/L			08/25/17 16:16	1

Method: Total PFCA-Sum - Total PFCA (Summary) - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	6600				ng/L			08/25/17 16:10	1

Method: Total PFCA-Sum - Total PFCA (Summary) - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	16000				ng/L			08/25/17 16:10	1

Total Oxidation Precursors

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Lab Sample ID: 320-29998-7
Matrix: Water

Analyte	Pre - Treatment Method: 537 (modified)			Post - Treatment Method: 537 (modified)			Difference ¹	
	Result	Qualifier	Unit	Result	Qualifier	Unit	Result	Unit
Perfluorobutanoic acid (PFBA)	9.8		ng/L	45		ng/L	35	ng/L
Perfluoropentanoic acid (PFPeA)	28		ng/L	80		ng/L	52	ng/L
Perfluorohexanoic acid (PFHxA)	28		ng/L	170		ng/L	140	ng/L
Perfluoroheptanoic acid (PFHpA)	17		ng/L	20		ng/L	3.1	ng/L
Perfluorooctanoic acid (PFOA)	23		ng/L	24		ng/L	1.1	ng/L
Perfluorononanoic acid (PFNA)	57		ng/L	54		ng/L	0.00	ng/L
Total PFCA	160		ng/L	390		ng/L	230	ng/L

Client Sample ID: MW-1701-35

Lab Sample ID: 320-29998-8
Matrix: Water

Analyte	Pre - Treatment Method: 537 (modified)			Post - Treatment Method: 537 (modified)			Difference ¹	
	Result	Qualifier	Unit	Result	Qualifier	Unit	Result	Unit
Perfluorobutanoic acid (PFBA)	450		ng/L	2500		ng/L	2100	ng/L
Perfluoropentanoic acid (PFPeA)	1500		ng/L	3700		ng/L	2300	ng/L
Perfluorohexanoic acid (PFHxA)	2900		ng/L	7800		ng/L	4900	ng/L
Perfluoroheptanoic acid (PFHpA)	760		ng/L	840		ng/L	76	ng/L
Perfluorooctanoic acid (PFOA)	800		ng/L	880		ng/L	80	ng/L
Perfluorononanoic acid (PFNA)	140		ng/L	130		ng/L	0.00	ng/L
Total PFCA	6600		ng/L	16000		ng/L	9300	ng/L

¹ Difference = Post-Treatment - Pre-Treatment

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons

Matrix: Water

Prep Type: Pre-Treatment

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	3C8 FOS/ (25-150)	3C4 PFB/ (25-150)	3C2 PFHx (25-150)	3C4 PFO/ (25-150)	3C5 PFNA/ (25-150)	3C2 PFDA/ (25-150)	3C2 PFUn (25-150)	3C2 PFDo (25-150)
320-29998-7	MW-507	23 *	64	87	104	98	105	103	108
320-29998-8 - DL	MW-1701-35			110					
320-29998-8	MW-1701-35	16 *	46		79	44	100	103	99
LCS 320-176939/2-A	Lab Control Sample	83	96	104	108	105	111	107	107
LCSD 320-176939/3-A	Lab Control Sample Dup	81	100	101	111	107	119	119	121
MB 320-176939/1-A	Method Blank	80	106	104	112	109	114	113	110

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4 PFO/ (25-150)	3C4-PFHp (25-150)	3C5 PFPe (25-150)	M2-6:2FTS (25-150)	M2-8:2FTS (25-150)	M2-4:2FTS (0-150)	3C3-PFB/ (25-150)
320-29998-7	MW-507	103	104	92	82	141	166 *	102	87
320-29998-8 - DL	MW-1701-35	110	102		107	241 *			107
320-29998-8	MW-1701-35		46	52			139	98	
LCS 320-176939/2-A	Lab Control Sample	98	97	106	102	128	126	121	87
LCSD 320-176939/3-A	Lab Control Sample Dup	100	99	105	106	128	151 *	117	87
MB 320-176939/1-A	Method Blank	102	94	107	105	127	126	134	95

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	C2-PFTeL (25-150)
320-29998-7	MW-507	182 *
320-29998-8 - DL	MW-1701-35	
320-29998-8	MW-1701-35	165 *
LCS 320-176939/2-A	Lab Control Sample	157 *
LCSD 320-176939/3-A	Lab Control Sample Dup	166 *
MB 320-176939/1-A	Method Blank	159 *

Surrogate Legend

13C8 FOSA = 13C8 FOSA
13C4 PFBA = 13C4 PFBA
13C2 PFHxA = 13C2 PFHxA
13C4 PFOA = 13C4 PFOA
13C5 PFNA = 13C5 PFNA
13C2 PFDA = 13C2 PFDA
13C2 PFUnA = 13C2 PFUnA
13C2 PFDoA = 13C2 PFDoA
18O2 PFHxS = 18O2 PFHxS
13C4 PFOS = 13C4 PFOS
13C4-PFHpA = 13C4-PFHpA
13C5 PFPeA = 13C5 PFPeA
M2-6:2FTS = M2-6:2FTS
M2-8:2FTS = M2-8:2FTS
M2-4:2FTS = M2-4:2FTS
13C3-PFBS = 13C3-PFBS
13C2-PFTeDA = 13C2-PFTeDA

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons

Matrix: Water

Prep Type: Post-Treatment

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	3C8 FOS/ (25-150)	3C4 PFB/ (25-150)	3C2 PFHx (25-150)	3C4 PFO/ (25-150)	3C5 PFNA/ (25-150)	3C2 PFDA/ (25-150)	3C2 PFUn (25-150)	3C2 PFDo (25-150)
320-29998-7	MW-507	11 *	79	89	94	81	70	65	54
320-29998-8 - DL	MW-1701-35		87						
320-29998-8	MW-1701-35	7 *		42	56	26	48	41	43
LCS 320-176941/2-A	Lab Control Sample	5 *	61	53	58	53	52	54	55
LCSD 320-176941/3-A	Lab Control Sample Dup	7 *	65	59	64	58	62	62	66
MB 320-176941/1-A	Method Blank	5 *	83	81	87	83	79	77	78

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4 PFO/ (25-150)	3C4-PFHp (25-150)	3C5 PFPe (25-150)	M2-6:2FTS (25-150)	M2-8:2FTS (25-150)	M2-4:2FTS (0-150)	3C3-PFBs (25-150)
320-29998-7	MW-507	96	94	90	84	109	110	0	93
320-29998-8 - DL	MW-1701-35	110	96		87				105
320-29998-8	MW-1701-35		49	40		97	109	0	
LCS 320-176941/2-A	Lab Control Sample	97	96	50	48	116	118	0	96
LCSD 320-176941/3-A	Lab Control Sample Dup	98	93	59	60	123	113	0	92
MB 320-176941/1-A	Method Blank	104	98	84	85	126	118	0	96

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	C2-PFTeL (25-150)
320-29998-7	MW-507	90
320-29998-8 - DL	MW-1701-35	
320-29998-8	MW-1701-35	99
LCS 320-176941/2-A	Lab Control Sample	105
LCSD 320-176941/3-A	Lab Control Sample Dup	121
MB 320-176941/1-A	Method Blank	142

Surrogate Legend

13C8 FOSA = 13C8 FOSA
13C4 PFBA = 13C4 PFBA
13C2 PFHxA = 13C2 PFHxA
13C4 PFOA = 13C4 PFOA
13C5 PFNA = 13C5 PFNA
13C2 PFDA = 13C2 PFDA
13C2 PFUnA = 13C2 PFUnA
13C2 PFDoA = 13C2 PFDoA
18O2 PFHxS = 18O2 PFHxS
13C4 PFOS = 13C4 PFOS
13C4-PFHpA = 13C4-PFHpA
13C5 PFPeA = 13C5 PFPeA
M2-6:2FTS = M2-6:2FTS
M2-8:2FTS = M2-8:2FTS
M2-4:2FTS = M2-4:2FTS
13C3-PFBS = 13C3-PFBS
13C2-PFTeDA = 13C2-PFTeDA

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-176939/1-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Method Blank

Prep Type: Pre-Treatment

Prep Batch: 176939

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.92	J	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluoropentanoic acid (PFPeA)	ND		5.0	2.5	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorohexanoic acid (PFHxA)	ND		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluoroheptanoic acid (PFHpA)	ND		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorooctanoic acid (PFOA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorononanoic acid (PFNA)	ND		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorodecanoic acid (PFDA)	ND		5.0	1.1	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorotetradecanoic acid (PFTeA)	ND		5.0	0.50	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorobutanesulfonic acid (PFBS)	ND		5.0	2.3	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		5.0	2.2	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5.0	1.8	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		5.0	3.2	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 16:34	1
Perfluorooctane Sulfonamide (FOSA)	2.10	J	40	1.6	ng/L		08/01/17 13:50	08/13/17 16:34	1
6:2FTS	ND		50	9.6	ng/L		08/01/17 13:50	08/13/17 16:34	1
8:2FTS	ND		50	10	ng/L		08/01/17 13:50	08/13/17 16:34	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	82		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C4 PFBA	127		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C* PF6HA	124		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C4 PFOA	11*		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C5 PFNA	12x		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C* PF9A	114		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C* PFDUa	113		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C* PF9nA	112		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
18O* PF6HS	12*		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C4 PFOS	x4		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C4-PF6oA	12/		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C5 PFPpA	125		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
e *-7:*FMS	1*/		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
e *-8:*FMS	1*7		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
e *-4:*FMS	134		2 - 152	2802101/ 13:52	2801301/ 17:34	1
13C3-PFBS	x5		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1
13C*-PFMp9A	15x T		* 5 - 152	2802101/ 13:52	2801301/ 17:34	1

Lab Sample ID: LCS 320-176939/2-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample

Prep Type: Pre-Treatment

Prep Batch: 176939

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	100	108		ng/L		108	74 - 138
Perfluoropentanoic acid (PFPeA)	100	96.5		ng/L		97	69 - 134
Perfluorohexanoic acid (PFHxA)	100	90.6		ng/L		91	70 - 136

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCS 320-176939/2-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample

Prep Type: Pre-Treatment

Prep Batch: 176939

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	100	105		ng/L		105	63 - 135
Perfluorooctanoic acid (PFOA)	100	96.9		ng/L		97	63 - 141
Perfluorononanoic acid (PFNA)	100	97.8		ng/L		98	71 - 140
Perfluorodecanoic acid (PFDA)	100	101		ng/L		101	66 - 141
Perfluoroundecanoic acid (PFUnA)	100	95.6		ng/L		96	68 - 139
Perfluorododecanoic acid (PFDoA)	100	96.3		ng/L		96	71 - 139
Perfluorotridecanoic Acid (PFTriA)	100	103		ng/L		103	51 - 139
Perfluorotetradecanoic acid (PFTeA)	100	95.7		ng/L		96	47 - 130
Perfluorobutanesulfonic acid (PFBS)	88.4	90.0		ng/L		102	55 - 147
Perfluorohexanesulfonic acid (PFHxS)	91.0	90.2		ng/L		99	58 - 138
Perfluoroheptanesulfonic Acid (PFHpS)	95.2	101		ng/L		106	32 - 170
Perfluorooctanesulfonic acid (PFOS)	92.8	87.5		ng/L		94	47 - 162
Perfluorodecanesulfonic acid (PFDS)	96.4	94.8		ng/L		98	35 - 157
Perfluorooctane Sulfonamide (FOSA)	100	100		ng/L		100	59 - 163
6:2FTS	94.8	103		ng/L		109	60 - 140
8:2FTS	95.8	100		ng/L		105	60 - 140

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C8 FOSA	83		* 5 - 152
13C4 PFBA	x7		* 5 - 152
13C* PF6tA	124		* 5 - 152
13C4 PFOA	128		* 5 - 152
13C5 PFNA	125		* 5 - 152
13C* PF9A	111		* 5 - 152
13C* PFDUA	12/		* 5 - 152
13C* PF9nA	12/		* 5 - 152
18O* PF6tS	x8		* 5 - 152
13C4 PFOS	x/		* 5 - 152
13C4-PF6oA	127		* 5 - 152
13C5 PFPpA	12*		* 5 - 152
e *-7.*FMS	1*8		* 5 - 152
e *-8.*FMS	1*7		* 5 - 152
e *-4.*FMS	1*1		2 - 152
13C3-PFBS	8/		* 5 - 152
13C*-PFMp9A	15/ T		* 5 - 152

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCSD 320-176939/3-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample Dup

Prep Type: Pre-Treatment

Prep Batch: 176939

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	100	110		ng/L		110	74 - 138	2	30
Perfluoropentanoic acid (PFPeA)	100	93.5		ng/L		94	69 - 134	3	30
Perfluorohexanoic acid (PFHxA)	100	89.8		ng/L		90	70 - 136	1	30
Perfluoroheptanoic acid (PFHpA)	100	104		ng/L		104	63 - 135	1	30
Perfluorooctanoic acid (PFOA)	100	96.5		ng/L		96	63 - 141	0	30
Perfluorononanoic acid (PFNA)	100	101		ng/L		101	71 - 140	3	30
Perfluorodecanoic acid (PFDA)	100	108		ng/L		108	66 - 141	7	30
Perfluoroundecanoic acid (PFUnA)	100	104		ng/L		104	68 - 139	9	30
Perfluorododecanoic acid (PFDoA)	100	94.1		ng/L		94	71 - 139	2	30
Perfluorotridecanoic Acid (PFTriA)	100	134		ng/L		134	51 - 139	26	30
Perfluorotetradecanoic acid (PFTeA)	100	98.1		ng/L		98	47 - 130	2	30
Perfluorobutanesulfonic acid (PFBS)	88.4	94.0		ng/L		106	55 - 147	4	30
Perfluorohexanesulfonic acid (PFHxS)	91.0	89.4		ng/L		98	58 - 138	1	30
Perfluoroheptanesulfonic Acid (PFHpS)	95.2	98.1		ng/L		103	32 - 170	3	30
Perfluorooctanesulfonic acid (PFOS)	92.8	92.9		ng/L		100	47 - 162	6	30
Perfluorodecanesulfonic acid (PFDS)	96.4	93.9		ng/L		97	35 - 157	1	30
Perfluorooctane Sulfonamide (FOSA)	100	98.2		ng/L		98	59 - 163	2	30
6:2FTS	94.8	96.4		ng/L		102	60 - 140	7	30
8:2FTS	95.8	100		ng/L		104	60 - 140	0	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C8 FOSA	81		* 5 - 152
13C4 PFBA	122		* 5 - 152
13C* PF6 HA	121		* 5 - 152
13C4 PFOA	111		* 5 - 152
13C5 PFNA	12/		* 5 - 152
13C* PF9 A	11x		* 5 - 152
13C* PFDA	11x		* 5 - 152
13C* PF9 nA	1*1		* 5 - 152
18O* PF6 HS	122		* 5 - 152
13C4 PFOS	xx		* 5 - 152
13C4-PF6 oA	125		* 5 - 152
13C5 PFPpA	127		* 5 - 152
e *-7:*FMS	1*8		* 5 - 152
e *-8:*FMS	151 T		* 5 - 152
e *-4:*FMS	11/		2 - 152
13C3-PFBS	8/		* 5 - 152
13C*-PFMp9A	177 T		* 5 - 152

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: MB 320-176941/1-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Method Blank

Prep Type: Post-Treatment

Prep Batch: 176941

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	9.55		5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluoropentanoic acid (PFPeA)	ND		5.0	2.5	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorohexanoic acid (PFHxA)	ND		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluoroheptanoic acid (PFHpA)	ND		5.0	2.0	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorooctanoic acid (PFOA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorononanoic acid (PFNA)	ND		5.0	1.6	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorodecanoic acid (PFDA)	1.89	J	5.0	1.1	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluoroundecanoic acid (PFUnA)	ND		5.0	1.9	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorododecanoic acid (PFDoA)	ND		5.0	1.5	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	1.4	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorotetradecanoic acid (PFTeA)	0.935	J	5.0	0.50	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorobutanesulfonic acid (PFBS)	ND		5.0	2.3	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		5.0	2.2	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5.0	1.8	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		5.0	3.2	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorodecanesulfonic acid (PFDS)	ND		5.0	3.0	ng/L		08/01/17 13:50	08/13/17 17:36	1
Perfluorooctane Sulfonamide (FOSA)	5.68	J	40	1.6	ng/L		08/01/17 13:50	08/13/17 17:36	1
6:2FTS	ND		50	9.6	ng/L		08/01/17 13:50	08/13/17 17:36	1
8:2FTS	ND		50	10	ng/L		08/01/17 13:50	08/13/17 17:36	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	5	T	*5 - 152	280101/ 13:52	280130/ 17:37	1
13C4 PFBA	83		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C* PF6HA	81		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C4 PFOA	8/		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C5 PFNA	83		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C* PF9A	/x		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C* PFDA	//		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C* PF9nA	/8		*5 - 152	280101/ 13:52	280130/ 17:37	1
18O* PF6HS	124		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C4 PFOS	x8		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C4-PF6oA	84		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C5 PFPpA	85		*5 - 152	280101/ 13:52	280130/ 17:37	1
e *-7:*FMS	1*7		*5 - 152	280101/ 13:52	280130/ 17:37	1
e *-8:*FMS	118		*5 - 152	280101/ 13:52	280130/ 17:37	1
e *-4:*FMS	2		2 - 152	280101/ 13:52	280130/ 17:37	1
13C3-PFBS	x7		*5 - 152	280101/ 13:52	280130/ 17:37	1
13C*-PFMp9A	14*		*5 - 152	280101/ 13:52	280130/ 17:37	1

Lab Sample ID: LCS 320-176941/2-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample

Prep Type: Post-Treatment

Prep Batch: 176941

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	100	123		ng/L		123	74 - 138
Perfluoropentanoic acid (PFPeA)	100	107		ng/L		107	69 - 134
Perfluorohexanoic acid (PFHxA)	100	103		ng/L		103	70 - 136

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCS 320-176941/2-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample

Prep Type: Post-Treatment

Prep Batch: 176941

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	100	145	*	ng/L		145	63 - 135
Perfluorooctanoic acid (PFOA)	100	250	*	ng/L		250	63 - 141
Perfluorononanoic acid (PFNA)	100	93.6		ng/L		94	71 - 140
Perfluorodecanoic acid (PFDA)	100	93.1		ng/L		93	66 - 141
Perfluoroundecanoic acid (PFUnA)	100	89.8		ng/L		90	68 - 139
Perfluorododecanoic acid (PFDoA)	100	87.2		ng/L		87	71 - 139
Perfluorotridecanoic Acid (PFTriA)	100	108		ng/L		108	51 - 139
Perfluorotetradecanoic acid (PFTeA)	100	92.2		ng/L		92	47 - 130
Perfluorobutanesulfonic acid (PFBS)	88.4	93.8		ng/L		106	55 - 147
Perfluorohexanesulfonic acid (PFHxS)	91.0	91.6		ng/L		101	58 - 138
Perfluoroheptanesulfonic Acid (PFHpS)	95.2	99.3		ng/L		104	32 - 170
Perfluorooctanesulfonic acid (PFOS)	92.8	90.5		ng/L		98	47 - 162
Perfluorodecanesulfonic acid (PFDS)	96.4	85.4		ng/L		89	35 - 157
Perfluorooctane Sulfonamide (FOSA)	100	2.20	J *	ng/L		2	59 - 163
6:2FTS	94.8	ND	*	ng/L		0.7	60 - 140
8:2FTS	95.8	ND	*	ng/L		0	60 - 140

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C8 FOSA	5	T	*5 - 152
13C4 PFBA	71		*5 - 152
13C* PF6HA	53		*5 - 152
13C4 PFOA	58		*5 - 152
13C5 PFNA	53		*5 - 152
13C* PF9A	5*		*5 - 152
13C* PFDUA	54		*5 - 152
13C* PF9nA	55		*5 - 152
18O* PF6HS	x/		*5 - 152
13C4 PFOS	x7		*5 - 152
13C4-PF6oA	52		*5 - 152
13C5 PFPpA	48		*5 - 152
e *-7.*FMS	117		*5 - 152
e *-8.*FMS	118		*5 - 152
e *-4.*FMS	2		2 - 152
13C3-PFBS	x7		*5 - 152
13C*-PFMp9A	125		*5 - 152

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCSD 320-176941/3-A

Matrix: Water

Analysis Batch: 179243

Client Sample ID: Lab Control Sample Dup

Prep Type: Post-Treatment

Prep Batch: 176941

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	100	124		ng/L		124	74 - 138	0	30
Perfluoropentanoic acid (PFPeA)	100	114		ng/L		114	69 - 134	6	30
Perfluorohexanoic acid (PFHxA)	100	105		ng/L		105	70 - 136	3	30
Perfluoroheptanoic acid (PFHpA)	100	136	*	ng/L		136	63 - 135	6	30
Perfluorooctanoic acid (PFOA)	100	265	*	ng/L		265	63 - 141	6	30
Perfluorononanoic acid (PFNA)	100	93.0		ng/L		93	71 - 140	1	30
Perfluorodecanoic acid (PFDA)	100	90.8		ng/L		91	66 - 141	3	30
Perfluoroundecanoic acid (PFUnA)	100	92.0		ng/L		92	68 - 139	2	30
Perfluorododecanoic acid (PFDoA)	100	87.4		ng/L		87	71 - 139	0	30
Perfluorotridecanoic Acid (PFTriA)	100	104		ng/L		104	51 - 139	3	30
Perfluorotetradecanoic acid (PFTeA)	100	93.1		ng/L		93	47 - 130	1	30
Perfluorobutanesulfonic acid (PFBS)	88.4	90.4		ng/L		102	55 - 147	4	30
Perfluorohexanesulfonic acid (PFHxS)	91.0	95.9		ng/L		105	58 - 138	5	30
Perfluoroheptanesulfonic Acid (PFHpS)	95.2	107		ng/L		112	32 - 170	7	30
Perfluorooctanesulfonic acid (PFOS)	92.8	91.0		ng/L		98	47 - 162	1	30
Perfluorodecanesulfonic acid (PFDS)	96.4	92.9		ng/L		96	35 - 157	8	30
Perfluorooctane Sulfonamide (FOSA)	100	ND	*	ng/L		1	59 - 163	46	30
6:2FTS	94.8	ND	*	ng/L		1	60 - 140	66	30
8:2FTS	95.8	ND	*	ng/L		0.2	60 - 140	200	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C8 FOSA	7	T	* 5 - 152
13C4 PFBA	75		* 5 - 152
13C* PF6 HA	5x		* 5 - 152
13C4 PFOA	74		* 5 - 152
13C5 PFNA	58		* 5 - 152
13C* PF9 A	7*		* 5 - 152
13C* PFDA	7*		* 5 - 152
13C* PF9 nA	77		* 5 - 152
18O* PF6 HS	x8		* 5 - 152
13C4 PFOS	x3		* 5 - 152
13C4-PF6 oA	5x		* 5 - 152
13C5 PFPpA	72		* 5 - 152
e *-7:*FMS	1*3		* 5 - 152
e *-8:*FMS	113		* 5 - 152
e *-4:*FMS	2		2 - 152
13C3-PFBS	x*		* 5 - 152
13C*-PFMp9A	1*1		* 5 - 152

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

LCMS

Prep Batch: 176939

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29998-7	MW-507	Pre-Treatment	Water	TOPS Pre - Prep	
320-29998-8 - DL	MW-1701-35	Pre-Treatment	Water	TOPS Pre - Prep	
320-29998-8	MW-1701-35	Pre-Treatment	Water	TOPS Pre - Prep	
MB 320-176939/1-A	Method Blank	Pre-Treatment	Water	TOPS Pre - Prep	
LCS 320-176939/2-A	Lab Control Sample	Pre-Treatment	Water	TOPS Pre - Prep	
LCSD 320-176939/3-A	Lab Control Sample Dup	Pre-Treatment	Water	TOPS Pre - Prep	

Prep Batch: 176941

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29998-7	MW-507	Post-Treatment	Water	TOPS Post Prep	
320-29998-8	MW-1701-35	Post-Treatment	Water	TOPS Post Prep	
320-29998-8 - DL	MW-1701-35	Post-Treatment	Water	TOPS Post Prep	
MB 320-176941/1-A	Method Blank	Post-Treatment	Water	TOPS Post Prep	
LCS 320-176941/2-A	Lab Control Sample	Post-Treatment	Water	TOPS Post Prep	
LCSD 320-176941/3-A	Lab Control Sample Dup	Post-Treatment	Water	TOPS Post Prep	

Analysis Batch: 179243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29998-7	MW-507	Post-Treatment	Water	537 (modified)	176941
320-29998-7	MW-507	Pre-Treatment	Water	537 (modified)	176939
320-29998-8 - DL	MW-1701-35	Post-Treatment	Water	537 (modified)	176941
320-29998-8	MW-1701-35	Post-Treatment	Water	537 (modified)	176941
320-29998-8 - DL	MW-1701-35	Pre-Treatment	Water	537 (modified)	176939
320-29998-8	MW-1701-35	Pre-Treatment	Water	537 (modified)	176939
MB 320-176939/1-A	Method Blank	Pre-Treatment	Water	537 (modified)	176939
MB 320-176941/1-A	Method Blank	Post-Treatment	Water	537 (modified)	176941
LCS 320-176939/2-A	Lab Control Sample	Pre-Treatment	Water	537 (modified)	176939
LCS 320-176941/2-A	Lab Control Sample	Post-Treatment	Water	537 (modified)	176941
LCSD 320-176939/3-A	Lab Control Sample Dup	Pre-Treatment	Water	537 (modified)	176939
LCSD 320-176941/3-A	Lab Control Sample Dup	Post-Treatment	Water	537 (modified)	176941

Analysis Batch: 181305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29998-7	MW-507	Post-Treatment	Water	Total PFCA-Sum	
320-29998-7	MW-507	Pre-Treatment	Water	Total PFCA-Sum	
320-29998-8	MW-1701-35	Post-Treatment	Water	Total PFCA-Sum	
320-29998-8	MW-1701-35	Pre-Treatment	Water	Total PFCA-Sum	

Analysis Batch: 181308

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29998-7	MW-507	Total/NA	Water	Total PFCA-Dif	
320-29998-8	MW-1701-35	Total/NA	Water	Total PFCA-Dif	

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Client Sample ID: MW-507

Date Collected: 07/18/17 10:56

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Post-Treatment	Prep	TOPS Post Prep			100 mL	0.50 mL	176941	08/01/17 13:50	JER	TAL SAC
Post-Treatment	Analysis	537 (modified)		1			179243	08/13/17 18:10	SBC	TAL SAC
Pre-Treatment	Prep	TOPS Pre - Prep			100.00 mL	0.50 mL	176939	08/01/17 13:50	JER	TAL SAC
Pre-Treatment	Analysis	537 (modified)		1			179243	08/13/17 17:08	SBC	TAL SAC
Total/NA	Analysis	Total PFCA-Dif		1			181308	08/25/17 16:16	MKW	TAL SAC
Post-Treatment	Analysis	Total PFCA-Sum		1			181305	08/25/17 16:10	MKW	TAL SAC
Pre-Treatment	Analysis	Total PFCA-Sum		1			181305	08/25/17 16:10	MKW	TAL SAC

Client Sample ID: MW-1701-35

Date Collected: 07/18/17 12:35

Date Received: 07/20/17 09:25

Lab Sample ID: 320-29998-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Post-Treatment	Prep	TOPS Post Prep	DL		100 mL	0.50 mL	176941	08/01/17 13:50	JER	TAL SAC
Post-Treatment	Analysis	537 (modified)	DL	20			179243	08/13/17 18:04	SBC	TAL SAC
Post-Treatment	Prep	TOPS Post Prep			100 mL	0.50 mL	176941	08/01/17 13:50	JER	TAL SAC
Post-Treatment	Analysis	537 (modified)		1			179243	08/13/17 18:17	SBC	TAL SAC
Pre-Treatment	Prep	TOPS Pre - Prep	DL		100.00 mL	0.50 mL	176939	08/01/17 13:50	JER	TAL SAC
Pre-Treatment	Analysis	537 (modified)	DL	20			179243	08/13/17 17:01	SBC	TAL SAC
Pre-Treatment	Prep	TOPS Pre - Prep			100.00 mL	0.50 mL	176939	08/01/17 13:50	JER	TAL SAC
Pre-Treatment	Analysis	537 (modified)		1			179243	08/13/17 17:15	SBC	TAL SAC
Total/NA	Analysis	Total PFCA-Dif		1			181308	08/25/17 16:16	MKW	TAL SAC
Post-Treatment	Analysis	Total PFCA-Sum		1			181305	08/25/17 16:10	MKW	TAL SAC
Pre-Treatment	Analysis	Total PFCA-Sum		1			181305	08/25/17 16:10	MKW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc

TestAmerica Job ID: 320-29994-2

1 roectjSite: Cit/ oyf airbanFs f ire Trainink Area

Laboratory: TestAmerica Sacramento

All accregitationsjcertiyications helg b/ this laborator/ are listegd . ot all accregitationsjcertiyications are aNNicable to this reNbrtd

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasFa p STU	State 1 rokram	50	(ST-0))	52-54-58
Ari7ona	State 1 rokram	9	Az0804	04-55-58 Z
ArFansas DEQ	State 1 rokram	6	44-0695	06-58-54
Caliyornia	State 1 rokram	9	2498	05-35-54
Colorago	State 1 rokram	4	CA000uu	04-35-58
ConnecticH	State 1 rokram	5	1L -0695	06-30-59
f loriga	. EGA1	u	E48) 80	06-30-54
weorkia	State 1 rokram	u	. jA	05-29-54
L aKaii	State 1 rokram	9	. jA	05-29-54
Illinois	. EGA1	)	200060	03-58-54
Bansas	. EGA1	8	E-5038)	50-35-58
GA-M	DoD EGA1		G2u64	05-20-54
GoHsiana	. EGA1	6	30652	06-30-54
v aine	State 1 rokram	5	CA000u	0u-54-54
v ichikan	State 1 rokram	)	99u8	05-35-54
. eYaga	State 1 rokram	9	CA000uu	08-35-54
. eK L amNshire	. EGA1	5	2998	0u-54-54
. eK Jerse/	. EGA1	2	CA00)	06-30-54
. eK OorF	. EGA1	2	55666	0u-05-54
x rekon	. EGA1	50	u0u0	05-24-54
1 enns/ IYania	. EGA1	3	64-05282	03-35-54
TeRas	. EGA1	6	T50u80u399	0) -35-54
(S f ish & Wilgliye	f egeral		GE5u4344-0	08-35-54
(SDA	f egeral		1330-55-00u36	52-30-58
(SE1A (Cv V	f egeral	5	CA000uu	55-06-54
(tah	. EGA1	4	CA000uu	02-24-54
* irkinia	. EGA1	3	u60284	03-5u-54
Washinkton	State 1 rokram	50	C) 45	0) -0) -54
West * irkinia pDWU	State 1 rokram	3	9930C	52-35-58
W/ omink	State 1 rokram	4	4Tv S-G	05-29-58 Z

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Method	Method Description	Protocol	Laboratory
537 (modified)	Perfluorinated Hydrocarbons	EPA	TAL SAC
Total PFCA-Dif	Total PFCA (Treatment Difference)	TAL SOP	TAL SAC
Total PFCA-Sum	Total PFCA (Summary)	TAL SOP	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-29998-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-29998-7	MW-507	Water	07/18/17 10:56	07/20/17 09:25
320-29998-8	MW-1701-35	Water	07/18/17 12:35	07/20/17 09:25

2

3

4

5

6

7

8

9

10

12

13

14

15

CHAIN-OF-CUSTODY RECORD

Page 1 of 2

Laboratory Test America
Attn: David Altmeppen

Analysis Parameters/Sample Container Description
(include preservation)



320-29998 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOA	ONLY	TOP ASSAY	11 PEG	2	Notes
168386		1536	7/17/17	X	X					2	grand water
168378		1603	↓	X	X					2	
407429-D		1310	7/18/17	X	X					2	
168980		1515	↓	X	X					2	
169048		1625	↓	X	X					2	
87319		1244	7/17/17	X	X					2	
MW-507		1056	7/18/17	X			X			2	
MW-1701-35		1235	↓	X			X			2	
MW-1701-13		1329	↓	X	X					2	
669077		1519	↓	X	X					2	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>30</u>		Signature: <u>M. Hadd</u> Time: <u>1120</u>		Signature: <u>[Signature]</u> Time: <u>925</u>		Signature: _____ Time: _____	
Project Name: <u>C&E P&E Fire Tr.</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Marcy Nadel</u> Date: <u>7/19/17</u>		Printed Name: <u>Alonso Ayala</u> Date: <u>7/20/17</u>		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson</u>		Company: <u>T&W</u> <u>2-1</u>		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>		Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>MDN/C&E</u>		(attach shipping bill, if any)		Signature: _____ Time: _____		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Printed Name: _____ Date: _____		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time: <u>Standard</u>				Company: _____		Company: _____		Company: _____	
Special Instructions: <u>Please bill to 31-1-11735-008</u>									

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



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 2 of 2
Laboratory Test America
Attn: David Alitocker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOA Only						Total Number of Containers	Remarks/Matrix
87408		1552	7/18/17	X	X							2	Groundwater
87335		1629	7/18/17	X	X							2	Ground water
593460-2		1004	7/19/17	X	X							2	↓
515493-2		1055	7/19/17	X	X							2	↓
593560-2		1058	7/19/17	X	X							2	↓

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>30</u>		Signature: <u>M. Nadel</u> Time: <u>1120</u>		Signature: <u>[Signature]</u> Time: <u>925</u>		Signature: _____ Time: _____	
Project Name: <u>CFR Reg Fire Tr Center</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Marcy Nadel</u> Date: <u>7/19/17</u>		Printed Name: <u>Alonso Asury</u> Date: <u>7/20/17</u>		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson</u>		Company: <u>Taus</u> 2.1		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>							
Sampler: <u>MDN/CAB</u>		(attach shipping bill, if any)							
Instructions									
Requested Turnaround Time: <u>Standard</u>									
Special Instructions: <u>Please bill to 31-1-11735-008</u>									
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									
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: _____	

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-29998-2

Login Number: 29998

List Source: TestAmerica Sacramento

List Number: 1

Creator: Edman, Connor M

Question	Answer	Comment
Radioactivity as measured by a survey meter	1 rue	
The cooler's custody seal, if present, is intact	1 rue	
Sample custody seals, if present, are intact	No	
The cooler or sample has not appeared to have been compromised	1 rue	
Sample were refrigerated	1 rue	
Cooler temperature is acceptable	1 rue	
Cooler temperature is recorded	1 rue	
CAC is present	1 rue	
CAC is filled out in an appropriate	1 rue	
CAC is filled out with all pertinent information	1 rue	
Is the QR Sample name present on CAC	1 rue	
There are no discrepancies between the containers received and the CAC	1 rue	
Samples are received within 15 minutes of collection	1 rue	
Sample containers have legible labels	1 rue	
Containers are not broken or leaking	1 rue	
Sample collection dates are recorded	1 rue	
Properly stored sample containers are used	1 rue	
Sample bottles are completely filled	1 rue	
Sample preservation Period	No	
There is sufficient volume for all requested analyses, including requested S&M	1 rue	
Containers received have no headspace or bubble is present	1 rue	
Quality control samples are not present	1 rue	
Samples do not require settling or centrifugation	1 rue	
Tested Chlorine Check	No	

Laboratory Data Review Checklist

Completed By:

Marcy Nadel

Title:

Geologist

Date:

August 29, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

August 28, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-29998-2

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids for drinking water by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analyses were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☐ Yes ☒ No

Comments:

The laboratory's receiving personnel signed that they had relinquished the samples rather than received them. This is a minor clerical error that is not considered to affect the samples.

- b. Correct Analyses requested?

☐ Yes ☒ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☐ Yes ☒ No

Comments:

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

☐ Yes ☒ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☐ Yes ☒ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The laboratory notes that the samples arrived in good condition, property preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.1° C.

The case narrative also describes the compounds added during the oxidation step of the TOP assay, and other deviations from TestAmerica's in-house method.

The Isotope Dilution Analyte (IDA) recoveries associated with 13C8 FOSA, M2-8:2FTS, M2-6:2FTS, and 13C2-PFTeDA are outside the method recommended limits for one or more project or quality control (QC) samples.

Sample *MW-1701-35* was diluted to bring the concentration of target analytes within the instrument's calibration range, resulting in elevated reporting limits (RLs).

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

The case narrative does not report that any corrective actions were taken or required.

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

Comments:

The laboratory notes that data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, and that quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

5. Samples Results

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

☒ Yes ☐ No

Comments:

The COC included in the laboratory report lists fifteen water samples. Of these fifteen samples, only *MW-507* and *MW-1701-35* are included in this work order. The remaining water samples are reported separately.

- b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using solid phase extraction (SPE). The 14-day hold time for extraction and 40-day hold time for analysis were met.

- c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA, where applicable for non-detected results.

- e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

- a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

PFBA and FOSA were detected in MB 320-176939/1-A at estimated concentrations between the laboratory Method Detection Limit (MDL) and Reporting Limit (RL). MB 320-176939/1-A is given as a QC sample for the pre-treatment analyses of the project samples.

PFBA was detected in MB 320-176941/1-A at a concentration greater than the laboratory's RL. PFDA, PFTeA and FOSA were also detected in this method blank at estimated concentrations below the laboratory's RL. MB 320-176941/1-A is given as a QC sample for the post-treatment analyses of the project samples.

iii. If above LOQ, what samples are affected?

Comments:

The PFBA result for pre-treatment analysis of the sample *MW-507* is between five and ten times the concentration detected in MB 320-176939/1-A and is therefore considered to be affected. Similarly, the PFBA result of the post-treatment analysis of the sample *MW-507* is within five times the concentration detected in MB 320-176941/1-A. This result is therefore attributed to laboratory contamination. The PFBA results of the pre- and post-treatment analyses of the sample *MW-1701-35* are not considered to be affected because the detected concentrations are greater than ten times those detected in MB 320-176939/1-A and MB 320-176941/1-A.

FOSA was not detected in the pre-treatment analysis of the sample *MW-507* so the result is considered unaffected. However, FOSA was detected in the post-treatment analysis of this sample, as well as the pre- and post-treatment analyses of the sample *MW-1701-35*. All of these detections are estimated concentrations roughly equivalent to the concentrations detected in the associated method blank samples. These results are therefore attributed to laboratory contamination.

PFDA was not detected in the post-treatment analysis of the sample *MW-507*. However, PFDA was detected at an estimated concentration in the post-treatment analysis of the sample *MW-1701-35*. The PFDA concentration detected in the sample *MW-1701-35* is considered to be the result of laboratory contamination.

PFTeA was detected at an estimated concentration in the post-treatment analysis of the sample *MW-507*. This concentration is roughly equivalent to the concentration detected in MB 320-176941/1-A and is therefore considered to be the result of laboratory contamination. Conversely, PFTeA was not detected in the post-treatment analysis of the sample *MW-1701-35* so the result is considered unaffected.

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

☒ Yes ☐ No

Comments:

The PFBA result of the pre-treatment analysis of the sample *MW-507* is considered estimated with a high direction of bias and is flagged 'JH' in the analytical results table. The PFBA result of the post-treatment analysis of this sample is considered not detected and flagged 'UB' at the detected concentration in the analytical results table.

The FOSA results of the post-treatment analysis of the sample *MW-507* and both the pre- and post-treatment analyses of the sample *MW-1701-35* are considered not detected and flagged 'UB' at the RL in the analytical results table. The RL is reported as the most conservative detection level for these results.

The PFDA result of the post-treatment analysis of the sample *MW-1701-35* is considered not detected and flagged 'UB' at the RL in the analytical results table. The RL is reported as the most conservative detection level for these results.

The PFTeA result of the post-treatment analysis of the sample *MW-507* is considered not detected and flagged 'UB' at the RL in the analytical results table. The RL is reported as the most conservative detection level for these results.

v. Data quality or usability affected?

Comments:

The data quality was affected; 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

Comments:

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

☒ Yes ☐ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

The percent recoveries for PFHpA and PFOA were above their applicable laboratory limits while the percent recoveries for FOSA, 6:2FTS, and 8:2FTS were below their applicable laboratory limits in LCS 320-176941/2-A and LCSD 320-176941/3-A associated with the post-treatment batch.

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

The LCS/LCSD RPDs between the detected concentrations of FOSA, 6:2FTS, and 8:2FTS were greater than the laboratory limit of 30%.

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

Comments:

The analytical accuracy and precision failures observed in LCS 320-176941/2-A and LCSD 320-176941/3-A are considered to be representative of method performance for the post-treatment analysis for both project samples.

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

☒ Yes ☐ No

Comments:

The PFHpA and PFOA results of the post-treatment analysis of the samples *MW-507* and *MW-1701-35* are considered estimated with a high direction of bias. These results are flagged 'JH' in the analytical results table.

The FOSA 6:2FTS and 8:2FTS LCS and LCSD recoveries do not affect the project- sample results. The absence of detectable results (or results above the RL) demonstrates the oxidation process has converted the PFAS compounds to the end product PFCA, as noted in the case narrative.

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

Comments:

The data quality was affected, see above.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

The IDA recoveries for 13C8 FOSA, M2-8:2FTS, and 13C2-PFTeDA are outside of laboratory control limits in the pre-treatment analysis of the sample *MW-507*. The recovery of 13C8 FOSA was outside of laboratory control limits in the post-treatment analysis of the sample *MW-507*.

The IDA recoveries for 13C8 FOSA, 13C2-PFTeDA, and M2-6:2FTS are outside of laboratory control limits in the pre-treatment analysis of the sample *MW-1701-35*. The recovery of 13C8 FOSA was outside of laboratory control limits in the post-treatment analysis of the sample *MW-1701-35*.

The recovery of 13C2-PFTeDA was outside of laboratory control limits in MB 320-176939/1-A and LCS 320-176939/2-A.

The recoveries of M2-8:2FTS and 13C2-PFTeDA were outside of laboratory control limits in LCSD 320-176939/3-A.

The recovery of 13C8 FOSA was outside of laboratory control limits in MB 320-176941/1-A, LCS 320-176941/2-A, and LCSD 320-176941/3-A.

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

☒ Yes ☐ No

Comments:

Surrogate-recovery failures in QC samples are not considered to affect the data as long as the recovery of individual analytes associated with that surrogate are within the laboratory control limits for that QC sample.

The FOSA results for the project samples are affected by the IDA recovery failures of 13C8 FOSA. These results are already qualified for method blank detections with the exception of the pre-treatment analysis of the sample *MW-507*. This result is considered an estimated non-detection and flagged 'UJ' in the analytical results table.

PFTeA was not detected in the pre-treatment analysis of the samples *MW-507* and *MW-1701-35*. These results are considered estimated non-detections due to the IDA recovery failures of 13C2-PFTeDA and flagged 'UJ' in the analytical results table.

8:2FTS was not detected in the pre-treatment analysis of the sample *MW-507*. This result is considered an estimated non-detection due to the IDA recovery failure of M2-8:2FTS and flagged 'UJ' in the analytical results table.

The 6:2FTS result of the pre-treatment analysis of the sample *MW-1701-35* is considered estimated due to the IDA recovery failure of M2-6:2FTS. This result is flagged 'J' in the analytical results table.

iv. Data quality or usability affected?

Comments:

The data quality was affected; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☒ Yes ☐ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

- 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

Comments:

N/A; a trip blank is not required.

- iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

N/A; a trip blank is not required.

- iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with this work order, or for TOP assay analysis. Field-duplicate samples are submitted at the appropriate frequency for standard PFC and/or PFAS analyses for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☒ No ☐ Not Applicable

These samples were collected with a submersible pump. An equipment blank was not submitted with this work order; however, equipment blanks are collected with the appropriate frequency for the overall project. EB-301S in work order 320-30560 was collected using the same reusable equipment used for the two wells in this work order.

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

ii. If above LOQ, what samples are affected?

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

☒ Yes ☐ No

Comments:

No other data flags or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-30230-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/18/2017 4:05:18 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	10
QC Sample Results	11
QC Association Summary	14
Lab Chronicle	15
Certification Summary	16
Method Summary	17
Sample Summary	18
Chain of Custody	19
Receipt Checklists	20



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Job ID: 320-30230-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-30230-1

Receipt

The samples were received on 7/28/2017 9:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-177092.

Method(s) PFAS Prep: The sample bottles contain red-orange sediments. 168327 (320-30230-1), 127523-2 (320-30230-2), 168505 (320-30230-3) and 168459 (320-30230-4)

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-179916.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 168327

Lab Sample ID: 320-30230-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	85		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	21		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	2.0		2.0	0.65	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 127523-2

Lab Sample ID: 320-30230-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.9	J	2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.2		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.0	J	2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.3	J	2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	19		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168505

Lab Sample ID: 320-30230-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	16		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	76		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.7		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	37		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168459

Lab Sample ID: 320-30230-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	28		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	280		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 941328

Date Collected: 08/21/2018 9:11:33

Date Received: 08/21/2018 08:31:33

Lab Sample ID: 320-30230-9

Matrix: Water

MetAod: WS-LC-002/ Pt9 - Perfluorinated Poly(ether) Substances

Pnal(te	Result	Qualifier	RL	MDL	Unit	Date Prepared	Date Analyzed	Dil Fac
f erkuorobutanesulfonic acid	92		2.0	0.92	ng/L	08/01/17 14:10	08/06/17 07:55	1
Ff Q) Sz								
f erkuoroAexanesulfonic acid	1/		2.0	0.87	ng/L	08/01/17 14:10	08/06/17 07:55	1
Ff O6 xSz								
f erkuoroAeptanoic acid Ff O6 pPz	93		2.0	0.80	ng/L	08/01/17 14:10	08/06/17 07:55	1
f erkuorooctanoic acid Ff OBPz	29		2.0	0.75	ng/L	08/01/17 14:10	08/06/17 07:55	1
f erkuorooctanesulfonic acid	900		2.0	1.3	ng/L	08/01/17 14:10	08/06/17 07:55	1
Ff OBSz								
f erkuorononanoic acid Ff OHPz	210		2.0	0.65	ng/L	08/01/17 14:10	08/06/17 07:55	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA8	34		42 512-			- 30 10/17 1/ 61-	- 30 : 017 - 7022	1
1S9/ 3PFOHx	7/		42 512-			- 30 10/17 1/ 61-	- 30 : 017 - 7022	1
1S9/ PFCx	3-		42 512-			- 30 10/17 1/ 61-	- 30 : 017 - 7022	1
1S9/ PFC8	37		42 512-			- 30 10/17 1/ 61-	- 30 : 017 - 7022	1
1S9 2 PFp x	31		42 512-			- 30 10/17 1/ 61-	- 30 : 017 - 7022	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 928/ 23-2

Date Collected: 08/2/ 78 94:93

Date Received: 08/21/98 0h:3/

Lab Sample ID: 320-30230-2

Matrix: Water

MetAod: WS-LC-002/ Pt9 - f erfluorinated Poly(I Substances

Pnal(te	Result . ualiker	RL	MDL Qnit	D	f repared	Pnal(Ued	Dil Cac
f erfluorobutanesulfonic acid	9N J	2.0	0.92 ng/L		08/01/17 14:10	08/06/17 08:13	1
f erfluoroAexanesulfonic acid	1N	2.0	0.87 ng/L		08/01/17 14:10	08/06/17 08:13	1
f erfluoroAeptanoic acid f O6 pPz	9N J	2.0	0.80 ng/L		08/01/17 14:10	08/06/17 08:13	1
f erfluorooctanoic acid f OBPz	9N J	2.0	0.75 ng/L		08/01/17 14:10	08/06/17 08:13	1
f erfluorooctanesulfonic acid	9h	2.0	1.3 ng/L		08/01/17 14:10	08/06/17 08:13	1
f O6 Sz							
Perfluorononanoic acid (PFNA)	ND	2.0	0.65 ng/L		08/01/17 14:10	08/06/17 08:13	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	3N		42 512-	- 30 10/17 1/ 6l-	- 30 : 017 - 30lS	1
1S9/ 5PFOHx	31		42 512-	- 30 10/17 1/ 6l-	- 30 : 017 - 30lS	1
1S9/ PFCx	3/		42 512-	- 30 10/17 1/ 6l-	- 30 : 017 - 30lS	1
1S9/ PFC8	Nl		42 512-	- 30 10/17 1/ 6l-	- 30 : 017 - 30lS	1
1S9 2 PFp x	N-		42 512-	- 30 10/17 1/ 6l-	- 30 : 017 - 30lS	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 941/ 0/

Date Collected: 08/21/17 08:38

Date Received: 08/21/17 08:38

Lab Sample ID: 320-30230-3

Matrix: Water

MetAod: WS-LC-002/ Pt9 - Perfluorinated Poly(ether) Substances

Sample Name	Result	Qualifier	RL	MDL	Unit	Date Prepared	Date Analyzed	Dil Factor
Perfluorobutanesulfonic acid (PFBS)	94		2.0	0.92	ng/L	08/01/17 14:10	08/06/17 08:32	1
Perfluorooxanesulfonic acid (PFOS)	84		2.0	0.87	ng/L	08/01/17 14:10	08/06/17 08:32	1
Perfluorooctanoic acid (PFOA)	84		2.0	0.80	ng/L	08/01/17 14:10	08/06/17 08:32	1
Perfluorooctanoic acid (PFOP)	38		2.0	0.75	ng/L	08/01/17 14:10	08/06/17 08:32	1
Perfluorooctanesulfonic acid (PFOS)	9/ 0		2.0	1.3	ng/L	08/01/17 14:10	08/06/17 08:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L	08/01/17 14:10	08/06/17 08:32	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Factor
13C4 PFOA	14		42 512-	- 30 10/17 1/ 61-	- 30 : 017 - 3654	1
1S9/ 5PFOHx	7N		42 512-	- 30 10/17 1/ 61-	- 30 : 017 - 3654	1
1S9/ PFCx	32		42 512-	- 30 10/17 1/ 61-	- 30 : 017 - 3654	1
1S9/ PFC8	14		42 512-	- 30 10/17 1/ 61-	- 30 : 017 - 3654	1
1S9 2 PFpx	3N		42 512-	- 30 10/17 1/ 61-	- 30 : 017 - 3654	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 941v/ h

Date Collected: 08/21/17 09:24

Date Received: 08/21/17 08:31

Lab Sample ID: 320-30230-v

Matrix: Water

MetAod: WS-LC-002/ Pt9 - Perfluorinated Poly(ether) Substances

Peak Name	Result	Qualifier	RL	MDL	Unit	Date Prepared	Date Analyzed	Dil Factor
Perfluorobutanesulfonic acid (PFBS)	29		2.0	0.92	ng/L	08/17/17 13:20	08/17/17 21:56	1
Perfluorooxanesulfonic acid (PFOS)	920		2.0	0.87	ng/L	08/17/17 13:20	08/17/17 21:56	1
Perfluorooctanoic acid (PFOA)	93		2.0	0.80	ng/L	08/17/17 13:20	08/17/17 21:56	1
Perfluorooctanoic acid (PFOP)	21		2.0	0.75	ng/L	08/17/17 13:20	08/17/17 21:56	1
Perfluorooctanesulfonic acid (PFOS)	210		2.0	1.3	ng/L	08/17/17 13:20	08/17/17 21:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L	08/17/17 13:20	08/17/17 21:56	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Factor
13C4 PFOA	17		42-512	- 30/70/17 1S	- 30/70/17 41	1
1S9/ PFOP	1--		42-512	- 30/70/17 1S	- 30/70/17 41	1
1S9/ PFCx	1-1		42-512	- 30/70/17 1S	- 30/70/17 41	1
1S9/ PFC8	17		42-512	- 30/70/17 1S	- 30/70/17 41	1
1S9 2 PFp x	17		42-512	- 30/70/17 1S	- 30/70/17 41	1

TestAmerica Sacramento

Isotope Dilution Summary

4 1eQ: I naQCoC S h i foC&ICc

Wo,ectP ite: 4 itj o/ yairbaCf s yire TraiQCF Area

TestAmerica Job ID: 320-30230-9

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		34 2 PFOx (25-150)	3CH-PFOp (25-150)	8CHPF4 / (25-150)	8CHPF4 / (25-150)	8C5 PFN/ (25-150)
320-30230-9	95k32g	k2	g8	k0	kg	k9
320-30230-2	92g623-2	k7	k9	k8	79	70
320-30230-3	95k606	70	g7	k6	72	k7
320-30230-8	95k867	7g	900	909	7g	75
L4I 320-9gg072P-A	Lab 4 oQtro1l amp'e	k5	g5	gk	k5	k3
L4I 320-9g7795P-A	Lab 4 oQtro1l amp'e	7k	900	909	903	7k
L4I D 320-9gg072P-A	Lab 4 oQtro1l amp'e Dup	k2	g8	gg	k0	g7
L4I D 320-9g7795P-A	Lab 4 oQtro1l amp'e Dup	7g	909	909	909	7g
MB 320-9gg072P-A	Metnod B taCf	kg	g5	gk	kg	k2
MB 320-9g7795P-A	Metnod B taCf	77	7k	909	90g	900

Surrogate Legend

9kO2 Wy=H x 9kO2 Wy=H
 934 8-Wy=pA x 934 8-Wy=pA
 934 8 WyOA x 934 8 WyOA
 934 8 WyOI x 934 8 WyOI
 934 6 WyNA x 934 6 WyNA

QC Sample Results

4 1eCt: l naCCoCS h i toC&ICc
Wo,ectP ite: 4 itj o/ yairbaCf s yire TraiQCF Area

TestAmerica Job ID: 320-30230-9

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-177092/1-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 177092

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vër/korobktaCesk 1oQc acig uWydl (	OD		2)0	0) 2	CFRL		07R09R5 9N90	07R08R5 05:00	9
Vër/korone6aCesk 1oQc acig uWyB6l (	OD		2)0	0)75	CFRL		07R09R5 9N90	07R08R5 05:00	9
Vër/koronextaCoic acig uWyBxA(	OD		2)0	0)70	CFRL		07R09R5 9N90	07R08R5 05:00	9
Vër/korooctaCoic acig uWy p A(	OD		2)0	0)5H	CFRL		07R09R5 9N90	07R08R5 05:00	9
Vër/korooctaCesk 1oQc acig uWy p l (	OD		2)0	9)3	CFRL		07R09R5 9N90	07R08R5 05:00	9
Vër/koroCoCaCoic acig uWyOA(	OD		2)0	0)8H	CFRL		07R09R5 9N90	07R08R5 05:00	9

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	32		45 - 150	03R01712 1: 610	03R0712 02R00	1
1S9: -PFOHx	2/		45 - 150	03R01712 1: 610	03R0712 02R00	1
1S9: PFCx	23		45 - 150	03R01712 1: 610	03R0712 02R00	1
1S9: PFC8	32		45 - 150	03R01712 1: 610	03R0712 02R00	1
1S9 5 PFp x	34		45 - 150	03R01712 1: 610	03R0712 02R00	1

Lab Sample ID: LCS 320-177092/2-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 177092

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Vër/korobktaCesk 1oQc acig uWydl (	95)5	97)N		CFRL		90N	52 - 9H9
Vër/korone6aCesk 1oQc acig uWyB6l (	97)2	9.)N		CFRL		905	53 - 9H5
Vër/koronextaCoic acig uWyBxA(	20)0	20)9		CFRL		900	59 - 937
Vër/korooctaCoic acig uWy p A(	20)0	22)8		CFRL		993	50 - 9N0
Vër/korooctaCesk 1oQc acig uWy p l (	97)8	20)9		CFRL		907	8. - 9NN
Vër/koroCoCaCoic acig uWyOA(	20)0	20)5		CFRL		903	53 - 9N5

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	3/		45 - 150
1S9: -PFOHx	2/		45 - 150
1S9: PFCx	23		45 - 150
1S9: PFC8	3/		45 - 150
1S9 5 PFp x	3S		45 - 150

Lab Sample ID: LCSD 320-177092/3-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 177092

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Vër/korobktaCesk 1oQc acig uWydl (	95)5	9.)2		CFRL		90.	52 - 9H9	H	30
Vër/korone6aCesk 1oQc acig uWyB6l (	97)2	9.)8		CFRL		905	53 - 9H5	9	30
Vër/koronextaCoic acig uWyBxA(	20)0	20)9		CFRL		909	59 - 937	0	30
Vër/korooctaCoic acig uWy p A(	20)0	22)0		CFRL		990	50 - 9N0	3	30
Vër/korooctaCesk 1oQc acig uWy p l (	97)8	9.)H		CFRL		90H	8. - 9NN	3	30
Vër/koroCoCaCoic acig uWyOA(	20)0	20)3		CFRL		902	53 - 9N5	2	30

TestAmerica l acrameQo

QC Sample Results

4 1eCt: l naCCoCS h i'foC&IcC

TestAmerica Job ID: 320-30230-9

Wo,ectP ite: 4 itj o/ yairbaC's yire TraiQCF Area

LCS LCS

Isotope Dilution	%Recovery	Qualifier	Limits
13C4 PFOA8	34		45 - 150
1S9: -PFOHx	2:		45 - 150
1S9: PFCx	22		45 - 150
1S9: PFC8	30		45 - 150
1S9 5 PFpx	2N		45 - 150

Lab Sample ID: MB 320-179916/1-A

Matrix: Water

Analysis Batch: 180007

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 179916

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Wër/ korobktaCesk foQc acig uWy d l (	OD		2)0	0). 2	CFRL		07)95)95 93:20	07)95)95 9. :2.	9
Wër/ korone6aCesk foQc acig uWy B6l (	OD		2)0	0)75	CFRL		07)95)95 93:20	07)95)95 9. :2.	9
Wër/ koronextaCoic acig uWy BxA(	OD		2)0	0)70	CFRL		07)95)95 93:20	07)95)95 9. :2.	9
Wër/ korooctaCoic acig uWy p A(	OD		2)0	0)5H	CFRL		07)95)95 93:20	07)95)95 9. :2.	9
Wër/ korooctaCesk foQc acig uWy p l (	OD		2)0	9)3	CFRL		07)95)95 93:20	07)95)95 9. :2.	9
Wër/ koroCoCaCoic acig uWy OA(	OD		2)0	0)8H	CFRL		07)95)95 93:20	07)95)95 9. :2.	9

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	NN		45 - 150	037)27)2 1S6)0	037)27)2 1N6)N	1
1S9: -PFOHx	N8		45 - 150	037)27)2 1S6)0	037)27)2 1N6)N	1
1S9: PFCx	101		45 - 150	037)27)2 1S6)0	037)27)2 1N6)N	1
1S9: PFC8	102		45 - 150	037)27)2 1S6)0	037)27)2 1N6)N	1
1S9 5 PFpx	100		45 - 150	037)27)2 1S6)0	037)27)2 1N6)N	1

Lab Sample ID: LCS 320-179916/2-A

Matrix: Water

Analysis Batch: 180007

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179916

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Wër/ korobktaCesk foQc acig uWy d l (	95)5	20)2		CFRL		99N	52 - 9)H9
Wër/ korone6aCesk foQc acig uWy B6l (	97)2	9.)5		CFRL		907	53 - 9)H5
Wër/ koronextaCoic acig uWy BxA(	20)0	20)2		CFRL		909	59 - 937
Wër/ korooctaCoic acig uWy p A(	20)0	22).		CFRL		99N	50 - 9N0
Wër/ korooctaCesk foQc acig uWy p l (	97)8	9.)3		CFRL		90N	8. - 9NN
Wër/ koroCoCaCoic acig uWy OA(	20)0	22)N		CFRL		992	53 - 9N5

Isotope Dilution	%Recovery	Qualifier	Limits
13C4 PFOA8	N8		45 - 150
1S9: -PFOHx	100		45 - 150
1S9: PFCx	101		45 - 150
1S9: PFC8	10S		45 - 150
1S9 5 PFpx	N8		45 - 150

Lab Sample ID: LCS 320-179916/3-A

Matrix: Water

Analysis Batch: 180007

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179916

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Wër/ korobktaCesk foQc acig uWy d l (	95)5	20)0		CFRL		993	52 - 9)H9	9	30
Wër/ korone6aCesk foQc acig uWy B6l (	97)2	20)9		CFRL		990	53 - 9)H5	2	30

TestAmerica l acrameQo

QC Sample Results

4 1eQ: I naCCoCS h i fsoC&IcC
Wo,ectP ite: 4 itj o/ yairbaCf s yire TraiQCF Area

TestAmerica Job ID: 320-30230-9

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-179916/3-A

Matrix: Water

Analysis Batch: 180007

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179916

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ver/koronextaCoic acig uWy BxA(	20)0	20)5		CFRL		90N	59 - 937	3	30
Ver/koroctaCoic acig uWy p A(	20)0	2N)2		CFRL		929	50 - 9N0	8	30
Ver/koroctaCesk foCic acig uWy p l (	97)8	20)0		CFRL		907	8. - 9NN	3	30
Ver/koroCoCaCoic acig uWy OA(	20)0	22).		CFRL		99N	53 - 9N5	2	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFOA8	N2		45 - 150
1S9 : -PFOHx	101		45 - 150
1S9 : PFCx	101		45 - 150
1S9 : PFC8	101		45 - 150
1S9 5 PFp x	N2		45 - 150

TestAmerica I acrameQo

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

LCMS

Prep Batch: 177092

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30230-1	168327	Total/NA	Water	PFAS Prep	
320-30230-2	127523-2	Total/NA	Water	PFAS Prep	
320-30230-3	168505	Total/NA	Water	PFAS Prep	
MB 320-177092/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-177092/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-177092/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 178319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30230-1	168327	Total/NA	Water	WS-LC-0025 At1	177092
320-30230-2	127523-2	Total/NA	Water	WS-LC-0025 At1	177092
320-30230-3	168505	Total/NA	Water	WS-LC-0025 At1	177092
MB 320-177092/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	177092
LCS 320-177092/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	177092
LCSD 320-177092/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	177092

Prep Batch: 179916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30230-4	168459	Total/NA	Water	PFAS Prep	
MB 320-179916/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-179916/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-179916/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 180007

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30230-4	168459	Total/NA	Water	WS-LC-0025 At1	179916
MB 320-179916/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	179916
LCS 320-179916/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	179916
LCSD 320-179916/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	179916

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Client Sample ID: 129083

Date Collected: - 3/7/13 11:00

Date received: - 3/9/13 - T:0/

Lab Sample ID: 08-40-80-41

Matrix: Water

Are yBpe	Patch yBpe	Patch Method	vzn	Dil Nactor	Initial smoznt	Ninal smoznt	Patch 6zmber	Arepared or s nalBFed	s nalBut	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	177092	08/01/17 14:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			178319	08/06/17 07:55	SER	TAL SAC

Client Sample ID: 183/ 8048

Date Collected: - 3/7/13 12:10

Date received: - 3/9/13 - T:0/

Lab Sample ID: 08-40-80-48

Matrix: Water

Are yBpe	Patch yBpe	Patch Method	vzn	Dil Nactor	Initial smoznt	Ninal smoznt	Patch 6zmber	Arepared or s nalBFed	s nalBut	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	177092	08/01/17 14:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			178319	08/06/17 08:13	SER	TAL SAC

Client Sample ID: 129/ - /

Date Collected: - 3/7/13 13:03

Date received: - 3/9/13 - T:0/

Lab Sample ID: 08-40-80-40

Matrix: Water

Are yBpe	Patch yBpe	Patch Method	vzn	Dil Nactor	Initial smoznt	Ninal smoznt	Patch 6zmber	Arepared or s nalBFed	s nalBut	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	177092	08/01/17 14:10	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			178319	08/06/17 08:32	SER	TAL SAC

Client Sample ID: 129R/ T

Date Collected: - 3/7/13 1R:82

Date received: - 3/9/13 - T:0/

Lab Sample ID: 08-40-80-4R

Matrix: Water

Are yBpe	Patch yBpe	Patch Method	vzn	Dil Nactor	Initial smoznt	Ninal smoznt	Patch 6zmber	Arepared or s nalBFed	s nalBut	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	179916	08/17/17 13:20	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			180007	08/17/17 21:56	CBW	TAL SAC

Laboratory Reference:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc

TestAmerica Job ID: 320-30230-9

Site: City of Yairbanf s yire TraininF Area

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed and all accreditations/certifications are available to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska NPST	State 4 roFram	90	pST-0UU	92-9) -95
Arizona	State 4 roFram	7	Az050)	0) -99-95 Z
Arkansas DEQ	State 4 roFram	6	) ) -0679	06-95-9)
California	State 4 roFram	7	2) 75	09-39-9)
Colorado	State 4 roFram	)	CA000uu	0) -39-95
Connecticut	State 4 roFram	9	4L -0679	06-30-97
Delaware	d EGA4	u	E) 5U50	06-30-9)
Florida	State 4 roFram	u	d FA	09-27-9)
Hawaii	State 4 roFram	7	d FA	09-27-9)
Illinois	d EGA4	U	200060	03-95-9)
Iowa	d EGA4	5	E-9035U	90-39-95
GA-M	DoD EGA4		G2u6)	09-20-9)
Georgia	d EGA4	6	30692	06-30-9)
Indiana	State 4 roFram	9	CA000u	0u-9) -9)
Michigan	State 4 roFram	U	77u5	09-39-9)
Minnesota	State 4 roFram	7	CA000uu	05-39-9)
Montana	d EGA4	9	2775	0u-9) -9)
New Jersey	d EGA4	2	CA00U	06-30-9)
New York	d EGA4	2	99666	0u-09-9)
North Carolina	d EGA4	90	u0u0	09-2) -9)
Ohio	d EGA4	3	6) -09252	03-39-9)
Oregon	d EGA4	6	T90u50u377	0U-39-9)
Pennsylvania	yekeral		GE9u) 3)) -0	90-39-95
South Dakota	yekeral		4330-99-00u36	92-30-95
South Carolina	yekeral	9	CA000uu	99-06-9)
Tennessee	d EGA4	)	CA000uu	02-2) -9)
Utah	d EGA4	3	u6025)	03-9u-9)
Washington	State 4 roFram	90	CU) 9	0U-0U-9)
West Virginia NDW	State 4 roFram	3	7730C	92-39-95
Wisconsin	State 4 roFram	)	) Tv S-G	09-27-95 Z

Method Summary

8 1eQ: I naCCoCS h i'foC&lCc

Wo,ectP ite: 8 itj o/ yairbaCf s yire TraiQCF Area

TestAmerica Job ID: 320-30230-9

Method	Method Description	Protocol	Laboratory
h I -k8 -002g At9	W6r/1LoriCate5 Af j 1l LbstaCces	TAk-I A8	TAk I A8

Protocol References:

TAk-I A8 u TestAmerica kaboratories&h est I acrameQo&yaci1tj I taC5ar5 d =eratiCF Woce5LreO

Laboratory References:

TAk I A8 u TestAmerica I acrameQo&pp0 . iPersi5e W6rf v aj &h est I acrameQo&8 A wg60g&TEk (w96)373-g600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30230-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-30230-1	168327	Water	07/25/17 15:44	07/28/17 09:35
320-30230-2	127523-2	Water	07/25/17 16:13	07/28/17 09:35
320-30230-3	168505	Water	07/25/17 17:37	07/28/17 09:35
320-30230-4	168459	Water	07/25/17 14:26	07/28/17 09:35

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2385 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1
Laboratory TEST AMERICA
Attn: David Altshuler

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Total Number of Containers	Remarks/Matrix
168327		1544	7/25/17	X	X	2	groundwater
168127523-2		1613		X	X	2	
168505		1737		X	X	2	
168605		1740		X	X	2	
168459		1426		X	X	2	



320-30230 Chain of Custody

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>8</u>		Signature: <u>M. Madel</u> Time: <u>1020</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>CFRg Fire Tr Cal</u>		COC Seals/Intact? Y/N/NA: <u>—</u>		Printed Name: <u>Marcy Madel</u> Date: <u>7/26/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>—</u>		Company: <u>Shannon & Wilson</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>FedEx</u>							
Sampler: <u>MDN/SHH</u>		(attach shipping bill, if any)							
Instructions									
Requested Turnaround Time: <u>standard</u>									
Special Instructions: <u>Please bill to 31-1-11735-009</u>									
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									
Received By: 1.				Received By: 2.				Received By: 3.	
Signature: <u>Connor Korman</u> Time: <u>1027</u> Date: <u>7/26/17</u>				Signature: _____ Time: _____ Date: _____				Signature: _____ Time: _____ Date: _____	
Printed Name: <u>Connor Korman</u>				Printed Name: _____				Printed Name: _____	
Company: <u>THUS</u>				Company: _____				Company: _____	

5.6°C

No. 34498

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-30230-1

Login Number: 30230

List Source: TestAmerica Sacramento

List Number: 1

Creator: Nelson, Kym D

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

August 18, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

August 18, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-30230-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

The laboratory notes that the samples arrived in good condition, property preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.6° C.

The laboratory notes that both water samples contain red-orange colored sediment.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-177092 and 320-179916.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with this batch to demonstrate laboratory accuracy and precision.

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

Comments:

The laboratory did not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC proposed groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-177092/1-A or 320-1779916/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Yes, the maximum RPD for each LCS/LCSD was 6%.

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

Comments:

N/A; the percent recoveries and RPDs were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No

Comments:

A field-duplicate pair was not submitted with the two samples in this work order. However, field duplicate samples are submitted with the appropriate frequency for the project as a whole.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

These samples were not collected with reusable equipment so a practical potential for equipment based cross-contamination does not exist. For this reason, an equipment blank was not submitted.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags/qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-30232-1

Client Project/Site: City of Fairbanks Fire Training Area

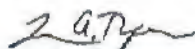
For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/10/2017 1:22:26 PM

Laura Turpen, Project Manager I

(916)374-4414

laura.turpen@testamericainc.com

Designee for

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?

 **Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	9
QC Association Summary	10
Lab Chronicle	11
Certification Summary	12
Method Summary	13
Sample Summary	14
Chain of Custody	15
Receipt Checklists	16



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Job ID: 320-30232-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-30232-1

Comments

p o awwitional commentsv

Receipt

The samdles 7 ere recei8ew on 9/25/2019 M3; Aq uthe samdles arri8ew in goow conwition, droderly dreser8ew anw, 7 here re. 6irew, on icev
The temderat6re of the cooler at receidt 7 as ; v NCv

LCMS

p o analytical or . 6ality iss6es 7 ere notew, other than those wescribew in the Definitions/Glossary dagev

Organic Prep

q ethow(s) PFAS Pred: Ins6fficient samdle 8ol6me 7 as a8ailable to derform a matrix sdike/matrix sdike w6dlicate (q S/q SD) associatew
7 ith dredaration batch 320-1990M2v

q ethow(s) PFAS Pred: The samdle bottles contain rew-orange sewimentsv
M2M24 (320-30232-1) anw 1° 5193 (320-30232-2)

p o awwitional analytical or . 6ality iss6es 7 ere notew, other than those wescribew abo8e or in the Definitions/Glossary dagev

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Client Sample ID: 92924

Lab Sample ID: 320-30232-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.4		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	38		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168173

Lab Sample ID: 320-30232-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Client Sample ID: 82821

Date Collected: 08/02/17 09:39

Date Received: 08/02/17 08:31

Lab Sample ID: 320-30232-9

6 at 17: x at 17

6 ethyl x S-LC-002/ At9 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	6 DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	1.1		2.0	0.75	ng/L		08/01/17 14:10	08/06/17 09:27	1
Perfluorooctanesulfonic acid (PFOS)	3.0		2.0	1.3	ng/L		08/01/17 14:10	08/06/17 09:27	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	69		25 - 150				06/01/17 14:10	06/09/17 0: 72/	1
13C4 PFOS	: 0		25 - 150				06/01/17 14:10	06/09/17 0: 72/	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Client Sample ID: 94v9d3

Date Collected: 08/02/17 09:29

Date Received: 08/02/17 08:31

Lab Sample ID: 320-30232-2

6 at 17: x at 17

6 ethyl: x S-LC-002/ At9 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	6 DL	Unit	D	Prepared	Analyzed	Dil Factor
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	ng/L		08/01/17 14:10	08/06/17 09:45	1
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L		08/01/17 14:10	08/06/17 09:45	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Factor
13C4 PFOA	64		25 - 150				06/01/17 14:10	06/09/17 0:45	1
13C4 PFOS	6:		25 - 150				06/01/17 14:10	06/09/17 0:45	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	3C4 PFO ₂ (25-150)	3C4 PFO ₃ (25-150)
320-30232-1	92924	86	90
320-30232-2	168173	84	89
LCS 320-177092/2-A	Lab Control Sample	78	86
LCSD 320-177092/3-A	Lab Control Sample Dup	77	80
MB 320-177092/1-A	Method Blank	78	87
Surrogate Legend			
13C4 PFOA = 13C4 PFOA			
13C4 PFOS = 13C4 PFOS			

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-177092/1-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 177092

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/01/17 14:10	08/06/17 07:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/01/17 14:10	08/06/17 07:00	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	72		5- 01- /				/ 2:/ 1:17 148/	/ 2:/ 6:17 / 78 /	1
13C4 PFOS	27		5- 01- /				/ 2:/ 1:17 148/	/ 2:/ 6:17 / 78 /	1

Lab Sample ID: LCS 320-177092/2-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 177092

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	22.6		ng/L		113	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	20.1		ng/L		108	69 - 144
Isotope Dilution	%Recovery	LCS Qualifier	Limits				
13C4 PFOA	72		5- 01- /				
13C4 PFOS	26		5- 01- /				

Lab Sample ID: LCSD 320-177092/3-A

Matrix: Water

Analysis Batch: 178319

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 177092

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	22.0		ng/L		110	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	19.5		ng/L		105	69 - 144	3	30
Isotope Dilution	%Recovery	LCSD Qualifier	Limits						
13C4 PFOA	77		5- 01- /						
13C4 PFOS	2/		5- 01- /						

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

LCMS

Prep Batch: 177092

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30232-1	92924	Total/NA	Water	PFAS Prep	
320-30232-2	168173	Total/NA	Water	PFAS Prep	
MB 320-177092/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-177092/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-177092/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 178319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30232-1	92924	Total/NA	Water	WS-LC-0025 At1	177092
320-30232-2	168173	Total/NA	Water	WS-LC-0025 At1	177092
MB 320-177092/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	177092
LCS 320-177092/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	177092
LCSD 320-177092/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	177092

Lab Chronicle

Client: Shannon & Wilson, Inc
 4 roectSite: Citj o/ yairbanf s yire TraininF Area

TestAmerica Job ID: 320-30232-9

Client Sample ID: 12129

Date CollecteW 8d72/ 7 d - - :0-

Date ReceiveW 8d7257 d 81:0/

Lab Sample ID: 0283082023-

4 atriM x ater

Prep Type	Batch Type	Batch 4 ethoW	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	PrepareW or AnalyzeW	Analyst	Lab
Totalp A	4rek	4y AS 4rek			9L00 m6	9L . m6	9NN082	0C090N97:90	Tg p	TA6 SAC
Totalp A	Analj sis	WS-6C-0025 At9		9			9NCB98	0C0. 0N08:2N	SER	TA6 SAC

Client Sample ID: - 65- d0

Date CollecteW 8d72/ 7 d - 5:2-

Date ReceiveW 8d7257 d 81:0/

Lab Sample ID: 0283082023-

4 atriM x ater

Prep Type	Batch Type	Batch 4 ethoW	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	PrepareW or AnalyzeW	Analyst	Lab
Totalp A	4rek	4y AS 4rek			9L00 m6	9L . m6	9NN082	0C090N97:90	Tg p	TA6 SAC
Totalp A	Analj sis	WS-6C-0025 At9		9			9NCB98	0C0. 0N08:75	SER	TA6 SAC

Laboratory References:

TA6 SAC = TestAmerica Sacramento, 000 Riverside 4arf waj , West Sacramento, CA 85. 05, TE6 (89.)3N3-5. 00

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc

TestAmerica Job ID: 320-30232-9

Site: City of Yairbanf s yire TraininF Area

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed and all accreditations/certifications are available to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska NPST	State 4 roFram	90	pST-0UU	92-9) -95
Arizona	State 4 roFram	7	Az050)	0) -99-95 Z
Arkansas DEQ	State 4 roFram	6	) ) -0679	06-95-9)
California	State 4 roFram	7	2) 75	09-39-9)
Colorado	State 4 roFram	)	CA000uu	0) -39-95
Connecticut	State 4 roFram	9	4L -0679	06-30-97
Delaware	d EGA4	u	E) 5U50	06-30-9)
Florida	State 4 roFram	u	d FA	09-27-9)
Hawaii	State 4 roFram	7	d FA	09-27-9)
Illinois	d EGA4	U	200060	03-95-9)
Iowa	d EGA4	5	E-9035U	90-39-95
GA-M	DoD EGA4		G2u6)	09-20-9)
Georgia	d EGA4	6	30692	06-30-9)
Indiana	State 4 roFram	9	CA000u	0u-9) -9)
Michigan	State 4 roFram	U	77u5	09-39-9)
Minnesota	State 4 roFram	7	CA000uu	05-39-9)
Montana	d EGA4	9	2775	0u-9) -9)
New Jersey	d EGA4	2	CA00U	06-30-9)
New York	d EGA4	2	99666	0u-09-9)
North Carolina	d EGA4	90	u0u0	09-2) -9)
Ohio	d EGA4	3	6) -09252	03-39-9)
Oregon	d EGA4	6	T90u50u377	0U-39-9)
Pennsylvania	yekeral		GE9u) 3)) -0	90-39-95
South Dakota	yekeral		4330-99-00u36	92-30-95
South Carolina	yekeral	9	CA000uu	99-06-9)
Tennessee	d EGA4	)	CA000uu	02-2) -9)
Utah	d EGA4	3	u6025)	03-9u-9)
Washington	State 4 roFram	90	CU) 9	0U-0U-9)
West Virginia NDW	State 4 roFram	3	7730C	92-39-95
Wisconsin	State 4 roFram	)	) Tv S-G	09-27-95 Z

Method Summary

8 1eQ: I naCCoCS h i'foC&lCc

Wo,ectP ite: 8 itj o/ yairbaCf s yire TraiQCF Area

TestAmerica Job ID: 320-30232-9

Method	Method Description	Protocol	Laboratory
h I -k8 -002g At9	W6r/1LoriCate5 Af j 1l LbstaCces	TAk-I A8	TAk I A8

Protocol References:

TAk-I A8 u TestAmerica kaboratories&h est I acrameQo&yaci1tj I taC5ar5 d =eratiCF Woce5LreO

Laboratory References:

TAk I A8 u TestAmerica I acrameQo&pp0 . iPersi5e W6rf v aj &h est I acrameQo&8 A wg60g&TEk (w96)373-g600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30232-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-30232-1	92924	Water	07/25/17 11:31	07/28/17 09:35
320-30232-2	168173	Water	07/25/17 18:21	07/28/17 09:35

2

3

4

5

6

7

8

9

10

12

13

14

15

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2255 Hill Road
Fairbanks, AK 99709
(907) 479-0608

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No	Time	Date Sampled	Comp.	Grab	(Include preservative if used)				Total Number of Containers	Remarks/Matrix	
92924		1131	7/25/17	X	X	X					2	grandwater
168173		1821	↓		X	X					2	↓



320-30232 Chain of Custody

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: 31-1-11735	Total Number of Containers: 4			Signature: M. Nadel	Time: 1020			Signature: _____	Time: _____
Project Name: CAF Reg FTR Centre	COC Seals/Intact? Y/N/NA: —			Printed Name: _____	Date: 7/26/13			Printed Name: _____	Date: _____
Contact: MDN	Received Good Cond./Cold: —			Company: Mary Nadel				Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method: FedEx			Company: Shannon & Wilson				Company: _____	
Sampler: MDN / SHH	(attach shipping bill, if any)								
Instructions				Received By: 1.		Received By: 2.		Received By: 3.	
Requested Turnaround Time: Standard				Signature: W. Hill	Time: 0735			Signature: _____	Time: _____
Special Instructions: Please bill to 31-1-11735-008				Printed Name: _____	Date: 7/28/13			Printed Name: _____	Date: _____
				Company: JAHS				Company: _____	

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

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

 5.6°C

No. 34458

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-30232-1

Login Number: 30232

List Source: TestAmerica Sacramento

List Number: 1

Creator: Nelson, Kym D

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

August 18, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

August 10, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-30232-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

The laboratory notes that the samples arrived in good condition, property preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.6° C.

The laboratory notes that both water samples contain red-orange colored sediment.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-177092.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and LCS duplicate (LCSD) were analyzed with this batch to demonstrate laboratory accuracy and precision.

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

Comments:

The laboratory did not specify any effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-177092/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

N/A; the percent recoveries and RPDs were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with the two samples in this work order. However, field duplicates are submitted with the appropriate frequency for the project as a whole.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

These samples were not collected with reusable equipment so a practical potential for equipment based cross-contamination does not exist. For this reason, an equipment blank was not submitted.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

There were no other data flags/qualifiers.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-30560-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

8/28/2017 1:11:22 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Detection Summary	5
Client Sample Results	7
Isotope Dilution Summary	14
QC Sample Results	15
QC Association Summary	17
Lab Chronicle	18
Certification Summary	20
Method Summary	21
Sample Summary	22
Chain of Custody	23
Receipt Checklists	24

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30560-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
/ rojectfSite: CitF okgairbanps gire TraininwArea

TestAmerica Job ID: 320-301P0-j

Job ID: 320-30560-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-30560-1

Receipt

The samvles d ere recei7e8 on 9f5f20j M3:20 / ; qthe samvles arri7e8 in woo8 con8ition, vroverlF vreser7e8 an8, d here reu. ire8, on ice6
The temverat. re okthe cooler at receivt d as 26° C6

LCMS

No analFtical or u. alitF iss. es d ere note8, other than those 8escribe8 in the DeknitionsfGlossarF vawe6

Organic Prep

; etho8(s) / gAS / rev: Ins. Wicent samvle 7ol. me d as a7ailable to verform a matrix svipefmatrix svipe 8. vlicate (; Sf; SD) associate8
d ith vrevaration batch 320-j M505P6

; etho8(s) / gAS / rev: The samvle bottles contain Fellod - brod n se8iment6j P9M2P-2 (320-301P0-j), ; W-30j D (320-301P0-2), ; W-30j S
(320-301P0-3), j P9Mj 9 (320-301P0-1) an8 P4Mlj (320-301P0-M)

No a88itional analFtical or u. alitF iss. es d ere note8, other than those 8escribe8 abo7e or in the DeknitionsfGlossarF vawe6

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 168726-2

Lab Sample ID: 320-30560-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	N8		2.0	0.72	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	33		2.0	0.xN	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	9.1		2.0	0.x0	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	10		2.0	0.N9	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	N9		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorononanoic acid (PF5 A)	0.x3 J		2.0	0.49	ng/L	1			WS-LC-0029 At1	Total/5 A

Client Sample ID: MW-301D

Lab Sample ID: 320-30560-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	11		2.0	0.72	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	x8		2.0	0.xN	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	12		2.0	0.x0	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	1N		2.0	0.N9	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	44		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorononanoic acid (PF5 A)	1.0 J		2.0	0.49	ng/L	1			WS-LC-0029 At1	Total/5 A

Client Sample ID: MW-301S

Lab Sample ID: 320-30560-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	4.7		2.0	0.72	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	x4		2.0	0.xN	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	4.4		2.0	0.x0	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	14		2.0	0.N9	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	x2		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorononanoic acid (PF5 A)	0.N2 J		2.0	0.49	ng/L	1			WS-LC-0029 At1	Total/5 A

Client Sample ID: EB-301S

Lab Sample ID: 320-30560-4

5 o Detections.

Client Sample ID: 168718

Lab Sample ID: 320-30560-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	4.0		2.0	0.72	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	2N		2.0	0.xN	ng/L	1			WS-LC-0029 At1	Total/5 A

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 168718 (Continued)

Lab Sample ID: 320-30560-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFBHA)	8.9		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	Nx		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	N4		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorononanoic acid (PF5 A)	0.44	J	2.0	0.49	ng/L	1			WS-LC-0029 At1	Total/5 A

Client Sample ID: 168700

Lab Sample ID: 320-30560-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	1.7	J	2.0	0.72	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	x.0		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	2.0		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	2.1		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	18		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A

Client Sample ID: 64751

Lab Sample ID: 320-30560-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFp A)	2x		2.0	0.00	ng/L	1			WS-LC-0029 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	20		2.0	1.3	ng/L	1			WS-LC-0029 At1	Total/5 A

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 168726-2

Date Collected: 08/03/17 10:07

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.4		2.0	0.02	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Perfluorohexanesulfonic acid (PFHxS)	33		2.0	0.0	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Perfluoroheptanoic acid (PFHpA)	5.1		2.0	0.00	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Perfluorooctanoic acid (PFOA)	10		2.0	0.09	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Perfluorooctanesulfonic acid (PFOS)	75		2.0	1.0	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Perfluorononanoic acid (PFNA)	0.83 J		2.0	0.09	ng/		00/11/1) 14:21	00/22/1) 20:.. 2	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA8	125		4- 01- 2				237117/ 16:41	237447/ 42:54	1
1S9 50PFOHx	124		4- 01- 2				237117/ 16:41	237447/ 42:54	1
1S9 5 PFCx	123		4- 01- 2				237117/ 16:41	237447/ 42:54	1
1S9 5 PFC8	12S		4- 01- 2				237117/ 16:41	237447/ 42:54	1
1S9 - PFp x	12S		4- 01- 2				237117/ 16:41	237447/ 42:54	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: MW-301D

Date Collected: 08/04/17 09:16

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-2

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11		2.0	0.02	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Perfluorohexanesulfonic acid (PFHxS)	84		2.0	0.0	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Perfluoroheptanoic acid (PFHpA)	12		2.0	0.00	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Perfluorooctanoic acid (PFOA)	17		2.0	0.09	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Perfluorooctanesulfonic acid (PFOS)	66		2.0	1.0	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Perfluorononanoic acid (PFNA)	1.0 J		2.0	0.09	ng/		00/11/1) 14:21	00/22/1) 21:00	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA8	N6		4- 01- 2				23/11/1) 16:41	23/44/1) 41:22	1
1S9 50PFOHx	NS		4- 01- 2				23/11/1) 16:41	23/44/1) 41:22	1
1S9 5 PFCx	124		4- 01- 2				23/11/1) 16:41	23/44/1) 41:22	1
1S9 5 PFC8	N3		4- 01- 2				23/11/1) 16:41	23/44/1) 41:22	1
1S9 - PFp x	NN		4- 01- 2				23/11/1) 16:41	23/44/1) 41:22	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: MW-301S

Date Collected: 08/04/17 09:42

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-3

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.9		2.0	0.02	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Perfluorohexanesulfonic acid (PFHxS)	86		2.0	0.0	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Perfluoroheptanoic acid (PFHpA)	6.6		2.0	0.00	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Perfluorooctanoic acid (PFOA)	16		2.0	0.9	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Perfluorooctanesulfonic acid (PFOS)	82		2.0	1.8	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Perfluorononanoic acid (PFNA)	0.72 J		2.0	0.49	ng/		00/11/1) 14:21	00/22/1) 21:1d	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA8	NS		4- 01- 2				23/11/1) 16:41	23/44/1) 41:1N	1
1S9 5PFOHx	NS		4- 01- 2				23/11/1) 16:41	23/44/1) 41:1N	1
1S9 5 PFCx	12S		4- 01- 2				23/11/1) 16:41	23/44/1) 41:1N	1
1S9 5 PFC8	12-		4- 01- 2				23/11/1) 16:41	23/44/1) 41:1N	1
1S9 - PFp x	NN		4- 01- 2				23/11/1) 16:41	23/44/1) 41:1N	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: EB-301S

Date Collected: 08/04/17 09:50

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-4

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PerflLorobLtanelsLfonic aci7 PFNS8	6 D		20	0.02	ng/		08/11/17 14:21	08/22/17 21:30	1
PerflLoroheBanesLfonic aci7 PFx BS8	6 D		20	0.00	ng/		08/11/17 14:21	08/22/17 21:30	1
PerflLoroheHanoic aci7 PFx HA8	6 D		20	0.00	ng/		08/11/17 14:21	08/22/17 21:30	1
PerflLoroOctanoic aci7 PFp A8	6 D		20	0.09	ng/		08/11/17 14:21	08/22/17 21:30	1
PerflLoroOctanesLfonic aci7 PFp S8	6 D		20	1.08	ng/		08/11/17 14:21	08/22/17 21:30	1
PerflLorononanoic aci7 PF6 A8	6 D		20	0.49	ng/		08/11/17 14:21	08/22/17 21:30	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	N		4- 01- 2	23/11/17 16:41	23/44/17 41:51	1
1S9 5PFOHx	N		4- 01- 2	23/11/17 16:41	23/44/17 41:51	1
1S9 5 PFCx	NS		4- 01- 2	23/11/17 16:41	23/44/17 41:51	1
1S9 5 PFC8	NS		4- 01- 2	23/11/17 16:41	23/44/17 41:51	1
1S9 - PFp x	Ni		4- 01- 2	23/11/17 16:41	23/44/17 41:51	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 168718

Date Collected: 08/04/17 12:38

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-5

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.0		2.0	0.02	ng/		08/11/17 14:21	08/22/17 21:99	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.0	ng/		08/11/17 14:21	08/22/17 21:99	1
Perfluoroheptanoic acid (PFHpA)	4.5		2.0	0.00	ng/		08/11/17 14:21	08/22/17 21:99	1
Perfluorooctanoic acid (PFOA)	7.8		2.0	0.09	ng/		08/11/17 14:21	08/22/17 21:99	1
Perfluorooctanesulfonic acid (PFOS)	76		2.0	1.0	ng/		08/11/17 14:21	08/22/17 21:99	1
Perfluorononanoic acid (PFNA)	0.66	J	2.0	0.09	ng/		08/11/17 14:21	08/22/17 21:99	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA8	N6		4- 01- 2				237117/ 16:41	237447/ 41:-	1
1S9 50PFOHx	N-		4- 01- 2				237117/ 16:41	237447/ 41:-	1
1S9 5 PFCx	122		4- 01- 2				237117/ 16:41	237447/ 41:-	1
1S9 5 PFC8	N-		4- 01- 2				237117/ 16:41	237447/ 41:-	1
1S9 - PFp x	N-		4- 01- 2				237117/ 16:41	237447/ 41:-	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 168700

Date Collected: 08/04/17 13:26

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-6

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.9	J	2.0	0.02	ng/		08/11/17 14:21	08/22/17 22:11	1
Perfluorohexanesulfonic acid (PFHxS)	8.0		2.0	0.03	ng/		08/11/17 14:21	08/22/17 22:11	1
Perfluoroheptanoic acid (PFHpA)	2.0		2.0	0.03	ng/		08/11/17 14:21	08/22/17 22:11	1
Perfluorooctanoic acid (PFOA)	2.1		2.0	0.09	ng/		08/11/17 14:21	08/22/17 22:11	1
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.0	ng/		08/11/17 14:21	08/22/17 22:11	1
Perfluorononanoic acid (PFNA)	6.0		2.0	0.09	ng/		08/11/17 14:21	08/22/17 22:11	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	11		4- 01- 2				23/11/17 16:41	23/44/17 44:15	1
¹⁸ O5 PFOA	14		4- 01- 2				23/11/17 16:41	23/44/17 44:15	1
¹⁸ O5 PFCA	12		4- 01- 2				23/11/17 16:41	23/44/17 44:15	1
¹⁸ O5 PFCA	12		4- 01- 2				23/11/17 16:41	23/44/17 44:15	1
¹⁸ O5 - PFCA	126		4- 01- 2				23/11/17 16:41	23/44/17 44:15	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Client Sample ID: 64751

Date Collected: 08/07/17 09:49

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-7

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	28		20	0.9	ng/l		08/11/17 14:21	08/22/17 22:32	1
Perfluorooctanesulfonic acid (PFOS)	20		20	1.8	ng/l		08/11/17 14:21	08/22/17 22:32	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1S9 5 PFCx	125		4- 01- 2				23/11/17 16:41	23/11/17 16:41	1
1S9 5 PFC8	125		4- 01- 2				23/11/17 16:41	23/11/17 16:41	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30560-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		34 2 PFOx (25-150)	3CH-PFOp (25-150)	8CHPF4 / (25-150)	8CHPF4 / (25-150)	8C5 PFNA/ (25-150)
320-30560-1	168726-2	104	102	108	103	103
320-30560-2	MW-301D	96	93	102	98	99
320-30560-3	MW-301S	98	93	103	105	99
320-30560-4	EB-301S	97	95	98	93	91
320-30560-5	168718	96	95	100	97	95
320-30560-6	168700	99	92	107	109	106
320-30560-7	64751			103	104	
LCS 320-179096/2-A	Lab Control Sample	96	91	91	83	80
LCSD 320-179096/3-A	Lab Control Sample Dup	96	92	98	104	97
MB 320-179096/1-A	Method Blank	97	91	97	104	101

Surrogate Legend	
18O2 PFHxS	= 18O2 PFHxS
13C4-PFHpA	= 13C4-PFHpA
13C4 PFOA	= 13C4 PFOA
13C4 PFOS	= 13C4 PFOS
13C5 PFNA	= 13C5 PFNA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-179096/1-A

Matrix: Water

Analysis Batch: 180721

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 179096

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFOS)	. D		2L0	0L72	ng/5		0N11/18 14:21	0N22/18 17:68	1
Perfluorohexanesulfonic acid (PFx BS)	. D		2L0	0L8	ng/5		0N11/18 14:21	0N22/18 17:68	1
Perfluorohexanoic acid (PFx HA)	. D		2L0	0LND	ng/5		0N11/18 14:21	0N22/18 17:68	1
Perfluorooctanoic acid (PFp A)	. D		2L0	0L89	ng/5		0N11/18 14:21	0N22/18 17:68	1
Perfluorooctanesulfonic acid (PFp S)	. D		2L0	1L3	ng/5		0N11/18 14:21	0N22/18 17:68	1
Perfluorononanoic acid (PF. A)	. D		2L0	0L49	ng/5		0N11/18 14:21	0N22/18 17:68	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	25		4- 01- 7	73/11/15 1S641	73/44/15 126 5	1
19H: PFOxp	21		4- 01- 7	73/11/15 1S641	73/44/15 126 5	1
19H: PFCp	25		4- 01- 7	73/11/15 1S641	73/44/15 126 5	1
19H: PFC8	17		4- 01- 7	73/11/15 1S641	73/44/15 126 5	1
19H- PFNp	171		4- 01- 7	73/11/15 1S641	73/44/15 126 5	1

Lab Sample ID: LCS 320-179096/2-A

Matrix: Water

Analysis Batch: 180721

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179096

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFOS)	18L8	1N3		ng/5		103	82 - 191
Perfluorohexanesulfonic acid (PFx BS)	1N2	18L8		ng/5		78	83 - 198
Perfluorohexanoic acid (PFx HA)	20L0	17L0		ng/5		79	81 - 13N
Perfluorooctanoic acid (PFp A)	20L0	20L6		ng/5		102	80 - 160
Perfluorooctanesulfonic acid (PFp S)	1N4	1N4		ng/5		100	47 - 166
Perfluorononanoic acid (PF. A)	20L0	20L6		ng/5		102	83 - 168

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	25		4- 01- 7
19H: PFOxp	21		4- 01- 7
19H: PFCp	21		4- 01- 7
19H: PFC8	39		4- 01- 7
19H- PFNp	37		4- 01- 7

Lab Sample ID: LCSD 320-179096/3-A

Matrix: Water

Analysis Batch: 180721

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179096

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFOS)	18L8	1N9		ng/5		109	82 - 191	2	30
Perfluorohexanesulfonic acid (PFx BS)	1N2	18L7		ng/5		7N	83 - 198	1	30
Perfluorohexanoic acid (PFx HA)	20L0	1NN		ng/5		76	81 - 13N	1	30
Perfluorooctanoic acid (PFp A)	20L0	17L8		ng/5		77	80 - 160	3	30
Perfluorooctanesulfonic acid (PFp S)	1N4	1N2		ng/5		7N	47 - 166	2	30
Perfluorononanoic acid (PF. A)	20L0	17L6		ng/5		78	83 - 168	9	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc

Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C4 PFOA8</i>	2S		4- 01- 7
<i>19H: OPFOxp</i>	24		4- 01- 7
<i>19H: PFCp</i>	23		4- 01- 7
<i>19H: PFC8</i>	17:		4- 01- 7
<i>19H- PFNp</i>	25		4- 01- 7

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30560-1

LCMS

Prep Batch: 179096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30560-1	168726-2	Total/NA	Water	PFAS Prep	
320-30560-2	MW-301D	Total/NA	Water	PFAS Prep	
320-30560-3	MW-301S	Total/NA	Water	PFAS Prep	
320-30560-4	EB-301S	Total/NA	Water	PFAS Prep	
320-30560-5	168718	Total/NA	Water	PFAS Prep	
320-30560-6	168700	Total/NA	Water	PFAS Prep	
320-30560-7	64751	Total/NA	Water	PFAS Prep	
MB 320-179096/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-179096/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-179096/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 180721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30560-1	168726-2	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-2	MW-301D	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-3	MW-301S	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-4	EB-301S	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-5	168718	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-6	168700	Total/NA	Water	WS-LC-0025 At1	179096
320-30560-7	64751	Total/NA	Water	WS-LC-0025 At1	179096
MB 320-179096/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	179096
LCS 320-179096/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	179096
LCSD 320-179096/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	179096

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roeyctfSite: CitF okgairbanps gire TraininOArea

TestAmerica Job ID: 320-301P0-j

Client Sample ID: 168726-2

Date Collected: 08/03/17 10:07

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 20:52	SEC	TA9 SAC

Client Sample ID: MW-301D

Date Collected: 08/04/17 09:16

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 2j :00	SEC	TA9 SAC

Client Sample ID: MW-301S

Date Collected: 08/04/17 09:42

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 2j :j .	SEC	TA9 SAC

Client Sample ID: EB-301S

Date Collected: 08/04/17 09:50

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 2j :3L	SEC	TA9 SAC

Client Sample ID: 168718

Date Collected: 08/04/17 12:38

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 2j :11	SEC	TA9 SAC

Client Sample ID: 168700

Date Collected: 08/04/17 13:26

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0P m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 22:j 5	SEC	TA9 SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
/ rojectfSite: CitF okgairbanps gire TraininOArea

TestAmerica Job ID: 320-301P0-j

Client Sample ID: 64751

Date Collected: 08/07/17 09:49

Date Received: 08/09/17 15:20

Lab Sample ID: 320-30560-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totalf7 A	/ reN	/ gAS / reN			j 600 m9	j 600 m9	j L. O. P	04fj j fj L j P:2j	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0021 Atj		j			j 40L2j	04f22fj L 22:32	SEC	TA9 SAC

Laboratory References:

TA9 SAC RTestAmerica Sacramento, 440 Bi=ersive / arpd aF, West Sacramento, CA . 1P01, Tw9 (. j P)3L3-1P00

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30940-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-099	12-15-18
AriZona	State Program	z	AZ0805	05-11-18 E
Arkansas DQ6	State Program	4	55-04z1	04-18-15
California	State Program	z	25z8	01-31-15
Colorado	State Program	5	CA000uu	05-31-18
Connecticut	State Program	1	PL-04z1	04-30-1z
Florida	NQGAP	u	Q58980	04-30-15
Georgia	State Program	u	N/A	01-2z-15
Hawaii	State Program	z	N/A	01-2z-15
Illinois	NQGAP	9	200040	03-18-15
Indiana	NQGAP	8	Q-10389	10-31-18
GA-M	DoD QGAP		Q2u45	01-20-15
Idaho	NQGAP	4	30412	04-30-15
Iowa	State Program	1	CA000u	0u-15-15
Michigan	State Program	9	zzu8	01-31-15
Minnesota	State Program	z	CA000uu	08-31-15
New Hampshire	NQGAP	1	2zz8	0u-15-15
New Jersey	NQGAP	2	CA009	04-30-15
New York	NQGAP	2	11444	0u-01-15
North Carolina	NQGAP	10	u0u0	01-25-15
Pennsylvania	NQGAP	3	45-01282	03-31-15
Texas	NQGAP	4	T10u80u3zz	09-31-15
US Fish & Wildlife	Federal		QQ1u5355-0	08-31-15
USDA	Federal		P330-11-00u34	12-30-18
USQPA UCv V	Federal	1	CA000uu	11-04-15
Utah	NQGAP	5	CA000uu	02-25-15
Virginia	NQGAP	3	u40285	03-1u-15
Washington	State Program	10	C951	09-09-15
West Virginia (DW)	State Program	3	zz30C	12-31-18
Wyoming	State Program	5	5Tv S-G	01-2z-18 E

EA Accreditation/Certification reneKal pending - accreditation/certification considered Valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30980-1

Method	Method Description	Protocol	Laboratory
WS-LC-0029 At1	Perfl5orinateu Alkyl S5bstances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC d TestAmerica Laboratories, West Sacramento, Facility Stanuaru = Qerating Proceu5rep

Laboratory References:

TAL SAC d TestAmerica Sacramento, . . 0 Riversiue Parkway, West Sacramento, CA 69809, TEL (618)373-9800

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30560-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-30560-1	168726-2	Water	08/03/17 10:07	08/09/17 15:20
320-30560-2	MW-301D	Water	08/04/17 09:16	08/09/17 15:20
320-30560-3	MW-301S	Water	08/04/17 09:42	08/09/17 15:20
320-30560-4	EB-301S	Water	08/04/17 09:50	08/09/17 15:20
320-30560-5	168718	Water	08/04/17 12:38	08/09/17 15:20
320-30560-6	168700	Water	08/04/17 13:26	08/09/17 15:20
320-30560-7	64751	Water	08/07/17 09:49	08/09/17 15:20

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 692-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

CHAIN-OF-CUSTODY RECORD

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Page 1 of 1
Laboratory: Test Anzica
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Total Number of Containers	Remarks/Matrix
168726-2		1007	8/3/17	X	X	2	groundwater
MW-301D		0916	8/4/17	X	X	2	
MW-301S		0942		X	X	2	
EB-301S		0950		X	X	2	
168718		1238		X	X	2	
168700		1326		X	X	2	
64751		0949	8/7/17	X		2	

Project Information Project Number: <u>31-1-11735</u> Project Name: <u>CF</u> Contact: <u>MDN</u> Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Sampler: <u>MDN/TXG/CAB/KUC</u>		Sample Receipt Total Number of Containers: <u>14</u> COC Seals/Intact? Y/N/NA: <u>-</u> Received Good Cond./Cold: <u>-</u> Delivery Method: <u>Goldstream</u> (attach shipping bill, if any)		Relinquished By: 1. Signature: <u>M. Nadel</u> Time: <u>8:15:32</u> Printed Name: <u>Mary Nadel</u> Date: <u>8/7/17</u> Company: <u>Shannon & Wilson</u>		Relinquished By: 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____		Relinquished By: 3. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____	
Instructions Requested Turnaround Time: <u>Standard</u> Special Instructions: <u>Please bill to 31-1-11735 -009 & -008</u>		Received By: 1. Signature: <u>[Signature]</u> Time: <u>15:20</u> Printed Name: <u>Alonso Aguayo</u> Date: <u>8/4/17</u> Company: <u>TANS 2-6'i</u>		Received By: 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____		Received By: 3. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____			



320-30560 Chain of Custody

No. **34630**

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-30940-1

Login Number: 30560

List Source: TestAmerica Sacramento

List Number: 1

Creator: Turpen, Troy

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	
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	
CF C is present.	True	
CF C is filled out in ink and legible.	True	
CF C is filled out with all pertinent information.	True	
Is the field Sampler's name present on CF CO	True	
There are no discrepancies between the containers received and the CF C.	True	
Samples are received within ?olding Time He(cluding tests with immediate ? Tsx	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) reservation Perified.	N/A	
There is sufficient vol. for all reVuested analyses, incl. any reVuested MS/MSDs	True	
Containers reVuring zero headspace have no headspace or bubble is <4mm H1/6"x	True	
Multiphasic samples are not present.	True	
Samples do not reVuire splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Laboratory Data Review Checklist

Completed By:

Marcy Nadel

Title:

Geologist

Date:

August 28, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

August 28, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-30560-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

The laboratory notes that the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 2.6° C.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-179096.

The laboratory notes that most of the project samples included with this work order contained sediment that was yellow-brown in color.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with this batch to demonstrate analytical method accuracy and precision.

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

Comments:

The laboratory did not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-179096/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Analytical precision was within acceptance criteria. The maximum LCS/LCSD RPD was 5%.

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

Comments:

N/A; the percent recoveries and RPDs were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with this work order. However, field duplicate samples are submitted with the appropriate frequency for the project as a whole.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☒ Yes ☐ No ☐ Not Applicable

Samples *MW-301D* and *MW-301S* were collected using submersible pumps. The equipment blank sample *EB-301S* was collected to demonstrate the effectiveness of our decontamination procedures for our reusable equipment.

- i. All results less than LOQ?

☒ Yes ☐ No Comments:

PFCs were not detected in EB-301S.

- ii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in EB-301S.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☒ Yes ☐ No Comments:

The project sample *168700* was collected from an unused well that was found to contain a blockage at a depth of approximately 10 to 15 feet below the ground surface. The total depth of the well is unknown and as such, we cannot determine with confidence if the sample was groundwater from within the well screen or water that may have been trapped in the well casing. As we cannot be certain that the sample is representative of groundwater conditions at the site, the results of this sample are considered estimated and flagged 'J*' in the analytical results table.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-30707-1
Client Project/Site: City of Fairbanks Fire Training Area

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

Attn: Marcy Nadel



Authorized for release by:
9/1/2017 3:10:13 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?



Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Detection Summary	6
Client Sample Results	9
Isotope Dilution Summary	22
QC Sample Results	24
QC Association Summary	29
Lab Chronicle	31
Certification Summary	34
Method Summary	35
Sample Summary	36
Chain of Custody	37
Receipt Checklists	38



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Qualifiers

LCMS

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD is outside acceptance limits.
H	Sample was prepped or analyzed beyond the specified holding time
*	Isotope Dilution analyte is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Job ID: 320-30707-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-30707-1

Receipt

The samples were received on 8/15/2017 9:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.7° C.

LCMS

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recoveries associated with the following samples are below the method recommended limit for several analytes: 1735-55 (320-30707-3) and 1735-58 (320-30707-6). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recoveries associated with the following samples are below the method recommended limit for 13C2-PFHxDA and 13C2-PFTeDA: (LCS 320-179746/2-A), (LCSD 320-179746/3-A) and (320-30652-A-14-D). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method(s) 537 (modified): The following samples were diluted to bring the concentration of target analytes within the calibration range: 1735-53 (320-30707-1), 1735-54 (320-30707-2), 1735-55 (320-30707-3), 1735-56 (320-30707-4), 1735-57 (320-30707-5) and 1735-58 (320-30707-6). Elevated reporting limits (RLs) are provided.

Method(s) 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit for 13C2-PFHxDA: (320-30652-A-14-F MSD). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for preparation batch 320-179746 and analytical batch 320-181472 were outside control limits for Perfluoro-n-octadecanoic acid (PFODA). Sample matrix interference and/or non-homogeneity are suspected. The associated laboratory control sample LCS recoveries were within acceptance limits.

Method(s) 537 (modified): The laboratory control sample / laboratory control sample duplicate (LCS/LCSD) for preparation batch 320-179746 and analytical batch 320-181156 recovered outside control limits for the following analyte: Perfluorotridecanoic Acid (PFTriA). The associated samples were re-prepared outside holding time. Both sets of data have been reported. 1735-53 (320-30707-1), 1735-54 (320-30707-2), 1735-55 (320-30707-3), 1735-56 (320-30707-4), 1735-57 (320-30707-5), 1735-58 (320-30707-6), (LCS 320-179746/2-A) and (LCSD 320-179746/3-A)

Method(s) 537 (modified): The matrix spike duplicate (MSD) recovery for preparation batch 320-179746 and analytical batch 320-181472 Perfluorotridecanoic Acid (PFTriA) was outside control limits. Sample matrix interference and/or non-homogeneity are suspected.

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

General Chemistry

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-179966.

Method(s) PFAS Prep: The sample bottle contains brown-yellow colored sediment. 168921 (320-30707-7)

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-181636.

Method(s) SHAKE: The following samples were re-prepared outside of preparation holding time due to low PFTriDA recoveries in the Laboratory Control Sample and Laboratory Control Sample Duplicate. 1735-53 (320-30707-1), 1735-54 (320-30707-2), 1735-55

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Job ID: 320-30707-1 (Continued)

Laboratory: TestAmerica Sacramento (Continued)

(320-30707-3), 1735-56 (320-30707-4), 1735-57 (320-30707-5) and 1735-58 (320-30707-6).

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-53

Lab Sample ID: 320-30707-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.2		0.25	0.081	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	4.2		0.25	0.16	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	7.0		0.25	0.088	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.5		0.25	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	15		0.25	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	4.0		0.25	0.10	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	3.2		0.25	0.071	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.26		0.25	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.66		0.25	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	37		0.25	0.15	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	1.0		0.25	0.15	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	0.41	J	6.2	0.10	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	330		2.5	1.6	ug/Kg	10		✱	537 (modified)	Total/NA

Client Sample ID: 1735-54

Lab Sample ID: 320-30707-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.2		0.24	0.077	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	4.4		0.24	0.16	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	7.8		0.24	0.084	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.7		0.24	0.10	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	7.8		0.24	0.12	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.9		0.24	0.099	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	1.3		0.24	0.068	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.18	J	0.24	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.51		0.24	0.12	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		0.24	0.14	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.33		0.24	0.14	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	0.18	J	5.9	0.095	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	180		1.2	0.75	ug/Kg	5		✱	537 (modified)	Total/NA

Client Sample ID: 1735-55

Lab Sample ID: 320-30707-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.9		0.23	0.076	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	4.4		0.23	0.15	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	6.4		0.23	0.083	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.4		0.23	0.10	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	15		0.23	0.12	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.71		0.23	0.097	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.31		0.23	0.067	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	0.86		0.23	0.12	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorotridecanoic Acid (PFTriA)	0.32	*	0.23	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoro-n-hexadecanoic acid (PFHxDA)	0.21	J	0.23	0.061	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.73		0.23	0.12	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	23		0.23	0.14	ug/Kg	1		✱	537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-55 (Continued)

Lab Sample ID: 320-30707-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluoroheptanesulfonic Acid (PFHpS)	32		0.23	0.14	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorodecanesulfonic acid (PFDS)	0.53		0.23	0.084	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	1.1	J	5.9	0.094	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	1200		23	15	ug/Kg	100	✱		537 (modified)	Total/NA
Perfluorotridecanoic Acid (PFTriA) - RE	0.38	H	0.23	0.11	ug/Kg	1	✱		537 (modified)	Total/NA

Client Sample ID: 1735-56

Lab Sample ID: 320-30707-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.5		0.25	0.081	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	2.5		0.25	0.16	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	3.4		0.25	0.089	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6		0.25	0.11	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	8.9		0.25	0.13	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.42		0.25	0.10	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.18	J	0.25	0.071	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	12		0.25	0.13	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.80		0.25	0.13	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	14		0.25	0.15	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	1.9		0.25	0.15	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	0.13	J	6.3	0.10	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	2000		25	16	ug/Kg	100	✱		537 (modified)	Total/NA

Client Sample ID: 1735-57

Lab Sample ID: 320-30707-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.1		0.26	0.084	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	2.9		0.26	0.17	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	4.1		0.26	0.091	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.1		0.26	0.11	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.7		0.26	0.13	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.11	J	0.26	0.11	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.63		0.26	0.073	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	5.9		0.26	0.14	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.41		0.26	0.13	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	14		0.26	0.15	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	0.28		0.26	0.15	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorodecanesulfonic acid (PFDS)	0.21	J	0.26	0.093	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	0.14	J	6.4	0.10	ug/Kg	1	✱		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	540		13	8.1	ug/Kg	50	✱		537 (modified)	Total/NA
Perfluorotridecanoic Acid (PFTriA) - RE	0.14	J H	0.26	0.12	ug/Kg	1	✱		537 (modified)	Total/NA

Client Sample ID: 1735-58

Lab Sample ID: 320-30707-6

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-58 (Continued)

Lab Sample ID: 320-30707-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	1.2		0.21	0.070	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	3.6		0.21	0.14	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	12		0.21	0.076	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6		0.21	0.094	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	3.2		0.21	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.3		0.21	0.089	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	1.0		0.21	0.061	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	11		0.21	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorododecanoic acid (PFDoA)	0.22		0.21	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoro-n-octadecanoic acid (PFODA)	0.11	J	0.21	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.56		0.21	0.11	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	18		0.21	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	4.6		0.21	0.13	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonamide (FOSA)	0.35	J	5.4	0.086	ug/Kg	1		✱	537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - DL	400		11	6.8	ug/Kg	50		✱	537 (modified)	Total/NA
Perfluorotridecanoic Acid (PFTriA) - RE	0.11	J H	0.21	0.099	ug/Kg	1		✱	537 (modified)	Total/NA

Client Sample ID: 168921

Lab Sample ID: 320-30707-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L	1			WS-LC-0025	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1			At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.9	J	2.0	0.80	ng/L	1			WS-LC-0025	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L	1			At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L	1			WS-LC-0025	Total/NA
									At1	

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-53

Date Collected: 08/10/17 19:15

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-1

Matrix: Solid

Percent Solids: 79.9

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.2		0.25	0.081	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoropentanoic acid (PFPeA)	4.2		0.25	0.16	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorohexanoic acid (PFHxA)	7.0		0.25	0.088	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoroheptanoic acid (PFHpA)	5.5		0.25	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorooctanoic acid (PFOA)	15		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorononanoic acid (PFNA)	4.0		0.25	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorodecanoic acid (PFDA)	3.2		0.25	0.071	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoroundecanoic acid (PFUnA)	0.26		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorotridecanoic Acid (PFTriA)	ND *		0.25	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.072	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.25	0.065	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.25	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorobutanesulfonic acid (PFBS)	0.66		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorohexanesulfonic acid (PFHxS)	37		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluoroheptanesulfonic Acid (PFHpS)	1.0		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorodecanesulfonic acid (PFDS)	ND		0.25	0.090	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1
Perfluorooctane Sulfonamide (FOSA)	0.41 J		6.2	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:37	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	47		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C4 PFBA	79		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2 PFHxA	81		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C4 PFOA	81		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C5 PFNA	53		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2 PFDA	69		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2 PFUnA	84		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2 PFDoA	66		25 - 150	08/16/17 16:59	08/24/17 18:37	1
18O2 PFHxS	72		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C4 PFOS	47		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C4-PFHxA	101		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C5 PFPeA	86		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C3-PFBS	74		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2-PFTeDA	67		25 - 150	08/16/17 16:59	08/24/17 18:37	1
13C2-PFHxDA	50		25 - 150	08/16/17 16:59	08/24/17 18:37	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	330		2.5	1.6	ug/Kg	☼	08/16/17 16:59	08/25/17 20:05	10
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	86		25 - 150				08/16/17 16:59	08/25/17 20:05	10

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	ND	H	0.25	0.11	ug/Kg	☼	08/25/17 17:44	08/30/17 17:19	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-53

Date Collected: 08/10/17 19:15

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-1

Matrix: Solid

Percent Solids: 79.9

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C2 PFDa	108		25 - 150	08/25/17 17:44	08/30/17 17:19	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-54

Date Collected: 08/10/17 19:20

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-2

Matrix: Solid

Percent Solids: 84.3

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.2		0.24	0.077	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoropentanoic acid (PFPeA)	4.4		0.24	0.16	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorohexanoic acid (PFHxA)	7.8		0.24	0.084	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoroheptanoic acid (PFHpA)	6.7		0.24	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorooctanoic acid (PFOA)	7.8		0.24	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorononanoic acid (PFNA)	1.9		0.24	0.099	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorodecanoic acid (PFDA)	1.3		0.24	0.068	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoroundecanoic acid (PFUnA)	0.18	J	0.24	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorododecanoic acid (PFDoA)	ND		0.24	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorotridecanoic Acid (PFTriA)	ND	*	0.24	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.24	0.069	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.24	0.062	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.24	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorobutanesulfonic acid (PFBS)	0.51		0.24	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorohexanesulfonic acid (PFHxS)	32		0.24	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluoroheptanesulfonic Acid (PFHpS)	0.33		0.24	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorodecanesulfonic acid (PFDS)	ND		0.24	0.086	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1
Perfluorooctane Sulfonamide (FOSA)	0.18	J	5.9	0.095	ug/Kg	☼	08/16/17 16:59	08/24/17 18:44	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	48		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C4 PFBA	82		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2 PFHxA	82		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C4 PFOA	87		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C5 PFNA	66		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2 PFDA	81		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2 PFUnA	81		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2 PFDoA	68		25 - 150	08/16/17 16:59	08/24/17 18:44	1
18O2 PFHxS	75		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C4 PFOS	59		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C4-PFHpA	105		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C5 PFPeA	85		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C3-PFBS	79		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2-PFTeDA	69		25 - 150	08/16/17 16:59	08/24/17 18:44	1
13C2-PFHxDA	63		25 - 150	08/16/17 16:59	08/24/17 18:44	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	180		1.2	0.75	ug/Kg	☼	08/16/17 16:59	08/25/17 20:25	5
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	83		25 - 150				08/16/17 16:59	08/25/17 20:25	5

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	ND	H	0.24	0.11	ug/Kg	☼	08/25/17 17:44	08/30/17 17:25	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-54

Date Collected: 08/10/17 19:20

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-2

Matrix: Solid

Percent Solids: 84.3

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C2 PFDa	108		25 - 150	08/25/17 17:44	08/30/17 17:25	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-55

Date Collected: 08/10/17 19:25

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-3

Matrix: Solid

Percent Solids: 85.8

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.9		0.23	0.076	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoropentanoic acid (PFPeA)	4.4		0.23	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorohexanoic acid (PFHxA)	6.4		0.23	0.083	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoroheptanoic acid (PFHpA)	2.4		0.23	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorooctanoic acid (PFOA)	15		0.23	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorononanoic acid (PFNA)	0.71		0.23	0.097	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorodecanoic acid (PFDA)	0.31		0.23	0.067	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoroundecanoic acid (PFUnA)	0.86		0.23	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorododecanoic acid (PFDoA)	ND		0.23	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorotridecanoic Acid (PFTriA)	0.32	*	0.23	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.23	0.068	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	0.21	J	0.23	0.061	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.23	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorobutanesulfonic acid (PFBS)	0.73		0.23	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorohexanesulfonic acid (PFHxS)	23		0.23	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluoroheptanesulfonic Acid (PFHpS)	32		0.23	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorodecanesulfonic acid (PFDS)	0.53		0.23	0.084	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1
Perfluorooctane Sulfonamide (FOSA)	1.1	J	5.9	0.094	ug/Kg	☼	08/16/17 16:59	08/24/17 18:51	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	31		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C4 PFBA	75		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2 PFHxA	79		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C4 PFOA	79		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C5 PFNA	37		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2 PFDA	57		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2 PFUnA	37		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2 PFDoA	22	*	25 - 150	08/16/17 16:59	08/24/17 18:51	1
18O2 PFHxS	75		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C4 PFOS	28		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C4-PFHxA	102		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C5 PFPeA	87		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C3-PFBS	75		25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2-PFTeDA	17	*	25 - 150	08/16/17 16:59	08/24/17 18:51	1
13C2-PFHxDA	12	*	25 - 150	08/16/17 16:59	08/24/17 18:51	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	1200		23	15	ug/Kg	☼	08/16/17 16:59	08/25/17 20:32	100

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	92		25 - 150	08/16/17 16:59	08/25/17 20:32	100

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-55

Date Collected: 08/10/17 19:25

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-3

Matrix: Solid

Percent Solids: 85.8

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	0.38	H	0.23	0.11	ug/Kg	☼	08/25/17 17:44	08/30/17 17:32	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C2 PFDoA	103		25 - 150				08/25/17 17:44	08/30/17 17:32	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-56

Date Collected: 08/10/17 19:40

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-4

Matrix: Solid

Percent Solids: 80.3

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.5		0.25	0.081	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoropentanoic acid (PFPeA)	2.5		0.25	0.16	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorohexanoic acid (PFHxA)	3.4		0.25	0.089	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoroheptanoic acid (PFHpA)	1.6		0.25	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorooctanoic acid (PFOA)	8.9		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorononanoic acid (PFNA)	0.42		0.25	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorodecanoic acid (PFDA)	0.18	J	0.25	0.071	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoroundecanoic acid (PFUnA)	12		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorododecanoic acid (PFDoA)	ND		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorotridecanoic Acid (PFTriA)	ND	*	0.25	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.25	0.073	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.25	0.065	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorobutanesulfonic acid (PFBS)	0.80		0.25	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorohexanesulfonic acid (PFHxS)	14		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluoroheptanesulfonic Acid (PFHpS)	1.9		0.25	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorodecanesulfonic acid (PFDS)	ND		0.25	0.090	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1
Perfluorooctane Sulfonamide (FOSA)	0.13	J	6.3	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 18:58	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	45		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C4 PFBA	80		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2 PFHxA	87		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C4 PFOA	94		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C5 PFNA	36		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2 PFDA	83		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2 PFUnA	75		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2 PFDoA	56		25 - 150	08/16/17 16:59	08/24/17 18:58	1
18O2 PFHxS	77		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C4 PFOS	25		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C4-PFHxA	111		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C5 PFPeA	90		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C3-PFBS	81		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2-PFTeDA	60		25 - 150	08/16/17 16:59	08/24/17 18:58	1
13C2-PFHxDA	43		25 - 150	08/16/17 16:59	08/24/17 18:58	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	2000		25	16	ug/Kg	☼	08/16/17 16:59	08/25/17 20:39	100
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	101		25 - 150				08/16/17 16:59	08/25/17 20:39	100

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	ND	H	0.25	0.11	ug/Kg	☼	08/25/17 17:44	08/30/17 17:39	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-56

Date Collected: 08/10/17 19:40

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-4

Matrix: Solid

Percent Solids: 80.3

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C2 PFDa	96		25 - 150	08/25/17 17:44	08/30/17 17:39	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-57

Date Collected: 08/10/17 19:45

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-5

Matrix: Solid

Percent Solids: 78.3

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.1		0.26	0.084	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoropentanoic acid (PFPeA)	2.9		0.26	0.17	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorohexanoic acid (PFHxA)	4.1		0.26	0.091	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoroheptanoic acid (PFHpA)	1.1		0.26	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorooctanoic acid (PFOA)	4.7		0.26	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorononanoic acid (PFNA)	0.11	J	0.26	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorodecanoic acid (PFDA)	0.63		0.26	0.073	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoroundecanoic acid (PFUnA)	5.9		0.26	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorododecanoic acid (PFDoA)	ND		0.26	0.16	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorotridecanoic Acid (PFTriA)	ND	*	0.26	0.12	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.26	0.075	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.26	0.067	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.26	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorobutanesulfonic acid (PFBS)	0.41		0.26	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorohexanesulfonic acid (PFHxS)	14		0.26	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluoroheptanesulfonic Acid (PFHpS)	0.28		0.26	0.15	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorodecanesulfonic acid (PFDS)	0.21	J	0.26	0.093	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1
Perfluorooctane Sulfonamide (FOSA)	0.14	J	6.4	0.10	ug/Kg	☼	08/16/17 16:59	08/24/17 19:05	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	72		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C4 PFBA	84		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2 PFHxA	89		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C4 PFOA	101		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C5 PFNA	51		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2 PFDA	92		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2 PFUnA	102		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2 PFDoA	85		25 - 150	08/16/17 16:59	08/24/17 19:05	1
18O2 PFHxS	83		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C4 PFOS	47		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C4-PFHpA	118		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C5 PFPeA	94		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C3-PFBS	85		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2-PFTeDA	56		25 - 150	08/16/17 16:59	08/24/17 19:05	1
13C2-PFHxDA	48		25 - 150	08/16/17 16:59	08/24/17 19:05	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	540		13	8.1	ug/Kg	☼	08/16/17 16:59	08/25/17 20:46	50
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	101		25 - 150				08/16/17 16:59	08/25/17 20:46	50

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-57

Date Collected: 08/10/17 19:45

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-5

Matrix: Solid

Percent Solids: 78.3

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	0.14	J H	0.26	0.12	ug/Kg	☼	08/25/17 17:44	08/30/17 17:46	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C2 PFDoA	94		25 - 150				08/25/17 17:44	08/30/17 17:46	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-58

Date Collected: 08/10/17 19:55

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-6

Matrix: Solid

Percent Solids: 92.7

Method: 537 (modified) - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	1.2		0.21	0.070	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoropentanoic acid (PFPeA)	3.6		0.21	0.14	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorohexanoic acid (PFHxA)	12		0.21	0.076	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoroheptanoic acid (PFHpA)	1.6		0.21	0.094	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorooctanoic acid (PFOA)	3.2		0.21	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorononanoic acid (PFNA)	2.3		0.21	0.089	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorodecanoic acid (PFDA)	1.0		0.21	0.061	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoroundecanoic acid (PFUnA)	11		0.21	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorododecanoic acid (PFDoA)	0.22		0.21	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorotridecanoic Acid (PFTriA)	ND *		0.21	0.099	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.21	0.062	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.21	0.056	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoro-n-octadecanoic acid (PFODA)	0.11 J		0.21	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorobutanesulfonic acid (PFBS)	0.56		0.21	0.11	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorohexanesulfonic acid (PFHxS)	18		0.21	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluoroheptanesulfonic Acid (PFHpS)	4.6		0.21	0.13	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorodecanesulfonic acid (PFDS)	ND		0.21	0.077	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1
Perfluorooctane Sulfonamide (FOSA)	0.35 J		5.4	0.086	ug/Kg	☼	08/16/17 16:59	08/24/17 19:12	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	25		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C4 PFBA	83		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2 PFHxA	82		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C4 PFOA	90		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C5 PFNA	55		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2 PFDA	56		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2 PFUnA	32		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2 PFDoA	13 *		25 - 150	08/16/17 16:59	08/24/17 19:12	1
18O2 PFHxS	82		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C4 PFOS	41		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C4-PFHpA	111		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C5 PFPeA	90		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C3-PFBS	73		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2-PFTeDA	7 *		25 - 150	08/16/17 16:59	08/24/17 19:12	1
13C2-PFHxDA	4 *		25 - 150	08/16/17 16:59	08/24/17 19:12	1

Method: 537 (modified) - Perfluorinated Hydrocarbons - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctane Sulfonate (PFOS)	400		11	6.8	ug/Kg	☼	08/16/17 16:59	08/25/17 20:53	50
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOS	79		25 - 150				08/16/17 16:59	08/25/17 20:53	50

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-58

Date Collected: 08/10/17 19:55

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-6

Matrix: Solid

Percent Solids: 92.7

Method: 537 (modified) - Perfluorinated Hydrocarbons - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTriA)	0.11	J H	0.21	0.099	ug/Kg	☼	08/25/17 17:44	08/30/17 18:00	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C2 PFDoA	86		25 - 150				08/25/17 17:44	08/30/17 18:00	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 168921

Date Collected: 08/14/17 12:50

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-7

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L		08/17/17 17:05	08/23/17 19:09	1
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L		08/17/17 17:05	08/23/17 19:09	1
Perfluoroheptanoic acid (PFHpA)	1.9	J	2.0	0.80	ng/L		08/17/17 17:05	08/23/17 19:09	1
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L		08/17/17 17:05	08/23/17 19:09	1
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L		08/17/17 17:05	08/23/17 19:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/17/17 17:05	08/23/17 19:09	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	100		25 - 150				08/17/17 17:05	08/23/17 19:09	1
13C4-PFHpA	103		25 - 150				08/17/17 17:05	08/23/17 19:09	1
13C4 PFOA	106		25 - 150				08/17/17 17:05	08/23/17 19:09	1
13C4 PFOS	102		25 - 150				08/17/17 17:05	08/23/17 19:09	1
13C5 PFNA	96		25 - 150				08/17/17 17:05	08/23/17 19:09	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)						
		3C8 FOS/ (25-150)	3C4 PFB/ (25-150)	3C2 PFHx (25-150)	3C4 PFO/ (25-150)	3C5 PFN/ (25-150)	3C2 PFD/ (25-150)	3C2 PFUn (25-150)
320-30707-1	1735-53	47	79	81	81	53	69	84
320-30707-1 - DL	1735-53							
320-30707-1 - RE	1735-53							108
320-30707-2	1735-54	48	82	82	87	66	81	81
320-30707-2 - DL	1735-54							68
320-30707-2 - RE	1735-54							108
320-30707-3	1735-55	31	75	79	79	37	57	37
320-30707-3 - DL	1735-55							22 *
320-30707-3 - RE	1735-55							103
320-30707-4	1735-56	45	80	87	94	36	83	75
320-30707-4 - DL	1735-56							56
320-30707-4 - RE	1735-56							96
320-30707-5	1735-57	72	84	89	101	51	92	102
320-30707-5 - DL	1735-57							85
320-30707-5 - RE	1735-57							94
320-30707-6	1735-58	25	83	82	90	55	56	32
320-30707-6 - DL	1735-58							13 *
320-30707-6 - RE	1735-58							86
LCS 320-179746/2-A	Lab Control Sample	57	85	84	94	92	82	74
LCS 320-181348/2-A	Lab Control Sample							41
LCSD 320-179746/3-A	Lab Control Sample Dup	45	92	90	110	100	92	75
LCSD 320-181348/3-A	Lab Control Sample Dup							42
MB 320-179746/1-A	Method Blank	53	90	92	103	98	91	78
MB 320-181348/1-A	Method Blank							61

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)						
		3C2 PFHx (25-150)	3C4 PFO/ (25-150)	3C4-PFHp (25-150)	3C5 PFPe (25-150)	3C3-PFB/ (25-150)	C2-PFTe/ (25-150)	C2-PFHx/ (25-150)
320-30707-1	1735-53	72	47	101	86	74	67	50
320-30707-1 - DL	1735-53		86					
320-30707-1 - RE	1735-53							
320-30707-2	1735-54	75	59	105	85	79	69	63
320-30707-2 - DL	1735-54		83					
320-30707-2 - RE	1735-54							
320-30707-3	1735-55	75	28	102	87	75	17 *	12 *
320-30707-3 - DL	1735-55		92					
320-30707-3 - RE	1735-55							
320-30707-4	1735-56	77	25	111	90	81	60	43
320-30707-4 - DL	1735-56		101					
320-30707-4 - RE	1735-56							
320-30707-5	1735-57	83	47	118	94	85	56	48
320-30707-5 - DL	1735-57		101					
320-30707-5 - RE	1735-57							
320-30707-6	1735-58	82	41	111	90	73	7 *	4 *
320-30707-6 - DL	1735-58		79					
320-30707-6 - RE	1735-58							
LCS 320-179746/2-A	Lab Control Sample	83	76	111	85	80	9 *	5 *
LCS 320-181348/2-A	Lab Control Sample							
LCSD 320-179746/3-A	Lab Control Sample Dup	92	87	124	95	88	10 *	4 *
LCSD 320-181348/3-A	Lab Control Sample Dup							

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)					
		¹⁸ O ₂ PFHx (25-150)	¹³ C ₄ PFO ₂ (25-150)	¹³ C ₄ -PFHp (25-150)	¹³ C ₅ PFPe (25-150)	¹³ C ₃ -PFB ₂ (25-150)	¹² C-PFTeI (25-150)
MB 320-179746/1-A	Method Blank	88	83	113	94	87	57
MB 320-181348/1-A	Method Blank						36

Surrogate Legend

¹³C₈ FOSA = ¹³C₈ FOSA
¹³C₄ PFBA = ¹³C₄ PFBA
¹³C₂ PFHxA = ¹³C₂ PFHxA
¹³C₄ PFOA = ¹³C₄ PFOA
¹³C₅ PFNA = ¹³C₅ PFNA
¹³C₂ PFDA = ¹³C₂ PFDA
¹³C₂ PFUnA = ¹³C₂ PFUnA
¹³C₂ PFDaA = ¹³C₂ PFDaA
¹⁸O₂ PFHxS = ¹⁸O₂ PFHxS
¹³C₄ PFOS = ¹³C₄ PFOS
¹³C₄-PFHpA = ¹³C₄-PFHpA
¹³C₅ PFPeA = ¹³C₅ PFPeA
¹³C₃-PFBs = ¹³C₃-PFBs
¹³C₂-PFTeDA = ¹³C₂-PFTeDA
¹³C₂-PFHxDA = ¹³C₂-PFHxDA

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		¹⁸ O ₂ PFHx (25-150)	¹³ C ₄ -PFHp (25-150)	¹³ C ₄ PFO ₂ (25-150)	¹³ C ₄ PFO ₂ (25-150)	¹³ C ₅ PFNA (25-150)
320-30707-7	168921	100	103	106	102	96
LCS 320-179966/2-A	Lab Control Sample	93	97	94	96	86
LCSD 320-179966/3-A	Lab Control Sample Dup	96	101	98	99	89
MB 320-179966/1-A	Method Blank	99	108	102	102	92

Surrogate Legend

¹⁸O₂ PFHxS = ¹⁸O₂ PFHxS
¹³C₄-PFHpA = ¹³C₄-PFHpA
¹³C₄ PFOA = ¹³C₄ PFOA
¹³C₄ PFOS = ¹³C₄ PFOS
¹³C₅ PFNA = ¹³C₅ PFNA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-179746/1-A

Matrix: Solid

Analysis Batch: 181156

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 179746

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		0.20	0.065	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoropentanoic acid (PFPeA)	ND		0.20	0.13	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorohexanoic acid (PFHxA)	ND		0.20	0.071	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoroheptanoic acid (PFHpA)	ND		0.20	0.088	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorooctanoic acid (PFOA)	ND		0.20	0.10	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorononanoic acid (PFNA)	ND		0.20	0.083	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorodecanoic acid (PFDA)	ND		0.20	0.057	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoroundecanoic acid (PFUnA)	ND		0.20	0.11	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorododecanoic acid (PFDoA)	ND		0.20	0.12	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorotridecanoic Acid (PFTriA)	ND		0.20	0.092	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorotetradecanoic acid (PFTeA)	ND		0.20	0.058	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	ND		0.20	0.052	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoro-n-octadecanoic acid (PFODA)	ND		0.20	0.10	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorobutanesulfonic acid (PFBS)	ND		0.20	0.10	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.20	0.12	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		0.20	0.12	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorodecanesulfonic acid (PFDS)	ND		0.20	0.072	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorooctane Sulfonate (PFOS)	ND		0.20	0.13	ug/Kg		08/16/17 16:59	08/24/17 17:49	1
Perfluorooctane Sulfonamide (FOSA)	ND		5.0	0.080	ug/Kg		08/16/17 16:59	08/24/17 17:49	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 FOSA	53		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C4 PFBA	90		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2 PFHxA	92		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C4 PFOA	103		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C5 PFNA	98		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2 PFDA	91		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2 PFUnA	78		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2 PFDoA	61		25 - 150	08/16/17 16:59	08/24/17 17:49	1
18O2 PFHxS	88		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C4 PFOS	83		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C4-PFHpA	113		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C5 PFPeA	94		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C3-PFBS	87		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2-PFTeDA	57		25 - 150	08/16/17 16:59	08/24/17 17:49	1
13C2-PFHxDA	36		25 - 150	08/16/17 16:59	08/24/17 17:49	1

Lab Sample ID: LCS 320-179746/2-A

Matrix: Solid

Analysis Batch: 181156

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179746

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	4.00	4.41		ug/Kg		110	23 - 191
Perfluoropentanoic acid (PFPeA)	4.00	4.07		ug/Kg		102	57 - 154
Perfluorohexanoic acid (PFHxA)	4.00	4.25		ug/Kg		106	62 - 152
Perfluoroheptanoic acid (PFHpA)	4.00	4.17		ug/Kg		104	69 - 148

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCS 320-179746/2-A

Matrix: Solid

Analysis Batch: 181156

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179746

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanoic acid (PFOA)	4.00	4.15		ug/Kg		104	54 - 144
Perfluorononanoic acid (PFNA)	4.00	3.89		ug/Kg		97	75 - 134
Perfluorodecanoic acid (PFDA)	4.00	4.10		ug/Kg		103	69 - 145
Perfluoroundecanoic acid (PFUnA)	4.00	3.72		ug/Kg		93	66 - 156
Perfluorododecanoic acid (PFDoA)	4.00	4.25		ug/Kg		106	62 - 152
Perfluorotridecanoic Acid (PFTriA)	4.00	1.40	*	ug/Kg		35	56 - 138
Perfluorotetradecanoic acid (PFTeA)	4.00	3.76		ug/Kg		94	38 - 143
Perfluoro-n-hexadecanoic acid (PFHxDA)	4.00	4.18		ug/Kg		105	10 - 131
Perfluoro-n-octadecanoic acid (PFODA)	4.00	2.65		ug/Kg		66	10 - 122
Perfluorobutanesulfonic acid (PFBS)	3.54	3.82		ug/Kg		108	69 - 139
Perfluorohexanesulfonic acid (PFHxS)	3.64	3.64		ug/Kg		100	53 - 157
Perfluoroheptanesulfonic Acid (PFHpS)	3.81	4.43		ug/Kg		116	61 - 156
Perfluorodecanesulfonic acid (PFDS)	3.86	2.65		ug/Kg		69	41 - 122
Perfluorooctane Sulfonate (PFOS)	3.71	3.73		ug/Kg		100	47 - 154
Perfluorooctane Sulfonamide (FOSA)	4.00	4.52	J	ug/Kg		113	65 - 144

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C8 FOSA	57		25 - 150
13C4 PFBA	85		25 - 150
13C2 PFHxA	84		25 - 150
13C4 PFOA	94		25 - 150
13C5 PFNA	92		25 - 150
13C2 PFDA	82		25 - 150
13C2 PFUnA	74		25 - 150
13C2 PFDoA	41		25 - 150
18O2 PFHxS	83		25 - 150
13C4 PFOS	76		25 - 150
13C4-PFHpA	111		25 - 150
13C5 PFPeA	85		25 - 150
13C3-PFBS	80		25 - 150
13C2-PFTeDA	9	*	25 - 150
13C2-PFHxDA	5	*	25 - 150

Lab Sample ID: LCSD 320-179746/3-A

Matrix: Solid

Analysis Batch: 181156

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179746

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	4.00	4.59		ug/Kg		115	23 - 191	4	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: LCSD 320-179746/3-A

Matrix: Solid

Analysis Batch: 181156

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179746

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoropentanoic acid (PFPeA)	4.00	4.19		ug/Kg		105	57 - 154	3	30
Perfluorohexanoic acid (PFHxA)	4.00	4.52		ug/Kg		113	62 - 152	6	30
Perfluoroheptanoic acid (PFHpA)	4.00	4.26		ug/Kg		106	69 - 148	2	30
Perfluorooctanoic acid (PFOA)	4.00	3.85		ug/Kg		96	54 - 144	7	30
Perfluorononanoic acid (PFNA)	4.00	4.19		ug/Kg		105	75 - 134	7	30
Perfluorodecanoic acid (PFDA)	4.00	4.22		ug/Kg		105	69 - 145	3	30
Perfluoroundecanoic acid (PFUnA)	4.00	3.76		ug/Kg		94	66 - 156	1	30
Perfluorododecanoic acid (PFDoA)	4.00	4.13		ug/Kg		103	62 - 152	3	30
Perfluorotridecanoic Acid (PFTriA)	4.00	1.43	*	ug/Kg		36	56 - 138	2	30
Perfluorotetradecanoic acid (PFTeA)	4.00	3.95		ug/Kg		99	38 - 143	5	30
Perfluoro-n-hexadecanoic acid (PFHxDA)	4.00	4.26		ug/Kg		107	10 - 131	2	30
Perfluoro-n-octadecanoic acid (PFODA)	4.00	2.48		ug/Kg		62	10 - 122	7	30
Perfluorobutanesulfonic acid (PFBS)	3.54	3.89		ug/Kg		110	69 - 139	2	30
Perfluorohexanesulfonic acid (PFHxS)	3.64	3.85		ug/Kg		106	53 - 157	6	30
Perfluoroheptanesulfonic Acid (PFHpS)	3.81	4.40		ug/Kg		116	61 - 156	1	30
Perfluorodecanesulfonic acid (PFDS)	3.86	2.35		ug/Kg		61	41 - 122	12	30
Perfluorooctane Sulfonate (PFOS)	3.71	3.83		ug/Kg		103	47 - 154	3	30
Perfluorooctane Sulfonamide (FOSA)	4.00	4.50	J	ug/Kg		113	65 - 144	1	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
13C8 FOSA	45		25 - 150
13C4 PFBA	92		25 - 150
13C2 PFHxA	90		25 - 150
13C4 PFOA	110		25 - 150
13C5 PFNA	100		25 - 150
13C2 PFDA	92		25 - 150
13C2 PFUnA	75		25 - 150
13C2 PFDoA	42		25 - 150
18O2 PFHxS	92		25 - 150
13C4 PFOS	87		25 - 150
13C4-PFHpA	124		25 - 150
13C5 PFPeA	95		25 - 150
13C3-PFBS	88		25 - 150
13C2-PFTeDA	10	*	25 - 150
13C2-PFHxDA	4	*	25 - 150

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: 537 (modified) - Perfluorinated Hydrocarbons (Continued)

Lab Sample ID: MB 320-181348/1-A

Matrix: Solid

Analysis Batch: 182248

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 181348

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorotridecanoic Acid (PFTrIA)	ND		0.20	0.092	ug/Kg		08/25/17 17:44	08/30/17 16:58	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFDaA	90		25 - 150				08/25/17 17:44	08/30/17 16:58	1

Lab Sample ID: LCS 320-181348/2-A

Matrix: Solid

Analysis Batch: 182248

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 181348

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	
Perfluorotridecanoic Acid (PFTrIA)	4.00	3.69		ug/Kg		92	56 - 138	
Isotope Dilution	%Recovery	LCS Qualifier	Limits					
13C2 PFDaA	93		25 - 150					

Lab Sample ID: LCSD 320-181348/3-A

Matrix: Solid

Analysis Batch: 182248

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 181348

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorotridecanoic Acid (PFTrIA)	4.00	3.85		ug/Kg		96	56 - 138	4	30
Isotope Dilution	%Recovery	LCSD Qualifier	Limits						
13C2 PFDaA	97		25 - 150						

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-179966/1-A

Matrix: Water

Analysis Batch: 181092

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 179966

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		08/17/17 17:05	08/23/17 18:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		08/17/17 17:05	08/23/17 18:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		08/17/17 17:05	08/23/17 18:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		08/17/17 17:05	08/23/17 18:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		08/17/17 17:05	08/23/17 18:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		08/17/17 17:05	08/23/17 18:14	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	99		25 - 150				08/17/17 17:05	08/23/17 18:14	1
13C4-PFHpA	108		25 - 150				08/17/17 17:05	08/23/17 18:14	1
13C4 PFOA	102		25 - 150				08/17/17 17:05	08/23/17 18:14	1
13C4 PFOS	102		25 - 150				08/17/17 17:05	08/23/17 18:14	1
13C5 PFNA	92		25 - 150				08/17/17 17:05	08/23/17 18:14	1

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-179966/2-A

Matrix: Water

Analysis Batch: 181092

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 179966

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	22.1		ng/L		125	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	21.4		ng/L		118	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	22.1		ng/L		110	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	24.3		ng/L		121	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	20.7		ng/L		111	69 - 144
Perfluorononanoic acid (PFNA)	20.0	22.9		ng/L		115	73 - 147

LCS		LCS	Limits
Isotope Dilution	%Recovery	Qualifier	
18O2 PFHxS	93		25 - 150
13C4-PFHxS	97		25 - 150
13C4 PFOA	94		25 - 150
13C4 PFOS	96		25 - 150
13C5 PFNA	86		25 - 150

Lab Sample ID: LCSD 320-179966/3-A

Matrix: Water

Analysis Batch: 181092

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 179966

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	22.2		ng/L		126	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	21.3		ng/L		117	73 - 157	0	30
Perfluoroheptanoic acid (PFHpA)	20.0	21.4		ng/L		107	71 - 138	3	30
Perfluorooctanoic acid (PFOA)	20.0	23.9		ng/L		119	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)	18.6	20.7		ng/L		111	69 - 144	0	30
Perfluorononanoic acid (PFNA)	20.0	23.2		ng/L		116	73 - 147	1	30

LCSD		LCSD	Limits
Isotope Dilution	%Recovery	Qualifier	
18O2 PFHxS	96		25 - 150
13C4-PFHxS	101		25 - 150
13C4 PFOA	98		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	89		25 - 150

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

LCMS

Prep Batch: 179746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1 - DL	1735-53	Total/NA	Solid	SHAKE	
320-30707-1	1735-53	Total/NA	Solid	SHAKE	
320-30707-2	1735-54	Total/NA	Solid	SHAKE	
320-30707-2 - DL	1735-54	Total/NA	Solid	SHAKE	
320-30707-3	1735-55	Total/NA	Solid	SHAKE	
320-30707-3 - DL	1735-55	Total/NA	Solid	SHAKE	
320-30707-4	1735-56	Total/NA	Solid	SHAKE	
320-30707-4 - DL	1735-56	Total/NA	Solid	SHAKE	
320-30707-5	1735-57	Total/NA	Solid	SHAKE	
320-30707-5 - DL	1735-57	Total/NA	Solid	SHAKE	
320-30707-6	1735-58	Total/NA	Solid	SHAKE	
320-30707-6 - DL	1735-58	Total/NA	Solid	SHAKE	
MB 320-179746/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-179746/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
LCSD 320-179746/3-A	Lab Control Sample Dup	Total/NA	Solid	SHAKE	

Prep Batch: 179966

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-7	168921	Total/NA	Water	PFAS Prep	
MB 320-179966/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-179966/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-179966/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 181092

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-7	168921	Total/NA	Water	WS-LC-0025	179966
MB 320-179966/1-A	Method Blank	Total/NA	Water	At1	179966
LCS 320-179966/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	179966
LCSD 320-179966/3-A	Lab Control Sample Dup	Total/NA	Water	At1	179966
				WS-LC-0025	179966
				At1	

Analysis Batch: 181156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-179746/1-A	Method Blank	Total/NA	Solid	537 (modified)	179746
LCS 320-179746/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	179746
LCSD 320-179746/3-A	Lab Control Sample Dup	Total/NA	Solid	537 (modified)	179746

Analysis Batch: 181202

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1	1735-53	Total/NA	Solid	537 (modified)	179746
320-30707-2	1735-54	Total/NA	Solid	537 (modified)	179746
320-30707-3	1735-55	Total/NA	Solid	537 (modified)	179746
320-30707-4	1735-56	Total/NA	Solid	537 (modified)	179746
320-30707-5	1735-57	Total/NA	Solid	537 (modified)	179746
320-30707-6	1735-58	Total/NA	Solid	537 (modified)	179746

Prep Batch: 181348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1 - RE	1735-53	Total/NA	Solid	SHAKE	

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

LCMS (Continued)

Prep Batch: 181348 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-2 - RE	1735-54	Total/NA	Solid	SHAKE	
320-30707-3 - RE	1735-55	Total/NA	Solid	SHAKE	
320-30707-4 - RE	1735-56	Total/NA	Solid	SHAKE	
320-30707-5 - RE	1735-57	Total/NA	Solid	SHAKE	
320-30707-6 - RE	1735-58	Total/NA	Solid	SHAKE	
MB 320-181348/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-181348/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
LCSD 320-181348/3-A	Lab Control Sample Dup	Total/NA	Solid	SHAKE	

Analysis Batch: 181472

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1 - DL	1735-53	Total/NA	Solid	537 (modified)	179746
320-30707-2 - DL	1735-54	Total/NA	Solid	537 (modified)	179746
320-30707-3 - DL	1735-55	Total/NA	Solid	537 (modified)	179746
320-30707-4 - DL	1735-56	Total/NA	Solid	537 (modified)	179746
320-30707-5 - DL	1735-57	Total/NA	Solid	537 (modified)	179746
320-30707-6 - DL	1735-58	Total/NA	Solid	537 (modified)	179746

Analysis Batch: 182248

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1 - RE	1735-53	Total/NA	Solid	537 (modified)	181348
320-30707-2 - RE	1735-54	Total/NA	Solid	537 (modified)	181348
320-30707-3 - RE	1735-55	Total/NA	Solid	537 (modified)	181348
320-30707-4 - RE	1735-56	Total/NA	Solid	537 (modified)	181348
320-30707-5 - RE	1735-57	Total/NA	Solid	537 (modified)	181348
320-30707-6 - RE	1735-58	Total/NA	Solid	537 (modified)	181348
MB 320-181348/1-A	Method Blank	Total/NA	Solid	537 (modified)	181348
LCS 320-181348/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	181348
LCSD 320-181348/3-A	Lab Control Sample Dup	Total/NA	Solid	537 (modified)	181348

General Chemistry

Analysis Batch: 179743

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-30707-1	1735-53	Total/NA	Solid	D 2216	
320-30707-2	1735-54	Total/NA	Solid	D 2216	
320-30707-3	1735-55	Total/NA	Solid	D 2216	
320-30707-4	1735-56	Total/NA	Solid	D 2216	
320-30707-5	1735-57	Total/NA	Solid	D 2216	
320-30707-6	1735-58	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-53

Date Collected: 08/10/17 19:15

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

Client Sample ID: 1735-53

Date Collected: 08/10/17 19:15

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-1

Matrix: Solid

Percent Solids: 79.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.03 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 18:37	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		5.03 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			181472	08/25/17 20:05	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		5.01 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 17:19	SBC	TAL SAC

Client Sample ID: 1735-54

Date Collected: 08/10/17 19:20

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-2

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

Client Sample ID: 1735-54

Date Collected: 08/10/17 19:20

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-2

Matrix: Solid

Percent Solids: 84.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			4.99 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 18:44	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		4.99 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5			181472	08/25/17 20:25	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		5.02 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 17:25	SBC	TAL SAC

Client Sample ID: 1735-55

Date Collected: 08/10/17 19:25

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-3

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-55

Date Collected: 08/10/17 19:25

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-3

Matrix: Solid

Percent Solids: 85.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			4.98 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 18:51	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		4.98 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	100			181472	08/25/17 20:32	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		4.98 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 17:32	SBC	TAL SAC

Client Sample ID: 1735-56

Date Collected: 08/10/17 19:40

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-4

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

Client Sample ID: 1735-56

Date Collected: 08/10/17 19:40

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-4

Matrix: Solid

Percent Solids: 80.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			4.98 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 18:58	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		4.98 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	100			181472	08/25/17 20:39	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		5.05 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 17:39	SBC	TAL SAC

Client Sample ID: 1735-57

Date Collected: 08/10/17 19:45

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-5

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

Client Sample ID: 1735-57

Date Collected: 08/10/17 19:45

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-5

Matrix: Solid

Percent Solids: 78.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			4.96 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 19:05	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		4.96 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	50			181472	08/25/17 20:46	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		5.00 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Client Sample ID: 1735-57

Date Collected: 08/10/17 19:45

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-5

Matrix: Solid

Percent Solids: 78.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 17:46	SBC	TAL SAC

Client Sample ID: 1735-58

Date Collected: 08/10/17 19:55

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-6

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			179743	08/16/17 15:55	TCS	TAL SAC

Client Sample ID: 1735-58

Date Collected: 08/10/17 19:55

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-6

Matrix: Solid

Percent Solids: 92.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.03 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)		1			181202	08/24/17 19:12	SBC	TAL SAC
Total/NA	Prep	SHAKE	DL		5.03 g	1.00 mL	179746	08/16/17 16:59	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	DL	50			181472	08/25/17 20:53	SBC	TAL SAC
Total/NA	Prep	SHAKE	RE		5.03 g	1.00 mL	181348	08/25/17 17:44	NS1	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			182248	08/30/17 18:00	SBC	TAL SAC

Client Sample ID: 168921

Date Collected: 08/14/17 12:50

Date Received: 08/15/17 09:35

Lab Sample ID: 320-30707-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	179966	08/17/17 17:05	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			181092	08/23/17 19:09	SBC	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 1 roectjSite: Cit/ oyf airbanFs f ire Trainink Area

TestAmerica Job ID: 320-30909-4

Laboratory: TestAmerica Sacramento

All accregitationjcertijycations helg b/ this laborator/ are listegd . ot all accregitationjcertijycations are aNNicable to this reNbrtd

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasFa p STU	State 1 rokram	40	(ST-0))	42-45-49
Ari8ona	State 1 rokram	7	Az0905	05-44-49 Z
ArFansas DEQ	State 1 rokram	6	55-0674	06-49-45
Caliyornia	State 1 rokram	7	2579	04-34-45
Colorago	State 1 rokram	5	CA000uu	05-34-49 Z
ConnecticH	State 1 rokram	4	1L -0674	06-30-47
f loriga	. EGA1	u	E59) 90	06-30-45
weorkia	State 1 rokram	u	. jA	04-27-45
L aKaii	State 1 rokram	7	. jA	04-27-45
Illinois	. EGA1	)	200060	03-49-45
Bansas	. EGA1	9	E-4039)	40-34-49
GA-M	DoD EGA1		G2u65	04-20-45
GoHsiana	. EGA1	6	30642	06-30-45
v aine	State 1 rokram	4	CA000u	0u-45-45
v ichikan	State 1 rokram	)	77u9	04-34-45
. eYaga	State 1 rokram	7	CA000uu	09-34-45
. eK L amNshire	. EGA1	4	2779	0u-45-45
. eK Jerse/	. EGA1	2	CA00)	06-30-45
. eK OorF	. EGA1	2	44666	0u-04-45
x rekon	. EGA1	40	u0u0	04-25-45
1 enns/ IYania	. EGA1	3	65-04292	03-34-45
TeRas	. EGA1	6	T40u90u377	0) -34-45
(S f ish & Wilgliye	f egeral		GE4u5355-0	09-34-45
(SDA	f egeral		1330-44-00u36	42-30-49
(SE1A (Cv V	f egeral	4	CA000uu	44-06-45
(tah	. EGA1	5	CA000uu	02-25-45
* irkinia	. EGA1	3	u60295	03-4u-45
Washinkton	State 1 rokram	40	C) 54	0) -0) -45
West * irkinia pDWU	State 1 rokram	3	7730C	42-34-49
W/ omink	State 1 rokram	5	5Tv S-G	04-27-49 Z

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Perfluorinated Hydrocarbons	EPA	TAL SAC
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

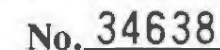
TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-30707-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-30707-1	1735-53	Solid	08/10/17 19:15	08/15/17 09:35
320-30707-2	1735-54	Solid	08/10/17 19:20	08/15/17 09:35
320-30707-3	1735-55	Solid	08/10/17 19:25	08/15/17 09:35
320-30707-4	1735-56	Solid	08/10/17 19:40	08/15/17 09:35
320-30707-5	1735-57	Solid	08/10/17 19:45	08/15/17 09:35
320-30707-6	1735-58	Solid	08/10/17 19:55	08/15/17 09:35
320-30707-7	168921	Water	08/14/17 12:50	08/15/17 09:35



Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-30707-1

Login Number: 30707

List Source: TestAmerica Sacramento

List Number: 1

Creator: Turpen, Troy

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

September 6, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

September 1, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-30707-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The laboratory notes that the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 0.7° C.

The Isotope Dilution Analyte (IDA) recoveries associated with 1735-55, 1735-58, and several QC samples are below the method recommended limits for one or more analytes.

Samples 1735-53, 1735-54, 1735-55, 1735-56, 1735-57, and 1735-58 were diluted to bring the concentration of one or more target analytes within the calibration range. Elevated reporting limits (RLs) are provided.

The laboratory control sample / laboratory control sample duplicate (LCS/LCSD) for preparation batch 320-179746 and analytical batch 320-181156 recovered outside control limits for PFTriA.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-179966.

The laboratory notes that water sample 168921 contained sediment that was yellow-brown in color.

The laboratory notes that there were two QC errors associated with the MS/MSD samples for soil preparation batch 320-179746. The laboratory project manager confirms that this MS/MSD was performed on a sample not included in this work order. These results were not included in the laboratory report.

c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

The project samples associated with the LCS/LCSD recovery failure for PFTriA were re-prepared outside holding time. The laboratory report includes both sets of data, but the original results are reported in the laboratory EDD.

An LCS and LCSD were extracted with preparation batch 320-179966 to demonstrate analytical method accuracy and precision.

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

Comments:

The laboratory notes that data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the soil samples were analyzed using solid phase extraction (SPE). The 14-day hold time for extraction and 40-day hold time for analysis were met. The project soil samples were re-prepared outside of hold time; however, the original results are reported.

Water sample 168921 was analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The soil sample LOQs, equivalent to the TestAmerica Reporting Limits (RLs), are less than applicable ADEC migration-to-groundwater soil cleanup levels for PFOS and PFOA, where applicable for non-detect results.

The water sample LOQs are also less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

Method blanks 320-179746/1-A and 320-181348/1-A were analyzed for the soil samples included in this work order. Method blank 320-179966/1-A was analyzed for the water sample in this work order.

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in each of the three method blank samples.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

The percent recovery of PFTriA in LCS 320-179746/2-A and LCSD 320-179746/3-A are below the range required by the laboratory. The other LCS and LCSD percent recoveries were within the ranges required by the laboratory method.

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

The RPDs were within acceptance criteria for each of the three preparation batches analyzed with this work order.

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

Comments:

The PFTriA results for each sample in preparation batch 320-179746 are considered affected. Each of the six soil samples were analyzed in this preparation batch.

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

☒ Yes ☐ No

Comments:

The soil sample PFTriA results are considered estimated and flagged 'JL' for detected results and 'UJ' for non-detected results in the analytical data table.

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

Comments:

The data quality was affected, see above.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

The IDA recovery for 13C2 PFD_oA is outside laboratory control limits in project samples 1735-55 and 1735-58.

The IDA recoveries for 13C2-PFTeDA and 13C2-PFHxDA are outside laboratory control limits in project samples 1735-55 and 1735-58 and QC samples 320-179746/2-A and 320-179746/3-A.

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

☒ Yes ☐ No

Comments:

The PFD_oA results for project samples 1735-55 and 1735-58 are affected by the IDA recovery failure of 13C2 PFD_oA. The PFHxDA and PFODA results for 1735-55 and 1735-58 are affected by the IDA recovery failure of 13C2 PFHxDA. These results are considered estimated and are flagged 'J' for detected values and 'UJ' for non-detected values in the analytical results table.

The isotopically-labeled 13C2 PFD_oA is also associated with PFTrDA results, while 13C2-PFTeDA is associated with PFTeDA. These analytes are not reported.

Surrogate-recovery failures in QC samples are not considered to affect the data as long as the recovery of individual analytes associated with that surrogate are within the laboratory control limits for that QC sample.

- iv. Data quality or usability affected?

Comments:

The data quality was affected for three analytes; see above.

- d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

- 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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☐ Yes ☒ No

Comments:

A soil-sample field-duplicate pair was submitted with this work order. Water-sample field-duplicates are submitted with the appropriate frequency for the project as a whole.

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

The field-duplicate pair 1735-53 / 1735-54 was submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

The field-duplicate RPDs for PFOA, PFNA, PFDA, PFHpS, PFOS, and FOSA are greater than 50%, where applicable for detected analytes.

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

Comments:

The data quality for the PFOA, PFNA, PFDA, PFHpS, PFOS, and FOSA results in samples 1735-53 and 1735-54 are considered affected. These results are considered estimated and are flagged 'J' in the analytical results table.

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

☐ Yes ☐ No ☒ Not Applicable

These samples are typically not collected with reusable equipment so a practical potential for equipment based cross-contamination does not exist. For this reason, an equipment blank was not submitted.

- i. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No

Comments:

We determined that there were no other necessary data flags/qualifiers.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-31462-1
Client Project/Site: City of Fairbanks Fire Training Area

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

Attn: Marcy Nadel



Authorized for release by:
9/21/2017 12:12:37 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?

**Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	10
Lab Chronicle	11
Certification Summary	12
Method Summary	13
Sample Summary	14
Chain of Custody	15
Receipt Checklists	16

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-31462-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
/ rojectfSite: CitF okgairbanps gire TraininwArea

TestAmerica Job ID: 320-31Pj 2-1

Job ID: 320-31462-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-31462-1

Receipt

The samvle d as recei7e8 on 9f12f2015 10:10 AM; the samvle arri7e8 in woo8 con8ition, vroverlF vreser7e8 an8, d here require8, on ice. The temverature okthe cooler at receivt d as P.26C.

LCMS

° o analFtical or qualif issues d ere note8, other than those 8escribe8 in the DeknitionsfNlossarF vawe.

Organic Prep

Metho8G(/ gAS / rev: The samvle contains re88ish-oranwe color se8iment. 1j) x30 G20-31Pj 2-1(

Metho8G(/ gAS / rev: Insufficient samvle 7olume d as a7ailable to verform a matri4 svipefmatri4 svipe 8uvlicate GMSfMSD(associate8 d ith vrevaration batch 320-1) x019.

° o a88itional analFtical or qualif issues d ere note8, other than those 8escribe8 abo7e or in the DeknitionsfNlossarF vawe.

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Client Sample ID: 168530

Lab Sample ID: 320-31462-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	92		2.0	0.72	ng/L	9			WS-LC-002N At9	Total/5 A
Perfluorohexanesulfonic acid (PF6 8S)	10		2.0	0.8x	ng/L	9			WS-LC-002N At9	Total/5 A
Perfluorohexanoic acid (PF6 HA)	93		2.0	0.80	ng/L	9			WS-LC-002N At9	Total/5 A
Perfluorooctanoic acid (PFp A)	20		2.0	0.xN	ng/L	9			WS-LC-002N At9	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	990		2.0	9.3	ng/L	9			WS-LC-002N At9	Total/5 A
Perfluorononanoic acid (PF5 A)	2.9		2.0	0.1N	ng/L	9			WS-LC-002N At9	Total/5 A

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-31462-1

Client Sample ID: 168530

Date Collected: 09/11/17 13:46

Date Received: 09/12/17 10:10

Lab Sample ID: 320-31462-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.92	ng/L		09/18/17 14:22	09/19/17 19:20	1
Perfluorohexanesulfonic acid (PFHxS)	60		2.0	0.87	ng/L		09/18/17 14:22	09/19/17 19:20	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		09/18/17 14:22	09/19/17 19:20	1
Perfluorooctanoic acid (PFOA)	20		2.0	0.75	ng/L		09/18/17 14:22	09/19/17 19:20	1
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L		09/18/17 14:22	09/19/17 19:20	1
Perfluorononanoic acid (PFNA)	2.1		2.0	0.65	ng/L		09/18/17 14:22	09/19/17 19:20	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150				09/18/17 14:22	09/19/17 19:20	1
13C4-PFHpA	127		25 - 150				09/18/17 14:22	09/19/17 19:20	1
13C4 PFOA	123		25 - 150				09/18/17 14:22	09/19/17 19:20	1
13C4 PFOS	115		25 - 150				09/18/17 14:22	09/19/17 19:20	1
13C5 PFNA	122		25 - 150				09/18/17 14:22	09/19/17 19:20	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		34 2 PFOx (25-150)	3CH-PFOp (25-150)	8CHPF4 (25-150)	8CHPF4 (25-150)	8C5 PFNA (25-150)
320-39412-9	917530	990	928	923	995	922
LCS 320-975096/2-A	Lab Control Sample	998	926	993	999	907
LCSD 320-975096/3-A	Lab Control Sample Dup	994	926	994	999	901
MB 320-975096/9-A	Method Blank	994	929	999	906	903

Surrogate Legend

97O2 PF=HS x 97O2 PF=HS
93C4-PF=pA x 93C4-PF=pA
93C4 PFOA x 93C4 PFOA
93C4 PFOS x 93C4 PFOS
93C5 PFNA x 93C5 PFNA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-185019/1-A

Matrix: Water

Analysis Batch: 185229

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 185019

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFOS)	. D		2L0	0L72	ng/5		07/9N98 94:22	07/97/98 98:99	9
Perfluorohe6anesulfonic acid (PFB6S)	. D		2L0	0LN8	ng/5		07/9N98 94:22	07/97/98 98:99	9
Perfluorohexanoic acid (PFBxA)	. D		2L0	0LN0	ng/5		07/9N98 94:22	07/97/98 98:99	9
Perfluorooctanoic acid (PFp A)	. D		2L0	0L8H	ng/5		07/9N98 94:22	07/97/98 98:99	9
Perfluorooctanesulfonic acid (PFp S)	. D		2L0	9L3	ng/5		07/9N98 94:22	07/97/98 98:99	9
Perfluorononanoic acid (PF. A)	. D		2L0	0L1H	ng/5		07/9N98 94:22	07/97/98 98:99	9

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	112		45 - 150	07/13/16 12:44	07/17/16 16:11	1
1S9 2-PFOHx	141		45 - 150	07/13/16 12:44	07/17/16 16:11	1
1S9 2 PFCx	111		45 - 150	07/13/16 12:44	07/17/16 16:11	1
1S9 2 PFC8	107		45 - 150	07/13/16 12:44	07/17/16 16:11	1
1S9 5 PFp x	10S		45 - 150	07/13/16 12:44	07/17/16 16:11	1

Lab Sample ID: LCS 320-185019/2-A

Matrix: Water

Analysis Batch: 185229

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 185019

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFOS)	98L8	91L1		ng/5		74	82 - 9H9
Perfluorohe6anesulfonic acid (PFB6S)	9N2	94L7		ng/5		N2	83 - 9HB
Perfluorohexanoic acid (PFBxA)	20L0	98L9		ng/5		N1	89 - 93N
Perfluorooctanoic acid (PFp A)	20L0	9NN		ng/5		74	80 - 940
Perfluorooctanesulfonic acid (PFp S)	9N1	9HH		ng/5		N3	17 - 944
Perfluorononanoic acid (PF. A)	20L0	98L2		ng/5		N1	83 - 948

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	116		45 - 150
1S9 2-PFOHx	147		45 - 150
1S9 2 PFCx	11S		45 - 150
1S9 2 PFC8	111		45 - 150
1S9 5 PFp x	103		45 - 150

Lab Sample ID: LCSD 320-185019/3-A

Matrix: Water

Analysis Batch: 185229

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 185019

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limit	RPD
Perfluorobutanesulfonic acid (PFOS)	98L8	98L2		ng/5		78	82 - 9H9	3
Perfluorohe6anesulfonic acid (PFB6S)	9N2	9H1		ng/5		NH	83 - 9HB	4
Perfluorohexanoic acid (PFBxA)	20L0	98L9		ng/5		NH	89 - 93N	9
Perfluorooctanoic acid (PFp A)	20L0	9NH		ng/5		73	80 - 940	9
Perfluorooctanesulfonic acid (PFp S)	9N1	91L0		ng/5		N1	17 - 944	3
Perfluorononanoic acid (PF. A)	20L0	98L2		ng/5		N1	83 - 948	0

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc

Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C4 PFOA8</i>	<i>112</i>		<i>45 - 150</i>
<i>1S9 2-PFOHx</i>	<i>147</i>		<i>45 - 150</i>
<i>1S9 2 PFCx</i>	<i>112</i>		<i>45 - 150</i>
<i>1S9 2 PFC8</i>	<i>111</i>		<i>45 - 150</i>
<i>1S9 5 PFp x</i>	<i>10N</i>		<i>45 - 150</i>

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-31462-1

LCMS

Prep Batch: 185019

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-31462-1	168530	Total/NA	Water	PFAS Prep	
MB 320-185019/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-185019/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-185019/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 185229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-31462-1	168530	Total/NA	Water	WS-LC-0025 At1	185019
MB 320-185019/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	185019
LCS 320-185019/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	185019
LCSD 320-185019/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	185019

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Client Sample ID: 129083

Date Collected: 3/11/18

Date Received: 3/11/18

Lab Sample ID: 8-341M2-41

Location: Water

Analysis Type	Patch Type	Patch Name	Size	Dilution Factor	Initial Volume	Final Volume	Patch Number	Preparation Date/Time	Analyst	Lab
Total/NA	Prep	PFAS Prep			950 mL	951 mL	96.097	07/96/98 94:22	TON	TAL SAC
Total/NA	Analysis	WS-LC-002. At9		9			96.227	07/97/98 97:20	SER	TAL SAC

Laboratory Reference:

TAL SAC = TestAmerica Sacramento, 660 Riverside Parkway, West Sacramento, CA 95691, TEL (791)383-1000

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	90	UST-055	92-98-97
Arizona	State Program	Z	AE0708	08-99-97 Q
Arkansas D6u	State Program	1	88-01Z9	01-97-98
California	State Program	Z	28Z7	09-39-98
Colorado	State Program	8	CA00044	08-39-98
Connecticut	State Program	9	PL-01Z9	01-30-9Z
Florida	N6 GAP	4	687570	01-30-98
Georgia	State Program	4	N/A	09-2Z-98
Hawaii	State Program	Z	N/A	09-2Z-98
Illinois	N6 GAP	5	200010	03-97-98
Indiana	N6 GAP	7	6-90375	90-39-97
IA-M	DoD 6 GAP		Q2418	09-20-98
Iowa	N6 GAP	1	30192	01-30-98
Kansas	State Program	9	CA0004	04-98-98
Michigan	State Program	5	ZZ47	09-39-98
Minnesota	State Program	Z	CA00044	07-39-98
Montana	N6 GAP	9	ZZZ7	04-98-98
Nebraska	N6 GAP	2	CA005	01-30-98
Nevada	N6 GAP	2	99111	04-09-98
New England	N6 GAP	90	4040	09-28-98
Pennsylvania	N6 GAP	3	18-09272	03-39-98
Texas	N6 GAP	1	T9047043ZZ	05-39-98
US Fish & Wildlife	Federal		G6948388-0	07-39-98
USDA	Federal		P330-99-00431	92-30-97
US EPA UCv V	Federal	9	CA00044	99-01-98
Utah	N6 GAP	8	CA00044	02-28-98
Virginia	N6 GAP	3	410278	03-94-98
Washington	State Program	90	C589	05-05-98
West Virginia (DW)	State Program	3	ZZ30C	92-39-97
Wyoming	State Program	8	8Tv S-G	09-2Z-97 Q

QAcreditation/Certification reneKal pending - accreditation/certification considered Valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At9	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 65105, TEL (691)373-5100

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-39412-9

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39412-9	918730	Water	05/99/96 93:41	05/92/96 90:90

2

3

4

5

6

7

8

9

10

12

13

14

15



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory David M. Hickey
Attn: Test America

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Analysis Parameters/Sample Container Description (include preservative if used)					Total Number of Containers	Remarks/Matrix
108530		1346	9/11/17	X	X	X6 UHR PFC (WS-LC-0025)					2	groundwater



320-31462 Chain of Custody

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>2</u>		Signature: <u>M. Hickey</u> Time: <u>1700</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>C&P FINE (Cont)</u>		COC Seals/Intact? Y/N/NA: <u>—</u>		Printed Name: _____ Date: <u>9/11/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>—</u>		Company: <u>Marcy Nadel</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>Goldstreak</u>		Shannon & Wilson		Company: _____		Company: _____	
Sampler: <u>MDN</u>		(attach shipping bill, if any)		Received By: 1.		Received By: 2.		Received By: 3.	
Instructions				Signature: <u>Connor E. Dman</u> Time: <u>1610</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Requested Turnaround Time: <u>Standard</u>				Printed Name: _____ Date: <u>9/12/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Special Instructions: <u>Please bill to 31-1-11735-009</u>				Company: <u>TAW</u>		Company: _____		Company: _____	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									

422

No. 34671

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-31TR2-1

Login Number: 31462

List Source: TestAmerica Sacramento

List Number: 1

Creator: Edman, Connor M

Question	Answer	Comment
v ayioactiwit' k asnt chec/ ey or is =g bac/ f rouny as measurey b' a surve' meterp	drue	
dhe cooler's custoy' seal, iAQresent, is intactp	drue	
SamQe custoy' seals, iAQresent, are intactp	NgF	
dhe cooler or samQes yo not aQear to have been comQromisey or tamQerey k ithp	drue	
SamQes k ere receivey on icep	drue	
Cooler demQerature is acceQtablep	drue	
Cooler demQerature is recoryeyp	drue	
C? C is Qresentp	drue	
C? C is Alley out in in/ any lef iblep	drue	
C? C is Alley out k ith all Qertinent inAQmationp	drue	
Is the Hiely SamQers name Qresent on C? C(	drue	
there are no yiscreQancies betk een the containers receivey any the C? Cp	drue	
SamQes are receivey k ithin x olyinf dime)ePcluyinf tests k ith immeiyate x dsV	drue	
SamQe containers have lef ible labels	drue	
Containers are not bro/ en or lea/ inf p	drue	
SamQe collection yategimes are Qrowiyeyp	drue	
FOQroQriate samQe containers are useyp	drue	
SamQe bottles are comQetel' Alleyp	drue	
SamQe qreservation MeriAeyp	NgF	
dhere is suAQcient wolpAr all reDuestey anal' ses, inclpan' reDuestey z Sg S6 s	drue	
Containers reDuirinf 4ero heaysQace have no heaysQace or bubble is =Rmm)1g"p	drue	
z ultiQhasic samQes are not Qresentp	drue	
SamQes yo not reDuire sQittinf or comQositinf p	drue	
v esiyual Chlorine Chec/ ey	NgF	

Laboratory Data Review Checklist

Completed By:

Marcy Nadel

Title:

Geologist

Date:

September 21, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

September 21, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-31462-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

N/A; there were no discrepancies reported by the laboratory.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

The laboratory notes that the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 4.2° C.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-185019.

The laboratory notes that the project sample included with this work order contained sediment that was reddish-orange in color.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with this batch to demonstrate analytical method accuracy and precision.

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

Comments:

The laboratory did not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MB 320-185019/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Analytical precision was within acceptance criteria. The maximum LCS/LCSD RPD was 4%.

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

Comments:

N/A; analytical accuracy and precision were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

A field-duplicate pair was not submitted with this work order. However, field-duplicate samples are submitted with the appropriate frequency for the project as a whole.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

Sample 168530 was collected using a peristaltic pump which utilizes disposable sterilized tubing. Since this sample was not collected with reusable equipment, a practical potential for equipment based cross-contamination does not exist.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-32289-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

10/18/2017 12:42:27 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Detection Summary	5
Client Sample Results	9
Isotope Dilution Summary	37
QC Sample Results	38
QC Association Summary	41
Lab Chronicle	44
Certification Summary	49
Method Summary	50
Sample Summary	51
Chain of Custody	52
Receipt Checklists	55



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32298-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Job ID: 320-32289-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-32289-1

Receipt

The samples were received on 10/11/2017 10:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6° C.

Receipt Exceptions

The following sample was submitted for analysis; however, it was not listed on the Chain-of-Custody (COC): 669077 (320-32289-28) The method was added after consulting with the client.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-188948 and method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples; MW-1701-35 (320-32289-2), MW-1701-45 (320-32289-3), MW-507 (320-32289-4), 168459 (320-32289-5), 87301 (320-32289-6), 168980 (320-32289-7), 167878 (320-32289-8), 87335 (320-32289-9), 515515 (320-32289-10), 87319 (320-32289-11), 129089 (320-32289-12), 167983 (320-32289-13), 87416 (320-32289-15), 87408 (320-32289-16) and 92924 (320-32289-17) contain yellowish-brown sediment.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-188955, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples 167860 (320-32289-21), 167960 (320-32289-22), 169048 (320-32289-23), 168173 (320-32289-24), 168273 (320-32289-25) and 64751 (320-32289-27) contain yellowish-brown sediment.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-189342, method code PFAS_DI_Prep.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Client Sample ID: MW-1701-13

Lab Sample ID: 320-32289-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	100		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	57		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: MW-1701-35

Lab Sample ID: 320-32289-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	500		100	37	ng/L	50			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11000		100	64	ng/L	50			WS-LC-0025 At1	Total/NA

Client Sample ID: MW-1701-45

Lab Sample ID: 320-32289-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	450		100	37	ng/L	50			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	11000		100	64	ng/L	50			WS-LC-0025 At1	Total/NA

Client Sample ID: MW-507

Lab Sample ID: 320-32289-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	28		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	270		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168459

Lab Sample ID: 320-32289-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	26		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	260		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87301

Lab Sample ID: 320-32289-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.1		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168980

Lab Sample ID: 320-32289-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Client Sample ID: 167878

Lab Sample ID: 320-32289-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87335

Lab Sample ID: 320-32289-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515515

Lab Sample ID: 320-32289-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87319

Lab Sample ID: 320-32289-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	23		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 129089

Lab Sample ID: 320-32289-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	21		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	20		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 167983

Lab Sample ID: 320-32289-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	24		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	28		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 167801

Lab Sample ID: 320-32289-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	12		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Client Sample ID: 87416

Lab Sample ID: 320-32289-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87408

Lab Sample ID: 320-32289-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	34		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 92924

Lab Sample ID: 320-32289-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.4		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	28		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168386

Lab Sample ID: 320-32289-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.1		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	39		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168378

Lab Sample ID: 320-32289-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.4		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	30		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 521779

Lab Sample ID: 320-32289-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	10		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 167860

Lab Sample ID: 320-32289-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Client Sample ID: 167960

Lab Sample ID: 320-32289-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.0		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 169048

Lab Sample ID: 320-32289-23

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168173

Lab Sample ID: 320-32289-24

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	21		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168273

Lab Sample ID: 320-32289-25

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	20		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 569356

Lab Sample ID: 320-32289-26

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.0		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 64751

Lab Sample ID: 320-32289-27

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	23		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 669077

Lab Sample ID: 320-32289-28

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	32		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 6 M-1r 01-13

Date Collected: 10/31/17 10:30

Date Received: 10/31/17 10:25

Lab Sample ID: 320-32298-1

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	100		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 03:26	1
AexfluooctanesulRonic acid yA(F SO	5r		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 03:26	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	169		62 512-			1- 011018 1/ 76-	1- 014018 - 376/	1
13C4 PFO:	112		62 512-			1- 011018 1/ 76-	1- 014018 - 376/	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 6 M-1r 01-35

Date Collected: 10/31/17 10:59

Date Received: 10/31/17 10:25

Lab Sample ID: 320-32298-2

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	500		100	37 ng/L		10/11/17 16:20	10/19/17 04:80	50
AexRuoxooctanesulRonic acid yA(F SO	11000		100	68 ng/L		10/11/17 16:20	10/19/17 04:80	50
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	118		62 512-			1- 011018 1/ 76-	1- 019018 - S74-	2-
13C4 PFO:	111		62 512-			1- 011018 1/ 76-	1- 019018 - S74-	2-

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 6 M-1r 01-U5

Date Collected: 10/30/17 10:09

Date Received: 10/31/17 10:25

Lab Sample ID: 320-32298-3

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	U50		100	37 ng/L		10/11/17 16:20	10/19/17 04:59	50
AexRuoxooctanesulRonic acid yA(F SO	11000		100	68 ng/L		10/11/17 16:20	10/19/17 04:59	50
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	169		62 512-			1- 011018 1/ 76-	1- 019018 - S29	2-
13C4 PFO:	116		62 512-			1- 011018 1/ 76-	1- 019018 - S29	2-

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 6 M-50r

Date Collected: 10/31/17 12:20

Date Received: 10/31/17 10:25

Lab Sample ID: 320-32298-U

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpared	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	29		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 08:21	1
AexfluooctanesulRnic acid yA(F SO	2r 0		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 08:21	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	141		62 512-			1- 011018 1/ 76-	1- 014018 - 4761	1
13C4 PFO:	162		62 512-			1- 011018 1/ 76-	1- 014018 - 4761	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q9U58

Date Collected: 10/03/17 10:20

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-5

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpared	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	2Q		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 08:34	1
Aexfluooctanesulonic acid yA(F SO	2Q		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 08:34	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	162		62 512-			1-011018 1/76-	1-014018 - 473S	1
13C4 PFO:	116		62 512-			1-011018 1/76-	1-014018 - 473S	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 9r301

Date Collected: 10/31/17 15:38

Date Received: 10/31/17 10:25

Lab Sample ID: 320-32298-Q

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	U4		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 08:59	1
AexfluooctanesulRnic acid yA(F SO	25		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 08:59	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	169		62 512-			1- 011018 1/ 76-	1- 014018 - 4729	1
13C4 PFO:	116		62 512-			1- 011018 1/ 76-	1- 014018 - 4729	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q890

Date Collected: 10/03/17 1Q28

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-r

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	24		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 05:16	1
AexRuoxooctanesulRonic acid yA(F SO	1U		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 05:16	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	168		62 512-			1- 011018 1/ 76-	1- 014018 - 271/	1
13C4 PFO:	116		62 512-			1- 011018 1/ 76-	1- 014018 - 271/	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q9r9

Date Collected: 10/17/17 08:10

Date Received: 10/17/17 10:25

Lab Sample ID: 320-32298-9

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	24		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 05:53	1
AexfluooctanesulRonic acid yA(F SO	1Q		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 05:53	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	138		62 512-			1- 011018 1/ 76-	1- 014018 - 2723	1
13C4 PFO:	1- /		62 512-			1- 011018 1/ 76-	1- 014018 - 2723	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 9r335

Date Collected: 10/17/17 10:30

Date Received: 10/17/17 10:25

Lab Sample ID: 320-32298-8

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 06:11	1
AexfluooctanesulRonic acid yA(F SO	12		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 06:11	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	16S		62 512-			1- 011018 1/ 76-	1- 014018 - / 711	1
13C4 PFO:	113		62 512-			1- 011018 1/ 76-	1- 014018 - / 711	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 515515

Date Collected: 10/10/17 11:30

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-10

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	24		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 06:30	1
AexfluooctanesulRonic acid yA(F SO	15		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 06:30	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	13-		62 512-			1- 011018 1/ 76-	1- 014018 - / 73-	1
13C4 PFO:	113		62 512-			1- 011018 1/ 76-	1- 014018 - / 73-	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 9r318

Date Collected: 10/17/17 12:30

Date Received: 10/17/17 10:25

Lab Sample ID: 320-32298-11

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlfkl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	U4		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 06:89	1
AexfluooctanesulRonic acid yA(F SO	23		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 06:89	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	13-		62 512-			1- 011018 1/ 76-	1- 014018 - / 79	1
13C4 PFO:	11S		62 512-			1- 011018 1/ 76-	1- 014018 - / 79	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 128098

Date Collected: 10/17/17 10:03

Date Received: 10/17/17 10:25

Lab Sample ID: 320-32298-12

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	21		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 07:06	1
AexfluooctanesulRonic acid yA(F SO	20		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 07:06	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	131		62 512-			1- 011018 1/ 76-	1- 014018 - 87 /	1
13C4 PFO:	113		62 512-			1- 011018 1/ 76-	1- 014018 - 87 /	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q893

Date Collected: 10/11/17 10:58

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-13

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	2U		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 07:25	1
AexfluooctanesulRonic acid yA(F SO	29		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 07:25	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	136		62 512-			1- 011018 1/ 76-	1- 014018 - 8762	1
13C4 PFO:	118		62 512-			1- 011018 1/ 76-	1- 014018 - 8762	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q901

Date Collected: 10/17/17 15:35

Date Received: 10/17/17 10:25

Lab Sample ID: 320-32298-1U

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpared	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 07:83	1
Aexfluooctanesulonic acid yA(F SO	12		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 07:83	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	16S		62 512-			1- 011018 1/ 76-	1- 014018 - 8743	1
13C4 PFO:	114		62 512-			1- 011018 1/ 76-	1- 014018 - 8743	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 9r U1Q

Date Collected: 10/05/17 11:25

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-15

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpared	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	U6		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 09:01	1
Aexfluooctanesulonic acid yA(F SO	21		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 09:01	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	131		62 512-			1-011018 1/76-	1-014018 - 97 1	1
13C4 PFO:	11/		62 512-			1-011018 1/76-	1-014018 - 97 1	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 9r U09

Date Collected: 10/05/17 10:00

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-1Q

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpared	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	54		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 09:20	1
Aexfluooctanesulonic acid yA(F SO	3U		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 09:20	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	16S		62 512-			1-011018 1/76-	1-014018 - 976-	1
13C4 PFO:	114		62 512-			1-011018 1/76-	1-014018 - 976-	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 8282U

Date Collected: 10/05/17 10:10

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-1r

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	54J		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 09:39	1
AexRuoxooctanesulRonic acid yA(F SO	29		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 09:39	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	13-		62 512-			1- 011018 1/ 76-	1- 014018 - 9739	1
13C4 PFO:	111		62 512-			1- 011018 1/ 76-	1- 014018 - 9739	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q939Q

Date Collected: 10/05/17 10:50

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-19

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	54		2.0	0.75 ng/L		10/11/17 16:20	10/18/17 04:15	1
AexfluooctanesulRnic acid yA(F SO	38		2.0	1.3 ng/L		10/11/17 16:20	10/18/17 04:15	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	13-		62 512-			1- 011018 1/ 76-	1- 014018 - S712	1
13C4 PFO:	112		62 512-			1- 011018 1/ 76-	1- 014018 - S712	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q93r9

Date Collected: 10/10/17 11:22

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-18

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	54J		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 14:29	1
AexfluooctanesulRnic acid yA(F SO	30		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 14:29	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	163		62 512-			1- 011018 1/ 734	1- 013018 1S769	1
13C4 PFO:	112		62 512-			1- 011018 1/ 734	1- 013018 1S769	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 521r r 8

Date Collected: 10/07/17 12:2r

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-20

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 14:87	1
AexRuoxooctanesulRonic acid yA(F SO	10		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 14:87	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	146		62 512-			1- 011018 1/ 734	1- 013018 1S#8	1
13C4 PFO:	13-		62 512-			1- 011018 1/ 734	1- 013018 1S#8	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q9Q

Date Collected: 10/11/17 13:51

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-21

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 20:05	1
AexRuoxooctanesulRonic acid yA(F SO	15		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 20:05	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	169		62 512-			1-011018 1/734	1-013018 6-72	1
13C4 PFO:	114		62 512-			1-011018 1/734	1-013018 6-72	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q8Q

Date Collected: 10/07/17 13:01

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-22

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 20:23	1
AexfluooctanesulRnic acid yA(F SO	15		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 20:23	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	168		62 512-			1-011018 1/734	1-013018 6-763	1
13C4 PFO:	112		62 512-			1-011018 1/734	1-013018 6-763	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q80U9

Date Collected: 10/10/17 10:11

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-23

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	24		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 20:82	1
AexfluooctanesulRnic acid yA(F SO	22		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 20:82	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	139		62 512-			1- 011018 1/ 734	1- 013018 6- 746	1
13C4 PFO:	11S		62 512-			1- 011018 1/ 734	1- 013018 6- 746	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q91r3

Date Collected: 10/10/17 10:30

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-2U

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	24Q		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 21:00	1
AexfluooctanesulRnic acid yA(F SO	21		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 21:00	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	146		62 512-			1- 011018 1/ 734	1- 013018 617 -	1
13C4 PFO:	166		62 512-			1- 011018 1/ 734	1- 013018 617 -	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 1Q92r 3

Date Collected: 10/10/17 10:25

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-25

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - AexRuoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
AexRuoxooctanoic acid yA(F h O	24Q		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 21:19	1
AexRuoxooctanesulRonic acid yA(F SO	20		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 21:19	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	13/		62 512-			1- 011018 1/ 734	1- 013018 61719	1
13C4 PFO:	11S		62 512-			1- 011018 1/ 734	1- 013018 61719	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: 5Q835Q

Date Collected: 10/10/17 11:20

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-2Q

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 21:55	1
AexfluooctanesulRnic acid yA(F SO	1Q		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 21:55	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	136		62 512-			1- 011018 1/ 734	1- 013018 61722	1
13C4 PFO:	16-		62 512-			1- 011018 1/ 734	1- 013018 61722	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: Qr 51

Date Collected: 10/10/17 08:20

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-2r

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Axepaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	23		2.0	0.75 ng/L		10/11/17 16:38	10/13/17 22:13	1
AexfluooctanesulRonic acid yA(F SO	19		2.0	1.3 ng/L		10/11/17 16:38	10/13/17 22:13	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	164		62 512-			1- 011018 1/ 734	1- 013018 66713	1
13C4 PFO:	113		62 512-			1- 011018 1/ 734	1- 013018 66713	1

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Client Sample ID: QQ80r

Date Collected: 10/05/17 15:20

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32298-29

6 atxW Matex

6 etvod: MS-LC-0025 ht1 - Aexfluoxinated hlf kl Substances

h nalkte	Result	z ualiRex	RL	6 DL . nit	D	Aexpaxed	h nalk) ed	Dil (ac
Aexfluooctanoic acid yA(F h O	34		2.0	0.75 ng/L		10/13/17 18:55	10/17/17 00:25	1
AexfluooctanesulRnic acid yA(F SO	32		2.0	1.3 ng/L		10/13/17 18:55	10/17/17 00:25	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
13C4 PFOA	113		62 512-			1- 013018 14722	1- 018018 -- 762	1
13C4 PFO:	1- /		62 512-			1- 013018 14722	1- 018018 -- 762	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32298-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)	
		3C4 PFO/ (25-150)	3C4 PFO/ (25-150)
320-32298-1	4 W-1501-13	129	117
320-32298-2	4 W-1501-37	115	111
320-32298-3	4 W-1501-67	129	112
320-32298-6	4 W-705	161	127
320-32298-7	1M0678	127	112
320-32298-M	95301	129	112
320-32298-5	1M0890	125	112
320-32298-9	1M5959	135	10M
320-32298-8	95337	128	113
320-32298-10	717717	130	113
320-32298-11	95318	130	118
320-32298-12	128098	131	113
320-32298-13	1M5893	132	115
320-32298-16	1M5901	128	116
320-32298-17	9561M	131	11M
320-32298-1M	95609	128	116
320-32298-15	82826	130	111
320-32298-19	1M039M	130	117
320-32298-18	1M0359	123	117
320-32298-20	721558	162	130
320-32298-21	1M59M0	129	116
320-32298-22	1M58M0	125	117
320-32298-23	1M0069	139	118
320-32298-26	1M0153	162	122
320-32298-27	1M0253	13M	118
320-32298-2M	7M037M	132	120
320-32298-25	M6571	126	113
320-32298-29	M0055	113	10M
LCS 320-199869/2-A	Lab Control Sample	138	12M
LCS 320-199877/2-A	Lab Control Sample	125	119
LCS 320-198362/2-A	Lab Control Sample	113	110
LCSD 320-199869/3-A	Lab Control Sample Dup	123	113
LCSD 320-199877/3-A	Lab Control Sample Dup	12M	115
LCSD 320-198362/3-A	Lab Control Sample Dup	123	119
4 B 320-199869/1-A	4 ethod Blank	131	118
4 B 320-199877/1-A	4 ethod Blank	126	118
4 B 320-198362/1-A	4 ethod Blank	108	10M

Surrogate Legend

13C6 PFOA = 13C6 PFOA

13C6 PFOS = 13C6 PFOS

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-188948/1-A

Matrix: Water

Analysis Batch: 189462

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 188948

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/11/17 16:20	10/14/17 02:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/11/17 16:20	10/14/17 02:31	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	131		69 2195				15-11-10 1/ 85	15-14-10 5681	1
¹³ C4 PFO:	117		69 2195				15-11-10 1/ 85	15-14-10 5681	1

Lab Sample ID: LCS 320-188948/2-A

Matrix: Water

Analysis Batch: 189462

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 188948

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	18.0		ng/L		90	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	14.5		ng/L		78	69 - 144
Isotope Dilution	%Recovery	LCS Qualifier	Limits				
¹³ C4 PFOA	137		69 2195				
¹³ C4 PFO:	16/		69 2195				

Lab Sample ID: LCSD 320-188948/3-A

Matrix: Water

Analysis Batch: 189462

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 188948

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	17.6		ng/L		88	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)	18.6	14.8		ng/L		80	69 - 144	2	30
Isotope Dilution	%Recovery	LCSD Qualifier	Limits						
¹³ C4 PFOA	163		69 2195						
¹³ C4 PFO:	113		69 2195						

Lab Sample ID: MB 320-188955/1-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 188955

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/11/17 16:34	10/13/17 18:33	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/11/17 16:34	10/13/17 18:33	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	164		69 2195				15-11-10 1/ 84	15-13-10 1S83	1
¹³ C4 PFO:	117		69 2195				15-11-10 1/ 84	15-13-10 1S83	1

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-188955/2-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 188955

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	16.9		ng/L		85	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	14.2		ng/L		76	69 - 144
Isotope Dilution	%Recovery	LCS Qualifier	Limits				
13C4 PFOA	160		69 2195				
13C4 PFO:	11S		69 2195				

Lab Sample ID: LCSD 320-188955/3-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 188955

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	18.0		ng/L		90	70 - 140	6	30
Perfluorooctanesulfonic acid (PFOS)	18.6	14.8		ng/L		80	69 - 144	4	30
Isotope Dilution	%Recovery	LCSD Qualifier	Limits						
13C4 PFOA	16/		69 2195						
13C4 PFO:	110		69 2195						

Lab Sample ID: MB 320-189342/1-A

Matrix: Water

Analysis Batch: 189683

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 189342

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/13/17 14:55	10/16/17 23:30	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/13/17 14:55	10/16/17 23:30	1
Isotope Dilution	%Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac			
13C4 PFOA	157		69 2195	15-13-10 14:09	15-1/-10 63:85	1			
13C4 PFO:	15/		69 2195	15-13-10 14:09	15-1/-10 63:85	1			

Lab Sample ID: LCS 320-189342/2-A

Matrix: Water

Analysis Batch: 189683

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 189342

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	17.0		ng/L		85	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	14.1		ng/L		76	69 - 144
Isotope Dilution	%Recovery	LCS Qualifier	Limits				
13C4 PFOA	113		69 2195				
13C4 PFO:	115		69 2195				

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-189342/3-A

Matrix: Water

Analysis Batch: 189683

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 189342

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)	20.0	17.7		ng/L		88	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)	18.6	14.7		ng/L		79	69 - 144	4	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
¹³ C4 PFOA	163		69 2195
¹³ C4 PFO:	11S		69 2195

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

LCMS

Prep Batch: 188948

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-1	8 W-1N01-13	Total/5 A	Water	PFAS Prep	
320-32294-2	8 W-1N01-37	Total/5 A	Water	PFAS Prep	
320-32294-3	8 W-1N01-67	Total/5 A	Water	PFAS Prep	
320-32294-6	8 W-70N	Total/5 A	Water	PFAS Prep	
320-32294-7	1M0674	Total/5 A	Water	PFAS Prep	
320-32294-M	9N301	Total/5 A	Water	PFAS Prep	
320-32294-N	1M0490	Total/5 A	Water	PFAS Prep	
320-32294-9	1M09N9	Total/5 A	Water	PFAS Prep	
320-32294-4	9N337	Total/5 A	Water	PFAS Prep	
320-32294-10	717717	Total/5 A	Water	PFAS Prep	
320-32294-11	9N314	Total/5 A	Water	PFAS Prep	
320-32294-12	124094	Total/5 A	Water	PFAS Prep	
320-32294-13	1M0493	Total/5 A	Water	PFAS Prep	
320-32294-16	1M0901	Total/5 A	Water	PFAS Prep	
320-32294-17	9N61M	Total/5 A	Water	PFAS Prep	
320-32294-1M	9N609	Total/5 A	Water	PFAS Prep	
320-32294-1N	42426	Total/5 A	Water	PFAS Prep	
320-32294-19	1M039M	Total/5 A	Water	PFAS Prep	
8 B 320-199469/1-A	8 ethod Blank	Total/5 A	Water	PFAS Prep	
LCS 320-199469/2-A	Lab Control Sample	Total/5 A	Water	PFAS Prep	
LCSD 320-199469/3-A	Lab Control Sample Dup	Total/5 A	Water	PFAS Prep	

Prep Batch: 188955

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-14	1M03N9	Total/5 A	Water	PFAS Prep	
320-32294-20	721NN4	Total/5 A	Water	PFAS Prep	
320-32294-21	1M09M0	Total/5 A	Water	PFAS Prep	
320-32294-22	1M04M0	Total/5 A	Water	PFAS Prep	
320-32294-23	1M0069	Total/5 A	Water	PFAS Prep	
320-32294-26	1M01N3	Total/5 A	Water	PFAS Prep	
320-32294-27	1M02N3	Total/5 A	Water	PFAS Prep	
320-32294-2M	7M037M	Total/5 A	Water	PFAS Prep	
320-32294-2N	M6N71	Total/5 A	Water	PFAS Prep	
8 B 320-199477/1-A	8 ethod Blank	Total/5 A	Water	PFAS Prep	
LCS 320-199477/2-A	Lab Control Sample	Total/5 A	Water	PFAS Prep	
LCSD 320-199477/3-A	Lab Control Sample Dup	Total/5 A	Water	PFAS Prep	

Prep Batch: 189342

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-29	M00NN	Total/5 A	Water	PFAS Prep	
8 B 320-194362/1-A	8 ethod Blank	Total/5 A	Water	PFAS Prep	
LCS 320-194362/2-A	Lab Control Sample	Total/5 A	Water	PFAS Prep	
LCSD 320-194362/3-A	Lab Control Sample Dup	Total/5 A	Water	PFAS Prep	

Analysis Batch: 189460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-14	1M03N9	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-20	721NN4	Total/5 A	Water	WS-LC-0027 At1	199477

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

LCMS (Continued)

Analysis Batch: 189460 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-21	1M9M0	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-22	1M4M0	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-23	1M4069	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-26	1M91N3	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-27	1M92N3	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-2M	7M437M	Total/5 A	Water	WS-LC-0027 At1	199477
320-32294-2N	M6N71	Total/5 A	Water	WS-LC-0027 At1	199477
8 B 320-199477/1-A	8 ethod Blank	Total/5 A	Water	WS-LC-0027 At1	199477
LCS 320-199477/2-A	Lab Control Sample	Total/5 A	Water	WS-LC-0027 At1	199477
LCSD 320-199477/3-A	Lab Control Sample Dup	Total/5 A	Water	WS-LC-0027 At1	199477

Analysis Batch: 189462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-1	8 W-1ND1-13	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-6	8 W-70N	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-7	1M9674	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-M	9N301	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-N	1M9490	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-9	1M9N9	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-4	9N337	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-10	717717	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-11	9N314	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-12	124094	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-13	1M493	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-16	1M901	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-17	9N61M	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-1M	9N609	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-1N	42426	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-19	1M939M	Total/5 A	Water	WS-LC-0027 At1	199469
8 B 320-199469/1-A	8 ethod Blank	Total/5 A	Water	WS-LC-0027 At1	199469

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

LCMS (Continued)

Analysis Batch: 189462 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 320-199469/2-A	Lab Control Sample	Total/5 A	Water	WS-LC-0027 At1	199469
LCSD 320-199469/3-A	Lab Control Sample Dup	Total/5 A	Water	WS-LC-0027 At1	199469

Analysis Batch: 189683

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-29	MM#0NN	Total/5 A	Water	WS-LC-0027 At1	194362
8 B 320-194362/1-A	8 ethod Blank	Total/5 A	Water	WS-LC-0027 At1	194362
LCS 320-194362/2-A	Lab Control Sample	Total/5 A	Water	WS-LC-0027 At1	194362
LCSD 320-194362/3-A	Lab Control Sample Dup	Total/5 A	Water	WS-LC-0027 At1	194362

Analysis Batch: 189921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32294-2	8 W-1N01-37	Total/5 A	Water	WS-LC-0027 At1	199469
320-32294-3	8 W-1N01-67	Total/5 A	Water	WS-LC-0027 At1	199469

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roectfSite: CitF okgairbanps gire TraininOArea

TestAmerica Job ID: 320-3221P-j

Client Sample ID: 1 2 908309-

Date Collected: 03/3- 7/8 03:- 3

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk90

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 03:2L	CEW	TA9 SAC

Client Sample ID: 1 2 908309- v

Date Collected: 03/3- 7/8 03:vM

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk94

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		50			j 1PP2j	j 0fj 1fj 4 0P.: 0	CEW	TA9 SAC

Client Sample ID: 1 2 908309Nv

Date Collected: 03/3- 7/8 03:NM

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk9-

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		50			j 1PP2j	j 0fj 1fj 4 0P:51	CEW	TA9 SAC

Client Sample ID: 1 2 9v38

Date Collected: 03/3- 7/8 04:43

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk9N

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0.:2j	CEW	TA9 SAC

Client Sample ID: 06MvX

Date Collected: 03/3- 7/8 0N:46

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk9v

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0.:3P	CEW	TA9 SAC

Client Sample ID: MB- 30

Date Collected: 03/3- 7/8 0v:- x

Date / eceiRed: 03/7007/8 03:4v

Lab Sample ID: - 439- 44Mk96

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 6.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0.:51	CEW	TA9 SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roeyctfSite: CitFokgairbanps gire TraininOArea

TestAmerica Job ID: 320-3221P-j

Client Sample ID: 06MkMB

Date Collected: 03/3-708 06:4x

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk98

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 05:j L	CEW	TA9 SAC

Client Sample ID: 068MBM

Date Collected: 03/3N08 3x:0N

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk9V

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 05:53	CEW	TA9 SAC

Client Sample ID: MB- - v

Date Collected: 03/3N08 03:- N

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk9x

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0L:j j	CEW	TA9 SAC

Client Sample ID: v0vv0v

Date Collected: 03/3N08 00:- 6

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk903

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0L:30	CEW	TA9 SAC

Client Sample ID: MB- 0x

Date Collected: 03/3N08 04:- 3

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk900

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0L:1	CEW	TA9 SAC

Client Sample ID: 04x3Mk

Date Collected: 03/3N08 0N:3-

Date / eceiRed: 03/700708 03:4v

Lab Sample ID: -439-44Mk904

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 04:0L	CEW	TA9 SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roectfSite: CitFokgairbanps gire TraininOArea

TestAmerica Job ID: 320-3221P-j

Client Sample ID: 068xM

Date Collected: 03/30/08 0N:vx

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx90-

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 04:25	CEW	TA9 SAC

Client Sample ID: 068MB0

Date Collected: 03/30/08 0v:- v

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx90N

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 04:23	CEW	TA9 SAC

Client Sample ID: MBN06

Date Collected: 03/30/08 00:4v

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx90v

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 01:0j	CEW	TA9 SAC

Client Sample ID: MBN3M

Date Collected: 03/30/08 0N:38

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx906

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 01:20	CEW	TA9 SAC

Client Sample ID: x4x4N

Date Collected: 03/30/08 06:03

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx908

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 01:31	CEW	TA9 SAC

Client Sample ID: 06M M6

Date Collected: 03/30/08 03:v3

Date / eceiRed: 03/30/08 03:4v

Lab Sample ID: - 439-44Mx90M

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTA	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P. 1	j 0fj j fj 4 j L:20	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L2	j 0fj . fj 4 0P:j 5	CEW	TA9 SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roeyctfSite: CitFokgairbanps gire TraininOArea

TestAmerica Job ID: 320-3221P-j

Client Sample ID: 06M 8M

Date Collected: 03/36/08 00:44

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk90x

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 j P:21	CEW	TA9 SAC

Client Sample ID: v4088x

Date Collected: 03/36/08 04:48

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk943

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 j P: 4	CEW	TA9 SAC

Client Sample ID: 068M63

Date Collected: 03/36/08 0- :v0

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk940

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 20:05	CEW	TA9 SAC

Client Sample ID: 068x63

Date Collected: 03/36/08 0- :N0

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk944

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 20:23	CEW	TA9 SAC

Client Sample ID: 06x3NM

Date Collected: 03/36/08 0N:N0

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk94-

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 20: 2	CEW	TA9 SAC

Client Sample ID: 06M08-

Date Collected: 03/36/08 06:- 3

Date / eceiRed: 03/00/08 03:4v

Lab Sample ID: - 439-44Mk94N

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 2j :00	CEW	TA9 SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
/ roectfSite: CitF okgairbanps gire TraininOArea

TestAmerica Job ID: 320-3221P-j

Client Sample ID: 06M48-

Date Collected: 03736708 06:43

Date / eceiRed: 03700708 03:4v

Lab Sample ID: - 439-44Mk94v

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 2j :j 1	CEW	TA9 SAC

Client Sample ID: v6x- v6

Date Collected: 03736708 08:43

Date / eceiRed: 03700708 03:4v

Lab Sample ID: - 439-44Mk946

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 2j :55	CEW	TA9 SAC

Client Sample ID: 6N8v0

Date Collected: 03703708 3x:4N

Date / eceiRed: 03700708 03:4v

Lab Sample ID: - 439-44Mk948

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 11P55	j 0fj j fj 4 j L:3.	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1P. L0	j 0fj 3fj 4 22:j 3	CEW	TA9 SAC

Client Sample ID: 66x388

Date Collected: 0373v708 0v:4N

Date / eceiRed: 03700708 03:4v

Lab Sample ID: - 439-44Mk94M

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	/ sn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Totalf7 A	/ reN	/ gAS / reN			j 00 m9	j 0.L m9	j 1P3. 2	j 0fj 3fj 4 j . :55	T8 7	TA9 SAC
Totalf7 A	AnalFsis	WS-9C-0025 Atj		j			j 1PL13	j 0fj 4fj 4 00:25	CEW	TA9 SAC

LaboratorT / eferenceA:

TA9 SAC RTestAmerica Sacramento, 110 Bi=ersive / arpd aF, West Sacramento, CA P5L05, Tw9 (Pj L)343-5L00

TestAmerica Sacramento

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32294-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-19-18
AriZona	State Program	4	Az0809	09-11-19
Arkansas DZE	State Program	Q	99-0Q41	0Q18-19
California	State Program	4	2948	01-31-19
Colorado	State Program	9	CA00066	09-31-19
Connecticut	State Program	1	PH-0Q41	0Q30-14
Florida	NZLAP	6	Z98580	0Q30-19
Georgia	State Program	6	N/A	01-24-19
Hawaii	State Program	4	N/A	01-24-19
Illinois	NZLAP	5	2000QD	03-18-19
Kansas	NZLAP	8	Z-10385	10-31-18
L-A-B	DoD ZLAP		L26Q9	01-20-19
Louisiana	NZLAP	Q	30Q12	0Q30-19
Maine	State Program	1	CA0006	06-19-19
Michigan	State Program	5	4468	01-31-19
Nevada	State Program	4	CA00066	08-31-19
New Hampshire	NZLAP	1	2448	06-19-19
New Jersey	NZLAP	2	CA005	0Q30-19
New York	NZLAP	2	11QQQ	06-01-19
Oregon	NZLAP	10	6060	01-29-19
Pennsylvania	NZLAP	3	Q9-01282	03-31-19
Texas	NZLAP	Q	T106806344	05-31-19
US Fish & Wildlife	Federal		LZ169399-0	08-31-19
USDA	Federal		P330-11-0063Q	12-30-18
USZPA UCMR	Federal	1	CA00066	11-0Q19
Utah	NZLAP	9	CA00066	02-29-19
Virginia	NZLAP	3	6QD289	03-16-19
Washington	State Program	10	C591	05-05-19
West Virginia (DW)	State Program	3	4430C	12-31-18
Wyoming	State Program	9	9TMS-L	01-29-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32298-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

TAL SAC = TestAmerica Sacramento, 990 Riverside Parkway, West Sacramento, CA 85605, TEL (816)373-5600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32289-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-32289-1	MW-1701-13	Water	10/03/17 10:30	10/11/17 10:25
320-32289-2	MW-1701-35	Water	10/03/17 10:58	10/11/17 10:25
320-32289-3	MW-1701-45	Water	10/03/17 10:48	10/11/17 10:25
320-32289-4	MW-507	Water	10/03/17 12:20	10/11/17 10:25
320-32289-5	168459	Water	10/03/17 14:26	10/11/17 10:25
320-32289-6	87301	Water	10/03/17 15:39	10/11/17 10:25
320-32289-7	168980	Water	10/03/17 16:29	10/11/17 10:25
320-32289-8	167878	Water	10/04/17 09:14	10/11/17 10:25
320-32289-9	87335	Water	10/04/17 10:34	10/11/17 10:25
320-32289-10	515515	Water	10/04/17 11:36	10/11/17 10:25
320-32289-11	87319	Water	10/04/17 12:30	10/11/17 10:25
320-32289-12	129089	Water	10/04/17 14:03	10/11/17 10:25
320-32289-13	167983	Water	10/04/17 14:59	10/11/17 10:25
320-32289-14	167801	Water	10/04/17 15:35	10/11/17 10:25
320-32289-15	87416	Water	10/05/17 11:25	10/11/17 10:25
320-32289-16	87408	Water	10/05/17 14:07	10/11/17 10:25
320-32289-17	92924	Water	10/05/17 16:10	10/11/17 10:25
320-32289-18	168386	Water	10/05/17 10:50	10/11/17 10:25
320-32289-19	168378	Water	10/06/17 11:22	10/11/17 10:25
320-32289-20	521779	Water	10/06/17 12:27	10/11/17 10:25
320-32289-21	167860	Water	10/06/17 13:51	10/11/17 10:25
320-32289-22	167960	Water	10/06/17 13:41	10/11/17 10:25
320-32289-23	169048	Water	10/06/17 14:41	10/11/17 10:25
320-32289-24	168173	Water	10/06/17 16:30	10/11/17 10:25
320-32289-25	168273	Water	10/06/17 16:20	10/11/17 10:25
320-32289-26	569356	Water	10/06/17 17:20	10/11/17 10:25
320-32289-27	64751	Water	10/10/17 09:24	10/11/17 10:25
320-32289-28	669077	Water	10/05/17 15:24	10/11/17 10:25

TestAmerica Sacramento

CHAIN-OF-CUSTODY RECORD

Page 1 of 3

Laboratory Test America
Attn: David Alltucker

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOA / PFOA (WS-LC-0025)	Total Number of Containers	Remarks/Matrix
MW-1701-13		10:30	10/3/17	X	X		2	Groundwater
MW-1701-35		10:58		X	X		2	
MW-1701-45		10:48		X	X		2	
MW-507		12:20		X	X		2	
168459		14:26		X	X		2	
87301		15:39		X	X		2	
168980		16:29	✓	X	X		2	
167878		09:14	10/4/17	X	X		2	
87335		10:34		X	X		2	
515515		11:36	✓	X	X		2	✓



Project Information Project Number: <u>31-1-11735</u> Project Name: <u>CoF RFTC</u> Contact: <u>MDN</u> Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Sampler: <u>APW</u>		Sample Receipt Total Number of Containers: <u>54</u> COC Seals/Intact? Y/N/NA Received Good Cond./Cold Delivery Method: <u>Goldstream</u> (attach shipping bill, if any)		Relinquished By: 1. Signature: <u>Adam Wyborny</u> Time: <u>13:00</u> Printed Name: <u>Adam Wyborny</u> Date: <u>10/10/17</u> Company: <u>Shannon & Wilson, Inc.</u>		Relinquished By: 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____		Relinquished By: 3. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____	
Instructions Requested Turnaround Time: <u>Standard</u> Special Instructions: <u>Bill to 31-1-11735-008</u>				Received By: 1. Signature: <u>David Her</u> Time: <u>10:25</u> Printed Name: <u>David Her</u> Date: <u>10/11/17</u> Company: <u>TA WS</u>		Received By: 2. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____		Received By: 3. Signature: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____	

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

No. 34712

CHAIN-OF-CUSTODY RECORD

Page 2 of 3

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOs / PFOA (WS-LC-0055)						Total Number of Containers	Remarks/Matrix
87319		12:30	10/4/17		X	X						2	Groundwater
129089		14:03	↓		X	X						2	
167983		14:59	↓		X	X						2	
167801		15:35	↓		X	X						2	
87416		11:25	10/5/17		X	X						2	
87408		14:07	↓		X	X						2	
92924		16:10	↓		X	X						2	
168386		10:50	10/6/17		X	X						2	
168378		11:22	↓		X	X						2	
521779		12:27	↓		X	X						2	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number:		Total Number of Containers		Signature: _____ Time: <u>13:00</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name:		COC Seals/Intact? Y/N/NA		Printed Name: <u>Adam Wyborny</u> Date: <u>10/10/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact:		Received Good Cond./Cold		Company: <u>Shannon & Wilson, Inc.</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Delivery Method:		Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>QCS</u>		(attach shipping bill, if any)		Signature: _____ Time: <u>10:25</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Printed Name: <u>David Alltucker</u> Date: <u>10/11/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time:				Company: <u>TA WS 5.6°C</u>		Company: _____		Company: _____	
Special Instructions:									

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

No. 34713

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 3 of 3

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFOs / PFDA (w/ LC-6025)						Total Number of Containers	Remarks/Matrix
167860		13:51	10/6/17		X	X						2	Ground water
167960		13:41			X	X						2	
169048		14:41			X	X						2	
168173		16:30			X	X						2	
168273		16:20			X	X						2	
569356		17:20	✓		X	X						2	
64751		09:24	10/10/17		X	X						2	✓

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number:		Total Number of Containers 54		Signature: <u>Adam Wyborny</u> Time: <u>13:00</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name:		COC Seals/Intact? Y/N/NA		Printed Name: <u>Adam Wyborny</u> Date: <u>10/10/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact:		Received Good Cond./Cold		Company: <u>Shannon & Wilson, Inc.</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Delivery Method:		Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>Page</u>		(attach shipping bill, if any)		Signature: <u>David Her</u> Time: <u>10:25</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Printed Name: <u>David Her</u> Date: <u>10/11/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time: <u>10/11/17</u>				Company: <u>TA WS 5.60</u>		Company: _____		Company: _____	
Special Instructions:									

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

No. 34714

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-32298-1

Login Number: 32289

List Source: TestAmerica Sacramento

List Number: 1

Creator: Hytrek, Cheryl

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	
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.	False	Received eHtra samples not listed on COC.
Samples are received within (olding Time including tests with immediate (Ts)	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 x1/4").	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:

Marcy Nadel

Title:

Geologist

Date:

October 24, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

October 18, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-32289-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☐ Yes ☒ No

Comments:

Sample 669077 is not listed on the COC. It was added on October 12, following receipt by the laboratory, per email communication.

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

See 2.a. above.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The laboratory notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.6° C.

Sample 669077 was submitted for analysis but was not listed on the COC. The analysis method was added after consulting with Shannon & Wilson.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-188948, 188955, or 189342.

The laboratory notes that most of the project samples included with this work order contained yellowish-brown sediment.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The laboratory did not specify an effect on data quality or usability.

5. Samples Results

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

☐ Yes ☒ No

Comments:

Sample 669077 was added to the COC on October 12 per email communication with the laboratory.

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA, where applicable for non-detected results.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MBs 320-185019/1-A, 188955/1-A, or 189342/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Analytical precision was within acceptance criteria.

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

Comments:

N/A; analytical accuracy and precision were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

- 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

Comments:

N/A; a trip blank is not required.

- iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

- iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

- v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

- ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

The field-duplicate pairs MW-1701-35 / MW-1701-45, 167860 / 167960, and 168173 / 168273 were submitted with this WO.

- iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

RPDs were within DQOs.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☒ No ☐ Not Applicable

Samples MW-1701-13, MW-1701-35 / MW-1701-45, and MW-507 were collected using a reusable submersible pump. Sample 167878 was collected using the property owner's reusable hose due to limited accessibility. An equipment blank was not submitted with this WO; however, equipment blank samples are collected with the appropriate frequency for the overall project.

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The result for sample 167878 is consistent with previous results for this location; therefore, the data quality and usability were not considered affected.

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

a. Defined and appropriate?

☐ Yes ☒ No

Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-32290-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

10/18/2017 12:46:48 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	10
Lab Chronicle	11
Certification Summary	12
Method Summary	13
Sample Summary	14
Chain of Custody	15
Receipt Checklists	16

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

Job ID: 320-32290-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-32290-1

Receipt

The sample was received on 10/11/2017 10:25 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.4° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-188955, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples 95508 (320-32290-1) contain yellowish-brown sediment.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

Client Sample ID: 95508

Lab Sample ID: 320-32290-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.5		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	7.8		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	0.83	J	2.0	0.65	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

Client Sample ID: 91108

Date Collected: 4074074/ 40:1v

Date Received: 4074474/ 40:21

Lab Sample ID: 320-32290-4

Matrix: Water

Method: WS-LC-0021 At4 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFOS)	3.21		2.0	0.92	ng/L		10/11/17 16:34	10/13/17 22:32	1
Perfluorohexanesulfonic acid (PF6 xS)	1.28		2.0	0.87	ng/L		10/11/17 16:34	10/13/17 22:32	1
Perfluoroheptanoic acid (PF6 pA)	2.21		2.0	0.80	ng/L		10/11/17 16:34	10/13/17 22:32	1
Perfluorooctanoic acid (PFBA)	0.74		2.0	0.75	ng/L		10/11/17 16:34	10/13/17 22:32	1
Perfluorooctanesulfonic acid (PFBS)	4.3		2.0	1.3	ng/L		10/11/17 16:34	10/13/17 22:32	1
Perfluorononanoic acid (PFNA)	0.63	J	2.0	0.65	ng/L		10/11/17 16:34	10/13/17 22:32	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA8	112		45 - 150				10/11/17 1/6 S	10/13/17 712 446 4	1
1: 9 S-PFOHx	1: S		45 - 150				10/11/17 1/6 S	10/13/17 712 446 4	1
1: 9 S-PFCx	1: p		45 - 150				10/11/17 1/6 S	10/13/17 712 446 4	1
1: 9 S-PFC8	141		45 - 150				10/11/17 1/6 S	10/13/17 712 446 4	1
1: 9.5 PFNx	1SS		45 - 150				10/11/17 1/6 S	10/13/17 712 446 4	1

Isotope Dilution Summary

100 t: nSal l ol h & iSol Wl c
 , roEctjnite: 1 it/ oyf airbal Fs f ire Trail il k Area

TestAmerica Job ID: 320-32290-4

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		34 2 PFOx (25-150)	3CH-PFOp (25-150)	8CHPF4 / (25-150)	8CHPF4 / (25-150)	8C5 PFN/ (25-150)
320-32290-4	95507	44g	438	439	424	488
L1 n 320-477955j2-A	Lab 1 ol troQh amp@	443	434	42g	447	426
L1 nD 320-477955j3-A	Lab 1 ol troQh amp@ Dup	443	432	426	44g	427
MB 320-477955j4-A	MetSod B@l F	445	434	428	449	426

Surrogate Legend

47O2 , f =Hh x 47O2 , f =Hh
 431 8-, f =pA x 431 8-, f =pA
 431 8 , f OA x 431 8 , f OA
 431 8 , f On x 431 8 , f On
 431 5 , f NA x 431 5 , f NA

TestAmerica nacramel to

QC Sample Results

1 Cell: nSal l ol h & iSol Wl c
 , rolectjnite: 1 it/ oyf airbal Fs f ire Trail il k Area

TestAmerica Job ID: 320-32290-4

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-188955/1-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 188955

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
, ery@orobgtal esg@ol ic aciu d f (nO	) D		2.0	0.92	I kjL		40j44j47 45:3N	40j43j47 48:33	4
, ery@oroSe6al esg@ol ic aciu d f B6nO	) D		2.0	0.87	I kjL		40j44j47 45:3N	40j43j47 48:33	4
, ery@oroSextal oic aciu d f BxAO	) D		2.0	0.80	I kjL		40j44j47 45:3N	40j43j47 48:33	4
, ery@oroOctal oic aciu d f p AO	) D		2.0	0.7H	I kjL		40j44j47 45:3N	40j43j47 48:33	4
, ery@oroOctal esg@ol ic aciu d f p nO	) D		2.0	4.3	I kjL		40j44j47 45:3N	40j43j47 48:33	4
, ery@orol ol al oic aciu d f) AO	) D		2.0	0.5H	I kjL		40j44j47 45:3N	40j43j47 48:33	4

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	112		42 512-	1- 01 101/ 1: 6'S	1- 01 701/ 13677	1
179 SPFOHx	171		42 512-	1- 01 101/ 1: 6'S	1- 01 701/ 13677	1
179 SPFCx	14S		42 512-	1- 01 101/ 1: 6'S	1- 01 701/ 13677	1
179 SPFC8	11p		42 512-	1- 01 101/ 1: 6'S	1- 01 701/ 13677	1
179 2 PFNx	14:		42 512-	1- 01 101/ 1: 6'S	1- 01 701/ 13677	1

Lab Sample ID: LCS 320-188955/2-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 188955

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
, ery@orobgtal esg@ol ic aciu d f (nO	47.7	4HH		I kjL		88	72 - 4H4
, ery@oroSe6al esg@ol ic aciu d f B6nO	48.2	4NN		I kjL		79	73 - 4H7
, ery@oroSextal oic aciu d f BxAO	20.0	4H9		I kjL		80	74 - 438
, ery@oroOctal oic aciu d f p AO	20.0	45.9		I kjL		8H	70 - 4N0
, ery@oroOctal esg@ol ic aciu d f p nO	48.5	4N2		I kjL		75	59 - 4NN
, ery@orol ol al oic aciu d f) AO	20.0	45.2		I kjL		84	73 - 4N7

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	117		42 512-
179 SPFOHx	171		42 512-
179 SPFCx	14/		42 512-
179 SPFC8	113		42 512-
179 2 PFNx	14:		42 512-

Lab Sample ID: LCSD 320-188955/3-A

Matrix: Water

Analysis Batch: 189460

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 188955

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limit	RPD	Limit
, ery@orobgtal esg@ol ic aciu d f (nO	47.7	45.0		I kjL		94	72 - 4H4	3	30
, ery@oroSe6al esg@ol ic aciu d f B6nO	48.2	4N5		I kjL		80	73 - 4H7	4	30
, ery@oroSextal oic aciu d f BxAO	20.0	45.H		I kjL		82	74 - 438	3	30
, ery@oroOctal oic aciu d f p AO	20.0	48.0		I kjL		90	70 - 4N0	5	30
, ery@oroOctal esg@ol ic aciu d f p nO	48.5	4N8		I kjL		80	59 - 4NN	N	30
, ery@orol ol al oic aciu d f) AO	20.0	45.7		I kjL		83	73 - 4N7	3	30

TestAmerica nacramel to

QC Sample Results

TestAmerica Job ID: 320-32290-4

100% of total sample is in the sample

, reagent: 100% of total sample is in the sample

LCSD		LCSD	Limits
Isotope Dilution	%Recovery	Qualifier	
13C4 PFOA8	117		42 512-
179 SPFOHx	174		42 512-
179 SPFCx	14:		42 512-
179 SPFC8	11/		42 512-
179 2 PFNx	143		42 512-

TestAmerica nacranel to

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

LCMS

Prep Batch: 188955

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32290-1	95508	Total/NA	Water	PFAS Prep	
MB 320-188955/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-188955/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-188955/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 189460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32290-1	95508	Total/NA	Water	WS-LC-0025 At1	188955
MB 320-188955/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	188955
LCS 320-188955/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	188955
LCSD 320-188955/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	188955

Lab Chronicle

Client: Shannon & Wilson, Inc
 j ro/ectySite: Citf oFkairbangs kire Traininp Area

TestAmerica Job ID: 320-32210-P

Client Sample ID: 95508

Date Collected: 10/10/17 10:54

Date Received: 10/11/17 10:25

Lab Sample ID: 320-32290-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totals A	j reO	j kAS j reO			P500 m9	P544 m9	P. . 166	P0yPPyP7 P4:3L	TN8	TA9 SAC
Totals A	Analf sis	WS-9C-0026 AtP		P			P. 1L40	P0yP3yP7 22:32	CEW	TA9 SAC

Laboratory References:

TA9 SAC RTestAmerica Sacramento, . . 0 Bi=ersive j argd af , West Sacramento, CA 16406, Tw9 (1P4)373-6400

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 1 roectjSite: Cit/ oyf airbanFs f ire Trainink Area

TestAmerica Job ID: 320-32290-4

Laboratory: TestAmerica Sacramento

All accregitationsjcertiyications helg b/ this laborator/ are listegd . ot all accregitationsjcertiyications are aNNicable to this reNbrtd

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasFa p STU	State 1 rokram	40	(ST-0))	42-45-48
Ari7ona	State 1 rokram	9	Az0805	05-44-45
ArFansas DZE	State 1 rokram	Q	55-0Q94	0Q48-45
Caliyornia	State 1 rokram	9	2598	04-34-45
Colorago	State 1 rokram	5	CA00066	05-34-45
Connecticut	State 1 rokram	4	1H-0Q94	0Q30-49
f loriga	. ZLA1	6	Z58) 80	0Q30-45
Georkia	State 1 rokram	6	. jA	04-29-45
Hawaii	State 1 rokram	9	. jA	04-29-45
Illinois	. ZLA1	)	2000QD	03-48-45
Kansas	. ZLA1	8	Z-4038)	40-34-48
L-A-B	DoD ZLA1		L26Q5	04-20-45
Louisiana	. ZLA1	Q	30Q42	0Q30-45
Maine	State 1 rokram	4	CA0006	06-45-45
Michikan	State 1 rokram	)	9968	04-34-45
. evaga	State 1 rokram	9	CA00066	08-34-45
. ew HamNshire	. ZLA1	4	2998	06-45-45
. ew Jerse/	. ZLA1	2	CA00)	0Q30-45
. ew YorF	. ZLA1	2	44QQQ	06-04-45
Orekon	. ZLA1	40	6060	04-25-45
1 enns/ Ivania	. ZLA1	3	Q5-04282	03-34-45
Texas	. ZLA1	Q	T406806399	0) -34-45
(S f ish & Wilgliye	f egeral		LZ465355-0	08-34-45
(SDA	f egeral		1330-44-0063Q	42-30-48
(SZ1A (CMR	f egeral	4	CA00066	44-0Q45
(tah	. ZLA1	5	CA00066	02-25-45
Virkinia	. ZLA1	3	6QD285	03-46-45
Washinkton	State 1 rokram	40	C) 54	0) -0) -45
West Virkinia pDWU	State 1 rokram	3	9930C	42-34-48
W/ omink	State 1 rokram	5	5TMS-L	04-25-45 *

* AccreditationjCertiyication renewal Nengink - accregitationjcertiyication consigereg valigd

TestAmerica Sacramento

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

TestAmerica Job ID: 320-32290-8

Project: 1 it/ oyf airbal Fs f ire Trail il k Area

Method	Method Description	Protocol	Laboratory
& n-g1-002L At8	, en5oril ateu A6/ Qh5bstal ces	TAg-nA1	TAg nA1

Protocol References:

TAgnA1 d TestAmerica gaboratoriesW& est nacramel toW aciC/ ntal uaru = Ceratil k , roceu5rep

Laboratory References:

TAgnA1 d TestAmerica nacramel toW . 0 Riversiue , arFwa/ W& est nacramel toW A 9L60LWTEg (986)373-L600

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32290-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-32290-1	95508	Water	10/10/17 10:54	10/11/17 10:25

2

3

4

5

6

7

8

9

10

12

13

14

15

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1Laboratory Test America

Attn: David Alltucker

Analysis Parameters/Sample Container Description

(include preservative if used)

[illegible]

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: 31-1-11735		Total Number of Containers	2	Signature: _____ Time: 13:00		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: CoF RFTC		COC Seals/Intact? Y/N/NA		Printed Name: _____ Date: 10/10/17		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: MDN		Received Good Cond./Cold		Company: Adam Wyborny		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: Goldstreak		Company: Shannon & Wilson		Company: _____		Company: _____	
Sampler: APW		(attach shipping bill, if any)		Received By: 1.		Received By: 2.		Received By: 3.	
Instructions				Signature: _____ Time: 10:05		Signature: _____ Time: _____		Signature: _____ Time: _____	
Requested Turnaround Time: Standard				Printed Name: _____ Date: 10/11/17		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Special Instructions: Bill to 31-1-11735-009				Company: TA IUS 5.4c		Company: _____		Company: _____	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Chain of Custody									

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

No. 34727

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-32290-4

Login Number: 32290

List Source: TestAmerica Sacramento

List Number: 1

Creator: Hytrek, Cheryl

Question	Answer	Comment
Radioactivity as measured by a survey meter	1 rue	
The cooler's custody seal, if present, is intact	1 rue	
Sample custody seals, if present, are intact	Np	
The cooler or sample has not appeared to have been compromised	1 rue	
Sample were refrigerated	1 rue	
Cooler temperature is acceptable	1 rue	
Cooler temperature is recorded	1 rue	
CAC is present	1 rue	
CAC is filled out in an appropriate	1 rue	
CAC is filled out with all pertinent information	1 rue	
Is the Field Sample name present on CAC	1 rue	
There are no discrepancies between the containers received and the CAC	1 rue	
Samples are refrigerated within 1 hour of collection	1 rue	
Samples are refrigerated within 1 hour of collection	1 rue	
Sample containers have legible labels	1 rue	
Containers are not broken or leaking	1 rue	
Sample collection dates are recorded	1 rue	
Properly stored sample containers are used	1 rue	
Sample bottles are completely filled	1 rue	
Sample reservation is recorded	Np	
There is sufficient volume for all requested analyses, including requested VS/SMs	1 rue	
Containers received have no headspace or bubble is less than 1/4 inch	1 rue	
Volatile samples are not present	1 rue	
Samples do not require settling or centrifugation	1 rue	
Tested Chlorine Check	Np	

Laboratory Data Review Checklist

Completed By:

Marcy Nadel

Title:

Geologist

Date:

October 24, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

October 18, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-32289-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☐ Yes ☒ No

Comments:

Sample 669077 is not listed on the COC. It was added on October 12, following receipt by the laboratory, per email communication.

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

See 2.a. above.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The laboratory notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.6° C.

Sample 669077 was submitted for analysis but was not listed on the COC. The analysis method was added after consulting with Shannon & Wilson.

The laboratory notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-188948, 188955, or 189342.

The laboratory notes that most of the project samples included with this work order contained yellowish-brown sediment.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The laboratory did not specify an effect on data quality or usability.

5. Samples Results

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

☐ Yes ☒ No

Comments:

Sample 669077 was added to the COC on October 12 per email communication with the laboratory.

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA, where applicable for non-detected results.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

N/A; PFCs were not detected in MBs 320-185019/1-A, 188955/1-A, or 189342/1-A.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Percent recoveries were within the ranges required by the laboratory method.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

Analytical precision was within acceptance criteria.

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

Comments:

N/A; analytical accuracy and precision were within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

- 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

Comments:

N/A; a trip blank is not required.

- iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

- iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not required or submitted with this WO.

- v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

- ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

The field-duplicate pairs MW-1701-35 / MW-1701-45, 167860 / 167960, and 168173 / 168273 were submitted with this WO.

- iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

RPDs were within DQOs.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☒ No ☐ Not Applicable

Samples MW-1701-13, MW-1701-35 / MW-1701-45, and MW-507 were collected using a reusable submersible pump. Sample 167878 was collected using the property owner's reusable hose due to limited accessibility. An equipment blank was not submitted with this WO; however, equipment blank samples are collected with the appropriate frequency for the overall project.

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; an equipment blank was not submitted.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

iii. Data quality or usability affected?

Comments:

The result for sample 167878 is consistent with previous results for this location; therefore, the data quality and usability were not considered affected.

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

a. Defined and appropriate?

☐ Yes ☒ No

Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-32678-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

11/10/2017 12:03:26 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

Total Access

Have a Question?



**Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Sample Summary	13
Chain of Custody	14
Receipt Checklists	15

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Job ID: 320-32678-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-32678-1

Receipt

The sample was received on 10/25/2017 3:00 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.5° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-192325, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The following samples 515507 (320-32678-1) contain sediment.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Client Sample ID: 515507

Lab Sample ID: 320-32678-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Client Sample ID: 515507

Date Collected: 10/23/17 13:10

Date Received: 10/25/17 15:00

Lab Sample ID: 320-32678-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L		11/01/17 10:21	11/07/17 21:41	1
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L		11/01/17 10:21	11/07/17 21:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	78		25 - 150				11/01/17 10:21	11/07/17 21:41	1
13C4 PFOS	97		25 - 150				11/01/17 10:21	11/07/17 21:41	1

TestAmerica Sacramento

Isotope Dilution Summary

Location: h&aSSoS W, insoSPISc
Project: itf oFkairbaSgs kire TraiSiS7 Area

TestAmerica Job ID: 320-32981-C

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	3C4 PFO/ (25-150)	3C4 PFO/ (25-150)
320-32981-C	5C5508	81	48
M h 320-C42325y2-A	Mab I oStronhamLre	16	005
M hD 320-C42325y8-A	Mab I oStronhamLre DpL	84	49
u B 320-C42325yC-A	u et&od BræSg	88	46
Surrogate Legend			
C3I 6 j kOA = C3I 6 j kOA			
C3I 6 j kOh = C3I 6 j kOh			

TestAmerica hacrameSto

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-192325/1-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 192325

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/01/17 10:21	11/07/17 20:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/01/17 10:21	11/07/17 20:46	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	66		92 512-				11/01/17 10:21	11/07/17 20:46	1
13C4 PFO:	74		92 512-				11/01/17 10:21	11/07/17 20:46	1

Lab Sample ID: LCS 320-192325/2-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 192325

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	17.4		ng/L		87	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	15.7		ng/L		84	69 - 144
Isotope Dilution	%Recovery	Qualifier	Limits				
13C4 PFOA	54		92 512-				
13C4 PFO:	1-2		92 512-				

Lab Sample ID: LCSD 320-192325/3-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 192325

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	17.1		ng/L		85	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)	18.6	16.1		ng/L		87	69 - 144	3	30
Isotope Dilution	%Recovery	Qualifier	Limits						
13C4 PFOA	67		92 512-						
13C4 PFO:	7/		92 512-						

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

LCMS

Prep Batch: 192325

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32678-1	515507	Total/NA	Water	PFAS Prep	
MB 320-192325/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-192325/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-192325/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 193330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32678-1	515507	Total/NA	Water	WS-LC-0025 At1	192325
MB 320-192325/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	192325
LCS 320-192325/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	192325
LCSD 320-192325/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	192325

Lab Chronicle

Client: Shannon & Wilson, Inc
 y rofectSite: Citk ogpairbanQs pire TraininNArea

TestAmerica Job ID: 320-321Pj -/

Client Sample ID: 515507
Date Collected: 10/23/17 13:10
Date Received: 10/25/17 15:00

Lab Sample ID: 320-32678-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total A	ypre8	ypAS yre8			/ 00 mL	/ 01 mL	/ 9232.	// 10/ 17 P / 0:2/	T7 4	TAL SAC
Total A	Analksis	WS-LC-002. At/		/			/ 93330	// 10P7 P 2/ :5/	CEW	TAL SAC

Laboratory References:

TAL SAC RTestAmerica Sacramento, j j 0 Bi=ersive yarQd ak, West Sacramento, CA 9. 10. , TwL (9/ 1)3P3-. 100

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 j ro/ectySite: Citf oFkairbangs kire Trainind Area

TestAmerica Job ID: 320-32941-P

Laboratory: TestAmerica Sacramento

All accre. itationscertifications hel. bf this laboratorf are liste. Np ot all accre. itationscertifications are a((llicable to this re(ortN

Authority	Program	EPA Region	Identification Number	Expiration Date
Alasga U ST5	State j rodram	P0	) ST-088	P2-P1-P4
Ari7ona	State j rodram	z	AZ0401	01-PP-P1
Argansas DEQ	State j rodram	9	11-09zP	09-P4-P1
Califørnia	State j rodram	z	21z4	0P-3P-P1
Colora. o	State j rodram	1	CA00066	01-3P-P1
Connecticut	State j rodram	P	j H-09zP	09-30-Pz
klori. a	p ELAaj	6	E14840	09-30-P1
Geordia	State j rodram	6	p yA	0P-21-Pz
Hawaii	State j rodram	z	p yA	0P-2z-P1
Illinois	p ELAaj	8	200090	03-P4-P1
Kansas	p ELAaj	4	E-P0348	P0-3P-P4 B
L-A-M	DoD ELAaj		L2691	0P-20-P1
Louisiana	p ELAaj	9	309P2	09-30-P1
v aine	State j rodram	P	CA0006	06-P1-P1
v ichidan	State j rodram	8	zz64	0P-3P-P1
peYa. a	State j rodram	z	CA00066	04-3P-P1
pew Ham(shire	p ELAaj	P	2zz4	06-P1-P1
pew Jersef	p ELAaj	2	CA008	09-30-P1
pew Oorg	p ELAaj	2	PP999	06-0P-P1
x redon	p ELAaj	P0	6060	0P-21-P1
j ennsf lYania	p ELAaj	3	91-0P242	03-3P-P1
TeRas	p ELAaj	9	TP064063zz	08-3P-P1
) S kish & Wil. lifē	ke. eral		LEP61311-0	04-3P-P1
) SDA	ke. eral		j 330-PP-00639	P2-30-P4
) SEj A) Cv V	ke. eral	P	CA00066	PP-09-P1
) tah	p ELAaj	1	CA00066	02-21-P1
* irdinia	p ELAaj	3	690241	03-P6-P1
Washindton	State j rodram	P0	C81P	08-08-P1
West * irdinia UDW5	State j rodram	3	zz30C	P2-3P-P4
Wf omind	State j rodram	1	1Tv S-L	0P-21-Pz

BAccre. itationyCertification renewal (en. ind - accre. itationyCertification consi. ere. Yali. N

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32678-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-32678-1	515507	Water	10/23/17 13:10	10/25/17 15:00

2

3

4

5

6

7

8

9

10

12

13

14

15

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8026

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test American
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

[illegible]

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: 31-11735-008		Total Number of Containers: 2		Signature: M. Nadel Time: 1:30		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: CFRPC		COC Seals/Intact? Y/N/NA: -		Printed Name: Mary Nadel Date: 10/24/12		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: MDN		Received Good Cond./Cold: -		Company: Shannon & Wilson		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: Goldsneak							
Sampler: MDN		(attach shipping bill, if any)							
Instructions				Received By: 1.		Received By: 2.		Received By: 3.	
Requested Turnaround Time: Standard				Signature: Duff Time: 1:50		Signature: _____ Time: _____		Signature: _____ Time: _____	
Special Instructions: Please bill to 31-11735-008				Printed Name: David Her Date: 10/25/12		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File				Company: TAWS		Company: _____		Company: _____	

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-32678-1

Login Number: 32678

List Source: TestAmerica Sacramento

List Number: 1

Creator: Aguayo, Alonso

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
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.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Laboratory Data Review Checklist

Completed By:

Marcy Nadel

Title:

Geologist

Date:

November 17, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

November 10, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-32678-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.5° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-192325.

The case narrative notes that the project sample included with this work order contained sediment.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in MB 320-192325.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; IDA recoveries are within acceptable limits.

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with the sample included in this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

This sample was not collected with reusable equipment, therefore a practical potential for equipment based cross-contamination does not exist.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

- iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento

880 Riverside Parkway

West Sacramento, CA 95605

Tel: (916)373-5600

TestAmerica Job ID: 320-32680-1

Client Project/Site: City of Fairbanks Fire Training Area

For:

Shannon & Wilson, Inc

2355 Hill Rd.

Fairbanks, Alaska 99709-5244

Attn: Marcy Nadel



Authorized for release by:

11/10/2017 12:06:17 PM

David Alltucker, Project Manager I

(916)374-4383

david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?

**Ask
The
Expert**

Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	9
QC Association Summary	11
Lab Chronicle	12
Certification Summary	13
Method Summary	14
Sample Summary	15
Chain of Custody	16
Receipt Checklists	17

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project Site: City of Fairfield Fire Training Area

TestAmerica Job ID: 320-32670-8

Job ID: 320-32680-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-32680-1

Receipt

The samples were received on 8/22/2015 3:00 PM; the samples arrived in coolers, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.0°C.

LCMS

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

Organic Prep

Methov(s) 1f AS 1reg: Insufficient sample volume was available to perform a matrix spike matrix spike duplicate (MSjMSD) associated with preparation batch 320-89232d, methov cove 1f AS_DI_1reg.

Methov(s) 1f AS 1reg: The yellow ink samples 86733d (320-32670-8) and 6d7779 (320-32670-2) contain sediment.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32940-1

Client Sample ID: 168335

Lab Sample ID: 320-32680-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	N9		2.0	0.72	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	x1		2.0	0.4N	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	4.9		2.0	0.40	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	11		2.0	0.18	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	28		2.0	1.3	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorononanoic acid (PF5 A)	0.43	J	2.0	0.98	ng/L	1			WS-LC-0028 At1	Total/5 A

Client Sample ID: 658889

Lab Sample ID: 320-32680-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFOS)	2.4		2.0	0.72	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorohexanesulfonic acid (PFB6S)	19		2.0	0.4N	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorohexanoic acid (PFBHA)	19		2.0	0.40	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorooctanoic acid (PFp A)	22		2.0	0.18	ng/L	1			WS-LC-0028 At1	Total/5 A
Perfluorooctanesulfonic acid (PFp S)	27		2.0	1.3	ng/L	1			WS-LC-0028 At1	Total/5 A

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

Client Sample ID: 168335

Date Collected: 10/23/17 10:43

Date Received: 10/25/17 15:00

Lab Sample ID: 320-32680-1

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	7.6		2.0	0.92	ng/L		11/01/17 10:21	11/07/17 22:18	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		11/01/17 10:21	11/07/17 22:18	1
Perfluoroheptanoic acid (PFHpA)	8.6		2.0	0.80	ng/L		11/01/17 10:21	11/07/17 22:18	1
Perfluorooctanoic acid (PFOA)	11		2.0	0.75	ng/L		11/01/17 10:21	11/07/17 22:18	1
Perfluorooctanesulfonic acid (PFOS)	25		2.0	1.3	ng/L		11/01/17 10:21	11/07/17 22:18	1
Perfluorononanoic acid (PFNA)	0.83	J	2.0	0.65	ng/L		11/01/17 10:21	11/07/17 22:18	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	106		25 - 150				11/01/17 10:21	11/07/17 22:18	1
13C4-PFHpA	90		25 - 150				11/01/17 10:21	11/07/17 22:18	1
13C4 PFOA	83		25 - 150				11/01/17 10:21	11/07/17 22:18	1
13C4 PFOS	105		25 - 150				11/01/17 10:21	11/07/17 22:18	1
13C5 PFNA	76		25 - 150				11/01/17 10:21	11/07/17 22:18	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

Client Sample ID: 658889

Date Collected: 10/23/17 16:44

Date Received: 10/25/17 15:00

Lab Sample ID: 320-32680-2

Matrix: Water

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.8		2.0	0.92	ng/L		11/01/17 10:21	11/07/17 22:36	1
Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.87	ng/L		11/01/17 10:21	11/07/17 22:36	1
Perfluoroheptanoic acid (PFHpA)	16		2.0	0.80	ng/L		11/01/17 10:21	11/07/17 22:36	1
Perfluorooctanoic acid (PFOA)	22		2.0	0.75	ng/L		11/01/17 10:21	11/07/17 22:36	1
Perfluorooctanesulfonic acid (PFOS)	29		2.0	1.3	ng/L		11/01/17 10:21	11/07/17 22:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/01/17 10:21	11/07/17 22:36	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	101		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C4-PFHpA	86		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C4 PFOA	80		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C4 PFOS	98		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C5 PFNA	78		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C2-PFHxDA	37		25 - 150				11/01/17 10:21	11/07/17 22:36	1
13C2-PFTeDA	54		25 - 150				11/01/17 10:21	11/07/17 22:36	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32940-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)						
		³⁴ 2 PFOx (25-150)	¹³ CH-PFOp (25-150)	⁸ CHPF4 (25-150)	⁸ CHPF4 (25-150)	⁸ C5 PFNA (25-150)	¹² C-PFOxI (25-150)	¹² C-PFTeI (25-150)
320-32940-1	194335	109	80	43	105	79		
320-32940-2	954448	101	49	40	84	74	37	56
LCS 320-182325/2-A	Lab Control Sample	109	81	46	105	40		
LCSD 320-182325/3-A	Lab Control Sample Dup	87	46	78	89	77		
MB 320-182325/1-A	Method Blank	85	43	77	86	73		

Surrogate Legend

¹⁴O2 PF=HS x ¹⁴O2 PF=HS
¹³C6-PF=pA x ¹³C6-PF=pA
¹³C6 PFOA x ¹³C6 PFOA
¹³C6 PFOS x ¹³C6 PFOS
¹³C5 PFNA x ¹³C5 PFNA
¹³C2-PF=HDA x ¹³C2-PF=HDA
¹³C2-PFTeDA x ¹³C2-PFTeDA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32940-1

Method: WS-LC-0025 At1 - Perfluorinated Alkyl Substances

Lab Sample ID: MB 320-192325/1-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 192325

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFOS)	. D		2L0	0L72	ng/5		11/01/1N10:21	11/0N1N20:89	1
Perfluorohe6anesulfonic acid (PFB6S)	. D		2L0	0L4N	ng/5		11/01/1N10:21	11/0N1N20:89	1
Perfluorohexanoic acid (PFBx A)	. D		2L0	0L40	ng/5		11/01/1N10:21	11/0N1N20:89	1
Perfluorooctanoic acid (PFp A)	. D		2L0	0LNH	ng/5		11/01/1N10:21	11/0N1N20:89	1
Perfluorooctanesulfonic acid (PFp S)	. D		2L0	1L3	ng/5		11/01/1N10:21	11/0N1N20:89	1
Perfluorononanoic acid (PF. A)	. D		2L0	0L9H	ng/5		11/01/1N10:21	11/0N1N20:89	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	25		45 - 150	11/01/17/ 10/6/1	11/0/ 7/ / 406 S	1
19H: -PFOxp	39		45 - 150	11/01/17/ 10/6/1	11/0/ 7/ / 406 S	1
19H: PFCp	//		45 - 150	11/01/17/ 10/6/1	11/0/ 7/ / 406 S	1
19H: PFC8	2:		45 - 150	11/01/17/ 10/6/1	11/0/ 7/ / 406 S	1
19H5 PFNp	/ 9		45 - 150	11/01/17/ 10/6/1	11/0/ 7/ / 406 S	1

Lab Sample ID: LCS 320-192325/2-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 192325

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFOS)	1NN	1H4		ng/5		70	N2 - 1H1
Perfluorohe6anesulfonic acid (PFB6S)	14L2	1H7		ng/5		4N	N3 - 1HN
Perfluorohexanoic acid (PFBx A)	20L0	14L3		ng/5		71	N1 - 134
Perfluorooctanoic acid (PFp A)	20L0	1N8		ng/5		4N	N0 - 180
Perfluorooctanesulfonic acid (PFp S)	14L9	1HN		ng/5		48	97 - 188
Perfluorononanoic acid (PF. A)	20L0	14L1		ng/5		71	N3 - 18N

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	10S		45 - 150
19H: -PFOxp	21		45 - 150
19H: PFCp	3:		45 - 150
19H: PFC8	105		45 - 150
19H5 PFNp	30		45 - 150

Lab Sample ID: LCSD 320-192325/3-A

Matrix: Water

Analysis Batch: 193330

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 192325

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorobutanesulfonic acid (PFOS)	1NN	19L1		ng/5		71	N2 - 1H1	1	30
Perfluorohe6anesulfonic acid (PFB6S)	14L2	1H4		ng/5		4N	N3 - 1HN	0	30
Perfluorohexanoic acid (PFBx A)	20L0	14LN		ng/5		73	N1 - 134	2	30
Perfluorooctanoic acid (PFp A)	20L0	1N1		ng/5		4H	N0 - 180	2	30
Perfluorooctanesulfonic acid (PFp S)	14L9	19L1		ng/5		4N	97 - 188	3	30
Perfluorononanoic acid (PF. A)	20L0	1N4		ng/5		47	N3 - 18N	2	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc

Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32940-1

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C4 PFOA8</i>	<i>2/</i>		<i>45 - 150</i>
<i>19H: -PFOxp</i>	<i>3:</i>		<i>45 - 150</i>
<i>19H: PFCp</i>	<i>/ 2</i>		<i>45 - 150</i>
<i>19H: PFC8</i>	<i>2S</i>		<i>45 - 150</i>
<i>19H5 PFNp</i>	<i>//</i>		<i>45 - 150</i>

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

LCMS

Prep Batch: 192325

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32680-1	168335	Total/NA	Water	PFAS Prep	
320-32680-2	658889	Total/NA	Water	PFAS Prep	
MB 320-192325/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-192325/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-192325/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 193330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-32680-1	168335	Total/NA	Water	WS-LC-0025 At1	192325
320-32680-2	658889	Total/NA	Water	WS-LC-0025 At1	192325
MB 320-192325/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	192325
LCS 320-192325/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	192325
LCSD 320-192325/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	192325

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

Client Sample ID: 129008

Date Collected: 1-73071/ 1-:R0

Date received: 1-73871/ 18:-

Lab Sample ID: 03-40329-41

Matrix: Water

Prep Type	Batch Type	Batch Method	Volume	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	192325	11/01/17 10:21	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			193330	11/07/17 22:18	CBW	TAL SAC

Client Sample ID: 289996

Date Collected: 1-73071/ 12:RR

Date received: 1-73871/ 18:-

Lab Sample ID: 03-40329-43

Matrix: Water

Prep Type	Batch Type	Batch Method	Volume	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	192325	11/01/17 10:21	TON	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			193330	11/07/17 22:36	CBW	TAL SAC

Laboratory references:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32940-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-14-18
Ari7ona	State Program	z	AZ0804	04-11-14
Arkansas DEQ	State Program	9	44-09z1	09-18-14
California	State Program	z	24z8	01-31-14
Colorado	State Program	4	CA00066	04-31-14
Connecticut	State Program	1	PH-09z1	09-30-1z
Florida	NELAP	6	E48580	09-30-14
Georgia	State Program	6	N/A	01-24-1z
Hawaii	State Program	z	N/A	01-2z-14
Illinois	NELAP	5	200090	03-18-14
Kansas	NELAP	8	E-10385	10-31-18 B
L-A-M	DoD ELAP		L2694	01-20-14
Louisiana	NELAP	9	30912	09-30-14
v aine	State Program	1	CA0006	06-14-14
v ichigan	State Program	5	zz68	01-31-14
NeYada	State Program	z	CA00066	08-31-14
New Hampshire	NELAP	1	2zz8	06-14-14
New Jersey	NELAP	2	CA005	09-30-14
New Oork	NELAP	2	11999	06-01-14
x region	NELAP	10	6060	01-24-14
PennsylYania	NELAP	3	94-01282	03-31-14
TeRas	NELAP	9	T1068063zz	05-31-14
US Fish & Wildlife	Federal		LE164344-0	08-31-14
USDA	Federal		P330-11-00639	12-30-18
USEPA UCv V	Federal	1	CA00066	11-09-14
Utah	NELAP	4	CA00066	02-24-14
* irginia	NELAP	3	690284	03-16-14
Washington	State Program	10	C541	05-05-14
West * irginia (DW)	State Program	3	zz30C	12-31-18
Wyoming	State Program	4	4Tv S-L	01-24-1z

BAccreditation/Certification renewal pending - accreditation/certification considered Valid.

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32980-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Perfluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 65905, TEL (619)373-5900

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-32680-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-32680-1	168335	Water	10/23/17 10:43	10/25/17 15:00
320-32680-2	658889	Water	10/23/17 16:44	10/25/17 15:00

2

3

4

5

6

7

8

9

10

12

13

14

15



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1
Laboratory Test America
Attn: David Altucher

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Analysis Parameters/Sample Container Description (include preservative if used)				Total Number of Containers	Remarks/Matrix
168335		10:43	10/23/17	X	X	*60HR PFCs (WS-LC-3325)				2	Grandwater
658889		1644	↓	X	X					2	↓



320-32880 Chain of Custody

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>		Total Number of Containers: <u>4</u>		Signature: <u>M. Nadel</u> Time: <u>13:00</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>C&F PFC</u>		COC Seals/Intact? Y/N/NA: <u>-</u>		Printed Name: <u>Marcy Nadel</u> Date: <u>10/24/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold: <u>-</u>		Company: <u>Shannon & Wilson</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>Goldstream</u>		Received By: <u>1.</u>		Received By: <u>2.</u>		Received By: <u>3.</u>	
Sampler: <u>MDN</u>		(attach shipping bill, if any)		Signature: <u>[Signature]</u> Time: <u>15:00</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Printed Name: <u>David Her</u> Date: <u>10/25/17</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time: <u>Standard</u>				Company: <u>TAW</u>		Company: _____		Company: _____	
Special Instructions: <u>Please bill to 31-1-11735-009</u>									

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

No. 34477

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-32680-1

Login Number: 32680

List Source: TestAmerica Sacramento

List Number: 1

Creator: Aguayo, Alonso

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

November 17, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

November 10, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-32680-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.5° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-192325.

The case narrative notes that the project samples included in this work order contained sediment.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability are not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in MB 320-192325.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; IDA recoveries were within acceptable limits.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with the analytical samples included in this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☒ No ☐ Not Applicable

Sample 168335 was collected with a peristaltic pump which utilizes disposable sterilized tubing. Sample 658889 was collected with a reusable, submersible pump. An equipment blank sample was not submitted with this work order. However, equipment blanks are collected at the appropriate frequency for the overall project.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not submitted.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not submitted.

- iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-33293-1
Client Project/Site: City of Fairbanks Fire Training Area

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

Attn: Marcy Nadel



Authorized for release by:
11/20/2017 2:52:59 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Sample Summary	13
Chain of Custody	14
Receipt Checklists	15

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Job ID: 320-33293-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-33293-1

Receipt

The sample was received on 11/14/2017 12:20 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-194806, method code PFAS_DI_Prep.

Method(s) PFAS Prep: The sample bottles 95630 (320-33293-1) contain sediment.

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: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Client Sample ID: 95630

Lab Sample ID: 320-33293-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	4.1		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Client Sample ID: 95630

Date Collected: 11/07/17 11:27

Date Received: 11/14/17 12:20

Lab Sample ID: 320-33293-1

Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	4.1		2.0	0.75	ng/L		11/15/17 10:30	11/15/17 15:41	1
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L		11/15/17 10:30	11/15/17 15:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	104		25 - 150				11/15/17 10:30	11/15/17 15:41	1
13C4 PFOS	102		25 - 150				11/15/17 10:30	11/15/17 15:41	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	³ C4 PFO/ (25-150)	³ C4 PFO/ (25-150)
320-33293-1	95630	104	102
LCS 320-194806/2-A	Lab Control Sample	92	96
LCSD 320-194806/3-A	Lab Control Sample Dup	92	92
MB 320-194806/1-A	Method Blank	94	95

Surrogate Legend

¹³C4 PFOA = ¹³C4 PFOA

¹³C4 PFOS = ¹³C4 PFOS

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Sulphates

Lay Sample d : MD B20-13890/ x1-A

Matrft: Water

Ai alksfs Datbh: 13835/

		MD	MD								
Ai alkte		Result	Qualifier	RL	MI	L	z i ft	I	Nprepared	Ai alkFed	I fl Pab
Perfluorooctanoic acid (PFOA)		ND		2.0	0.75		ng/L		11/15/17 10:30	11/15/17 14:46	1
Perfluorooctanesulfonic acid (PFOS)		ND		2.0	1.3		ng/L		11/15/17 10:30	11/15/17 14:46	1
		MB	MB								
Isotope Dilution		%Recovery	Qualifier	Limits				Prepared		Analyzed	
13C4 PFOA		94		25 - 150				11/15/17 10:30		11/15/17 14:46	
13C4 PFOS		95		25 - 150				11/15/17 10:30		11/15/17 14:46	

Clfei t Sample d : Method Dlai n

Nrep 4kpe: 4otal6 A

Nrep Datbh: 13890/

Lay Sample d : LCS B20-13890/ x2-A

Matrft: Water

Ai alksfs Datbh: 13835/

			Spfne	LCS	LCS			%Reb.	
Ai alkte			Added	Result	Qualifur	z i ft	I	%Reb	Lfmfts
Perfluorooctanoic acid (PFOA)			20.0	19.4		ng/L		97	70 - 140
Perfluorooctanesulfonic acid (PFOS)			18.6	18.1		ng/L		98	69 - 144
		LCS	LCS						
Isotope Dilution	%Recovery	Qualifier	Limits						
13C4 PFOA	92		25 - 150						
13C4 PFOS	96		25 - 150						

Clfei t Sample d : Lay Coi trol Sample

Nrep 4kpe: 4otal6 A

Nrep Datbh: 13890/

%Reb.

Lay Sample d : LCS B20-13890/ xB-A

Matrft: Water

Ai alksfs Datbh: 13835/

			Spfne	LCSI	LCSI			%Reb.			RNI
Ai	alkte		Added	Result	Qualifier	z i ft	I	%Reb	Lfmfts	RNI	Lfmft
Perfluorooctanoic acid (PFOA)			20.0	19.5		ng/L		97	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)			18.6	19.1		ng/L		103	69 - 144	5	30
			LCS	LCS							
Isotope Dilution			%Recovery	Qualifier	Limits						
13C4 PFOA			92		25 - 150						
13C4 PFOS			92		25 - 150						

Clfei t Sample d : Lay Coi trol Sample I up

Nrep 4kpe: 4otal6 A

Nrep Datbh: 13890/

%Reb.

RNI

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

LCMS

Prep Batch: 194806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33293-1	95630	Total/NA	Water	PFAS Prep	
MB 320-194806/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-194806/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-194806/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 194956

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-33293-1	95630	Total/NA	Water	WS-LC-0025 At1	194806
MB 320-194806/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	194806
LCS 320-194806/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	194806
LCSD 320-194806/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	194806

Lab Chronicle

Client: Shannon & Wilson, Inc
 j ro/ectySite: Citf oFkairbangs kire Traininp Area

TestAmerica Job ID: 320-33213-P

Client Sample ID: 95630

Date Collected: 11/07/17 11:27

Date Received: 11/14/17 12:20

Lab Sample ID: 320-33293-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Totals A	j reO	j kAS j reO			P500 mL	P566 mL	P19. 06	PPYP7YP4 P0:30	TN8	TAL SAC
Totals A	Analf sis	WS-LC-0027 AtP		P			P19176	PPYP7YP4 P7:9P	CEW	TAL SAC

Laboratory References:

TAL SAC RTestAmerica Sacramento, . . 0 Bi=ersive j argd af , West Sacramento, CA 17607, TwL (1P6)343-7600

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 1 roectjSite: Cit/ oyf airbanFs f ire Trainink Area

TestAmerica Job ID: 320-33293-4

Laboratory: TestAmerica Sacramento

All accregitationjcertiyications helg b/ this laborator/ are listegd . ot all accregitationjcertiyications are aNNicable to this reNbrtd

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasFa p STU	State 1 rokram	40	(ST-0))	42-45-48
Ari7ona	State 1 rokram	9	Az0805	05-44-45
ArFansas DZE	State 1 rokram	Q	55-0Q94	0Q48-45
Caliyornia	State 1 rokram	9	2598	04-34-45
Colorago	State 1 rokram	5	CA00066	05-34-45
Connecticut	State 1 rokram	4	1H-0Q94	0Q30-49
f loriga	. ZLA1	6	Z58) 80	0Q30-45
Georkia	State 1 rokram	6	. jA	04-25-49
Hawaii	State 1 rokram	9	. jA	04-29-45
Illinois	. ZLA1	)	2000QD	03-48-45
Kansas	. ZLA1	8	Z-4038)	40-34-48 B
L-A-M	DoD ZLA1		L26Q5	04-20-45
Louisiana	. ZLA1	Q	30Q42	0Q30-45
v aine	State 1 rokram	4	CA0006	06-45-45
v ichikan	State 1 rokram	)	9968	04-34-45
. eYaga	State 1 rokram	9	CA00066	08-34-45
. ew HamNshire	. ZLA1	4	2998	06-45-45
. ew Jerse/	. ZLA1	2	CA00)	0Q30-45
. ew OorF	. ZLA1	2	44QQQ	06-04-45
x rekon	. ZLA1	40	6060	04-25-45
1 enns/ IYania	. ZLA1	3	Q5-04282	03-34-45
TeRas	. ZLA1	Q	T406806399	0) -34-45
(S f ish & Wilgliye	f egeral		LZ465355-0	08-34-45
(SDA	f egeral		1330-44-0063Q	42-30-48
(SZ1A (Cv V	f egeral	4	CA00066	44-0Q45
(tah	. ZLA1	5	CA00066	02-25-45
* irkinia	. ZLA1	3	6QD285	03-46-45
Washinkton	State 1 rokram	40	C) 54	0) -0) -45
West * irkinia pDWU	State 1 rokram	3	9930C	42-34-48
W/ omink	State 1 rokram	5	5Tv S-L	04-25-49

Method Summary

1 Objective: nSal I ol h & iSol Wl c

, roectjnite: 1 it/ oyf airbal Fs f ire Trail il k Area

TestAmerica Job ID: 320-33293-8

Method	Method Description	Protocol	Laboratory
& n-g1-002L At8	f Coril ateu AC/ Ch5bstal ces	TAg-nA1	TAg nA1

Protocol References:

TAg-nA1 d TestAmerica gaboratoriesV& est nacramel toW aci@/ ntal uaru = Ceratil k , roceu5rep

Laboratory References:

TAg nA1 d TestAmerica nacramel toW . 0 Riversiue , arFwa/ V& est nacramel toW A 9L60LVTEg (986)373-L600

TestAmerica nacramel to

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: City of Fairbanks Fire Training Area

TestAmerica Job ID: 320-33293-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-33293-1	95630	Water	11/07/17 11:27	11/14/17 12:20

2

3

4

5

6

7

8

9

10

12

13

14

15

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

[illegible]

320-33293 Chain of Custody

Project Information		Sample Receipt	
Project Number: <u>31-1-11735-008</u>	Total Number of Containers: <u>2</u>		
Project Name: <u>LOF RFTC</u>	COC Seals/Intact? Y/N/NA: <u>—</u>		
Contact: <u>MDN</u>	Received Good Cond./Cold: <u>—</u>		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method: <u>Goldstreak</u>		
Sampler: <u>CAB</u>	(attach shipping bill, if any)		
Instructions			
Requested Turnaround Time: <u>Standard</u>			
Special Instructions: <u>Please bill to 31-1-11735-008</u>			
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File			

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-33293-1

Login Number: 33293

List Source: TestAmerica Sacramento

List Number: 1

Creator: Turpen, Troy

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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	Gel Ice
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 $<6\text{mm}$ (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:

Marcy Nadel

Title:

Geologist

Date:

December 6, 2017

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

November 20, 2017

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-33293-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☐ Yes ☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☐ Yes ☒ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 4.7° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-194806.

The case narrative notes that the project sample included in this work order contained sediment.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability are not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in MB 320-194806.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; IDA recoveries were within acceptable limits.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with the analytical sample included in this work order. However, field-duplicate samples are submitted with the appropriate frequency for the overall project.

ii. Submitted blind to lab?

☐ Yes ☒ No

Comments:

N/A; a field-duplicate pair was not submitted with this work order.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; a field-duplicate pair was not submitted.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

The sample included in this work order was not collected using reusable equipment. Therefore, an equipment blank sample was not submitted with this work order.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not required.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not required.

- iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35279-1
Client Project/Site: CF RFTC

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

Attn: Marcy Nadel



Authorized for release by:
2/6/2018 1:05:08 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?

**Ask
The
Expert**

Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Detection Summary	5
Client Sample Results	7
Isotope Dilution Summary	17
QC Sample Results	18
QC Association Summary	19
Lab Chronicle	20
Certification Summary	22
Method Summary	23
Sample Summary	24
Chain of Custody	25
Receipt Checklists	26



Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Job ID: 320-35279-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-35279-1

Receipt

The samples were received on 1/23/2018 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

LCMS

Method(s) WS-LC-0025 At1: Isotope Dilution Analyte (IDA) recovery for 13C4 PFOA is above the method recommended limit for the following samples: 569356 (320-35279-4) and 515515 (320-35279-6). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method(s) WS-LC-0025 At1: Isotope Dilution Analyte (IDA) recovery for 13C4 PFOA and 13C4 PFOS are above the method recommended limit for the following sample: 87416 (320-35279-10). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-205812.

Method(s) PFAS Prep: The following sample(s): MW-1701-35 (320-35279-1), MW-1701-13 (320-35279-2), 168688 (320-35279-3), 569356 (320-35279-4), 521779 (320-35279-5), 515515 (320-35279-6), 515615 (320-35279-7), 515507 (320-35279-8), 515469 (320-35279-9) and 87416 (320-35279-10) in preparation batch 320-205812 were observed to be an orange color and there was sediment present as well.

Method(s) PFAS Prep: In the following sample(s): MW-1701-13 (320-35279-2) in preparation batch 320-206551 sediment was present.

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: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: MW-1701-35

Lab Sample ID: 320-35279-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	660		200	75	ng/L	100			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16000		200	130	ng/L	100			WS-LC-0025 At1	Total/NA

Client Sample ID: MW-1701-13

Lab Sample ID: 320-35279-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	27		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 168688

Lab Sample ID: 320-35279-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.1		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 569356

Lab Sample ID: 320-35279-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	15		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 521779

Lab Sample ID: 320-35279-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	3.2		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.8		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515515

Lab Sample ID: 320-35279-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515615

Lab Sample ID: 320-35279-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.7		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 515507

Lab Sample ID: 320-35279-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 515469

Lab Sample ID: 320-35279-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: 87416

Lab Sample ID: 320-35279-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.0		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	20		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: Mr -6806-39

Lab Sample ID: 320-39281-6

Date Collected: 06/29/18 16:32

MatxW r atex

Date Received: 06/23/18 01:29

Method: r S-LC-0029 h16 - Fluorinated Halogenated Substances

Sample Name	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
hexafluorooctanoic acid (KAF hO)	0		200	75	ng/L		01/26/18 13:52	02/01/18 08:12	100
hexafluorooctanesulfonyl acid (KAF SO)	6000		200	130	ng/L		01/26/18 13:52	02/01/18 08:12	100
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	116		25 - 150				01/26/18 13:52	02/01/18 08:12	100
13C4 PFOS	117		25 - 150				01/26/18 13:52	02/01/18 08:12	100

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: Mr -6806-63

Date Collected: 06/29/2016

Date Received: 06/23/2016 01:29

Lab Sample ID: 320-39281-2

Matrix: Water

Method: EPA 816 - Fluorinated Alkyl Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	28		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 05:22	1
Perfluorooctanesulfonyl fluoride (PFOS)	6Q		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 05:22	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	140		25 - 150				01/26/18 13:52	01/27/18 05:22	1
¹³ C4 PFOS	142		25 - 150				01/26/18 13:52	01/27/18 05:22	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 6) /) / /
Date Collected: 06/29/18 06:06
Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-3
Matrix: Water

Method: r S-LC-0029 h16 - Fluorinated Halogenated Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
hexafluorooctanoic acid (KAF hO)	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 05:40	1
hexafluorooctanesulfonyl acid (KAF SO)	34		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 05:40	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	147		25 - 150				01/26/18 13:52	01/27/18 05:40	1
13C4 PFOS	145		25 - 150				01/26/18 13:52	01/27/18 05:40	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 9) 139)

Date Collected: 06/29/18 08:09

Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-Q

Matrix: Water

Method: EPA 821-RF - Alkylated Aromatic Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,5-Pentachlorobenzoic acid (KAF HO)	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 05:58	1
1,2,3,4,5-Pentachlorobenzenesulfonic acid (KAF SO)	69		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 05:58	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	155	*	25 - 150				01/26/18 13:52	01/27/18 05:58	1
13C4 PFOS	150		25 - 150				01/26/18 13:52	01/27/18 05:58	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 926881

Date Collected: 06/16/18 09:53

Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-9

Matrix: Water

Method: EPA 821-RF - Alkylated Aromatic Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,5-Pentachlorobenzoic acid (KAF HO)	34		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 06:17	1
1,2,3,4,5-Pentachlorobenzenesulfonic acid (KAF SO)	14		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 06:17	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	137		25 - 150				01/26/18 13:52	01/27/18 06:17	1
¹³ C4 PFOS	137		25 - 150				01/26/18 13:52	01/27/18 06:17	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 969969

Date Collected: 06/26/18 06:35

Date Received: 06/27/18 01:29

Lab Sample ID: 320-39281-

Matrix: Water

Method: EPA 8160-8 - Fluorinated Alkyl Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 06:35	1
Perfluorooctanesulfonyl fluoride (PFOS)	6Q		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 06:35	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	152	*	25 - 150				01/26/18 13:52	01/27/18 06:35	1
¹³ C4 PFOS	146		25 - 150				01/26/18 13:52	01/27/18 06:35	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 969) 69

Date Collected: 06/26/18 06:00

Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-8

Matrix: Water

Method: r S-LC-0029 h16 - Fluorinated Halogenated Substances

Sample Name	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
hexafluorooctanoic acid (KAF hO	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 06:53	1
hexafluorooctanesulfonyl acid (KAF SO	6Q		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 06:53	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	141		25 - 150				01/26/18 13:52	01/27/18 06:53	1
13C4 PFOS	136		25 - 150				01/26/18 13:52	01/27/18 06:53	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 969908

Date Collected: 06/16/ 2018

Date Received: 06/23/ 2018

Lab Sample ID: 320-39281-1

Matrix: Water

Method: EPA 816 - Fluorinated Alkyl Substances

Sample Name	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 07:30	1
Perfluorooctanesulfonyl fluoride (PFOS)	6		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 07:30	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	138		25 - 150				01/26/18 13:52	01/27/18 07:30	1
¹³ C4 PFOS	139		25 - 150				01/26/18 13:52	01/27/18 07:30	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 969Q 1

Date Collected: 06/22/18 16:09:26

Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-1

Matrix: Water

Method: EPA 821-RF - Fluorinated Alkyl Substances

Compound	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PF8O)	24		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 07:48	1
Perfluorooctanesulfonyl fluoride (PF8S)	6Q		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 07:48	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	142		25 - 150				01/26/18 13:52	01/27/18 07:48	1
¹³ C4 PFOS	139		25 - 150				01/26/18 13:52	01/27/18 07:48	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: / 8Q6)

Date Collected: 06/22/18 6Q61

Date Received: 06/23/18 01:29

Lab Sample ID: 320-39281-60

Matrix: Water

Method: EPA 821-R-18-010 - Alkylated Halogenated Substances

Sample Name	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dilution Factor
1,1,1-Trichloro-2,2,2-trifluoroethane (KAF 10)	94		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 08:07	1
1,1,1-Trichloro-2,2,2-trifluoroethane (KAF 10)	20		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 08:07	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dilution Factor
13C4 PFOA	157	*	25 - 150				01/26/18 13:52	01/27/18 08:07	1
13C4 PFOS	153	*	25 - 150				01/26/18 13:52	01/27/18 08:07	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	PFOA (25-150)	PFOS (25-150)
320-35279-1	MW-1701-35	116	117
320-35279-2	MW-1701-13	140	142
320-35279-3	168688	147	145
320-35279-4	569356	155 *	150
320-35279-5	521779	137	137
320-35279-6	515515	152 *	146
320-35279-7	515615	141	136
320-35279-8	515507	138	139
320-35279-9	515469	142	139
320-35279-10	87416	157 *	153 *
LCS 320-205812/2-A	Lab Control Sample	109	112
LCSD 320-205812/3-A	Lab Control Sample Dup	108	115
MB 320-205812/1-A	Method Blank	107	111
Surrogate Legend			
PFOA = 13C4 PFOA			
PFOS = 13C4 PFOS			

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-205812/1-A

Matrix: Water

Analysis Batch: 205861

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 205812

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		01/26/18 13:52	01/27/18 01:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		01/26/18 13:52	01/27/18 01:05	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹³ C4 PFOA	169		25 - 156				61027018 13/52	61029018 61/65	1
¹³ C4 PFO:	111		25 - 156				61027018 13/52	61029018 61/65	1

Lab Sample ID: LCS 320-205812/2-A

Matrix: Water

Analysis Batch: 205861

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 205812

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorooctanoic acid (PFOA)	20.0	22.1		ng/L		110	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.9		ng/L		97	69 - 144
Isotope Dilution	%Recovery	Qualifier	Limits				
¹³ C4 PFOA	16S		25 - 156				
¹³ C4 PFO:	112		25 - 156				

Lab Sample ID: LCSD 320-205812/3-A

Matrix: Water

Analysis Batch: 205861

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 205812

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	22.9		ng/L		115	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144	1	30
Isotope Dilution	%Recovery	Qualifier	Limits						
¹³ C4 PFOA	168		25 - 156						
¹³ C4 PFO:	115		25 - 156						

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

LCMS

Prep Batch: 205812

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35279-1	MW-1701-35	Total/NA	Water	PFAS Prep	
320-35279-2	MW-1701-13	Total/NA	Water	PFAS Prep	
320-35279-3	168688	Total/NA	Water	PFAS Prep	
320-35279-4	569356	Total/NA	Water	PFAS Prep	
320-35279-5	521779	Total/NA	Water	PFAS Prep	
320-35279-6	515515	Total/NA	Water	PFAS Prep	
320-35279-7	515615	Total/NA	Water	PFAS Prep	
320-35279-8	515507	Total/NA	Water	PFAS Prep	
320-35279-9	515469	Total/NA	Water	PFAS Prep	
320-35279-10	87416	Total/NA	Water	PFAS Prep	
MB 320-205812/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-205812/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-205812/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 205861

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35279-2	MW-1701-13	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-3	168688	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-4	569356	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-5	521779	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-6	515515	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-7	515615	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-8	515507	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-9	515469	Total/NA	Water	WS-LC-0025 At1	205812
320-35279-10	87416	Total/NA	Water	WS-LC-0025 At1	205812
MB 320-205812/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	205812
LCS 320-205812/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	205812
LCSD 320-205812/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	205812

Analysis Batch: 206599

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35279-1	MW-1701-35	Total/NA	Water	WS-LC-0025 At1	205812

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 1 2 908309-4

Date Collected: 3070470/ 0-:4M

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx90

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		100			206599	02/01/18 08:12	CBW	TAL SAC

Client Sample ID: 1 2 908309-

Date Collected: 3070470/ 0N:M

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx9V

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 05:22	TTP	TAL SAC

Client Sample ID: 06/ 6/ /

Date Collected: 3070470/ 06:30

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx9-

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 05:40	TTP	TAL SAC

Client Sample ID: 46x- 46

Date Collected: 3070470/ 08:4/

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx9N

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 05:58	TTP	TAL SAC

Client Sample ID: 4M088x

Date Collected: 3070/ 70/ 04:0-

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx94

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 06:17	TTP	TAL SAC

Client Sample ID: 404404

Date Collected: 3070/ 70/ 04:43

Date Received: 307M 70/ 3x:M

Lab Sample ID: -MB9-4MBx96

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Brepared or PnalTue	PnalTA	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 06:35	TTP	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Client Sample ID: 404604

Date Collected: 3070/ 70/ 06:33

Date Received: 307M 70/ 3x:M4

Lab Sample ID: - MB9-4MBx98

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 06:53	TTP	TAL SAC

Client Sample ID: 404438

Date Collected: 3070x70/ 0N:N3

Date Received: 307M 70/ 3x:M4

Lab Sample ID: - MB9-4MBx97

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 07:30	TTP	TAL SAC

Client Sample ID: 404N6x

Date Collected: 307MM70/ 03:4N

Date Received: 307M 70/ 3x:M4

Lab Sample ID: - MB9-4MBx9x

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 07:48	TTP	TAL SAC

Client Sample ID: / 8N06

Date Collected: 307MM70/ 0N:0x

Date Received: 307M 70/ 3x:M4

Lab Sample ID: - MB9-4MBx903

1 atriW 2 ater

Brep 5Tpe	yatch 5Tpe	yatch 1 ethod	Rsn	Dil zactor	Initial Pmosnt	zinal Pmosnt	yatch Fsmber	Bprepared or PnalTued	PnalTAt	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	205812	01/26/18 13:52	SK	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			205861	01/27/18 08:07	TTP	TAL SAC

LaboratorT ReferenceA:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 j ro/ectySite: Cf Ff TC

TestAmerica Job ID: 320-39241-P

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (a) ST5	State j ro8ram	P0	) ST-099	0P-3P-P7 z
Arizona	State j ro8ram	1	AE0407	07-PP-P7
Arkansas DQ6	State j ro8ram	u	77-0u1P	0u-P4-P7
California	State j ro8ram	1	2714	0P-3P-P1
Colorado	State j ro8ram	7	CA000HH	07-3P-P7
Connecticut	State j ro8ram	P	j G-0u1P	0u-30-P1
Florida	NQwAj	H	Q74940	0u-30-P7
Georgia	State j ro8ram	H	NyA	0P-27-P1
Hawaii	State j ro8ram	1	NyA	0P-21-P1
Illinois	NQwAj	9	2000u0	03-P4-P7
Iowa	NQwAj	4	Q-P0349	P0-3P-P7
Kansas	DoD QwAj		w2Hu7	0P-20-2P
Louisiana	NQwAj	u	30uP2	0u-30-P7
Maine	State j ro8ram	P	CA000H	0H-PH-P7
Maryland	State j ro8ram	9	11H4	0P-3P-P7 z
Massachusetts	State j ro8ram	1	CA000HH	04-3P-P7
Michigan	NQwAj	P	2114	0H-P7-P7
Minnesota	NQwAj	2	CA009	0u-30-P7
Mississippi	NQwAj	2	PPuuu	0H-0P-P7
Missouri	NQwAj	P0	H0H0	0P-21-20
Montana	NQwAj	3	u7-0P242	03-3P-P7
Nevada	NQwAj	u	TP0H40H311	09-3P-P7
New Hampshire	f ekeral		wQPH7377-0	04-3P-P7
New Jersey	f ekeral		j 330-PP-00H3u	0P-P4-2P
New Mexico	f ekeral	P	CA000HH	PP-0u-P7
New York	NQwAj	7	CA000HH	02-27-P7
North Carolina	NQwAj	3	Hu0247	03-PH-P7
North Dakota	State j ro8ram	P0	C97P	09-09-P7
Ohio	State j ro8ram	3	1130C	P2-3P-P7
Oklahoma	State j ro8ram	7	7TY S-w	0P-27-P1

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: CF RFTC

TestAmerica Job ID: 320-35279-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35279-1	MW-1701-35	Water	01/15/18 13:52	01/23/18 09:25
320-35279-2	MW-1701-13	Water	01/15/18 14:29	01/23/18 09:25
320-35279-3	168688	Water	01/15/18 16:01	01/23/18 09:25
320-35279-4	569356	Water	01/15/18 17:58	01/23/18 09:25
320-35279-5	521779	Water	01/18/18 15:13	01/23/18 09:25
320-35279-6	515515	Water	01/18/18 15:50	01/23/18 09:25
320-35279-7	515615	Water	01/18/18 16:00	01/23/18 09:25
320-35279-8	515507	Water	01/19/18 14:40	01/23/18 09:25
320-35279-9	515469	Water	01/22/18 10:54	01/23/18 09:25
320-35279-10	87416	Water	01/22/18 14:19	01/23/18 09:25



SHANNON & WILSON, INC.

Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Page 1 of 1
Laboratory Test America
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative)



320-35279 Chain of Custody

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PRs (PRs + PRs)	LS - LC - 0025												
MW-1701-35		1352	1/15/18	X	X													2	Groundwater
MW-1701-13		1429	1/15/18	X	X													2	
168688		1601	1/15/18	X	X													2	
569356		1758	1/15/18	X	X													2	
521779		1513	1/18/18	X	X													2	
515515		1550	1/18/18	X	X													2	
515615		1600	1/18/18	X	X													2	
515507		1440	1/19/18	X	X													2	
515469		10:54	1/22/18	X	X													2	
87416		14:19	1/22/18	X	X													2	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735-008</u>		Total Number of Containers		Signature: <u>Craig Beebe</u> Time: <u>1500</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>GF RFTC</u>		COC Seals/Intact? Y/N/NA		Printed Name: <u>Craig Beebe</u> Date: <u>1/22/18</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>MDN</u>		Received Good Cond./Cold		Company: <u>Shannon & Wilson, Inc.</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method: <u>Gold Streak</u>		Received By: <u>David Her</u> Time: <u>9:25</u>		Received By: 2.		Received By: 3.	
Sampler: <u>CAB</u>		(attach shipping bill, if any)		Printed Name: <u>David Her</u> Date: <u>1/23/18</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Instructions				Company: <u>TH - Sgc</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Requested Turnaround Time: <u>Standard</u>				Company: _____		Company: _____		Company: _____	
Special Instructions: <u>Please Bill To:</u> <u>31-1-11735-008</u>									
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-35279-1

Login Number: 35279

List Source: TestAmerica Sacramento

List Number: 1

Creator: Hytrek, Cheryl

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
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 $<6\text{mm}$ (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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 15, 2018

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

February 6, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35279-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☒ Yes ☐ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 3.2° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-205812.

The case narrative notes that the project samples included in this work order contained sediment.

The case narrative also notes isotope dilution analyte (IDA) recovery failures associated with samples 569356, 515515, and 87416.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

The laboratory notes that quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

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

Comments:

The case narrative does not specify an effect on data quality or usability. See section 6 below for assessment regarding IDA recovery failures.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability are not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in the MB.

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

☒ Yes ☐ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☐ Yes ☒ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☐ Yes ☒ No

Comments:

IDA ¹³C₄ PFOA was recovered outside QC limits for samples 569356 and 515515. IDAs ¹³C₄ PFOA and ¹³C₄ PFOS were recovered outside QC limits for sample 87416.

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

☒ Yes ☐ No

Comments:

The project sample analytes associated with the IDA recovery failure are considered estimated, with no direction of bias. The results are flagged 'J'.

iv. Data quality or usability affected?

Comments:

Yes; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

- 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

Comments:

N/A; a trip blank is not required.

- iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

N/A; a trip blank is not required.

- iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

- v. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

Field-duplicate pair 515515/515615 were submitted with this work order.

- ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

- iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

RPDs for the field-duplicate sample results were below DQOs.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

The sample included in this work order was not collected using reusable equipment. Therefore, an equipment blank sample was not submitted with this work order.

i. All results less than LOQ?

☐ Yes ☒ No

Comments:

N/A; an equipment blank was not required.

ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not required.

iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

a. Defined and appropriate?

☐ Yes ☒ No

Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-35503-1
Client Project/Site: CoF RFTC

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

Attn: Marcy Nadel



Authorized for release by:
2/12/2018 12:31:26 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?

 **Ask
The
Expert**

Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Sample Summary	13
Chain of Custody	14
Receipt Checklists	15

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Job ID: 320-35503-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-35503-1

Receipt

The sample was received on 1/30/2018 8:57 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.4° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-207323.

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: CoF RFTC

TestAmerica Job ID: 320-35503-1

Client Sample ID: 51057L

ba3 Sample ID: 2-682776285

Analyte	Result	Qualifier	Rb	MDb	Unit	Dil	Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	5.6		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	17		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Client Sample ID: 168157

Date Collected: 01/25/18 09:32

Date Received: 01/30/18 08:57

Lab Sample ID: 320-35503-1

Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	5.6		2.0	0.75	ng/L		02/07/18 09:29	02/07/18 21:17	1
Perfluorooctanesulfonic acid (PFOS)	17		2.0	1.3	ng/L		02/07/18 09:29	02/07/18 21:17	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	164		92 5126				69-60-18 6/ 79/	69-60-18 9170	1
13C4 PFO:	11S		92 5126				69-60-18 6/ 79/	69-60-18 9170	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	PFOA (25-150)	PFOS (25-150)
320-35503-1	168157	104	116
LCS 320-207323/2-A	Lab Control Sample	93	111
LCSD 320-207323/3-A	Lab Control Sample Dup	96	113
MB 320-207323/1-A	Method Blank	94	112

Surrogate Legend

PFOA = 13C4 PFOA

PFOS = 13C4 PFOS

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-207323/1-A

Matrix: Water

Analysis Batch: 207369

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 207323

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		02/07/18 09:29	02/07/18 14:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		02/07/18 09:29	02/07/18 14:15	1
Isotope Dilution	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	64		92 512-				- 90 801/ - 6796	- 90 801/ 14712	1
13C4 PFO:	119		92 512-				- 90 801/ - 6796	- 90 801/ 14712	1

Lab Sample ID: LCS 320-207323/2-A

Matrix: Water

Analysis Batch: 207369

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 207323

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits	%Rec.
Perfluorooctanoic acid (PFOA)	20.0	20.3		ng/L		101	70 - 140	
Perfluorooctanesulfonic acid (PFOS)	18.6	17.3		ng/L		93	69 - 144	
Isotope Dilution	%Recovery	LCS Qualifier	Limits					
13C4 PFOA	63		92 512-					
13C4 PFO:	111		92 512-					

Lab Sample ID: LCSD 320-207323/3-A

Matrix: Water

Analysis Batch: 207369

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 207323

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluorooctanoic acid (PFOA)	20.0	20.5		ng/L		103	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.9		ng/L		96	69 - 144	3	30
Isotope Dilution	%Recovery	LCSD Qualifier	Limits						
13C4 PFOA	6S		92 512-						
13C4 PFO:	113		92 512-						

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

LCMS

Prep Batch: 207323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35503-1	168157	Total/NA	Water	PFAS Prep	
MB 320-207323/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-207323/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-207323/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 207369

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35503-1	168157	Total/NA	Water	WS-LC-0025 At1	207323
MB 320-207323/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	207323
LCS 320-207323/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	207323
LCSD 320-207323/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	207323

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Client Sample ID: MW M50

Date Collecte/ : 2MB51M 26:73

Date Receive/ : 2M721M 2- :50

Lab Sample ID: 7329755279V

8 atrix: d ater

Prep Type	Batch Type	Batch 8 etho/	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepare/ or Analyze/	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	207323	02/07/18 09:29	CBW	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			207369	02/07/18 21:17	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 1 roectjSite: Co/ y/ TC

TestAmerica Job ID: 320-39903-4

Laboratory: TestAmerica Sacramento

All accref itationsjcertifications helf bk this laboratork are listef g d ot all accref itationsjcertifications are a. . llicable to this re. ortg

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasNa p STU	State 1 ro5ram	40	4) -020	04-20-24
Ari8ona	State 1 ro5ram	7	Az0) 0Z	0Z-44-4Z
ArNansas DEQ	State 1 ro5ram	6	ZZ-0674	06-4) -4Z
Califørnia	State 1 ro5ram	7	2Z7)	04-34-47
Coloraf o	State 1 ro5ram	Z	CA000uu	0Z-34-4Z
Connectich	State 1 ro5ram	4	1L-0674	06-30-47
/ lorif a	d EGA1	u	EZ) 9) 0	06-30-4Z
weor5ia	State 1 ro5ram	u	djA	04-2Z-47
L aKaii	State 1 ro5ram	7	djA	04-27-47
Illinois	d EGA1	9	200060	03-4) -4Z
Bansas	d EGA1	)	E-403) 9	40-34-4Z
GA-M	DoD EGA1		Q2u6Z	04-20-24
GoHsiana	d EGA1	6	30642	06-30-4Z
v aine	State 1 ro5ram	4	CA000u	0u-4u-4Z
v ichi5an	State 1 ro5ram	9	77u)	04-34-4Z Y
d eQaf a	State 1 ro5ram	7	CA000uu	0) -34-4Z
d eK Lam. shire	d EGA1	4	277)	0u-4Z-4Z
d eK Jersek	d EGA1	2	CA009	06-30-4Z
d eK x orN	d EGA1	2	44666	0u-04-4Z
Rre5on	d EGA1	40	u0u0	04-27-47
1 ennskI Qania	d EGA1	3	6Z-042) 2	03-34-4Z
TeVas	d EGA1	6	T40u) 0u377	09-34-4Z
(S / ish & Wilf lifē	/ ef eral		QE4uZ3ZZ-0	0) -34-4Z
(SDA	/ ef eral		1330-44-00u36	04-4) -24
(SE1A (Cv y	/ ef eral	4	CA000uu	44-06-4Z
(tah	d EGA1	Z	CA000uu	02-2Z-4Z
* ir5inia	d EGA1	3	u602) Z	03-4u-4Z
Washin5ton	State 1 ro5ram	40	C9Z4	09-09-4Z
West * ir5inia pDWU	State 1 ro5ram	3	7730C	42-34-4Z
Wkomin5	State 1 ro5ram	Z	ZTv S-G	04-2Z-47

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

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

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF RFTC

TestAmerica Job ID: 320-35503-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35503-1	168157	Water	01/25/18 09:32	01/30/18 08:57

2

3

4

5

6

7

8

9

10

12

13

14

15



SHANNON & WILSON, INC.

Geotechnical and Environmental Consultants

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

CHAIN-OF-CUSTODY RECORD

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

Laboratory Test America Page 1 of 1
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	PFCS (PFOs + PFOA)	Total Number of Containers	Remarks/Matrix
168157		0932	1/25/18	X	X		2	Groundwater
168257		0942	1/25/18	X	X		2	Groundwater

Project Information Project Number: <u>31-1-11735-008</u> Project Name: <u>CoF RFTC</u> Contact: <u>MDN</u> Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Sampler: <u>CAB</u>		Sample Receipt Total Number of Containers: <u> </u> COC Seals/Intact? Y/N/NA: <u> </u> Received Good Cond./Cold: <u> </u> Delivery Method: <u>Gold Streak</u> (attach shipping bill, if any)		Relinquished By: 1. Signature: <u>Craig Boebe</u> Time: <u>1615</u> Printed Name: <u>Craig Boebe</u> Date: <u>1/29/18</u> Company: <u>Shannon & Wilson, Inc.</u>		Relinquished By: 2. Signature: <u> </u> Time: <u> </u> Printed Name: <u> </u> Date: <u> </u> Company: <u> </u>		Relinquished By: 3. Signature: <u> </u> Time: <u> </u> Printed Name: <u> </u> Date: <u> </u> Company: <u> </u>	
Instructions Requested Turnaround Time: <u>Standard</u> Special Instructions: <u>Please bill to: 31-1-11735-008</u>				Received By: 1. Signature: <u>David H</u> Time: <u>0857</u> Printed Name: <u>David H</u> Date: <u>1/30/18</u> Company: <u>TA-Sac</u>		Received By: 2. Signature: <u> </u> Time: <u> </u> Printed Name: <u> </u> Date: <u> </u> Company: <u> </u>		Received By: 3. Signature: <u> </u> Time: <u> </u> Printed Name: <u> </u> Date: <u> </u> Company: <u> </u>	

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



320-35503 Chain of Custody

5.4

No. 34824



Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-39903-1

Login Number: 35503

List Source: TestAmerica Sacramento

List Number: 1

Creator: Turpen, Troy

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	
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	Gel Oack
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
CF C is present.	True	
CF C is filled out in ink and legible.	True	
CF C is filled out with all pertinent information.	True	
Is the Field Sampler's name present on CF CH	True	
There are no discrepancies between the containers received and the CF C.	True	
Samples are received within (Holding Time) including tests with immediate (TsP	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 x1/4"P.	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:

Kristen Freiburger

Title:

Senior Chemist

Date:

February 15, 2018

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

February 12, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-35503-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☒ Yes ☐ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes ☐ No

Comments:

- b. Correct Analyses requested?

☒ Yes ☐ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes ☐ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 5.4° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-207323.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates that the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability are not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in the MB.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☒ Yes ☐ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☐ Yes ☒ No

Comments:

iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

Field-duplicate samples were not submitted with this work order; however, they have been submitted at the proper frequency for the overall project.

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

N/A; see above.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; see above.

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

Comments:

The data quality and usability were not affected.

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

☐ Yes ☐ No ☒ Not Applicable

The sample included in this work order was not collected using reusable equipment. Therefore, an equipment blank sample was not submitted with this work order.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not required.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not required.

- iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 320-36306-1
Client Project/Site: CoF - RFTC

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

Attn: Marcy Nadel



Authorized for release by:
3/7/2018 9:12:47 AM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?

**Ask
The
Expert**

Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAP and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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	7
QC Sample Results	8
QC Association Summary	10
Lab Chronicle	11
Certification Summary	12
Method Summary	13
Sample Summary	14
Chain of Custody	15
Receipt Checklists	16

Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Case Narrative

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Job ID: 320-36306-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-36306-1

Receipt

The sample was received on 2/22/2018 9:40 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-210973.

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: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Client Sample ID: 168181

Lab Sample ID: 320-36306-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	13		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	72		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	21		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	56		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	58		2.0	0.65	ng/L	1			WS-LC-0025 At1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Client Sample ID: 168181

Date Collected: 02/21/18 13:20

Date Received: 02/22/18 09:40

Lab Sample ID: 320-36306-1

Matrix: Water

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	13		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 22:45	1
Perfluorohexanesulfonic acid (PFHxS)	72		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 22:45	1
Perfluoroheptanoic acid (PFHpA)	11		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 22:45	1
Perfluorooctanoic acid (PFOA)	21		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 22:45	1
Perfluorooctanesulfonic acid (PFOS)	56		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 22:45	1
Perfluorononanoic acid (PFNA)	58		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 22:45	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	100		25 - 150				09/02/18 19795	09/02/18 22745	1
19: 4-PFH3C	120		25 - 150				09/02/18 19795	09/02/18 22745	1
19: 4 PFOC	p5		25 - 150				09/02/18 19795	09/02/18 22745	1
19: 4 PFOS	8A		25 - 150				09/02/18 19795	09/02/18 22745	1
19: 5 PFNC	109		25 - 150				09/02/18 19795	09/02/18 22745	1

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-36306-1	168181	100	120	95	87	103
LCS 320-210973/2-A	Lab Control Sample	102	114	92	98	97
LCSD 320-210973/3-A	Lab Control Sample Dup	96	117	88	90	96
MB 320-210973/1-A	Method Blank	96	116	91	92	98

Surrogate Legend

PFHxS = 18O2 PFHxS

PFHpA = 13C4-PFHpA

PFOA = 13C4 PFOA

PFOS = 13C4 PFOS

PFNA = 13C5 PFNA

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-210973/1-A

Matrix: Water

Analysis Batch: 211104

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 210973

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		03/02/18 13:35	03/02/18 20:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		03/02/18 13:35	03/02/18 20:54	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA8	25		4- 01- 7	7/ 6/46/3 1/ :-	7/ 6/46/3 47:- S	1
1/ 9 SPFOHx	115		4- 01- 7	7/ 6/46/3 1/ :-	7/ 6/46/3 47:- S	1
1/ 9 SPFCx	21		4- 01- 7	7/ 6/46/3 1/ :-	7/ 6/46/3 47:- S	1
1/ 9 SPFC8	24		4- 01- 7	7/ 6/46/3 1/ :-	7/ 6/46/3 47:- S	1
1/ 9- PFpx	23		4- 01- 7	7/ 6/46/3 1/ :-	7/ 6/46/3 47:- S	1

Lab Sample ID: LCS 320-210973/2-A

Matrix: Water

Analysis Batch: 211104

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 210973

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.8		ng/L		101	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.0		ng/L		99	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.9		ng/L		100	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	21.2		ng/L		106	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	18.3		ng/L		98	69 - 144
Perfluorononanoic acid (PFNA)	20.0	20.9		ng/L		105	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA8	174		4- 01- 7
1/ 9 SPFOHx	115		4- 01- 7
1/ 9 SPFCx	24		4- 01- 7
1/ 9 SPFC8	23		4- 01- 7
1/ 9- PFpx	2N		4- 01- 7

Lab Sample ID: LCSD 320-210973/3-A

Matrix: Water

Analysis Batch: 211104

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 210973

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.5		ng/L		105	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.6		ng/L		102	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.2		ng/L		101	71 - 138	1	30
Perfluorooctanoic acid (PFOA)	20.0	21.8		ng/L		109	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	19.3		ng/L		104	69 - 144	5	30
Perfluorononanoic acid (PFNA)	20.0	21.4		ng/L		107	73 - 147	2	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

<i>Isotope Dilution</i>	<i>LCSD</i>	<i>LCSD</i>	<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>13C4 PFOA8</i>	25		4- 01- 7
<i>1/ 9 SPFOHx</i>	11N		4- 01- 7
<i>1/ 9 SPFCx</i>	33		4- 01- 7
<i>1/ 9 SPFC8</i>	27		4- 01- 7
<i>1/ 9- PFpx</i>	25		4- 01- 7

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

LCMS

Prep Batch: 210973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36306-1	168181	Total/NA	Water	PFAS Prep	
MB 320-210973/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-210973/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-210973/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 211104

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36306-1	168181	Total/NA	Water	WS-LC-0025 At1	210973
MB 320-210973/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	210973
LCS 320-210973/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	210973
LCSD 320-210973/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	210973

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Client Sample ID: 168181

Date Collected: 02/21/18 13:20

Date Received: 02/22/18 09:40

Lab Sample ID: 320-36306-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PFAS Prep			1.00 mL	1.66 mL	210973	03/02/18 13:35	ABH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			211104	03/02/18 22:45	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
 1 roectjSite: Co/ - y / TC

TestAmerica Job ID: 320-39309-4

Laboratory: TestAmerica Sacramento

All accref itationsjcertifications helf bk this laboratork are listef g d ot all accref itationsjcertifications are a. . licable to this re. ortg

Authority	Program	EPA Region	Identification Number	Expiration Date
AlasNa p STU	State 1 ro5ram	40	4) -020	04-20-24
Ari8ona	State 1 ro5ram	7	Az0) 0Z	0Z-44-4Z
ArNansas DEQ	State 1 ro5ram	9	ZZ-0974	09-4) -4Z
Califørnia	State 1 ro5ram	7	2Z7)	04-34-47
Coloraf o	State 1 ro5ram	Z	CA00066	0Z-34-4Z
Connecticut	State 1 ro5ram	4	1H-0974	09-30-47
/ lorif a	d ELA1	6	EZ) G) 0	09-30-4Z
weor5ia	State 1 ro5ram	6	djA	04-2Z-47
HaKaai	State 1 ro5ram	7	djA	04-27-47
Illinois	d ELA1	G	200090	03-4) -4Z
Bansas	d ELA1	)	E-403) G	40-34-4Z
L-A-M	DoD ELA1		L269Z	04-20-24
Louisiana	d ELA1	9	30942	09-30-4Z
v aine	State 1 ro5ram	4	CA0006	06-46-4Z
v ichi5an	State 1 ro5ram	G	776)	04-34-4Z Y
d eQaf a	State 1 ro5ram	7	CA00066	0) -34-4Z
d eK Ham. shire	d ELA1	4	277)	06-4Z-4Z
d eK Jersek	d ELA1	2	CA00G	09-30-4Z
d eK xorN	d ELA1	2	44999	06-04-4Z
Rre5on	d ELA1	40	6060	04-27-47
1 ennskI Qania	d ELA1	3	9Z-042) 2	03-34-4Z
TeVas	d ELA1	9	T406) 06377	0G-34-4Z
(S / ish & Wilf lifē	/ ef eral		LE46Z3ZZ-0	0) -34-4Z
(SDA	/ ef eral		1330-44-00639	04-4) -24
(SE1A (Cv y	/ ef eral	4	CA00066	44-09-4Z
(tah	d ELA1	Z	CA00066	02-2Z-4Z Y
* ir5inia	d ELA1	3	6902) Z	03-46-4Z
Washin5ton	State 1 ro5ram	40	CGZ4	0G0G4Z
West * ir5inia pDWU	State 1 ro5ram	3	7730C	42-34-4Z
Wkomin5	State 1 ro5ram	Z	ZTv S-L	04-2Z-47

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-35305-1

Method	Method Description	Protocol	Laboratory
WS-LC-002u At1	Fidoriante Aly= Sdbstances	TAL-SAC	TAL SAC

Protocol References:

TAL-SAC OTestAmerica Laboratories, West Sacramento, Facilit= Stankark p geratin. Procekdre8

Laboratory References:

TAL SAC OTestAmerica Sacramento, vv0 Riversike Pary9 a=, West Sacramento, CA 6u50u, TEL (615)373-u500

Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: CoF - RFTC

TestAmerica Job ID: 320-36306-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36306-1	168181	Water	02/21/18 13:20	02/22/18 09:40

2

3

4

5

6

7

8

9

10

12

13

14

15

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

2043 Westport Center Drive
St. Louis, MO 63146-3564
(314) 699-9660

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

1321 Bannock Street, Suite 200
Denver, CO 80204
(303) 825-3800

2705 Saint Andrews Loop, Suite A
Pasco, WA 99301-3378
(509) 946-6309

CHAIN-OF-CUSTODY RECORD

Laboratory Test America Page 1 of 1
Attn: David Alltucker

Analysis Parameters/Sample Container Description
(include preservative if used)

[illegible]

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>31-1-11735</u>	Total Number of Containers: <u>2</u>	COC Seals/Intact? Y/N/NA		Signature: <u>Craig Beebe</u>	Time: <u>14:10</u>	Signature: _____	Time: _____	Signature: _____	Time: _____
Project Name: <u>CoF - RFTC</u>	Received <u>Good Cond./Cold</u>	Delivery Method: <u>Gold Streak</u>		Printed Name: <u>Craig Beebe</u>	Date: <u>2/21/18</u>	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
Contact: <u>MDN</u>	Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Sampler: <u>CAB</u>		Company: <u>Shannon & Wilson, Inc</u>		Company: _____		Company: _____	
Instructions		Requested Turnaround Time: <u>Standard</u>		Received By: 1.		Received By: 2.		Received By: 3.	
Special Instructions: <u>Please bill to:</u>		Signature: _____		Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: _____	Time: _____
<u>31-1-1175-008</u> <u>CAB</u> <u>31-1-11735-008</u>		Printed Name: _____		Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report		Company: _____		Company: _____		Company: _____		Company: _____	
Yellow - w/shipment - for consignee files		Signature: <u>Troy G. Turpin</u>		Signature: _____		Signature: _____		Signature: _____	
		Date: <u>2/22/18</u>		Date: _____		Date: _____		Date: _____	
		Company: <u>TA-SAC</u>		Company: _____		Company: _____		Company: _____	

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-36306-1

Login Number: 36306

List Source: TestAmerica Sacramento

List Number: 1

Creator: Gooch, Mayce

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	
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	Gel Packs
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:

Kristen Freiburger

Title:

Senior Chemist

Date:

March 7, 2018

CS Report Name:

City of Fairbanks Fire Training Area

Report Date:

March 7, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-36306-1

ADEC File Number:

102.38.182

Hazard Identification Number:

26309

1. Laboratory

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

☒ Yes☒ No

Comments:

ADEC has not approved an analytical laboratory for analysis of PFCs. However, the laboratory is certified for perfluorinated alkyl acids in drinking water analysis by the National Environmental Laboratory Accreditation Program (NELAP) in Oregon.

- 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

Comments:

Analysis were performed by TestAmerica Laboratories, Inc. in West Sacramento, CA.

2. Chain of Custody (CoC)

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

☒ Yes☒ No

Comments:

- b. Correct Analyses requested?

☒ Yes☒ No

Comments:

3. Laboratory Sample Receipt Documentation

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

☒ Yes☒ No

Comments:

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

☒ Yes☒ No

Comments:

Analysis of PFCs does not require a preservative other than temperature control.

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

☒ Yes☒ No

Comments:

The sample receipt form notes that the samples were received in good condition.

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

☒ Yes ☐ No

Comments:

There were no discrepancies identified in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

The data quality and usability were unaffected; see above.

4. Case Narrative

- a. Present and understandable?

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

The case narrative notes the samples arrived in good condition, properly preserved, and that the temperature of the sample cooler upon receipt at the laboratory was 1.2° C.

The case narrative notes that there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-210973.

- c. Were all corrective actions documented?

☒ Yes ☐ No

Comments:

A laboratory control sample (LCS) and a LCS duplicate (LCSD) were extracted with each preparation and analysis batch to demonstrate analytical method accuracy and precision.

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

Comments:

The case narrative does not specify an effect on data quality or usability.

5. Samples Results

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

☒ Yes ☐ No

Comments:

b. All applicable holding times met?

☒ Yes ☐ No

Comments:

The laboratory indicates the water samples were analyzed using direct injection and in-line analysis. The 28-day hold time for analysis using direct aqueous injection (DAI) was met.

c. All soils reported on a dry weight basis?

☐ Yes ☒ No

Comments:

N/A; soil samples were not submitted with this work order.

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

☒ Yes ☐ No

Comments:

The LOQ, equivalent to the TestAmerica Reporting Limit (RL), is less than applicable EPA lifetime drinking water health advisory levels and ADEC groundwater cleanup levels for PFOS and PFOA.

e. Data quality or usability affected?

☐ Yes ☒ No

Comments:

The data quality and usability are not affected.

6. QC Samples

a. Method Blank

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

☒ Yes ☐ No

Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

☒ Yes ☐ No

Comments:

iii. If above LOQ, what samples are affected?

Comments:

None; PFCs were not detected in the MB.

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

☐ Yes ☒ No

Comments:

Qualification of the results was not required; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

Metals and 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 DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☒ Yes ☐ No

Comments:

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

Comments:

None; analytical accuracy and precision are within acceptable limits.

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

☒ Yes ☐ No

Comments:

Qualification of the data was not required; see above.

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

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

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

☒ Yes ☐ No

Comments:

The analytical method WS-LC-0025 uses IDA recovery, which entails adding a ¹³C-isotope of each target analyte and assessing the recovery of each analyte. The isotopically-labeled compounds are discussed as surrogates for this method.

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

☒ Yes ☐ No

Comments:

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

☒ Yes ☐ No

Comments:

N/A; see above.

iv. Data quality or usability affected?

Comments:

No; see above.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

☐ Yes ☒ No

Comments:

PFCs are not volatile compounds so a trip blank is not required.

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

Comments:

N/A; a trip blank is not required.

iii. All results less than LOQ?

☒ Yes ☐ No

Comments:

N/A; a trip blank is not required.

iv. If above LOQ, what samples are affected?

Comments:

None; a trip blank was not submitted with this work order.

v. Data quality or usability affected?

Comments:

The data quality and usability are not affected; see above.

e. Field Duplicate

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

☒ Yes ☐ No

Comments:

A field-duplicate pair was not submitted with this work order; however, they have been submitted at the proper frequency for the overall project.

ii. Submitted blind to lab?

☒ Yes ☐ No

Comments:

N/A; see above.

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(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

Comments:

N/A; see above.

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

Comments:

N/A; see above.

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

☐ Yes ☐ No ☒ Not Applicable

The sample included in this work order was not collected using reusable equipment. Therefore, an equipment blank sample was not submitted with this work order.

- i. All results less than LOQ?

☐ Yes ☒ No Comments:

N/A; an equipment blank was not required.

- ii. If above LOQ, what samples are affected?

Comments:

N/A; an equipment blank was not required.

- iii. Data quality or usability affected?

Comments:

The data quality and usability are not affected.

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

- a. Defined and appropriate?

☐ Yes ☒ No Comments:

No other data flags and/or qualifiers were required.

APPENDIX F
***IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT***



Date: April 2018
To: Mr. Andrew Ackerman, City of Fairbanks
Re: July 2017-Feb 2018 Private Well
Sampling Report, Regional Fire Training
Center, Fairbanks, AK

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

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