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Administration's Division of
Risk Management
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SUMMARY REPORT
August 2018 to November 2018
Private Well Sampling - Revision 1
GUSTAVUS, ALASKA



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Submitted To: Alaska Department of Administration's Division of Risk Management
333 Willoughby Avenue
Juneau, Alaska 99807
Attn: Contact Name

Subject: SUMMARY REPORT, AUGUST 2018 TO NOVEMBER 2018 PRIVATE WELL
SAMPLING - REVISION 1, GUSTAVUS, ALASKA

Shannon & Wilson prepared this report and participated in this project as a consultant to Alaska Department of Transportation and Public Facilities (DOT&PF) and Alaska Department of Administration's Division of Risk Management (DRM). Our scope of services was specified in our letter titled *Confirmation of Authorization to Proceed with Environmental Support Services, Gustavus Airport PFAS Assessment, Gustavus, Alaska* with Alaska Department of Administration Division of Risk Management dated August 23, 2018. This report presents a summary of our services from August 2018 through December 2018 and was prepared by the undersigned.

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

Sincerely,

SHANNON & WILSON, INC.


Digitally signed by Craig
Alan Beebe
Date: 2019.05.07 15:51:35
-08'00'

Craig Beebe

Geologist

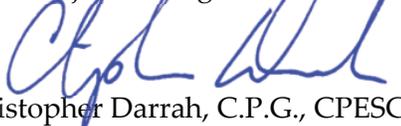
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ACRONYMS

AAC	Alaska Administrative Code
AFFF	aqueous film-forming foam
bgs	below ground surface
°C	degrees Celsius
cfs	cubic feet per second
COC	chain of custody
DEC	Alaska Department of Environmental Conservation
DHSS	Alaska Department of Health and Social Services
DNR	Alaska Department of Natural Resources
DOA	Alaska Department of Administration
DOT&PF	Alaska Department of Environmental Conservation
DRM	Alaska Department of Administration Division of Risk Management
EPA	U.S. Environmental Protection Agency
GST	Gustavus Airport Terminal
LHA	Lifetime Health Advisory
ng/L	nanograms per liter
NPS	National Park Service
PFAS	per- and polyfluoroalkyl substance
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFNA	perfluorononanoic acid
POE	point of entry
ppt	parts per trillion
QA	quality assurance
QC	quality control
SGS	SGS North America, Inc.
TestAmerica	TestAmerica Laboratories, Inc.
UCMR	Unregulated Contaminant Monitoring Rule
USGS	U.S. Geological Survey
WELTS	Well Log Tracking System
WO	work order
YSI	multiprobe water quality meter

1 INTRODUCTION

Shannon & Wilson, Inc. has prepared this report to document our well-search and private-well sampling effort near the Gustavus Airport (GST) in Gustavus, Alaska. This report covers August 2018 to December 2018 for the ongoing project. The GST is an active, Alaska Department of Environmental Conservation (DEC) listed contaminated site due to the presence of per- and polyfluoroalkyl substances (PFASs) in groundwater and surface water (File Number 1507.38.017, Hazard ID 26904).

This report was prepared for the Alaska Department of Administration's Division of Risk Management (DRM). A copy has also been submitted to the Alaska Department of Transportation & Public Facilities (DOT&PF) in accordance with the terms and conditions of our contract with DOT&PF, relevant DEC guidance documents, and 18 Alaska Administrative Code (AAC) 75.335.

1.1 Purpose and Objectives

The purpose of the services described in this report was to evaluate the potential for human exposure to PFAS-containing water in private water-supply wells. Our objectives were to identify private water-supply wells in neighborhoods near the Gustavus Airport and collect private-well samples from the well search areas. The well search areas are shown in Figure 1, Well Search Extent.

1.2 Background

The GST terminal is located at 1 Airport Way in Gustavus, Alaska. The property is owned by the DOT&PF, who also owns multiple adjacent parcels. The geographic coordinates of the GST terminal are latitude 58.4252778, longitude -135.7074167.

The DOT&PF Crash and Fire Rescue program used aqueous film-forming foam (AFFF) for training, systems testing, and emergency response at the GST for many years. Areas of potential use include the DOT&PF Crash and Fire Rescue building, near the intersection of runways one and two and near the end of runway one on the southeast side (Figure 1, Well Search Extent). The precise timeline and locations of AFFF use at the GST is unknown.

AFFF contains PFASs, a category of persistent organic compounds considered emerging contaminants. Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are two PFASs 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 U.S. Environmental Protection Agency (EPA) published a Lifetime Health Advisory (LHA) level for PFOS and PFOA in drinking water in May 2016. The DEC Contaminated Sites Program published groundwater-cleanup levels for PFOS and PFOA in November 2016. Prior to the publication of these levels, there were no state-level cleanup levels established for PFAS. On August 20, 2018, the DEC published a Technical Memorandum outlining new action levels for PFAS in water. The action levels proposed in the Technical Memorandum have been submitted as proposed regulation; the regulations are still pending at this time. However, statewide projects have adopted the proposed regulatory action levels. These action levels for PFAS are summarized in Section 1.4, Contaminants of Concern and Regulatory Levels.

In March 14, 2018 DEC requested DOT&PF collect PFAS samples during the next groundwater sampling event from monitoring wells already being monitored for petroleum contamination. On June 27, 2018, DOT&PF sampled the airport terminal well and the National Park Service (NPS) Water System well for the presence of PFAS. The analytical results were received on July 30, 2018. The airport terminal well had levels of PFAS exceeding both the EPA's health advisory levels and the DEC proposed action levels. The NPS well had detections of several PFAS but were below the EPA's health advisory levels and the DEC proposed action levels.

DOT&PF and DRM contacted Shannon & Wilson regarding the Gustavus results. In an email from Scott Jordan on August 14, 2018, we received confirmation to proceed with collecting samples in Gustavus. We provided DRM with a document titled 'Confirmation of Authorization to Proceed with Environmental Support Services, Gustavus Airport PFAS Assessment, Gustavus, Alaska' on August 23, 2018. We began the private-well search and sampling efforts described herein on August 27, 2019.

1.3 Geology and Hydrology

The GST sampling area lies in a glacial outwash plain. The plain is bounded by the Chilkat Mountain Range to the northeast, Glacier Bay to the northwest and Icy Strait to the south. Fluvial deposits are found with increasing frequency near the shoreline. Due to a high rate of glacial isostatic rebound, higher concentrations of silt are also observed closer to the shoreline.

Our knowledge of hydrology in the sampling area is limited and we were unable to obtain well-drilling or -construction logs for the private wells sampled in Gustavus. Bruce Smith was responsible for drilling large portion of the drinking-water wells in Gustavus. According to Mr. Smith, wells in the area range between ten and forty feet below ground surface (bgs). Through most of the town, sand is found for the first twenty to forty feet bgs,

followed by a clay layer of unknown thickness. Gravel lenses are found intermittently throughout the layer of sand.

1.4 Contaminants of Concern and Action Levels

The primary contaminants of concern are PFOS, PFOA, perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and perfluorobutanesulfonic acid (PFBS).

On August 20, 2018, DEC published a Technical Memorandum describing a new state action level for PFAS in drinking water. The action level is 70 parts per trillion (ppt) for the sum of five compounds: PFOS, PFOA, PFHpA, PFHxS, and PFNA. Following DEC guidance, we consider combined concentrations greater than or equal to 65 ppt to be exceedances of the action level. Additionally, the Technical Memorandum set an action level of 2,000 ppt for PFBS. On October 1, 2018, DEC issued proposed PFAS groundwater-cleanup levels that match the Technical Memorandum action levels. The current drinking-water action levels based on the technical memorandum and the current groundwater cleanup levels for PFOS and PFOA are summarized below in Exhibit 1-1.

Exhibit 1-1: Applicable Regulatory and Action Levels

Media	Compound	Level
Drinking water	PFOS + PFOA + PFHpA + PFHxS + PFNA	70 ppt
Drinking water	PFBS	2,000 ppt
Groundwater	PFOS	400 ppt
Groundwater	PFOA	400 ppt

Notes:

- 1 Drinking-water action levels are reported in ug/L in DEC Technical Memorandum. Results are compared to 65 ppt.
- 2 DEC groundwater-cleanup level is reported in micrograms per liter (ug/L) in Table C in 18 AAC 75.345, Table C.

1.5 Scope of Services

Our scope of services summarized in this report includes private well searches, sampling efforts in seven geographic search areas (Figure 1, Well Search Extent), and public-outreach support. Our purpose was to evaluate the potential for human exposure to PFAS-containing water in private wells near GST. The objective was to identify private wells in the sampling area and collect water samples. Please note this project is ongoing; planned future work is summarized in Section 4.4.

This report summarizes well search and sampling efforts performed between August 2018 and December 2018. Our well search sought to identify private wells, well use, and well details, where available. The initial well search included Areas 1 and 3 (Figure 1). In September and October/November 2018, we expanded our well search/sample area to include Areas 3 through 5, followed by Areas 6 and 7 (Figure 1). This report also includes data from a sampling event in December 2018 conducted for Barr Engineering for purposes of designing point-of-entry (POE) systems. POE design will not be discussed in this report.

This report was prepared for the exclusive use of the DRM and DOT&PF and its representatives. This work presents our professional judgment as to the conditions of 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 it was performed.

2 FIELD ACTIVITIES

This section summarizes activities performed between August 27, 2018 and December 9, 2018.

2.1 Well Search

The private well search began by obtaining an Autocad® file from DOT&PF that included geographical locations of parcels in Gustavus, Alaska. This Autocad® file was converted into a shapefile and used in tandem with available satellite imagery to identify possible structures prior to arriving in Gustavus. We also referenced the Alaska Department of

Natural Resources (DNR) Well Log Tracking System (WELTS) and subsurface water rights files listed on the DNR Water Estate Map.

We visited each parcel in the defined door-to-door well search areas (Figure 1) to ascertain if a well was present. We made a reasonable attempt to contact each owner or occupant in the search areas. If occupants were not present at the time we visited the property, we left a personalized door tag with information about how to contact a Shannon & Wilson representative. We also used public telephone and business records, made multiple visits to the property, and/or asked neighbors for information. Additionally, we spoke with local DOT&PF representative, Jeff Jarvis, regarding DOT&PF GST lease properties.

For the purposes of this project, a private well is defined as a privately-owned water-supply well. Please note this definition of private well does not match the DEC Drinking Water Program regularity classification of a private water system, "a potable water system serving one single-family residence or duplex" (18 AAC 80, 2014).

We completed a *Private Well Inventory Survey Form* for each identified private well. A copy of each completed Survey Form is included in Appendix A, Field Notes. We used this information to designate a well category based on use.

- Category 1: wells used for drinking or cooking, as reported by owners or occupants.
- Category 2: wells used for dish washing and other domestic purposes.
- Category 3: wells used for vegetable-garden irrigation and are not plumbed to indoor faucets or spigots. The well water is accessed by outdoor plumbing, but the well may be located underneath or inside the structure. These wells are considered non-drinking-water wells.
- Category 4: wells used for outdoor purposes only, such as irrigation of lawns or non-vegetable gardens or vehicle washing. These wells are considered non-drinking-water wells.
- Category 5: wells currently not in use. Wells that have been abandoned in place, are inoperable, disconnected, or intended for future use, are considered category 5 wells. These wells are considered non-drinking-water-wells.

We requested to sample each category 1, 2, 3 and 4 well identified during our well search. During sampling we provided additional education materials, including a list of project contacts and five-page drinking water advisory level fact sheet published by the EPA, and *Private Well Inventory Survey Form* (Appendix B). Properties with removed or decommissioned wells are not considered to have a well.

Well search activities began in Search Areas 1 and 2 (Figure 1) on August 27, 2018 following the public meeting hosted by various employees of the State of Alaska. In coordination with

the DRM, DOT&PF and DEC, we expanded the well search and sampling area to include Areas 3 through 7 in September and October/November 2018. Areas 3 and 6 are located on the west end of the runway and east of the Salmon River. Area 4 is located east of the airport. Area 5 is located near the northwest corner of airport property along Wilson Road. Area 7 is located on the west side of the Salmon River and north of Gustavus Road

The results of our August 2018 through December 2018 well search are summarized below. We were unable to contact all the owners and occupants in Areas 1 through 7 during the well search attempts. Parcels classified as “unknown – probable well” are those we were unable to reach as part of the well search described herein. Some of these parcels appeared unoccupied or abandoned. Parcels classified as “unknown - possible well” and “unknown - improbable well” will be included in our planned future well search efforts.

Exhibit 2-1: Well Summary by Parcel

Well present	120
Unknown – probable well	1
Unknown – possible well	3
Unknown – improbable well	2
No well	33
Total	159

2.2 Private Well Sampling

We conducted multiple private-well sampling events between August 27, 2018 and December 9, 2018. The following Shannon & Wilson personnel collected analytical water samples for this project. These individuals are State of Alaska Qualified Samplers per 18 AAC 75.333[b] and 18 AAC 78.088[b].

- Amber Masters, Environmental Scientist
- Marcy Nadel, Geologist
- Kristen Freiburger, Chemist
- Craig Beebe, Geologist
- Adam Wyborny, Environmental Engineer

We sampled 101 different private-wells during the reporting period; some wells were sampled multiples times, as requested. We collected private-well samples from a location 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 2.8, Alterations. 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.

We discharged purge water to an indoor sink or to the ground surface. In most cases, indoor plumbing leads to a private septic system. Following parameter stabilization, we collected PFAS water samples using laboratory-supplied containers. Copies of the *Private Well Sampling Logs* are included in Appendix A, Field Notes.



Exhibit 2-2: Photographs of some Private Well Purge and Sample Locations in Gustavus, Alaska.

We are aware of the potential for cross-contamination of PFAS water samples from numerous everyday household items. We took appropriate precautions to prevent cross-contamination, including discontinuing the use of personal protective equipment and field supplies known to contain PFASs, using liner bags to contain samples before and after sample collection, hand washing, and donning a fresh pair of disposable nitrile gloves before sample collection.

2.3 Surface Water Sampling

Five surface water analytical samples and a field duplicate were collected during the August and September sampling events. The first two samples were taken from a slough and a stormwater diversion ditch on each side of the southern end of runway two (SW-2001 and SW-2000, respectively). The third surface water sample (SW-2002) was taken from a drainage ditch near the old fire training pit. The fourth sample (SW-2004) was collected east of the airport from an open excavation in Area 4; the excavation was dug by a homeowner in the area to observe the groundwater levels. We were unable to collect private-well samples in Area 4 and opted to collect a surface water sample from the open excavation to determine if this area may be impacted by PFAS. The fifth sample (SW-2003) was obtained from an open excavation near the center of Area 3. A homeowner in Area 3 dug a hole where he believes an old drainage ditch flows into the slough. A clearing of trees near this excavation provided further evidence the excavation was in the area of the old drainage ditch; however, we cannot be certain of the old drainage ditch exact location. The old drainage ditch is notable as it used to drain water from the airport to the Salmon River. The sample was collected per the owner's request.

2.4 Sample Custody, Storage, and Transport

Immediately after collection, the sample bottles for each location were placed in Ziploc bags and stored in a designated sample cooler maintained between 0 °C and 6 °C with ice substitute separated from the sample bottles by a 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 and packing material as necessary to prevent bottle breakage. We applied custody seals to the cooler, which were observed to be intact upon receipt by the laboratory.

We shipped sample coolers to TestAmerica Laboratories, Inc. (TestAmerica) in West Sacramento, California for analysis of PFAS using Alaska Air Cargo priority overnight service, also known as Goldstreak. Samples were generally shipped from Goldstreak in Juneau, Alaska. Private-well samples were submitted promptly to the analytical laboratory after each well search and sampling effort. This allowed sufficient time for the laboratory to analyze the samples within holding-time requirements of the analytical method. We requested an expedited, five-business-day turnaround time for first work order only.

We also shipped sample coolers to SGS North America Inc. (SGS) in Anchorage, Alaska on December 10, 2018 to analyze samples collected for Barr Engineering POE system design; samples were shipped from Juneau, Alaska using Goldstreak.

Each laboratory report is included in Appendix C.

2.5 Notification of Results

Following our review of the analytical data, we prepared analytical-data tables for the project team. We then called property owners and occupants to notify them of the results of PFAS water testing.

We also prepared letters for owners and occupants informing them of the results for the sample collected from their well. These letters were tailored to each property and analytical sample, and included the following information:

- sample name;
- analytical results for the three highest analyzed PFAS concentrations from the sampling event;
- comparison of analytical results to DEC's proposed action levels;
- description of the project; and
- pages of the TestAmerica laboratory report that apply to the owner or occupant's water-well sample, including other PFAS results.

Where requested, we e-mailed results letters to owners and/or occupants.

2.6 Alternative Water Sources

On September 17, 2018, the DOT&PF began offering and delivering bottled water to properties where the private-well sample showed results above the proposed DEC action levels.

The DOT&PF is exploring various options to provide affected residents with an alternative water source. These may include but are not limited to POE systems, constructing a community well outside of the affected area, rain catchment systems and installing cisterns.

2.7 Public Information

The DOT&PF hosts a webpage describing the PFAS water-testing project. The webpage includes a project summary, list of contacts, simplified regional results map, and links to additional resources. The map is updated after each sampling event following the receipt of analytical data; Appendix B includes an example from November 20, 2018.

On August 27, 2018, the DOT&PF hosted a public meeting at the Gustavus School with representatives from the DOT&PF, DEC, Alaska Department of Health and Social Services

(DHSS) and the Alaska Department of Administration (DOA). Invitations for the public meeting were sent to all Gustavus Post Office (PO) Box holders. The invitations included the invitation letter, the public meeting flyer, a project summary and contact sheet as well as a figure displaying search areas 1 and 2. A copy of the public-meeting invitation and health fact sheet are included in Appendix B.

On October 30, 2018, the DOT&PF hosted a second public meeting at the Gustavus School. DOT&PF sent invitations to all Gustavus PO Box holders, and individuals whose wells were sampled. Representatives from the DOT&PF, DEC, DHSS, DRM, the Agency for Toxic Substances and Disease Registry (ATSDR), and Shannon & Wilson gave brief presentations. Questions from residents were answered throughout the meeting, as well as following presentations. The question and answer session was followed by an open house where representatives were available to answer questions one-on-one.

2.8 Deviations

In general, we conducted our services in accordance with the sampling procedures noted above, and based on ongoing discussion with DRM, DEC and DOT&PF. The following are deviations from the procedures described in Sections 2.1 and 2.2 made throughout the project:

- 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 events: *PW-012, PW-031, PW-216, PW-431, NPS-Post, PW-006 Post* and *PW-011-Post*.
- Our sampling protocol includes stabilization of parameters; however, the following were collected from handpump wells and parameters were not measured: *PW-015* and *PW-209*.
- Our sampling protocol includes sampling directly from a spigot or port within the plumbing system. The following samples were taken through a hose fused to the only spigot before treatment began: *PW-001, PW-232* and *PW-233*.
- Sample *PW-275* was taken with the use of a non-dedicated pump (Exhibit 2-3).
- Upon discussion with DRM, we collected twelve water samples from private wells outside Areas 1 through 7: *PW-231, PW-234, PW-235, PW-239, PW-247, PW-248, PW-255, PW-400, PW-413, PW-440, PW-460* and *PW-461*.



Exhibit 2-3: Non-dedicated pump at PW-275

3 ANALYTICAL RESULTS

We submitted the initial drinking-water samples to TestAmerica for determination of six PFASs using Method WS-LC-0025, the laboratory's in-house method. This method analyzes for the PFAS listed in the EPA Unregulated Contaminant Monitoring Rule (UCMR): PFOS, PFOA, PFHpA, PFNA, PFBS, and PFHxS.

We submitted the POE analytical water samples to SGS for determination of twenty-four PFAS and twenty-three other analytes. The analytical methods used were EPA 537M by ID, EPA 1664B, EPA 300.0, EP 200.8, SM 5310B, SM21 2540C, SM21 2540D, SM21 4500-H B, SM21 2320B, SM21 2340B, SM21 2510B, SM21 4500-NH3 G, SM21 4500NO3-F, SM23 4500S D and SOP BAL-4100. The results of these are summarized in Table 4.

The TestAmerica and SGS laboratory reports and associated DEC Laboratory Data Review Checklists for each work order (WO) are listed in chronological order in Appendix C.

3.1 Initial Private Well Samples

Table 1 summarizes the concentrations of PFAS in the first sample collected from a given private well sampled between August 2018 and December 2018. For the purposes of this report, we compare the PFAS results to the sum of 5 action level of 70 ppt. The PFAS results for the sum of 5 PFAS range from not detected to 6,729 ppt for PFAS contamination associated with GST. Additionally, our sampling efforts identified a separate PFAS-affected area near PW-006; the sum of 5 result for this well was 47,636 ppt.

Table 2 summarizes the concentrations of PFAS in samples collected from previously-sampled wells. With the exception of PW-006, results are generally comparable to the initial sampling event.

3.2 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 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 DEC Laboratory Data Review Checklist and applied a standardized set of flags to data brought into question during the review. During our QC review we apply flags indicating estimated data or analytical bias as applicable. Our QC review did not encounter QA/QC errors resulting in flags.

We reviewed analytical sample results (TestAmerica WOs 42647, 42653, 42821, 43691, 44967 and 46041, and SGS WO 1186919) for this project. The laboratory reports, including case narratives describing laboratory QA results, along with completed DEC data-review, are included in Appendix C. 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 C for details regarding the results of our QA review for these six 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. 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.

4 DISCUSSION AND RECOMMENDATIONS

We present here our discussion relevant to PFASs in groundwater at and near the GST property.

4.1 Comparison to Action Levels

Of the 101 private-well samples collected from August to December 2018, there are 16 category 1 and 2 wells with combined concentrations exceeding the action level of 65 ppt, excluding PW-006. Of these, 14 are category 1 wells and two are category 2 wells. Two category 4 wells also exceeded the action level.

Six private well exceedances are located in Area 1 (Figure 1), excluding PW-006. Ten private-well exceedances are located on and near Wilson Road in Area 3 (Figure 1). Within Area 1, the majority of the exceedances are located near the airport terminal. These wells are shown in red in Figure 2 and summarized in Tables 1 and 2. There are no properties with private well exceedances in Areas 2, 4, 5, 6 or 7.

For the purposes of project planning, we propose a working definition of the plume-impacted area based on the PFOS, PFOA, PFHxS, PFNA and PFHpA combined results for private wells. We define the impacted area as Areas 1 and 3. The boundaries are based on our interpretation of private well samples collected from August 2018 to December 2018 and should not be construed as a precise plume boundary.

PW-006, located at [REDACTED] in Area 1, contains the highest concentration of five out of the six PFAS's tested. We understand contamination in this area is due to a release by the City of Gustavus fire department, and DEC is working with the City of Gustavus to characterize this site.

There were three private wells and one surface-water sample within the impacted area that exceeded the DEC groundwater-cleanup level for PFOS, in addition to the action level. PW-006 has been excluded from this count due to reasons discussed in the previous paragraph. These locations are depicted with dark red halos in Figure 2. They are located in the northern portion of Area 1 close to the Alaska DOT&PF Crash and Fire Rescue building.

PFOS was most frequently the highest detected PFAS in private wells tested to date. The wells with the highest PFOS concentrations are geographically closer to the DOT&PF Crash and Fire Rescue building than to the existing burn pit or former fire training area (Figures 1 and 3).

4.2 Planned Future Work

Shannon & Wilson will be continuing the well search to target properties not yet sampled in the search areas. This work will be completed through our statewide contract with DOT&PF. The outcomes of our ongoing well and sampling efforts will be reported separately.

Quarterly sampling will take place in March 2019 and quarterly thereafter throughout 2019. The results of ongoing quarterly sampling will be reported separately. We will evaluate seasonal and temporal trends after we have sampled these wells for four quarters.

Through coordination with the DOT&PF, we established the well monitoring network criteria prior to the March 2019 sampling event. Wells are included in the network if:

- they are active category 1 and 2 wells whose maximum combined PFOS, PFHpA, PFNA, PFHxS and PFOA concentration was greater than or equal to 35 ppt; or
- they are active category 1 and 2 wells within 500 lateral feet of wells whose combined PFOS, PFHpA, PFNA, PFHxS and PFOA concentration was greater than or equal to 35 ppt.

Lateral distance was measured from the GIS points collected during the initial round of sampling. As of January 24, there are 30 wells that meet these concentration- and location-based criteria. Quarterly well monitoring locations are shown in light and dark blue in Figure 3. PW-006 and subsequently PW-003 and PW-074 (within 500 lateral feet of PW-006) were excluded from the well monitoring network due to reasons discussed above. We understand DEC is working with the City of Gustavus to characterize this area.

Additionally, we will be preparing a site-characterization work plan for the Gustavus airport. We will provide the work plan to DOT&PF and DEC for review, comment and approval. After the workplan and funding has been approved by both DOT&PF and DEC, we will implement the work plan.

4.3 Recommendations

Based on our private well search and sampling effort completed between August 2018 and December 2018, we recommend the DOT&PF continue to:

- attempt to identify wells at properties where well status is unknown, per Exhibit 2-1: Well Summary by Parcel as of December 9, 2018;
- sample wells in the quarterly well monitoring network, as discussed in Section 4.4, Future Work;
- work with the DEC and DHSS to educate the public regarding the potential health effects of exposure to PFAS-containing water; and
- refrain from discharging PFAS-containing AFFF to the ground, surface water bodies or groundwater from ARFF training, equipment testing, or emergency response.

We recommend annual resampling of active wells (i.e., categories 1 through 4) within areas east of the Salmon River with a detected sum of 5 PFAS compounds (PFOS, PFNA, PFHxS, PFOA, and PFHpA) concentration above 17.5 ppt and within 500 lateral feet of these locations. Due to its proximity to the runway and a lack of groundwater data in the area, we recommend PW-201 also be included in the annual monitoring network. There are four locations that meet this criterion in addition to the quarterly monitoring network as of the results included in this report. Proposed annual monitoring locations are shown in purple on Figure 3. PW-006 has been excluded from the well monitoring network due to previously discussed reasons. PW-043 and PW-074 have been excluded from the well monitoring network due to its proximity to PW-006. We further recommend that the DOT&PF assess the lateral and vertical extent of the PFOS and PFOA groundwater plume.

Our recommendations are based on:

- Offsite groundwater conditions inferred through private well analytical water samples collected from August 27, 2018 through December 9, 2018.
- The results of testing performed on water samples we collected from the private wells on, near, and downgradient from the GST.
- Publicly available literature and data we reviewed for this project, including USGS, 2018.
- Our understanding of the project and information provided by the DOT&PF, DRM, and other members of the project team.
- The limitations of our approved scope described in our proposed Scope of Services dated August 23, 2019.

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

5 REFERENCES

- Alaska Department of Environmental Conservation (DEC), 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 (DEC), 2017, 18 AAC 75.341 Table C, Groundwater-Cleanup Levels.
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- Alaska Department of Environmental Conservation (DEC), 2017, Site characterization work plan and reporting guidance for investigation of contaminated sites: Juneau, Alaska, DEC 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 (DNR), 2018, Well log tracking system (WELTS): Available: <http://dnr.alaska.gov/mapper/controller?gsid=5A0ECA50689B47945240C5ECB15F52EB.tomcat-91>, accessed November 2017 to April 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
- U.S. Geological Survey (USGS), 2018. National Water Information System: Web Interface. Site numbers 15514000, 15485500. Available: <https://waterdata.usgs.gov/nwis/sw>, accessed March to June 2018.

**TABLE 1
SUMMARY OF FIRST TIME PRIVATE WELL ANALYTICAL RESULTS**

SHANNON & WILSON, INC.

Analyte					Perluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFASs
Action Level					2,000			70§			70§
Sample Name	PW-ID	Latitude	Longitude	Sample Date	ppt	ppt	ppt	ppt	ppt	ppt	ppt
<i>Airport Terminal</i>	Airport Terminal	58.4208	-135.7035	8/27/2018	4.5	5.7	4.3	<2.0	31	250	291 ‡
<i>City Hall</i>	City Hall	58.4134	-135.7391	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>Firehouse</i>	Firehouse	58.4128	-135.7402	9/27/2018	<2.0	<2.0	<2.0	<2.0	2.3	<2.0	2.3 ‡
<i>NPS Well</i>	NPS Well	58.4180	-135.7088	8/27/2018	1.3 J	1.8 J	4.6	<2.0	12	23	41 J‡
<i>PW-001</i>	PW-001	58.4221	-135.7124	8/28/2018	20	13	19	3.0	350	2300	2685
<i>PW-002</i>	PW-002	58.4162	-135.7255	8/28/2018	2.2	4.4	3.0	<2.0	32	160	199 ‡
<i>PW-003</i>	PW-003	58.4139	-135.7063	8/28/2018	<2.0	<2.0	1.4 J	<2.0	<2.0	<2.0	1.4 J‡
<i>PW-004</i>	PW-004	58.4136	-135.7051	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-005</i>	PW-005	58.4138	-135.7046	8/28/2018	<2.0	<2.0	0.90 J	<2.0	<2.0	<2.0	0.90 J‡
<i>PW-006</i>	PW-006	58.4150	-135.7080	8/28/2018	160	48	240	48	7400	39000	46736
<i>PW-106</i>	PW-006 (DUP)	58.4150	-135.7080	8/28/2018	170	48	240	48	7300	40000	47636
<i>PW-007</i>	PW-007	58.4123	-135.7096	8/28/2018	<2.0	<2.0	1.2 J	<2.0	<2.0	5.6	6.8 J‡
<i>PW-008</i>	PW-008	58.4112	-135.7089	8/28/2018	<2.0	<2.0	1.3 J	<2.0	<2.0	<2.0	1.3 J‡
<i>PW-009</i>	PW-009	58.4136	-135.7090	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-010</i>	PW-010	58.4131	-135.7278	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-011</i>	PW-011	58.4161	-135.7304	8/29/2018	2.9	3.4	3.3	<2.0	30	93	130 ‡
<i>PW-012</i>	PW-012	58.4177	-135.7324	8/29/2018	1.8 J	0.81 J	0.77 J	<2.0	8.9	7.7	18 J‡
<i>PW-013</i>	PW-013	58.4220	-135.7132	8/29/2018	57	230	130	8.9	860	5500	6729
<i>PW-014</i>	PW-014	58.4120	-135.7139	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-015</i>	PW-015	58.4094	-135.7135	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-016</i>	PW-016	58.4128	-135.7206	8/30/2018	<2.0	<2.0	1.3 J	<2.0	1.7 J	<2.0	3.0 J‡
<i>PW-017</i>	PW-017	58.4096	-135.7130	8/30/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-018</i>	PW-018	58.4118	-135.7120	8/30/2018	<2.0	<2.0	<2.0	<2.0	1.2 J	2.5	3.7 J‡
<i>PW-019</i>	PW-019	58.4127	-135.7129	8/30/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-020</i>	PW-020	58.4124	-135.7131	8/30/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-021</i>	PW-021	58.4105	-135.7079	8/30/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-022</i>	PW-022	58.4194	-135.7075	8/30/2018	6.4	4.8	6.9	<2.0	58	520	590 ‡
<i>PW-031</i>	PW-031	58.4176	-135.6997	8/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-032</i>	PW-032	58.4178	-135.7058	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-033</i>	PW-033	58.4125	-135.7080	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
<i>PW-034</i>	PW-034	58.4185	-135.7118	8/28/2018	<2.0	<2.0	<2.0	<2.0	1.1 J	1.5 J	2.6 J‡

**TABLE 1
SUMMARY OF FIRST TIME PRIVATE WELL ANALYTICAL RESULTS**

SHANNON & WILSON, INC.

Analyte					Perluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFASs
Action Level					2,000			70§			70§
Sample Name	PW-ID			Sample Date	ppt	ppt	ppt	ppt	ppt	ppt	ppt
PW-036	PW-036	58.4135	-135.7123	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-037	PW-037	58.4197	-135.7053	8/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-038	PW-038	58.4196	-135.7048	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-138	PW-038 (DUP)	58.4196	-135.7048	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-039	PW-039	58.4199	-135.7036	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-139	PW-039 (DUP)	58.4199	-135.7036	8/29/2018	<2.0	<2.0	0.79 J	<2.0	<2.0	<2.0	0.79 J‡
PW-040	PW-040	58.4196	-135.7033	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-041	PW-041	58.4152	-135.7054	8/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-042	PW-042	58.4125	-135.7068	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-043	PW-043	58.4130	-135.7047	8/29/2018	<2.0	0.94 J	7.6	<2.0	<2.0	6.6	15 J‡
PW-044	PW-044	58.4123	-135.7104	8/29/2018	<2.0	<2.0	1.3 J	<2.0	<2.0	2.0	3.3 J‡
PW-045	PW-045	58.4131	-135.7261	8/29/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-046	PW-046	58.4226	-135.7117	8/30/2018	120	29	82	<2.0	1900	83	2094 ‡
PW-146	PW-046 (DUP)	58.4226	-135.7117	8/30/2018	110	27	77	<2.0	1700	79	1883 ‡
PW-047	PW-047	58.4184	-135.7038	8/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-048	PW-048	58.4218	-135.7080	8/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-059	PW-059	58.4183	-135.7310	8/29/2018	<2.0	<2.0	<2.0	<2.0	1.2 J	<2.0	1.2 J‡
PW-061	PW-061	58.4168	-135.7058	8/27/2018	<2.0	1.3 J	3.8	<2.0	1.3 J	1.4 J	7.8 J‡
PW-066	PW-066	58.4112	-135.7120	12/8/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-070	PW-070	58.4114	-135.7097	8/31/2018	1.8 J	<2.0	1.0 J	<2.0	1.4 J	<2.0	2.4 J‡
PW-074	PW-074	58.4160	-135.7071	9/25/2018	<2.0	<2.0	<2.0	<2.0	1.1 J	<2.0	1.1 J‡
PW-174	PW-074 (DUP)	58.4160	-135.7071	9/25/2018	<2.0	<2.0	<2.0	<2.0	1.1 J	<2.0	1.1 J‡
PW-075	PW-075	58.4140	-135.7008	8/31/2018	<2.0	<2.0	1.4 J	<2.0	<2.0	<2.0	1.4 J‡
PW-200	PW-200	58.4141	-135.7313	9/24/2018	3.4	3.7	3.1	<2.0	37	92	136 ‡
PW-300	PW-200 (DUP)	58.4141	-135.7313	9/24/2018	3.2	3.6	3.1	<2.0	36	89	132 ‡
PW-201	PW-201	58.4336	-135.7278	9/25/2018	<2.0	<2.0	<2.0	<2.0	1.7 J	1.4 J	3.1 J‡
PW-202	PW-202	58.4152	-135.7335	9/25/2018	2.1	2.7	3.1	<2.0	20	68	94 ‡
PW-203	PW-203	58.4188	-135.7325	9/25/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-204	PW-204	58.4139	-135.7338	9/25/2018	<2.0	0.93 J	<2.0	<2.0	3.3	5.4	9.6 J‡
PW-206	PW-206	58.4175	-135.7381	9/28/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-209	PW-209	58.4156	-135.7322	9/26/2018	2.2	3.0	3.3	<2.0	26	100	132 ‡

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SHANNON & WILSON, INC.

Analyte					Perluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFASs
Action Level					2,000	70§					70§
Sample Name	PW-ID	Sample Date			ppt	ppt	ppt	ppt	ppt	ppt	ppt
PW-210	PW-210	58.4167	-135.7321	9/26/2018	2.7	3.0	2.8	<2.0	32	95	133 ‡
PW-310	PW-210 (DUP)	58.4167	-135.7321	9/26/2018	2.5	3.1	2.6	<2.0	30	92	128 ‡
PW-211	PW-211	58.4192	-135.7283	9/26/2018	<2.0	3.3	15	<2.0	1.1 J	9.1	29 J‡
PW-212	PW-212	58.4186	-135.7344	9/26/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-213	PW-213	58.4177	-135.7310	11/1/2018	3.2	2.2	2.3	<2.0	24	51	80 ‡
PW-214	PW-214	58.4195	-135.7345	9/27/2018	<2.0	<2.0	<2.0	<2.0	0.88 J	<2.0	0.88 J‡
PW-216	PW-216	58.4196	-135.7321	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-218	PW-218	58.4194	-135.7295	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-219	PW-219	58.4196	-135.7279	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-319	PW-219 (DUP)	58.4196	-135.7279	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-221	PW-221	58.4131	-135.7277	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-230	PW-230	58.4118	-135.7310	10/31/2018	<2.0	<2.0	1.1 J	<2.0	1.2 J	<2.0	2.3 J‡
PW-231	PW-231	58.4061	-135.7330	10/31/2018	<2.0	0.96 J	1.1 J	<2.0	2.6	<2.0	4.7 J‡
PW-232	PW-232	58.4096	-135.7306	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-233	PW-233	58.4099	-135.7286	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-234	PW-234	58.4164	-135.7454	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-235	PW-235	58.4229	-135.7274	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-236	PW-236	58.4110	-135.7291	10/31/2018	<2.0	<2.0	<2.0	<2.0	1.0 J	<2.0	1.0 J‡
PW-336	PW-236 (DUP)	58.4110	-135.7291	10/31/2018	<2.0	<2.0	<2.0	<2.0	0.96 J	<2.0	0.96 J‡
PW-237	PW-237	58.4103	-135.7304	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-238	PW-238	58.4109	-135.7312	11/1/2018	<2.0	<2.0	0.77 J	<2.0	3.5	2.0	6.3 J‡
PW-239	PW-239	58.4023	-135.7144	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-240	PW-240	58.4123	-135.7348	11/1/2018	<2.0	<2.0	<2.0	<2.0	3.3	<2.0	3.3 ‡
PW-241	PW-241	58.4123	-135.7300	11/1/2018	<2.0	<2.0	0.89 J	<2.0	6.1	2.7	9.7 J‡
PW-341	PW-241 (DUP)	58.4123	-135.7300	11/1/2018	<2.0	<2.0	0.98 J	<2.0	5.8	2.9	9.7 J‡
PW-247	PW-247	58.4142	-135.7452	11/2/2018	<2.0	<2.0	1.1 J	<2.0	2.7	<2.0	3.8 J‡
PW-248	PW-248	58.4071	-135.7302	11/2/2018	<2.0	<2.0	0.97 J	<2.0	6.3	1.8 J	9.1 J‡
PW-249	PW-249	58.4164	-135.7405	11/2/2018	<2.0	<2.0	0.84 J	<2.0	1.4 J	1.3 J	3.5 J‡
PW-349	PW-249 (DUP)	58.4164	-135.7405	11/2/2018	<2.0	<2.0	<2.0	<2.0	1.5 J	1.4 J	2.9 J‡
PW-255	PW-255	58.4176	-135.7424	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-275	PW-275	58.4128	-135.7298	12/9/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A

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Analyte					Perluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFAS§
Action Level					2,000	70§					70§
Sample Name	PW-ID	Sample Date			ppt	ppt	ppt	ppt	ppt	ppt	ppt
PW-375	PW-275 (DUP)	58.4128	-135.7298	12/9/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-400	PW-400	58.4209	-135.7282	9/25/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-401	PW-401	58.4139	-135.7285	9/25/2018	2.4	1.6 J	1.4 J	<2.0	18	40	61 J‡
PW-402	PW-402	58.4153	-135.7304	9/25/2018	3.7	3.3	3.4	<2.0	36	72	115 ‡
PW-403	PW-403	58.4168	-135.7332	9/25/2018	5.7	3.4	3.3	<2.0	41	83	131 ‡
PW-405	PW-405	58.4146	-135.7337	9/25/2018	3.8	4.1	3.9	<2.0	44	86	138 ‡
PW-406	PW-406	58.4171	-135.7280	9/25/2018	2.6	5.2	3.3	<2.0	36	150	195 ‡
PW-408	PW-408	58.4160	-135.7278	9/26/2018	2.1	4.8	2.5	<2.0	30	130	167 ‡
PW-413	PW-413	58.4199	-135.7357	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-418	PW-418	58.4142	-135.7291	9/27/2018	3.9	4.1	3.4	<2.0	40	74	122 ‡
PW-430	PW-430	58.4094	-135.7348	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-530	PW-430 (DUP)	58.4094	-135.7348	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-431	PW-431	58.4083	-135.7312	11/2/2018	<2.0	<2.0	<2.0	<2.0	5.4	6.1	12 ‡
PW-432	PW-432	58.4105	-135.7349	10/31/2018	<2.0	<2.0	<2.0	<2.0	2.5	2.0	4.5 ‡
PW-434	PW-434	58.4117	-135.7357	10/31/2018	<2.0	0.82 J	0.85 J	<2.0	4.6	2.8	9.1 J‡
PW-435	PW-435	58.4131	-135.7130	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-436	PW-436	58.4123	-135.7287	10/31/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-440	PW-440	58.4025	-135.7135	11/1/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A
PW-442	PW-442	58.4147	-135.7414	12/7/2018	<2.0	<2.0	<2.0	<2.0	1.1 J	<2.0	1.1 J‡
PW-460	PW-460	58.4071	-135.7282	11/2/2018	1.4 J	<2.0	<2.0	<2.0	1.7 J	<2.0	1.7 J‡
PW-461	PW-461	58.4170	-135.7452	11/2/2018	<2.0	1.6 J	1.2 J	<2.0	1.4 J	1.3 J	5.5 J‡

ppt parts per trillion, equivalent to nanograms per liter

§ Sum of 5 PFAS is equal to the sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA. ADEC action level is 70 ppt; results are compared to 65 ppt.

— Action level not established

Bold Concentration exceeds action level.

DUP Field-duplicate sample

< 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.

‡ Minimum concentration, the LHA Combined or Sum of 5 PFAS concentration includes one or more result that is not detected greater than the MDL.

N/A Not applicable. The sum of 5 PFAS concentration could not be calculated because one or more PFAS was not detected in the project sample.

**TABLE 2
SUMMARY OF PRIVATE WELL RESAMPLE ANALYTICAL RESULTS**

SHANNON & WILSON, INC.

Analyte					Perfluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFAS§
Action Level					2,000	70§					70§
Sample Name	PW-ID	Latitude	Longitude	Sample Date	ppt	ppt	ppt	ppt	ppt	ppt	ppt
<i>NPS Well-POST</i>	NPS Well	58.4180	-135.7088	9/25/2018	1.2 J	1.7 J	4.2	<2.0	11	20	37 J‡
<i>NPSWELL-PRE</i>	NPS Well	58.4180	-135.7088	9/25/2018	1.2 J	1.7 J	4.3	<2.0	11	22	39 J‡
<i>PW-006</i>	PW-006	58.4150	-135.7080	9/26/2018	9.0	1.4 J	2.3	<2.0	110	210	324 J‡
<i>PW-006-Berkey</i>	PW-006	58.4150	-135.7080	9/26/2018	<2.0	<2.0	<2.0	<2.0	0.90 J	5.6	6.5 J‡
<i>PW-006-Cistern</i>	PW-006	58.4150	-135.7080	9/26/2018	9.4	4.3	19	5.2	590	4100	4719
<i>PW-006-POST</i>	PW-006	58.4150	-135.7080	9/26/2018	9.6	1.4 J	2.4	<2.0	120	360	484 J‡
<i>PW-011</i>	PW-011	58.4161	-135.7304	9/25/2018	3.2	3.1	3.1	<2.0	34	80	120 ‡
<i>PW-011-POST</i>	PW-011	58.4161	-135.7304	9/25/2018	2.9	2.8	2.9	<2.0	31	86	123 ‡
<i>PW-401</i>	PW-401	58.4139	-135.7285	10/31/2018	2.3	1.7 J	1.6 J	<2.0	20	36	59 J‡

ppt parts per trillion, equivalent to nanograms per liter

§ Sum of 5 PFAS is equal to the sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA. ADEC action level is 70 ppt; results are compared to 65 ppt.

— Action level not established

Bold Concentration exceeds action level.

DUP Field-duplicate sample

< 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.

‡ Minimum concentration, the LHA Combined or Sum of 5 PFAS concentration includes one or more result that is not detected greater than the MDL.

N/A Not applicable. The sum of 5 PFAS concentration could not be calculated because one or more PFAS was not detected in the project sample.

TABLE 3
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

SHANNON & WILSON, INC.

Analyte					Perluoro-butane-sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-octanoic acid (PFOA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexansulfonic acid (PFHxS)	Perfluoro-octane sulfonate (PFOS)	Sum of 5 PFAS§
Action Level					2,000	70§					70§
Name	PW-ID	Latitude	Longitude	Sample Date	ppt	ppt	ppt	ppt	ppt	ppt	ppt
SW-2000	SW-2000	58.418	-135.721	8/29/2018	1.7 J	3.7	2.6	<2.0	26	110	142 ‡
SW-2100	SW-2000 (DUP)	58.418	-135.721	8/29/2018	1.6 J	3.6	2.6	<2.0	27	110	143 ‡
SW-2001	SW-2001	58.420	-135.722	8/29/2018	4.7	3.1	5.9	<2.0	120	200	329 ‡
SW-2002	SW-2002	58.419	-135.689	8/29/2018	8.2	8.8	9.9	1.2 J	70	410	500 J
SW-2003	SW-2003	58.416	-135.734	9/26/2018	<2.0	0.89 J	1.3 J	<2.0	5.1	6.3	14 J‡
SW-2004	SW-2004	58.425	-135.657	9/27/2018	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	N/A

ppt parts per trillion, equivalent to nanograms per liter

§ Sum of 5 PFAS is equal to the sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA. ADEC action level is 70 ppt; results are compared to 65 ppt.

— Action level not established

Bold Concentration exceeds action level.

DUP Field-duplicate sample

< 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.

‡ Minimum concentration, the LHA Combined or Sum of 5 PFAS concentration includes one or more result that is not detected greater than the MDL.

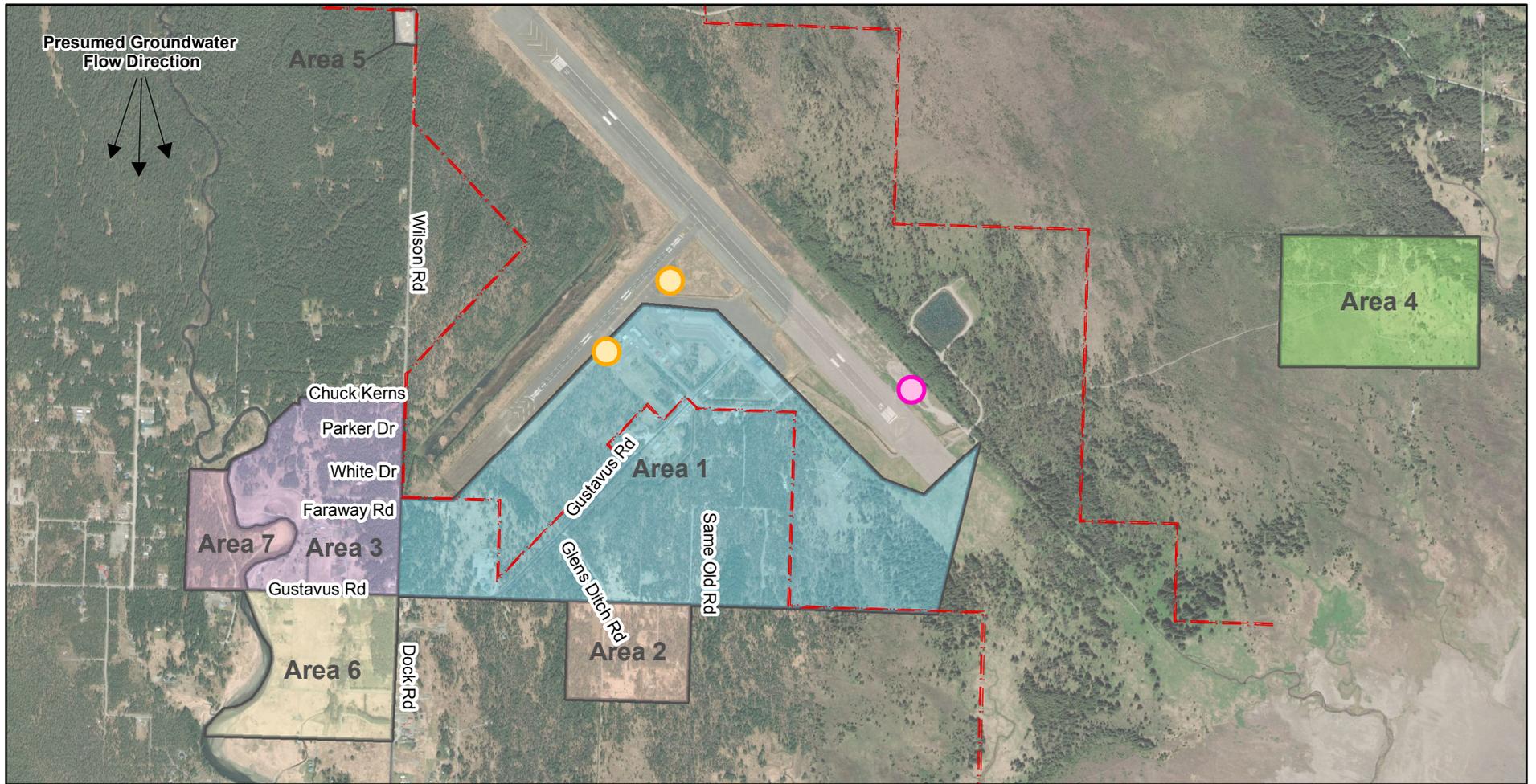
N/A Not applicable. The sum of 5 PFAS concentration could not be calculated because one or more PFAS was not detected in the project sample.

**TABLE 4
SUMMARY OF PRIVATE WELL POE ANALYTICAL RESULTS**

Analytical Method	Analyte	Units	PW-200		PW-202		PW-405 / PW-505**		PW-406		PW-408	
			Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
			58.4141	-135.7313	58.4152	-135.7335	58.4146	-135.7337	58.4171	-135.7280	58.4160	-135.7278
EPA 537M BY ID	4:2 Fluorotelomer sulfonate	ng/L	<7.70	<8.00	<8.00	<8.00	<7.70	<7.70	<7.70	<7.70	<7.70	
	6:2 Fluorotelomer sulfonate	ng/L	<7.70	<8.00	<8.00	<8.00	<7.70	<7.70	<7.70	<7.70	<7.70	
	8:2 Fluorotelomer sulfonate	ng/L	<7.70	<8.00	<8.00	<8.00	<7.70	<7.70	<7.70	<7.70	<7.70	
	N-ethyl perfluorooctane sulfonamidoacetic acid (NETFOSAA)	ng/L	<15.0	<16.0	<16.0	<16.0	<15.0	<15.0	<15.0	<15.0	<15.0	
	N-methyl perfluorooctane sulfonamidoacetic acid (NMEFOSAA)	ng/L	<15.0	<16.0	<16.0	<16.0	<15.0	<15.0	<15.0	<15.0	<15.0	
	Perfluorobutanoic acid (PFBA)	ng/L	<7.70 J*	<8.00	4.92 J	5.20 J	<7.70	<7.70	<7.70	<7.70	<7.70	
	Perfluorodecanesulfonic acid (PFDS)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluorodecanoic acid (PFDA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluorododecanoic acid (PFDOA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluoroheptanesulfonic acid (PFHPS)	ng/L	2.13 J	<4.00	3.23 J	2.30 J	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluoro-heptanoic acid (PFHpA)	ng/L	2.80 J*	2.33 J	4.57 J	5.44 J	3.20 J	3.20 J	3.20 J	3.20 J	3.20 J	
	Perfluorohexanoic acid (PFHXA)	ng/L	<7.70 B*	<8.80 B*	<9.95 B*	12.1 JH*	8.67	8.67	8.67	8.67	8.67	
	Perfluoro-hexansulfonic acid (PFHxS)	ng/L	23	8.77	28.8	23.8	21.1	21.1	21.1	21.1	21.1	
	Perfluorononanesulfonic acid	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluoro-nonanoic acid (PFNA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluorooctane sulfonamide (FOSA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80	
	Perfluoro-octane sulfonate (PFOS)	ng/L	97.7	20.0	114	113	115	115	115	115	115	
	Perfluoro-octanoic acid (PFOA)	ng/L	<7.70 B*	<8.22 B*	<16.8 B*	<13.4 B*	2.64 J	2.64 J	2.64 J	2.64 J	2.64 J	
	Perfluoropentanesulfonic acid	ng/L	3.33 J	<4.00	3.51 J	2.99 J	2.34 J	2.34 J	2.34 J	2.34 J	2.34 J	
	Perfluoropentanoic acid (PFPEA)	ng/L	8.47 J*	5.15 J	11.6	14.3	13.1	13.1	13.1	13.1	13.1	
Perfluorotetradecanoic acid (PFTEA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80		
Perfluorotridecanoic acid (PFTRIA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80		
Perfluoroundecanoic acid (PFUNA)	ng/L	<3.80	<4.00	<4.00	<3.80	<3.80	<3.80	<3.80	<3.80	<3.80		
Perfluorobutane-sulfonic acid (PFBS)	ng/L	2.18 J	2.51 J	2.19 J	1.98 J	<3.80	<3.80	<3.80	<3.80	<3.80		
EPA 1664B	Oil & Grease, Total	mg/L	<4.26 B*	<4.26 B*	<4.26 B*	<4.26 B*	<4.26 B*	<4.26 B*	<4.26 B*	<4.26 B*		
SM 5310B	Total Organic Carbon	mg/L	2.2	2.75	2.27	3.03	2.53	2.53	2.53	2.53		
SM21 2540C	Total Dissolved Solids	mg/L	379	317	393	481	455	455	455	455		
SM21 2540D	Total Suspended Solids	mg/L	5.63	13.2	5.76	14	13.8 J	13.8 J	13.8 J	13.8 J		
SM21 4500-H B	pH	N/A	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60		
SM21 2320B	Alkalinity	mg/L	232	257	239	224	217	217	217	217		
SM21 2340B	Hardness as CaCO3	mg/L	202	264	220	198	220	220	220	220		
SM21 2510B	Conductivity	umhos/cm	689	592	727	882	845	845	845	845		
SM21 4500-NH3 G	Ammonia as N	µg/L	120	135	95.8 J*	292	274 JL*	274 JL*	274 JL*	274 JL*		
SM21 4500NO3-F	Nitrate+Nitrite	µg/L	<100 B*	<100 B*	<100 B*	<100 B*	<50.0	<50.0	<50.0	<50.0		
SM23 4500S D	Sulfide	µg/L	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0		
EPA 300.0	Chloride	mg/L	68.2	15.8	74.9	127	127	127	127	127		
	Fluoride	µg/L	126 J	84.0 J	123 J	151 J	125 J	125 J	125 J	125 J		
	Sulfate	mg/L	9.05	19	12.1	15.4	13.4	13.4	13.4	13.4		
EP200.8	Calcium	mg/L	64.9	96	71.5	64.1	65.8	65.8	65.8	65.8		
	Chromium	µg/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00		
	Iron	mg/L	2.44	6.02	2.12	7.74	4.19	4.19	4.19	4.19		
	Magnesium	mg/L	9.7	5.87	10.1	9.21	13.5	13.5	13.5	13.5		
	Manganese	mg/L	0.339	0.146	0.23	0.218	0.225	0.225	0.225	0.225		
	Potassium	mg/L	6.11	1.66	6.67	8.54	7.05	7.05	7.05	7.05		
SOP BAL-4100	Sodium	mg/L	51.3	8.89	57.3	100	78.1	78.1	78.1	78.1		
	AS(III) (Arsenite)	µg/L	9.70	3.85	10.9	19.6	18.5	18.5	18.5	18.5		
	AS(V) (Arsenate)	µg/L	1.31	0.642	0.949	2.29	1.65	1.65	1.65	1.65		

TABLE 4
SUMMARY OF PRIVATE WELL POE ANALYTICAL RESULTS

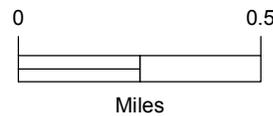
- Notes:**
- Analytical results reported from SGS North America, Inc. laboratory report 1186919.
 - ** Reported highest value where primary and duplicate sample results were not identical.
 - EPA Environmental Protection Agency
 - mg/L milligram per liter
 - µg/L microgram per liter
 - ng/L nanogram per liter
 - umhos/cm micromhos per centimeter
 - < 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. (*)
 - JL* Estimated concentration, biased low due to quality control failures. Flag applied by Shannon & Wilson, Inc. (*)
 - B* Result is considered not detected due to quality control failures. Result is shown as <LOQ or detected concentration. Flag applied by Shannon & Wilson, Inc. (*)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

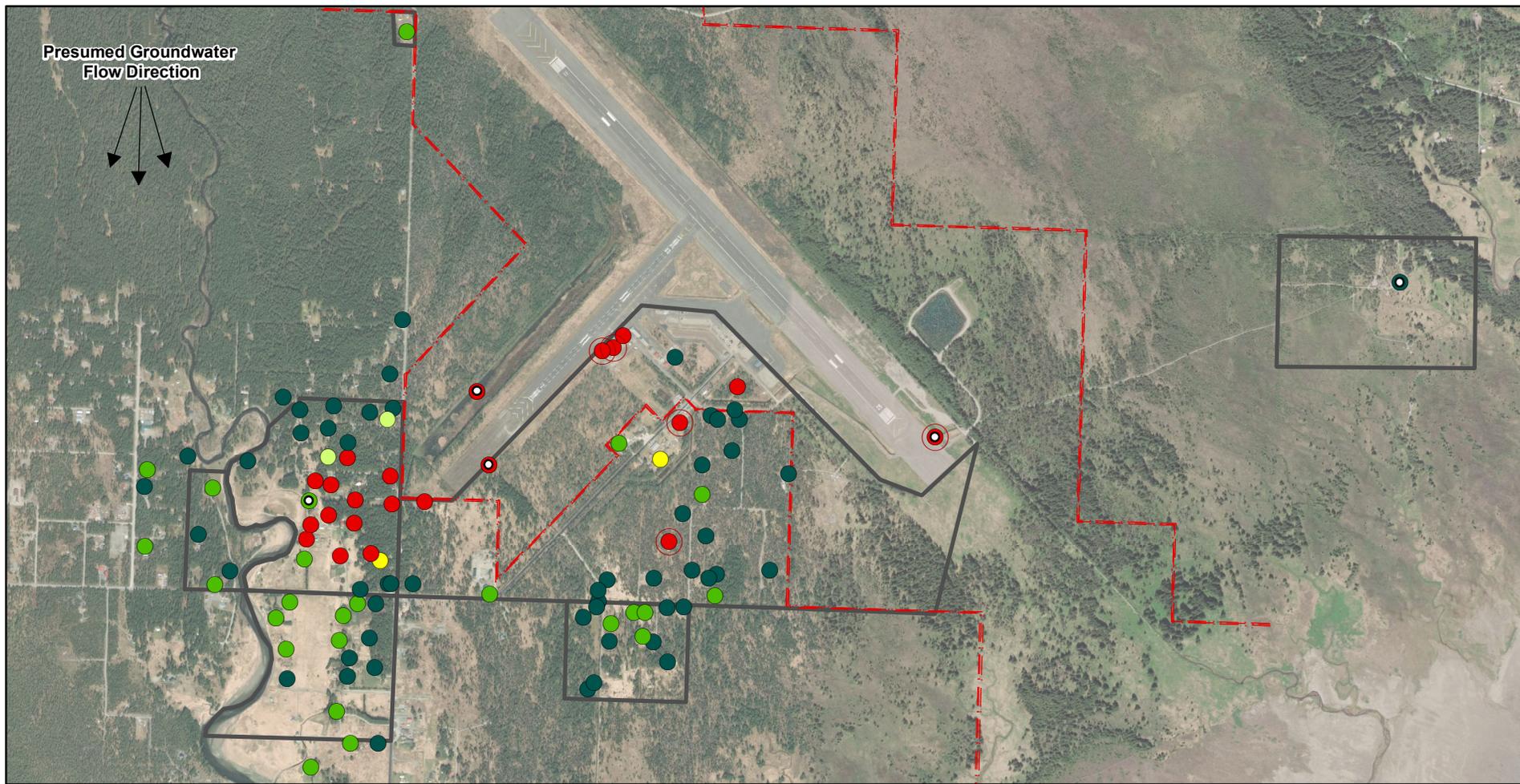
LEGEND

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Well Search Areas
- AFFF Burn Pit
- AFFF Sites
- Airport Property Boundary



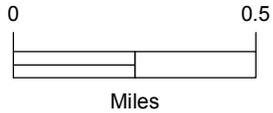
Gustavus PFAS Gustavus, Alaska	
WELL SEARCH EXTENT	
April 2019	101543-001
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
Figure 1	

Figure 1



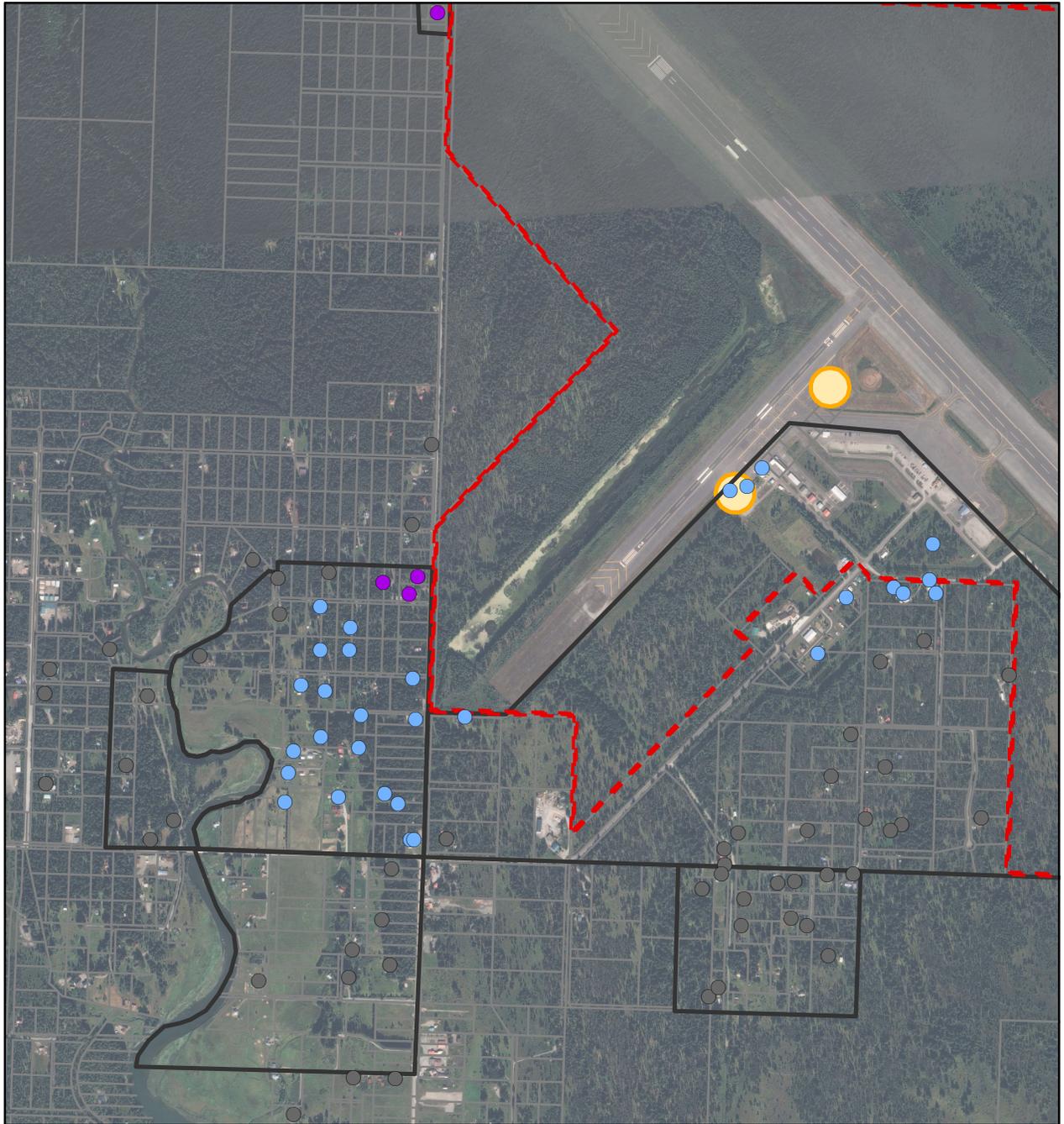
LEGEND

- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)
- Surface Water Sample
- PFOS ≥ 400 ppt
- Airport Property Boundary
- Well Search Areas

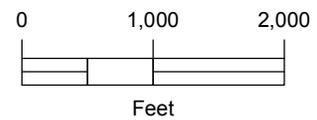


Gustavus PFAS Gustavus, Alaska	
ANALYTICAL RESULTS	
April 2019	101543-001
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
Figure 2	

Figure 2



Map adapted from aerial and satellite imagery provided through the Alaska Department of Natural Resources. (Satellite Imagery: Spot 5 © CNES, SPOT 6 & 7 © Airbus DS)

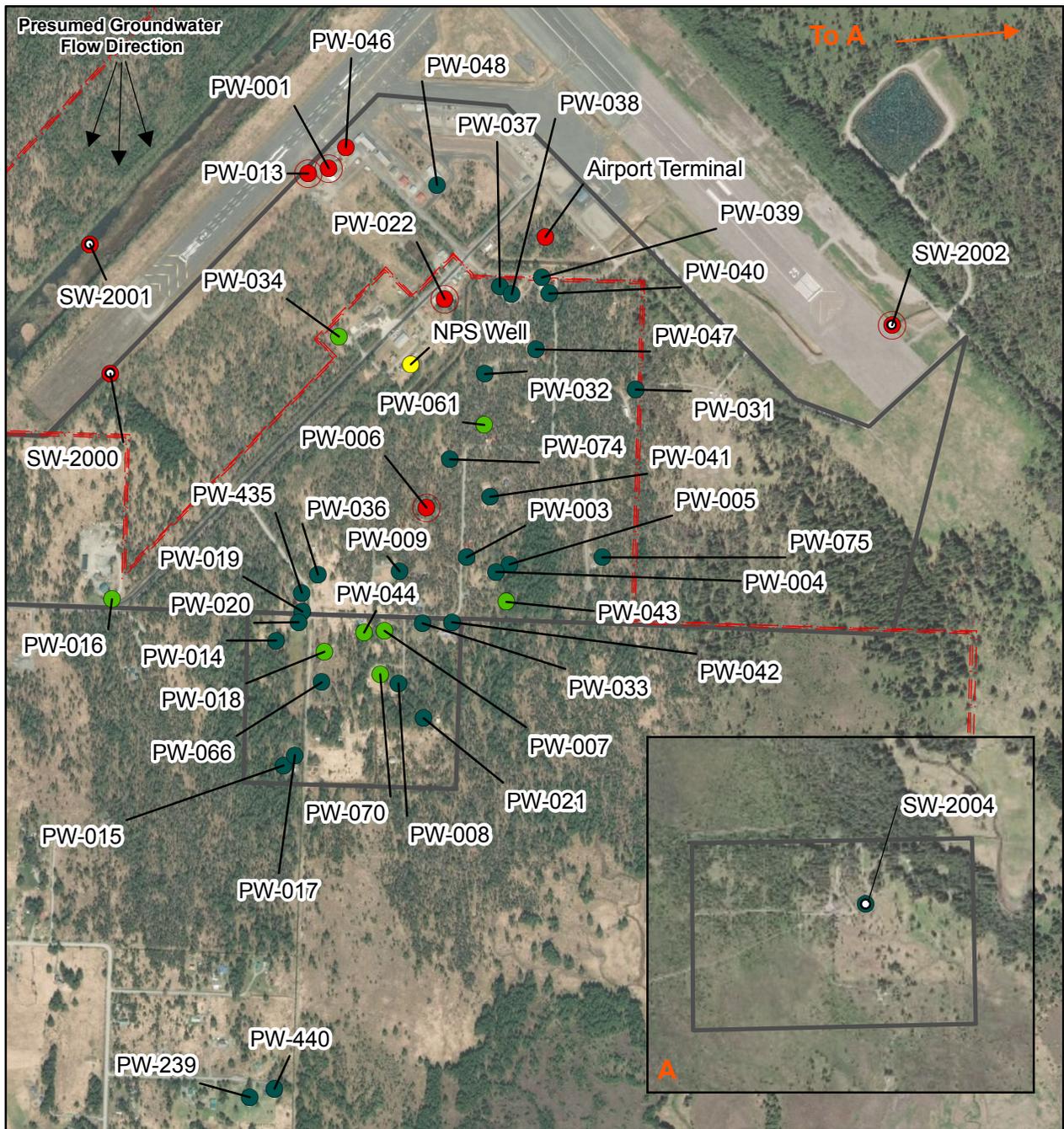


LEGEND

- | | | |
|--------------------------------|---------|---------------------------|
| Well Monitoring Network: | - - - - | Airport Property Boundary |
| ● Quarterly (February) | □ | Well Search Areas |
| ● Annual monitoring (proposed) | ■ | AFFF Sites |
| ● Not Included | — | Property Lines |



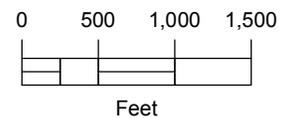
Gustavus Airport Gustavus, Alaska	
QUARTERLY AND ANNUAL WELL MONITORING NETWORK	
April 2019	101543-001
 SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
Figure 3	



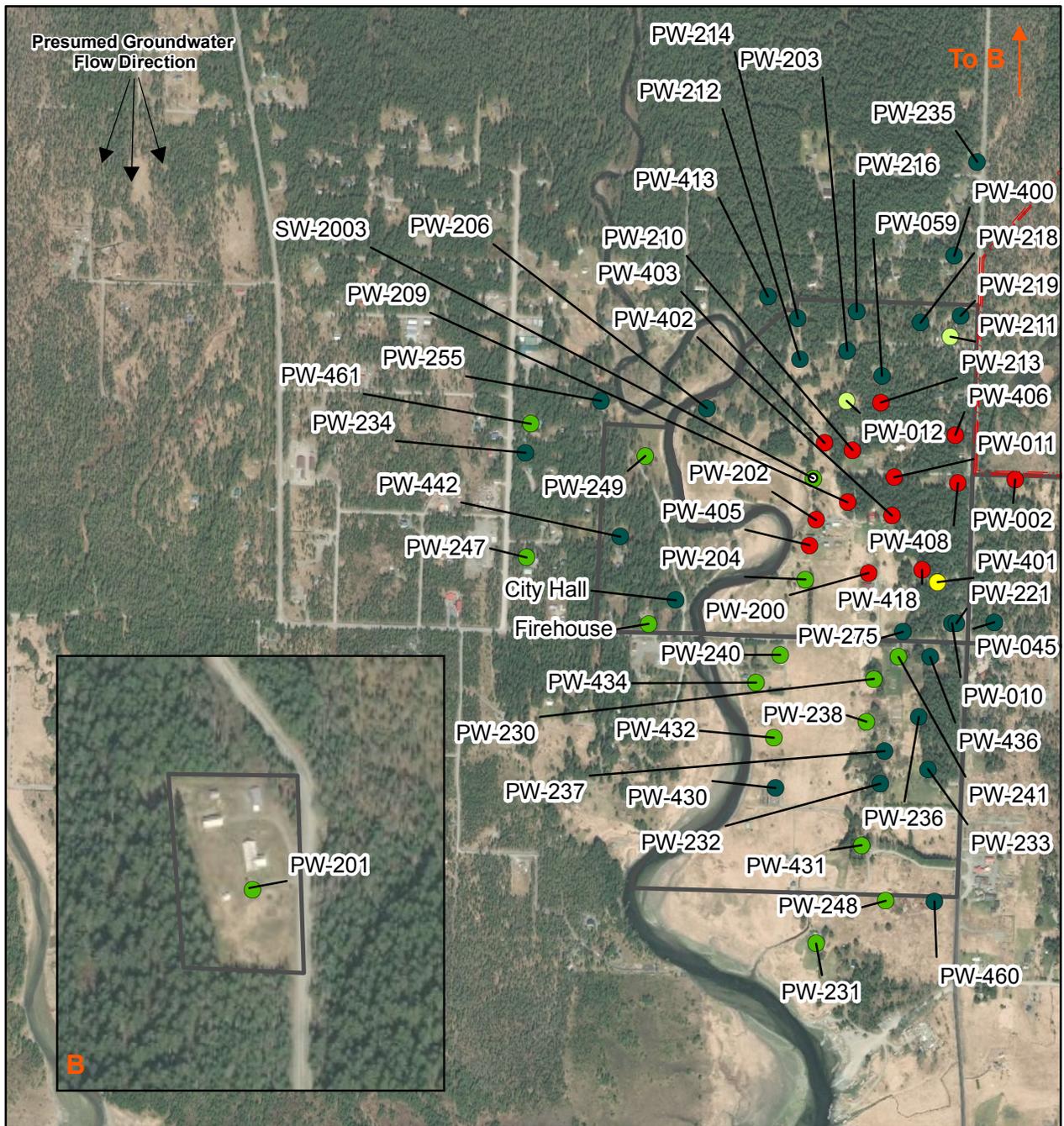
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- | | |
|-------------------------------|-------------------------------|
| ● ≤2.0 ppt | ○ Surface Water Sample |
| ● 2.1 to 17.4 ppt (3% to 25%) | ○ PFOS ≥ 400 ppt |
| ● 17.5 to 34 ppt (25% to 49%) | --- Airport Property Boundary |
| ● 35 to 64 ppt (50% to 99%) | □ Well Search Areas |
| ● ≥65 ppt (over action level) | |



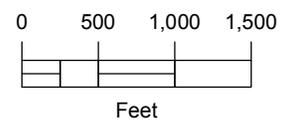
Gustavus PFAS Gustavus, Alaska	
ANALYTICAL RESULTS EAST	
April 2019	101543-001
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
Figure 4	



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)
- Surface Water Sample
- PFOS ≥ 400 ppt
- Airport Property Boundary
- Well Search Areas



Gustavus PFAS Gustavus, Alaska	
ANALYTICAL RESULTS WEST	
April 2019	101543-001
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	
Figure 5	

Appendix A

FIELD LOGS

CONTENTS

- Private well surveys
- Private well sampling logs

APPENDIX A: FIELD LOGS

Water supply well field notes contain personal information.
This content has been removed for confidentiality.

Appendix B

PUBLIC INFORMATION

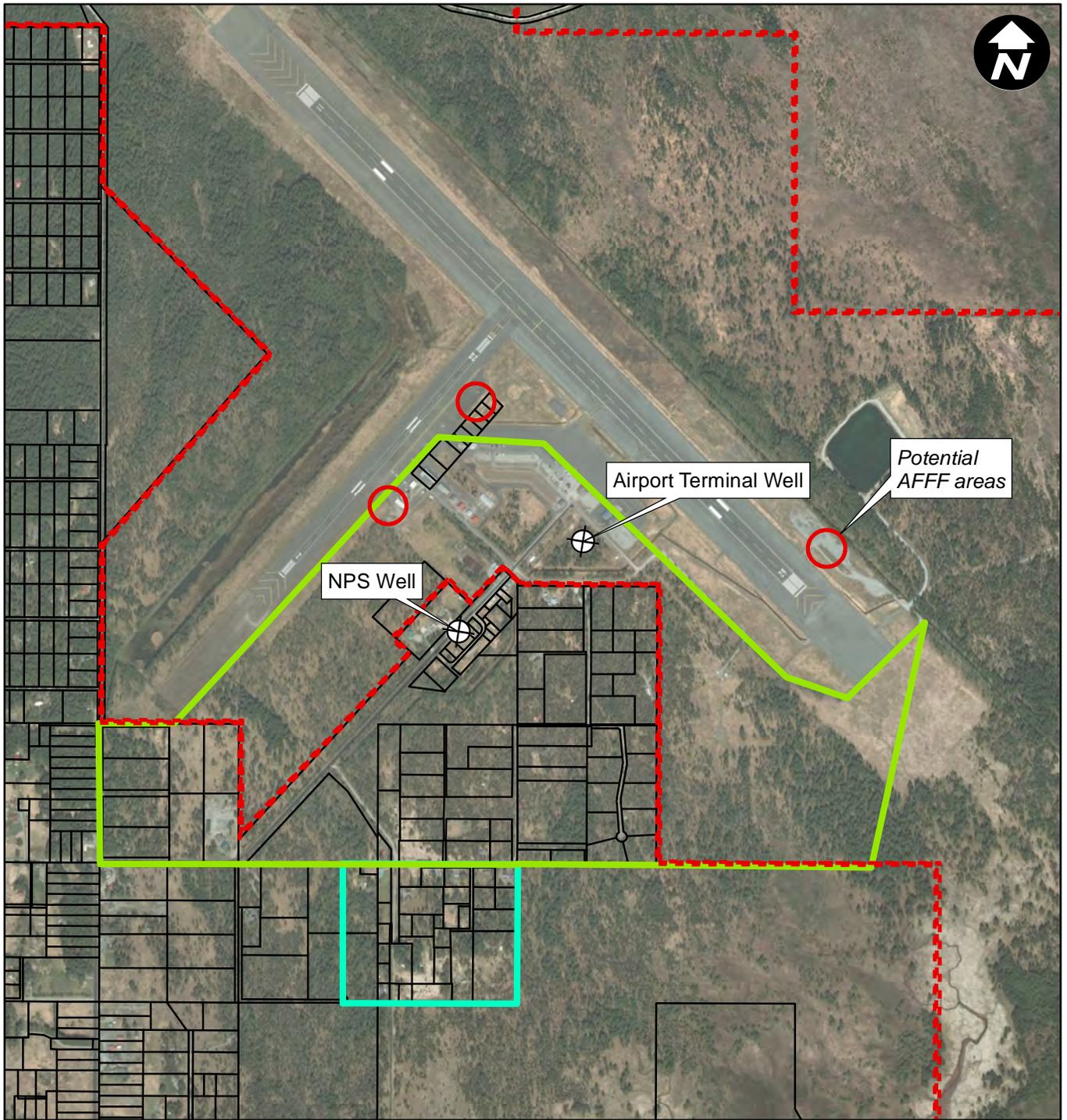
CONTENTS

- Shannon & Wilson, Inc. maps and templates
- DOT&PF fliers, notices, letters and presentations
- ATSDR fliers
- EPA flier
- DHSS presentation

APPENDIX B: PUBLIC INFORMATION

PUBLIC INFORMATION

Shannon & Wilson, Inc. maps and templates



Property lines and buildings information obtained from ADOT; 2012 information. Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Legend

 Public Wells

 Airport Property Boundary

 Property Lines

Search Areas

 Area 1

 Area 2

0 500 1,000 1,500



Feet

Gustavus Airport
Gustavus, Alaska

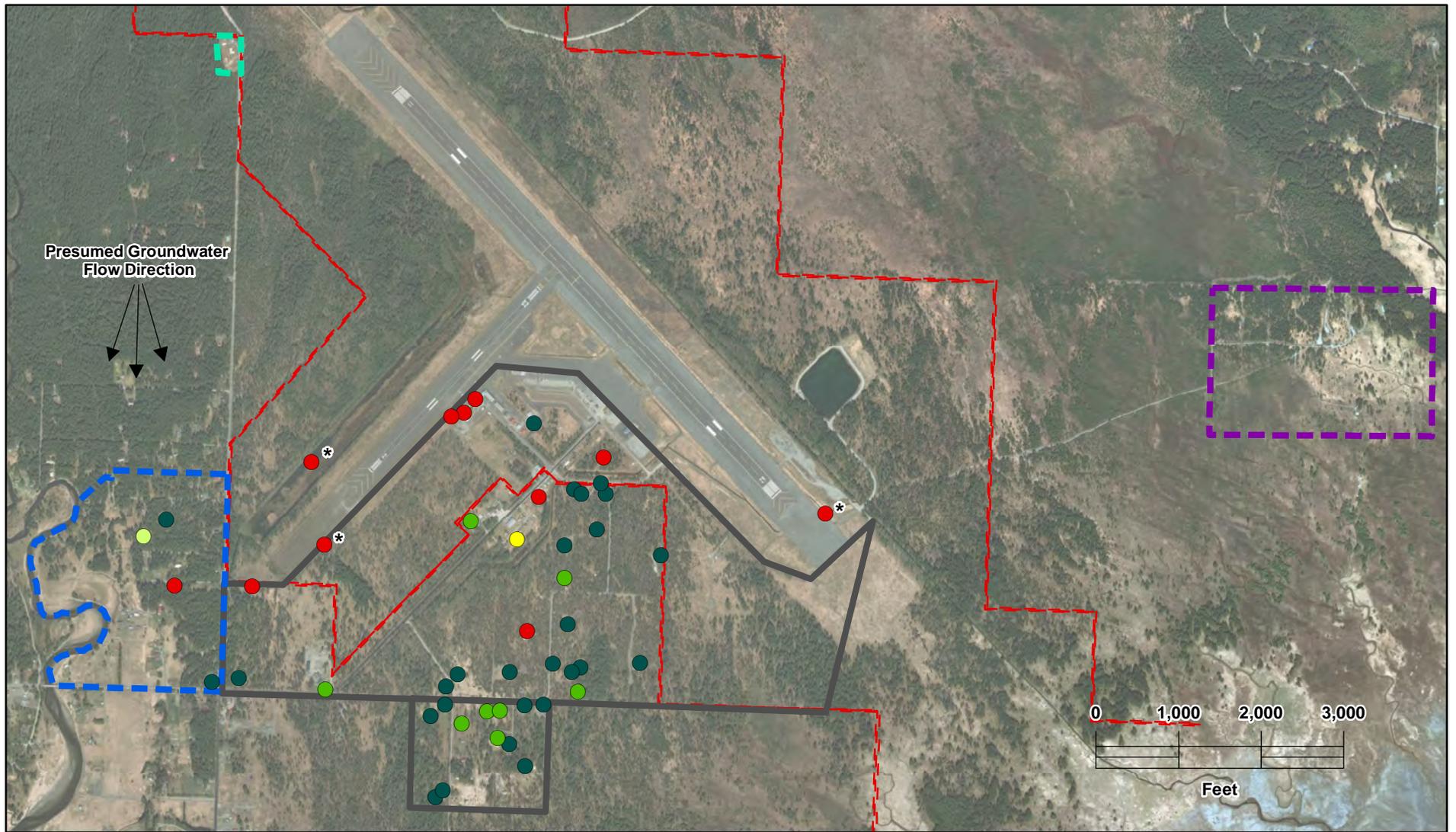
PFAS SAMPLING AREA

August 2018

101543

 SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

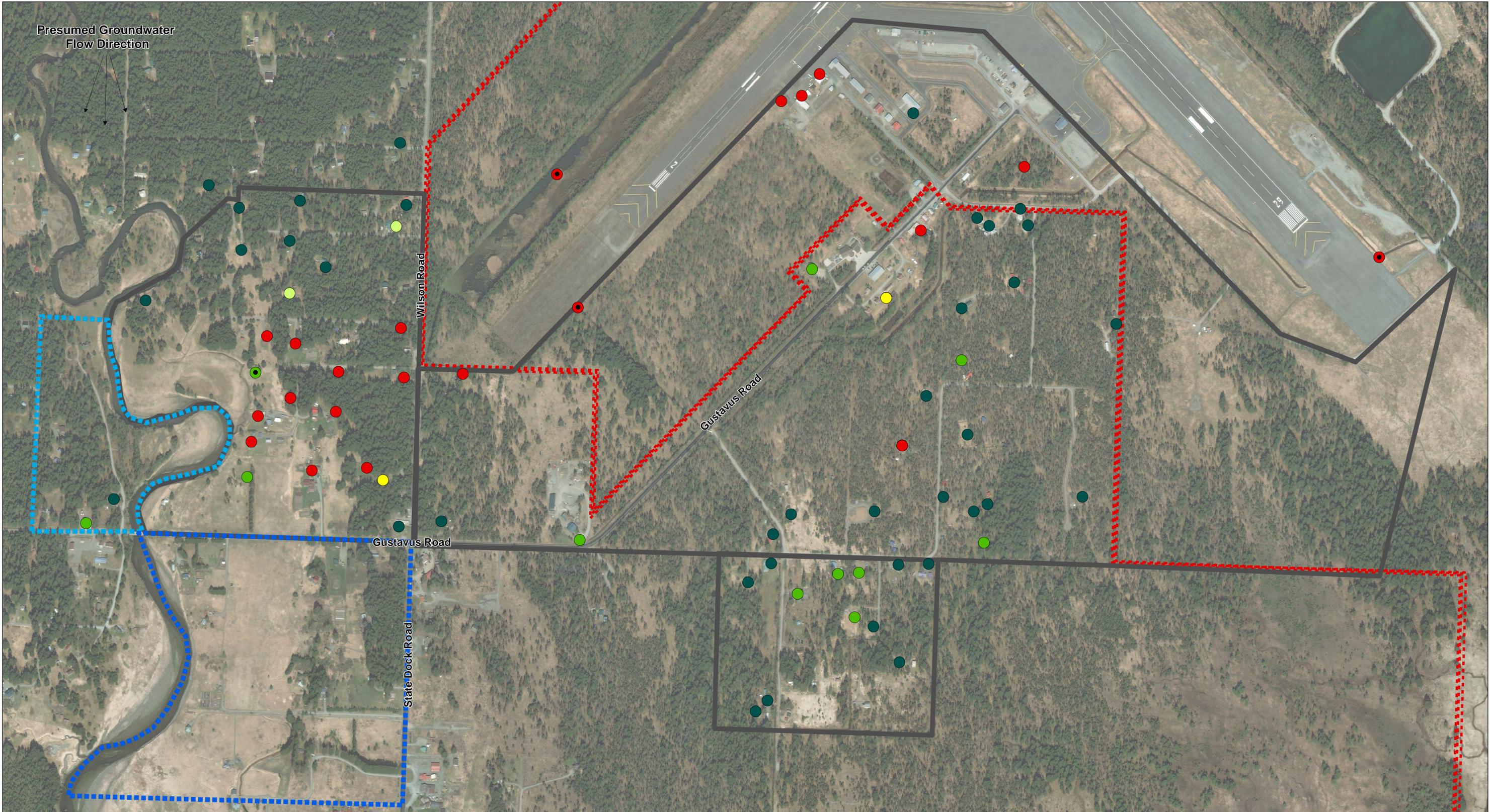
Sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA results (ADEC action level)

- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)

- ▭ Areas 1 and 2
- ▭ Area 3
- ▭ Area 4
- ▭ Area 5
- - - Airport Property Boundary
- * Surface Water Sample



Gustavus Airport Gustavus, Alaska	
PROPOSED SEARCH AREAS 3 - 5	
September 2018	101543
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure

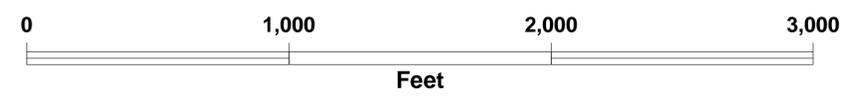


Presumed Groundwater Flow Direction

LEGEND

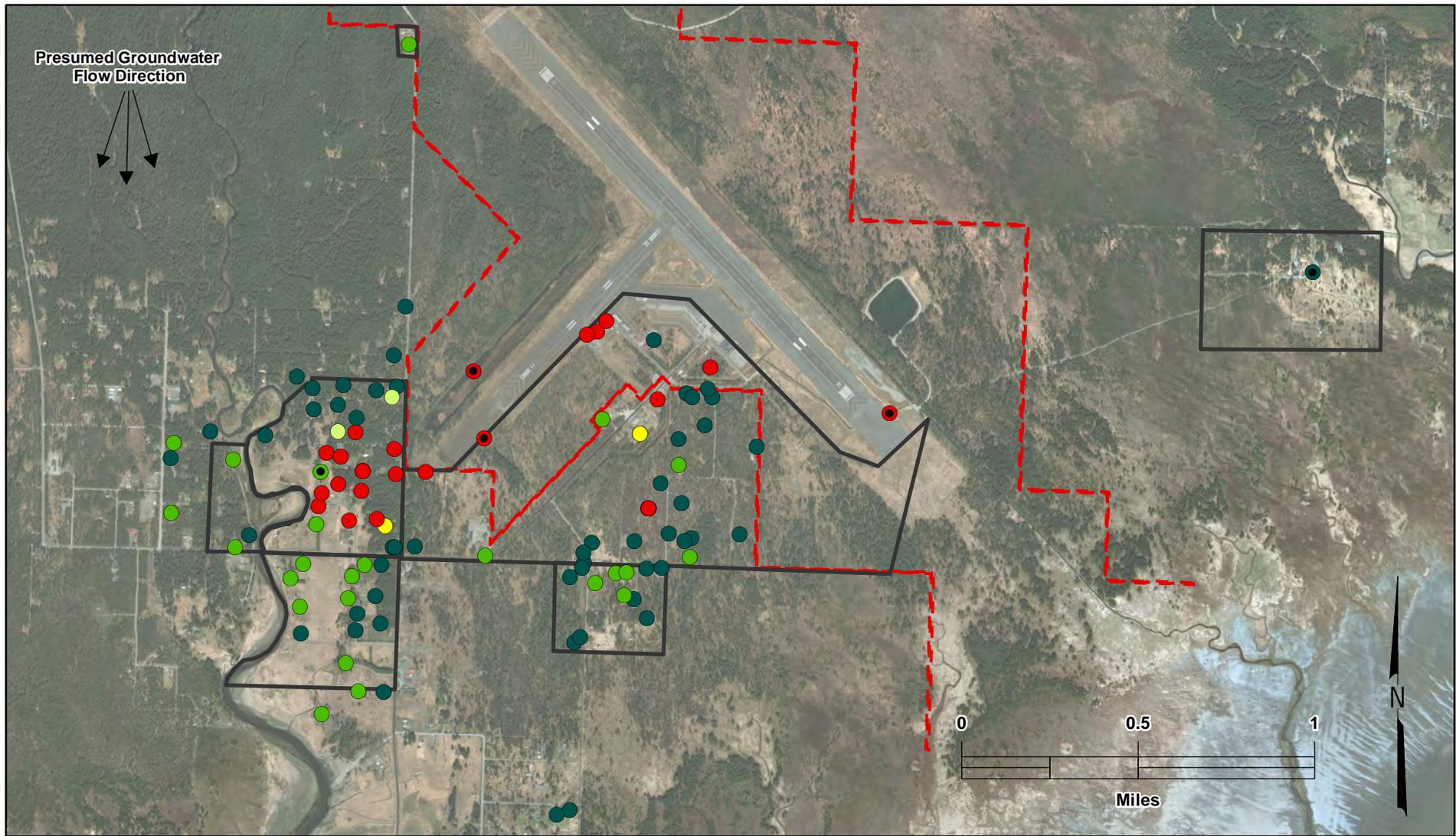
- Surface Water Sample
- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)
- ▭ Areas 1 - 5
- ▭ Area 6
- ▭ Area 7
- Airport Property Boundary

Notes:
ppt - parts per trillion
Results compiled based on sum of
PFOS, PFOA, PFHxS, PFHpA, PFNA.



Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Gustavus Airport Gustavus, Alaska	
PROPOSED SEARCH AREAS 6 & 7	
October 2018	101543
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure



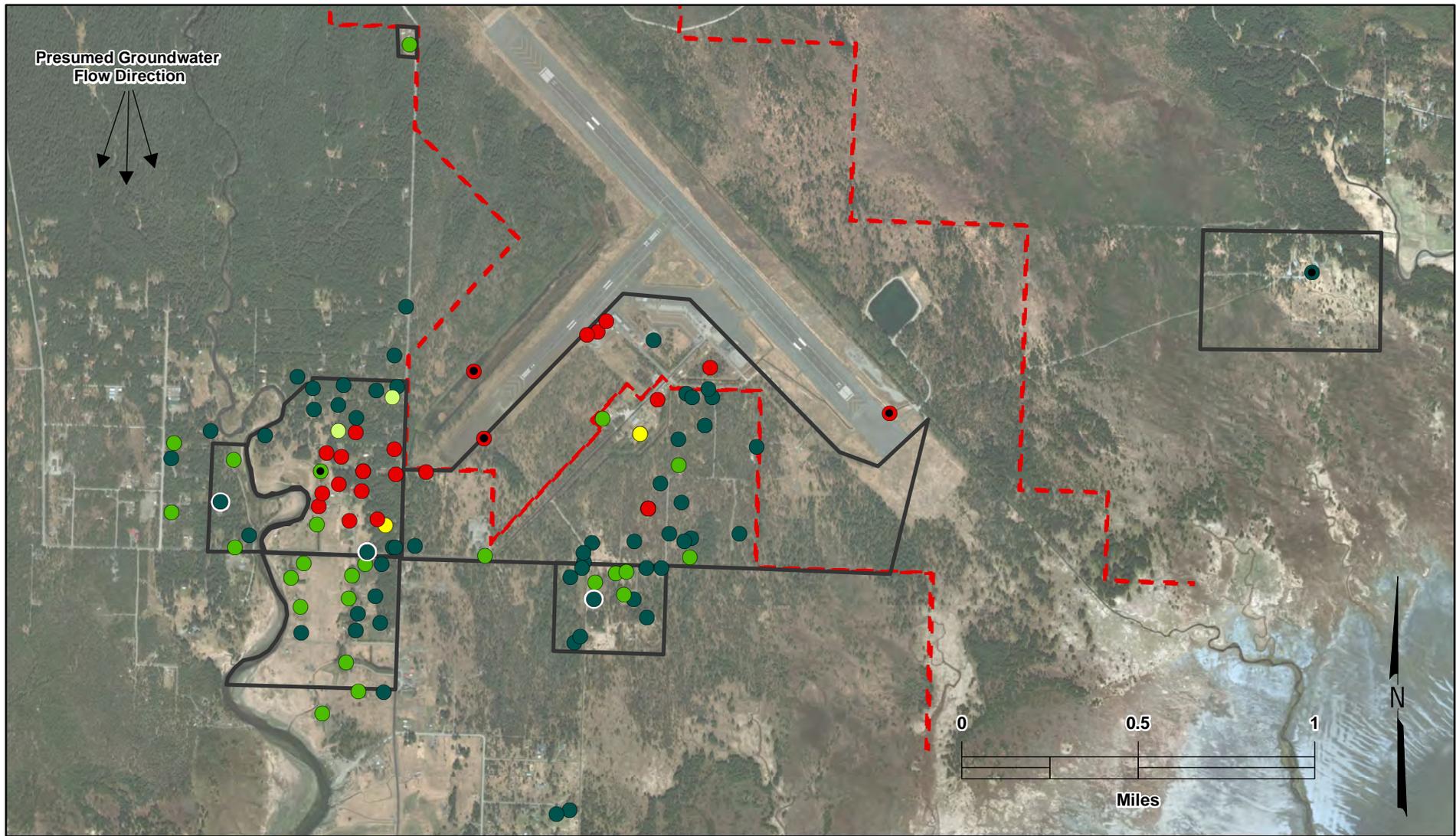
Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)
- Surface Water Sample
- Sampling Boundaries
- - - Airport Property Boundary

Notes:
 ppt - parts per trillion
 Results compiled based on sum of PFOS, PFOA, PFHxS, PFHpA, PFNA.
 Where multiple samples have been collected, the map shows the highest result.

Gustavus Airport Gustavus, Alaska	
ANALYTICAL RESULTS	
November 20, 2018	101543
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure 1



Map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- ≤2.0 ppt
- 2.1 to 17.4 ppt (3% to 25%)
- 17.5 to 34 ppt (25% to 49%)
- 35 to 64 ppt (50% to 99%)
- ≥65 ppt (over action level)
- Surface Water Sample
- Sampling Boundaries
- - - Airport Property Boundary

Notes:
 ppt - parts per trillion
 Results compiled based on sum of PFOS, PFOA, PFHxS, PFHpA, PFNA.
 Where multiple samples have been collected, the map shows the highest result.
 Results from the most recent sampling event are shown with a white halo.

Gustavus Airport Gustavus, Alaska	
ANALYTICAL RESULTS	
December 19, 2018	101543
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	Figure 1



We are conducting a door-to-door survey in this neighborhood on behalf of the Gustavus Airport, to confirm if your house is on a private well. This information will be used as part of our groundwater monitoring program.

Please contact me at

to confirm your household water source/s. If you are using a private well we may request a water sample. Thank you,

Shannon & Wilson Inc.

More information:
www.alaska.gov/go/C732

Private Well Inventory Survey Form

Date: _____

Physical Address: _____

Name (Owner): _____

Legal owner

Trust or Estate

Name (Occupant): _____

Mailing Address (owner): _____

Mailing address (occupant): _____

Email: Owner: _____ Occupant: _____

Contact Phone: Owner: _____ Occupant: _____

Preferred method of contact(circle): Email Phone

Number of persons residing at this location: Adults (18 and over) _____

Teenagers (13 to 17) _____

Children (12 and under) _____

Years at this residence: _____ Full-Time Seasonal

1) From where do you obtain your drinking water?

a) Residential (private) Well

b) Community well

c) Bottled water

d) Other _____

2) If you have a private well, please answer the following questions:

a) Where is the well located on the property? _____

b) Is the well in use? Yes No

3) If no, is the well usable, unusable, or properly abandoned?

Usable Unusable Abandoned Method _____

If yes, please check all that apply regarding the usage of your well water:

Drinking

Vegetable/grain Gardening

Cooking/ food preparation

-Size of Garden _____ sq.feet/acres

Other _____

-Average watering frequency using well water? (daily, weekly, etc.) _____

a) When was the well installed? _____

b) What is the well depth? _____

c) What is the well diameter? _____

d) What is the well type? Dug Well

Driven

Drilled

Unknown

e) Do you have any treatment on your well (e.g. water softener)? Please describe. _____

4) Sample Permission

Does Shannon & Wilson, Inc. have permission to sample your private water well?

Yes No

Signature

Date

MONTH X, 2018

NAME

MAILING ADDRESS

Gustavus, AK 99826

RE: RESULTS OF AUGUST 2018 PFAS PRIVATE WELL SAMPLING, GUSTAVUS AIRPORT

Dear Mr. and Ms. XXXX,

Thank you for participating in our private-well sampling program to evaluate the potential presence of per- and polyfluoroalkyl substances (PFAS) in groundwater near the Gustavus Airport (GST). Shannon & Wilson, Inc. collected a water sample on August X, 2018, from the well at your residence/business. Enclosed are the analytical results for the sample from your residential/commercial well water-supply well at PHYSICAL ADDRESS. We have prepared an identical letter for your tenant/s NAME.

The well-water sample was analyzed for six PFAS. Currently, the Alaska Department of Environmental Conservation (ADEC) action level for drinking water is 70 parts per trillion (ppt) for the sum of five compounds: PFOS, PFOA, PFHpA, PFHxS, and PFNA. However, results are rounded from 65 ppt for the purposes of supplying alternate drinking water.

Results of the analysis conducted by TestAmerica Laboratories, Inc. indicate that PFOS was not/was detected at X ppt, PFOA was not/was detected at X ppt, and PFHxS was not/was detected at X ppt [list three largest values /or/ the five PFAS compounds were not detected] in the water sample collected from your well. The sum of these five compounds is less than/greater than the ADEC action level. The portions of the original laboratory report that apply to your well (sample number XXXXXX and field-duplicate sample XXXXXX) are enclosed for your records. After coordinating with the ADEC and/or ADOT we may request to sample your well again.

The Alaska Department of Transportation will provide alternative drinking water to the occupants of homes and businesses whose well water exceeds the ADEC action level, and who use their water for drinking or cooking. In accordance with DEC guidelines, we will monitor

NAME
Business
MONTH X, 2018
Page 2

locations with results between 35 ppt and 65 ppt on a quarterly sampling schedule; and locations with results between 17 ppt and 34 ppt on an annual sampling schedule.

We have sampled approximately 100 private water-supply wells in Gustavus. As results are received we will update the PFAS sample results map on the Alaska Department of Transportation (ADOT) website.

Please see the enclosed PFAS fact sheet for a link to the ADOT website, and feel free to contact us if you have questions regarding your results.

Sincerely,

SHANNON & WILSON, INC.

Amber Masters
Environmental Scientist

Enc: Select Pages of Test America Laboratory Report No. 320-XXXXX
Gustavus Airport PFAS Fact Sheet

PUBLIC INFORMATION

DOT&PF fliers, notices, letters and presentations



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Southcoast Region
6860 Glacier Highway
P.O. Box 112506
Juneau, AK 99811-2506
Main: (907)465-1763
Fax: (907)465-3124
dot.alaska.gov

August 22, 2018

Dear Property Owner:

The Gustavus Airport was recently alerted to concentrations of Per- and Polyfluoroalkyl substances (PFAS) in groundwater at the airport. The Gustavus Airport used Aqueous Film Forming Foam (AFFF), a standard firefighting agent that contains PFAS, to extinguish hydrocarbon fires during training exercises, testing, and emergency events.

The Alaska Department of Transportation and Public Facilities (DOT&PF) and Alaska Department of Administration Division of Risk Management are working with an environmental consulting firm, Shannon & Wilson Inc., and the Alaska Department of Environmental Conservation (DEC) to identify and sample private water wells near and downgradient (south) of the Gustavus airport. Samples will determine if PFAS are present above recommended levels. PFAS are emerging contaminants, and research into the health effects of exposure to PFAS is ongoing.

Results of PFAS water testing will be shared with property owners and residents. If private wells are found to have PFAS levels at concentrations higher than advised, DOT&PF will provide an alternate drinking water source.

DOT&PF, along with representatives from Shannon & Wilson, Inc., and the Alaska Departments of Health and Social Services, Environmental Conservation and Administration will be hosting an informational meeting. We encourage all interested parties to attend. We will summarize the actions taken to date and the plan for further PFAS water testing.

Meeting Location: Gustavus Public Library
14 Gustavus Road

Meeting Date & Time: Monday, August 27, 2018
5:30 p.m. – 7:00 p.m.

Shannon & Wilson, Inc. will be collecting water samples from **Tuesday, August 28 to Friday, August 31**. If you have an active well and are located within the attached search areas, please attend the upcoming meeting or contact Shannon & Wilson's project manager, Kristen Freiburger, at (907) 750-0679 to schedule a sampling appointment.

For more information prior to the meeting, please visit www.alaska.gov/go/C732 or contact DOT&PF directly. We appreciate your patience as we work through this process and look forward to speaking with you.

Aurah Landau, Public Information Officer
Alaska Department of Transportation & Public Facilities, Southcoast Region
airportwater@alaska.gov
(907) 465-4503

"Keep Alaska Moving through service and infrastructure."



Gustavus Airport Firefighting Testing Area PFAS Factsheet

Per- and Polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFAS are considered emerging environmental contaminants and the health effects are not well known.

DOT&PF was alerted in late July 2018 to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport. The presumed source of PFAS in groundwater at the Gustavus Airport is the Federal Aviation Administration-mandated use of fire-fighting foams at Aircraft Rescue and Firefighting (ARFF) testing areas.

The Alaska Department of Environmental Conservation (DEC) groups five similar compounds into a combined PFAS action level of 70 parts per trillion. Out of caution, DEC will require the provision of alternative drinking water to affected properties with levels above 65 parts per trillion.

PFAS discovered in the Gustavus Airport terminal well are reported in concentrations above DEC action levels. Concentrations at a nearby well which serves the National Park Service water system are below DEC action levels.

DOT&PF is working with an environmental consulting firm, Shannon & Wilson, Inc., and the Alaska Department of Environmental Conservation (DEC) to identify and sample private water wells south of the airport as well as retest the two previously sampled wells beginning Monday, August 27, 2018. Test results from the samples are expected to be available by the end of September.

DOT&PF Public Informational Meeting

Monday, August 27, 2018, 5:30-7pm, at Gustavus Library

- The Alaska Departments of Transportation, Environmental Conservation, Health and Social Services, and Administration will attend and provide information.
- Shannon & Wilson, will attend to schedule sampling times for properties south of the airport.

Website: www.alaska.gov/go/C732

For questions about testing & study:

Shannon & Wilson, Inc.
Kristen Freiburger, Project Manager
Phone: 907-479-0600
Email: krf@shanwil.com

For regulatory questions:

Alaska Department of Environmental Conservation
Contaminated Site Program
Danielle Duncan, Environmental Program Specialist
Phone: 907-465-5207
Email: danielle.duncan@alaska.gov

For questions about PFAS health effects:

Alaska Department of Health & Social Services
Kristin Bridges, Public Health Scientist
Phone: 907-269-8028
Email: kristin.bridges@alaska.gov

For questions about Gustavus Airport Firefighting training area and all other inquiries:

Alaska Department of Transportation and Public Facilities, Southcoast Region
Aurah Landau, Public Information Officer
Phone: 907-465-4503
Email: airportwater@alaska.gov



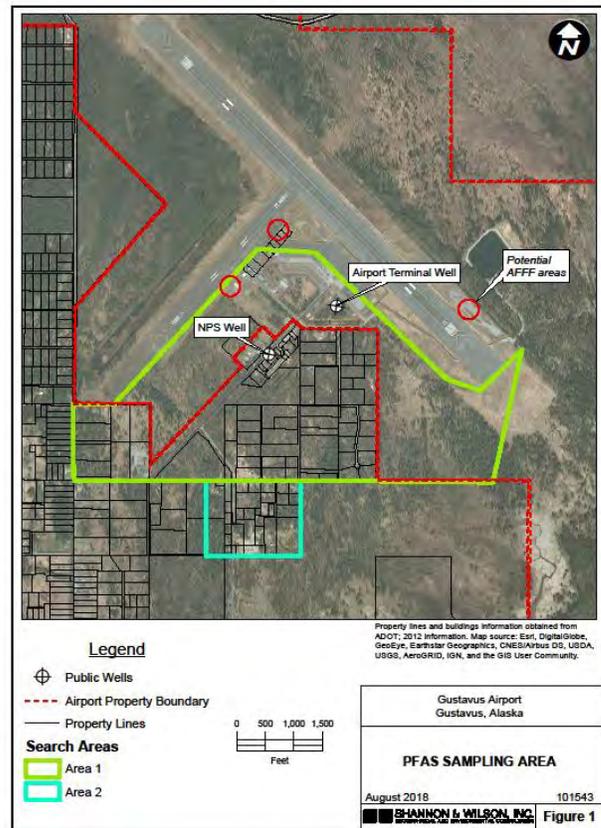
PUBLIC MEETING NOTICE DRINKING WATER

DOT&PF was recently alerted to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport. The presumed source of PFAS in groundwater at the Gustavus Airport is the Federal Aviation Administration-mandated use of fire-fighting foams at Aircraft Rescue and Firefighting (ARFF) testing areas.

Per- and Polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFAS are considered emerging environmental contaminants and the health effects are not well known.

PFAS discovered in the Gustavus Airport well serving Alaska Airlines and Alaska Seaplanes terminals are reported in concentrations above Alaska Department of Environmental Conservation (DEC) action levels. Concentrations at the well which serves the National Park Service water system are below DEC action levels.

DOT&PF is working with an environmental consulting firm, Shannon & Wilson, Inc., and DEC to identify and sample private water wells south of the airport as well as retest the two previously sampled wells beginning Monday, August 27, 2018. Test results from the samples are expected to be available by the end of September.



Public Information Meeting

Monday, August 27, 2018, 5:30-7pm, at Gustavus Library

- The Alaska Departments of Transportation, Environmental Conservation, Health and Social Services, and Administration will provide information.
- Shannon & Wilson, will attend to schedule sampling times for properties south of the airport.



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Southcoast Region
6860 Glacier Highway
P.O. Box 112506
Juneau, AK 99811-2506
Main: (907)465-1763
Fax: (907)465-3124
dot.alaska.gov

FOR IMMEDIATE RELEASE: Aug. 24, 2018

Contact: Aurah Landau, (907) 465-4503, airportwater@alaska.gov

PFAS Discovered in Groundwater Near Gustavus Airport Firefighting Foam Discharge Areas

(Juneau, Alaska) – The Alaska Department of Transportation and Public Facilities (DOT&PF) was recently alerted to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in two wells at and near the Gustavus Airport. The PFAS discovered in an airport terminal well are in concentrations higher than Alaska Department of Environmental Conservation (DEC) action levels. Concentrations at a nearby well are lower than DEC action levels. DOT&PF is working with an environmental consulting firm, Shannon & Wilson, Inc., and DEC to identify and sample private water wells south of the airport beginning Monday, Aug. 27, 2018.

“The safety of Gustavus residents is paramount. As soon as PFAS were discovered, DOT&PF initiated the process of notifying the community and testing neighboring properties. We will share test results with residents as soon they become available,” said Marc Luiken, DOT&PF Commissioner.

PFAS are commonly used in products for fire suppression, resistance to wear, and repelling oil, stains, grease, and water. PFAS can be found in carpets, upholstery, apparel, paper, non-stick cookware, food packaging, personal care products, and in firefighting aqueous film forming foams (AFFF). The use of AFFF during firefighting equipment testing at the Gustavus Airport is the presumed source of PFAS contamination in the affected wells. PFAS are considered emerging contaminants and the health effects are not yet well characterized.

Further well testing will start next week. Residents in sampling areas can contact Shannon & Wilson, Inc. at 479-0600 to schedule a testing appointment. A graphic of the sampling area is below.

DOT&PF will hold an informational public meeting in Gustavus to discuss PFAS and groundwater testing. The meeting is scheduled for Monday, August 27, 2018, at the Gustavus Library, from 5:30-7pm. DEC, the Alaska Department of Health and Human Services, and Alaska Department of Administration will also attend and provide information.

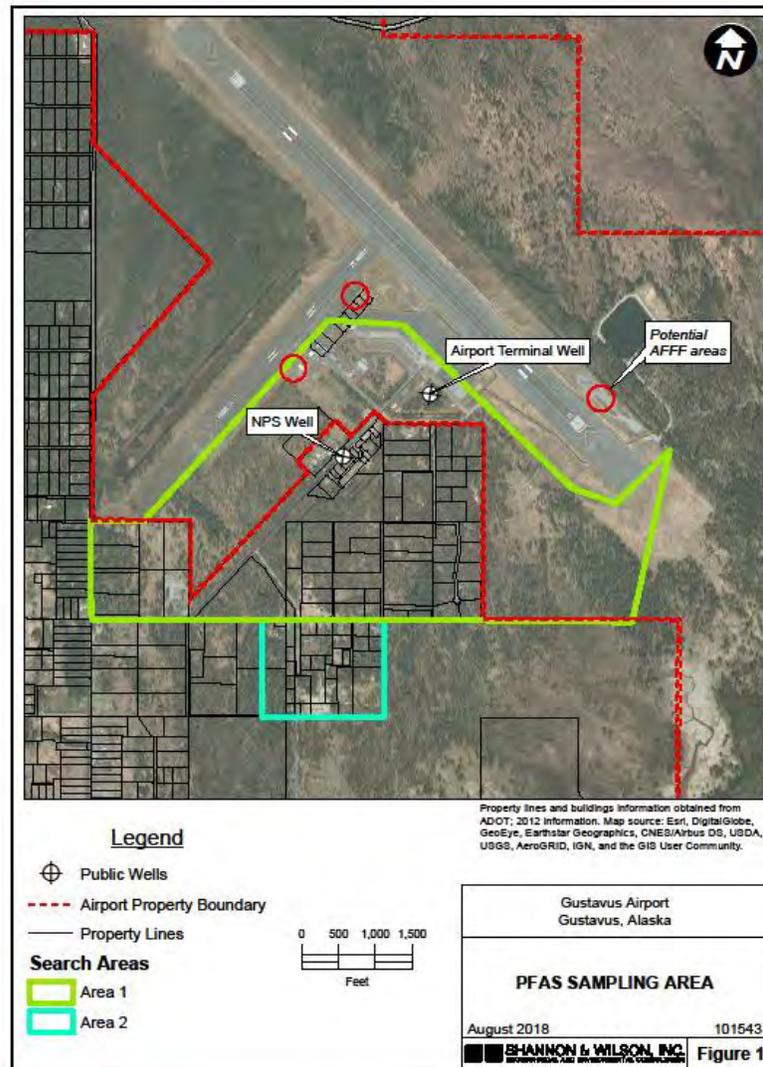
For more information, visit www.alaska.gov/go/C732 or contact Aurah Landau, (907) 465-4503, airportwater@alaska.gov

-more-

To learn more about PFAS, visit the following websites:

- Department of Health and Social Services- Environmental Public Health Program: <http://dhss.alaska.gov/dph/Epi/eph>
- Department of Environmental Conservation: <http://dec.alaska.gov/spar/csp/pfas-contaminants/>

Gustavus PFAS Well Sample Area – August 2018



The Alaska Department of Transportation and Public Facilities oversees 239 airports, 10 ferries serving 35 communities, over 5,600 miles of highway and 731 public facilities throughout the state of Alaska. The mission of the department is to "**Keep Alaska Moving** through service and infrastructure."

###



PFAS in Drinking Water - Safety Information

Can my family drink our well water?

Do not drink your well water or use it to prepare baby formula if the sum concentration of the five PFAS of concern (i.e., PFOS, PFOA, PFNA, PFHxS, and PFHpA) is above the Department of Environmental Conservation's (DEC) action level of 70 parts per trillion (ppt). You should also find an alternative water source for pets and other animals.

Is it safe to cook with my well water?

You should not use your well water when cooking or washing food if the sum concentration of the five PFAS of concern is 70 ppt or more. Heating or boiling water doesn't remove PFAS.

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

If your well water is contaminated with PFAS, it is safe to use well water to clean your house, wash dishes, and do laundry.

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

If your well water is contaminated with PFAS, you can reduce exposure by using an alternative (or treated) water source for brushing teeth or any other activity that might result in inadvertent ingestion of water. This is especially true for young children who may swallow water during bathing or brushing teeth. However, it is very unlikely that showering or taking baths with well water will cause any health problems for the following reasons:

- Your skin does not absorb PFAS very well
- PFAS are not skin irritants
- PFAS do not easily move from water to air, so it is highly unlikely that you will inhale much PFAS while showering

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

It is recommended that nursing mothers continue to breastfeed. This is because breastfeeding provides a number of health benefits for both infants and mothers, which outweigh any known risk associated with transfer of PFAS through breast milk.

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

Some people may feel more comfortable using an alternative water source (which includes rainwater) for their vegetable gardens. Some studies show that certain types of vegetables may absorb small amounts of PFAS through their roots (which can be distributed throughout the

plant), but the amount taken up depends on many different factors, which include the level of PFAS in the water, the frequency of watering, the type of PFAS in the water, and the type of produce grown. However, these studies also note that the health benefits of eating fresh vegetables outweigh the health risks associated with exposure to the small amounts of PFAS that may be present in vegetables. Ultimately, your exposure to PFAS through garden vegetables is not likely to be significant compared to other primary exposure routes such as drinking contaminated water.

If you are concerned about the PFAS content of your soil, produce can either be grown in raised beds with clean soil, or clean compost can be added to the soil to reduce the uptake of PFAS. Regardless of which options you select, we recommend you wash your vegetables with clean water and peel root vegetables.

Where can I get more information?

Helpful Phone Numbers:

State of Alaska EPHP at *907-269-8028* to learn more about health effects of PFAS

State of Alaska DEC at *907-451-2153* to learn more about testing for PFAS

Helpful Links:

EPHP's PFAS website: *<http://dhss.alaska.gov/dph/Epi/eph/Pages/default.aspx>*

DEC's PFAS website: *<http://dec.alaska.gov/spar/csp/pfas-contaminants/>*



Gustavus Airport Firefighting Testing Area PFAS Factsheet
Updated Sept. 20, 2018

Per- and Polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFAS are considered emerging environmental contaminants and the health effects are not well known.

DOT&PF was alerted in late July 2018 to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport. The presumed source of PFAS in groundwater at the Gustavus Airport is the Federal Aviation Administration-mandated use of fire-fighting foams at Aircraft Rescue and Firefighting (ARFF) testing areas.

The Alaska Department of Environmental Conservation (DEC) groups five similar compounds into a combined PFAS action level of 70 parts per trillion. Out of caution, DEC will require the provision of alternative drinking water to affected properties with levels above 65 parts per trillion.

DOT&PF worked with an environmental consulting firm, Shannon & Wilson, Inc., and the Alaska Department of Environmental Conservation (DEC) to identify and sample private water wells south of the airport as well as retest the two previously sampled wells beginning Monday, August 27, 2018. Based on those sample results, DOT&PF is conducting further sampling west of the airport beginning the week of September 24, 2018.

PFAS discovered in several wells on the Gustavus Airport property and 3 private wells off property are reported in concentrations above DEC action levels. Concentrations at most private wells and the well which serving the National Park Service water system are below DEC action levels.

Generalized sample results and the additional sampling area is available at www.alaska.gov/go/C732.

Website: www.alaska.gov/go/C732

For questions about testing & study:

Shannon & Wilson, Inc.
Kristen Freiburger, Project Manager
Phone: 907-479-0600
Email: krf@shanwil.com

For regulatory questions:

Alaska Department of Environmental Conservation
Contaminated Site Program
Danielle Duncan, Environmental Program Specialist
Phone: 907-465-5207
Email: danielle.duncan@alaska.gov

For questions about PFAS health effects:

Alaska Department of Health & Social Services
Kristin Bridges, Public Health Scientist
Phone: 907-269-8028
Email: kristin.bridges@alaska.gov

For questions about claims:

Alaska Department of Administration
Scott Jordan, Risk Management Director
Phone: 907-465-5723
Email: scott.jordan@alaska.gov

For questions about Gustavus Airport Firefighting training area and all other inquiries:

Alaska Department of Transportation and Public
Facilities, Southcoast Region
Aurah Landau, Public Information Officer
Phone: 907-465-4503
Email: airportwater@alaska.gov



PUBLIC MEETING NOTICE DRINKING WATER

DOT&PF was alerted in late July 2018 to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport.

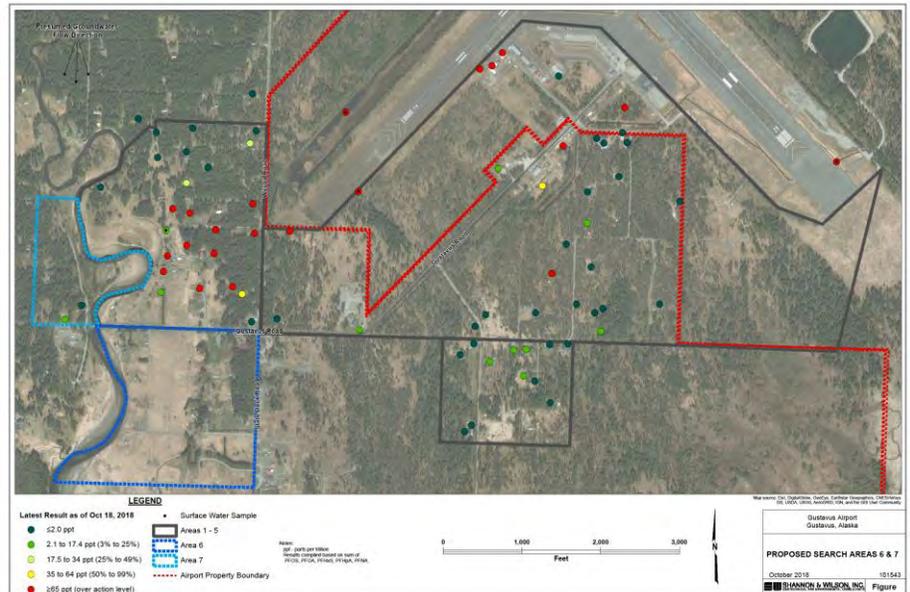
Since then, DOT&PF has worked with an environmental consulting firm, Shannon & Wilson, Inc., to identify and sample private water wells around the airport. Sampling was conducted in August, September, and early October 2018.

Based on those samples, PFAS in several wells on the Gustavus Airport property and a number of private wells off property are reported in concentrations above DEC action levels. Concentrations at many private wells and the well which serves the National Park Service water system are below DEC action levels. Many sampled private wells show negligible PFAS levels.

Shannon & Wilson, Inc. will be conducting further sampling west of the airport beginning October 31, 2018.

If you are in sampling areas 6 and 7 (in blue and purple in the map above), please call Kristen Freiburger, with Shannon & Wilson, Inc. at 907-479-0600 to schedule well sampling.

DOT&PF is providing alternative drinking water to homes with PFAS levels over DEC action levels. Together with DEC and engineering consultants, DOT&PF is beginning to assess options for long-term solution to provide clean drinking water.



Public Information Meeting

Tuesday, October 30, 2018, 5-6:30pm, at the school

- The Alaska Departments of Transportation, Environmental Conservation, Health and Social Services, and Administration will provide information.
- Shannon & Wilson, Inc. will attend to schedule sampling times for properties in the new sample areas.
- Feel free to email in questions ahead of time that you'd like publicly addressed: airportwater@alaska.com
- Questions? <http://www.alaska.gov/go/c732>; (907) 465-4503; airportwater@alaska.gov



Gustavus Airport Firefighting Testing Area PFAS Factsheet
Updated Oct 23, 2018

Per- and Polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that have been used for a wide variety of residential, commercial, and industrial uses. PFAS are considered emerging environmental contaminants and the health effects are not well known.

DOT&PF was alerted in late July 2018 to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport. The presumed source of PFAS in groundwater at the Gustavus Airport is the Federal Aviation Administration-mandated use of fire-fighting foams at Aircraft Rescue and Firefighting (ARFF) testing areas.

The Alaska Department of Environmental Conservation (DEC) groups five similar compounds into a combined PFAS action level of 70 parts per trillion. Out of caution, DEC will require the provision of alternative drinking water to affected properties with levels above 65 parts per trillion.

DOT&PF has worked with an environmental consulting firm, Shannon & Wilson, Inc., to identify and sample private water wells around the airport. Sampling was conducted in August 2018 and late September / early October 2018.

Based on those samples, PFAS in several wells on the Gustavus Airport property and a number of private wells off property are reported in concentrations above DEC action levels. Concentrations at many private wells and the well which serves the National Park Service water system are below DEC action levels. Many sampled private wells show negligible PFAS levels. The northern and eastern edges of the plume are defined. Shannon & Wilson, Inc. will be conducting further sampling west of the airport beginning October 31, 2018.

DOT&PF is providing alternative drinking water to homes with PFAS levels over DEC action levels. Together with DEC, the Alaska Department of Administration, and engineering consultants, DOT&PF is beginning to assess options for long-term solution to provide clean drinking water.

Website: www.alaska.gov/go/C732

For questions about testing & study:

Shannon & Wilson, Inc.
Kristen Freiburger, Project Manager
Phone: 907-479-0600
Email: krf@shanwil.com

For regulatory questions:

Alaska Department of Environmental Conservation
Contaminated Site Program
Danielle Duncan, Environmental Program Specialist
Phone: 907-465-5207
Email: danielle.duncan@alaska.gov

For questions about PFAS health effects:

Alaska Department of Health & Social Services
Kristin Bridges, Public Health Scientist
Phone: 907-269-8028
Email: kristin.bridges@alaska.gov

For questions about claims:

Alaska Department of Administration
Scott Jordan, Risk Management Director
Phone: 907-465-5723
Email: scott.jordan@alaska.gov

For questions about Gustavus Airport Firefighting training area and all other inquiries:

Alaska Department of Transportation and Public
Facilities, Southcoast Region
Aurah Landau, Public Information Officer
Phone: 907-465-4503
Email: airportwater@alaska.gov



Update on PFAS in Gustavus

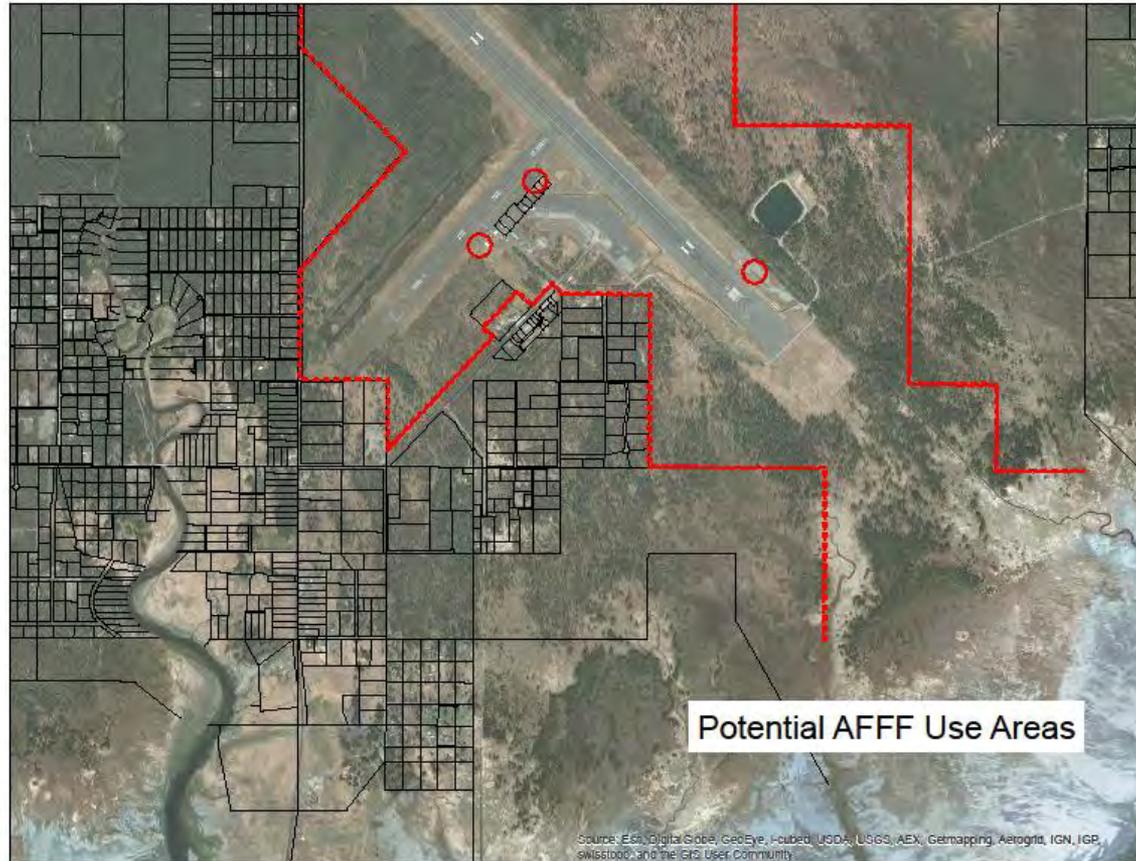
Aurah Landau
Public Information Officer
DOT&PF Southcoast Region

October 30, 2018

To Keep Alaska Flying and Thriving



GST Airport & AFFF Use Areas



Why have PFAS been used at airports?

PFAS have been used at Gustavus Airport in AFFF for required FAA training exercises, equipment testing, and any needed emergency fire response.

The Federal Aviation Administration (FAA) mandates¹:

- “testing of firefighting foam equipment on aircraft rescue and firefighting vehicles is done in accordance to NFPA 412: Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment”

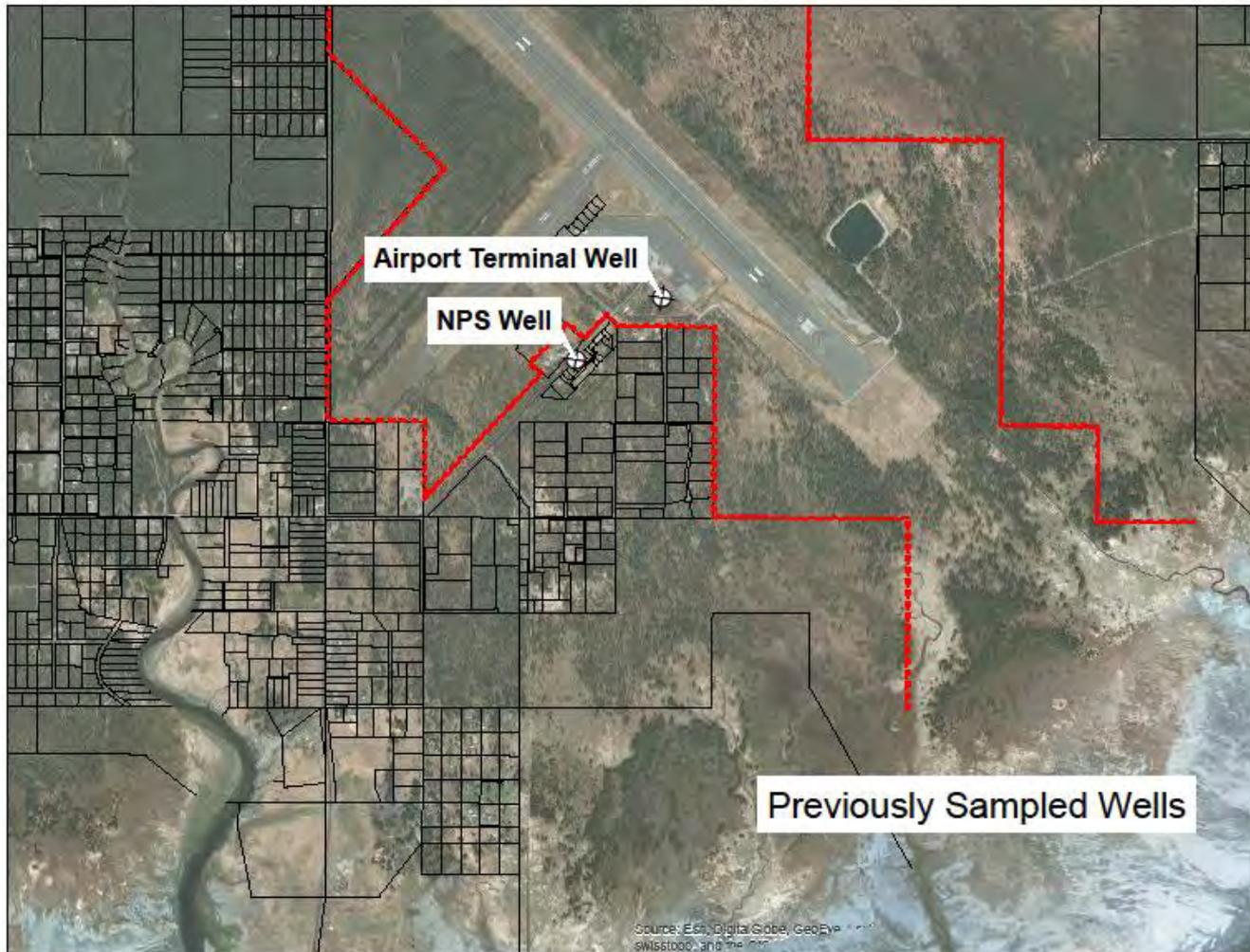
Simplified summary of NFPA 412²:

- Foams shall be flowed annually to insure expansion ratio and drainage criteria are met.

The use of AFFF at the Gustavus Airport prompted testing of monitoring and testing wells for PFAS presence (sampled summer 2018)

*Sources: ¹Use and Potential Impacts of AFFF Containing PFASs at Airports,
²National Fire Protection Association Standard 412*

Preliminary PFAS Sampling Results



Timeline

- Burn pit last used 2014
- AFFF used at Gustavus Airport for certification testing only (\approx 10 seconds per year) \approx 2015 – Current
- Gustavus preliminary water sampling June 27, 2018
- DOT&PF received preliminary sampling test results July 30, 2018



Response Actions

Short-term - Done

- Using water for training
- Directed Alaska Airlines & Alaska Seaplanes to continue to use alternate water (coincidentally begun in May 2018 due to surface water intrusion)
- Assign multi-agency group to assist
- Contract independent environmental consultant to sample

Short-Term – Ongoing

- Community outreach & collaboration with city, school, Park Service
- Determine plume

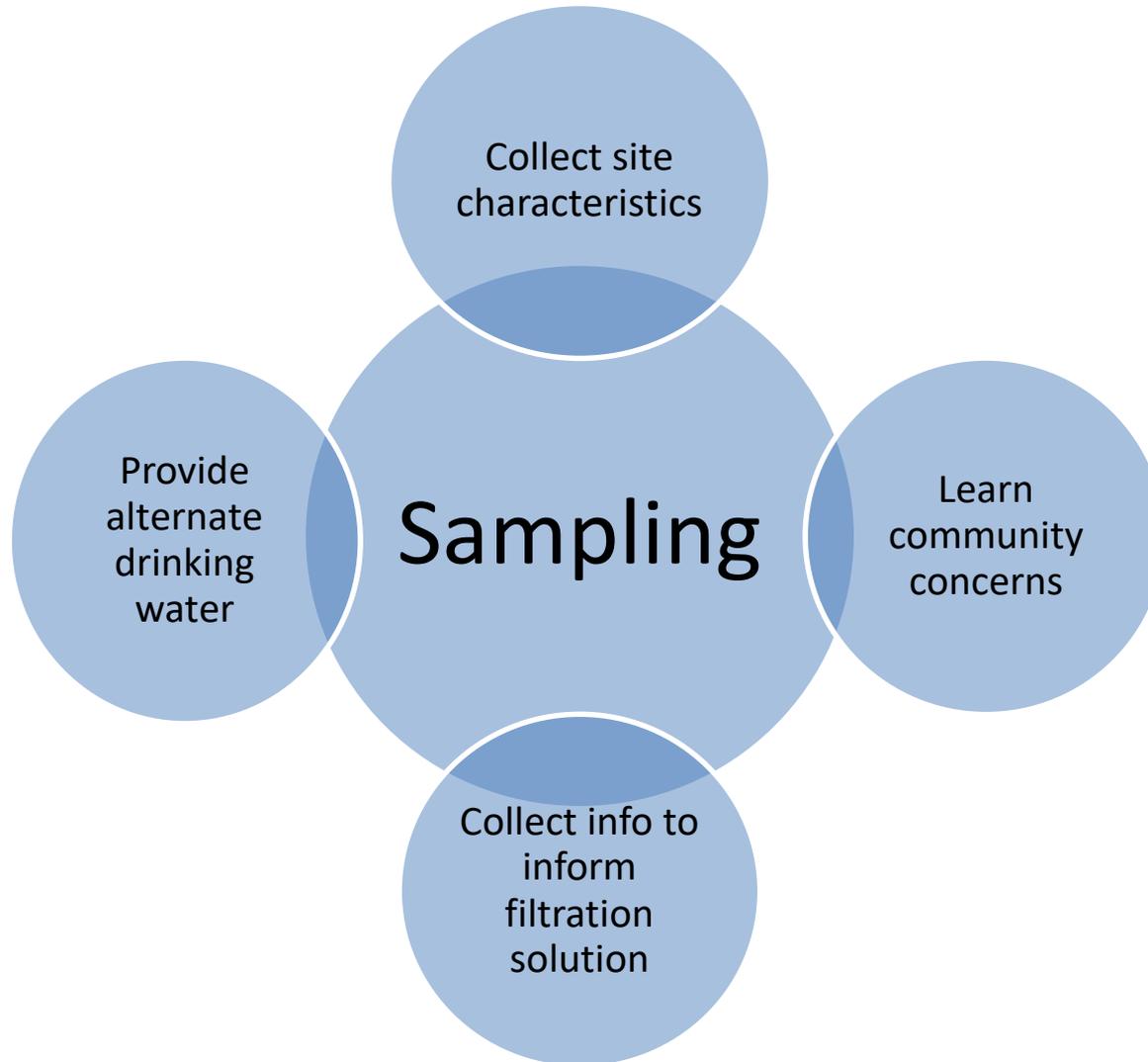
Long-Term – Beginning

- Determine appropriate water filtration options & scale
- Find alternative foams or containment systems for FAA-required foam tests

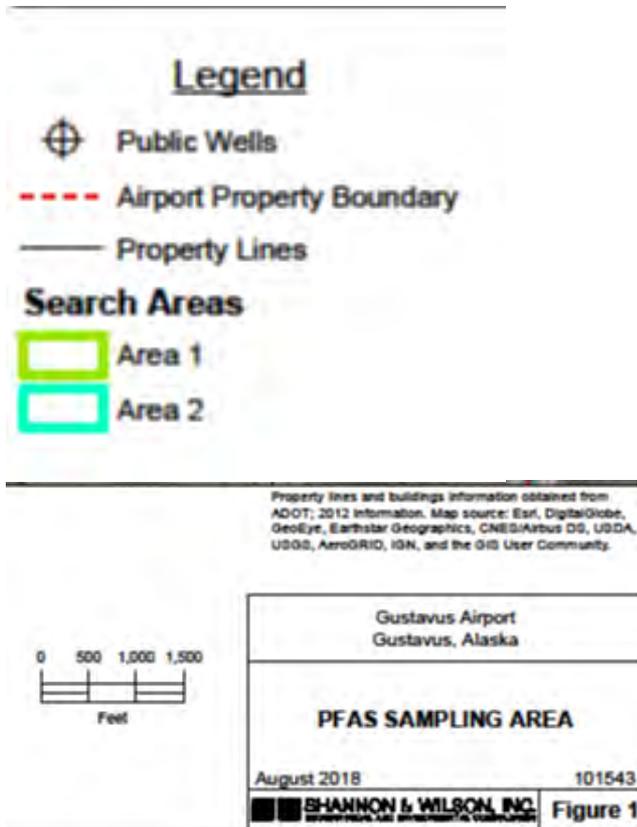
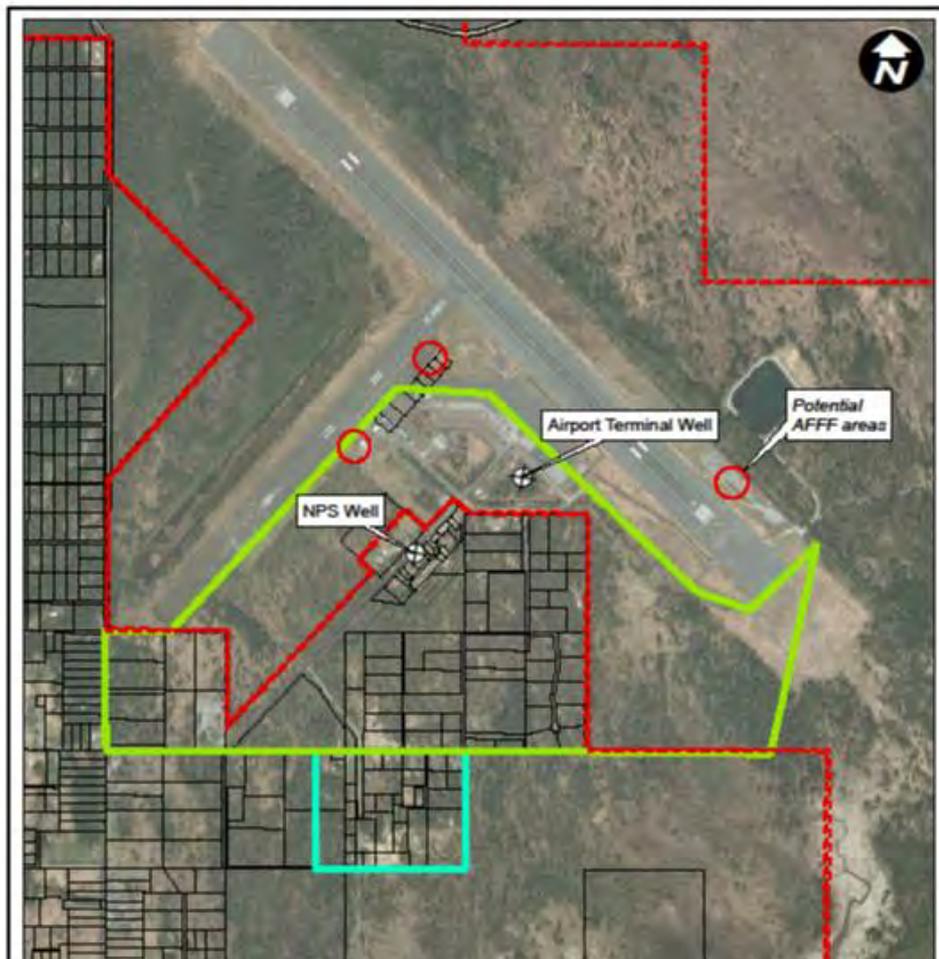
Timeline

- Burn pit last used 2014
- AFFF used at Gustavus Airport for certification testing only (\approx 10 seconds per year) \approx 2015 – Current
- Gustavus preliminary water sampling June 27, 2018
- DOT&PF received preliminary sampling test results July 30, 2018
- Inter-agency coordination begun Early August, 2018
- State of Alaska contracted Shannon & Wilson, Inc. August 16, 2018
- Well sampling begins August 27, 2018
- Inter-agency teams begins investigating long-term water source options September 2018

Water Sampling



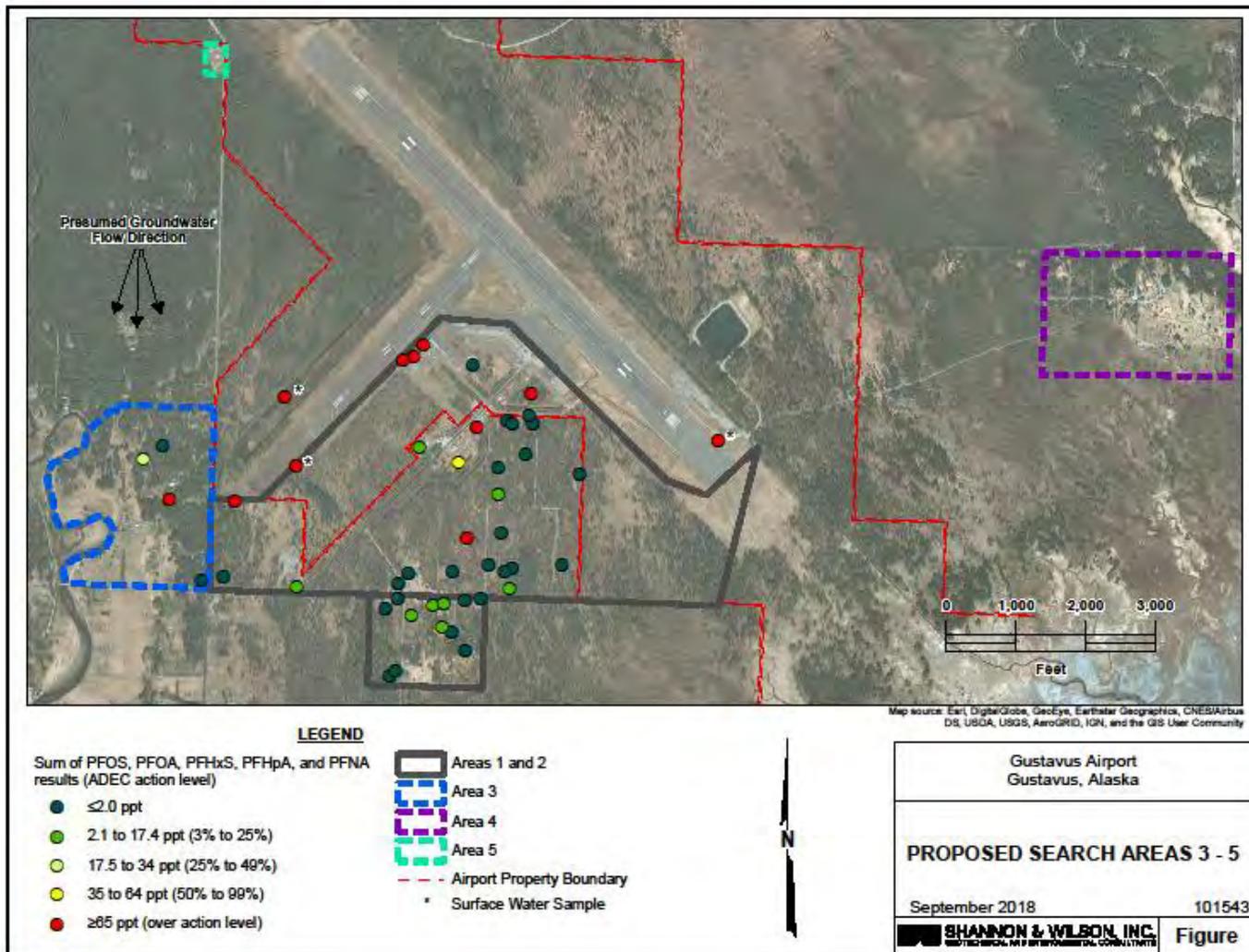
1st Sampling Area: Previously Sampled Wells, Airport Wells & Residences



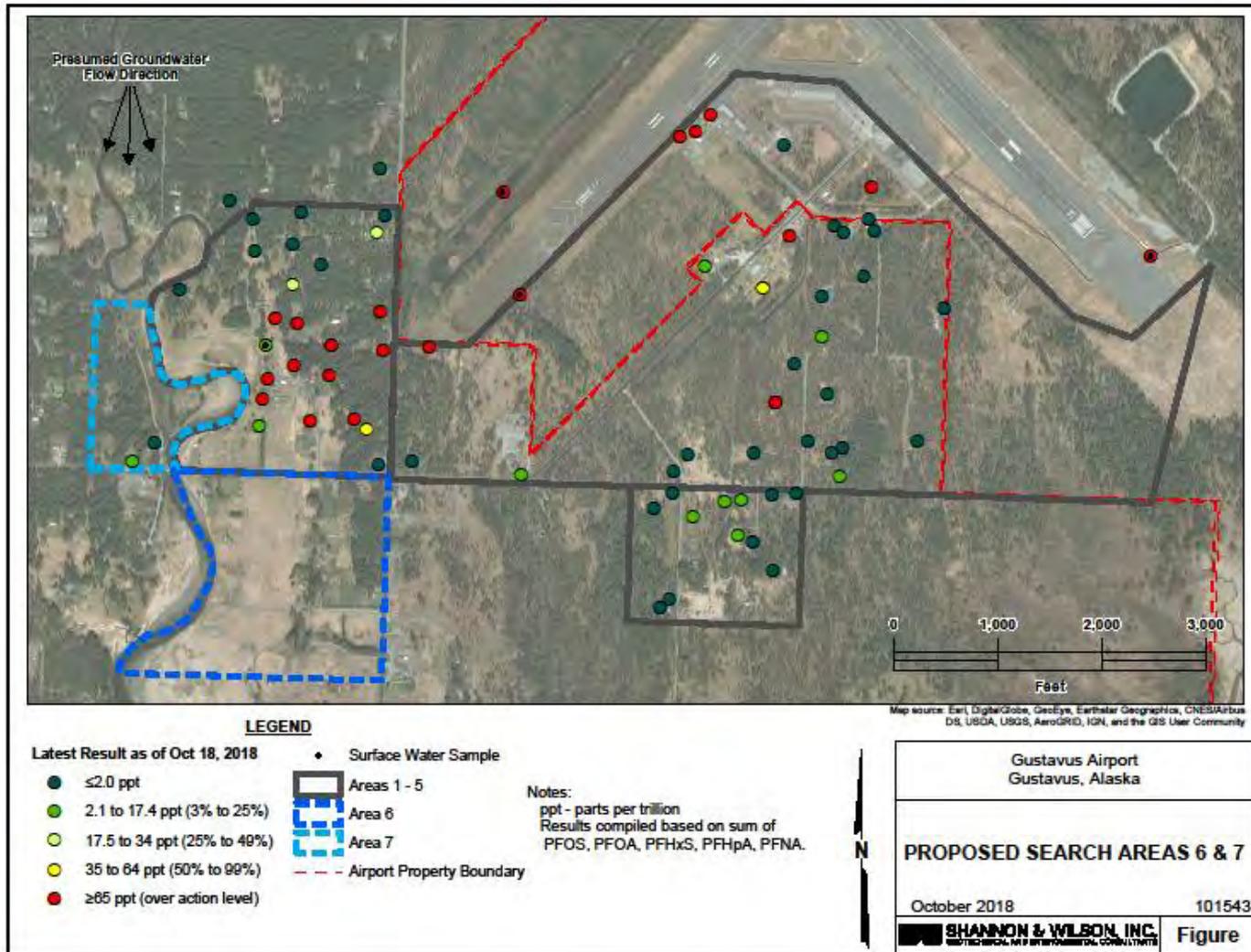
Info Provided Changed Sampling Plan



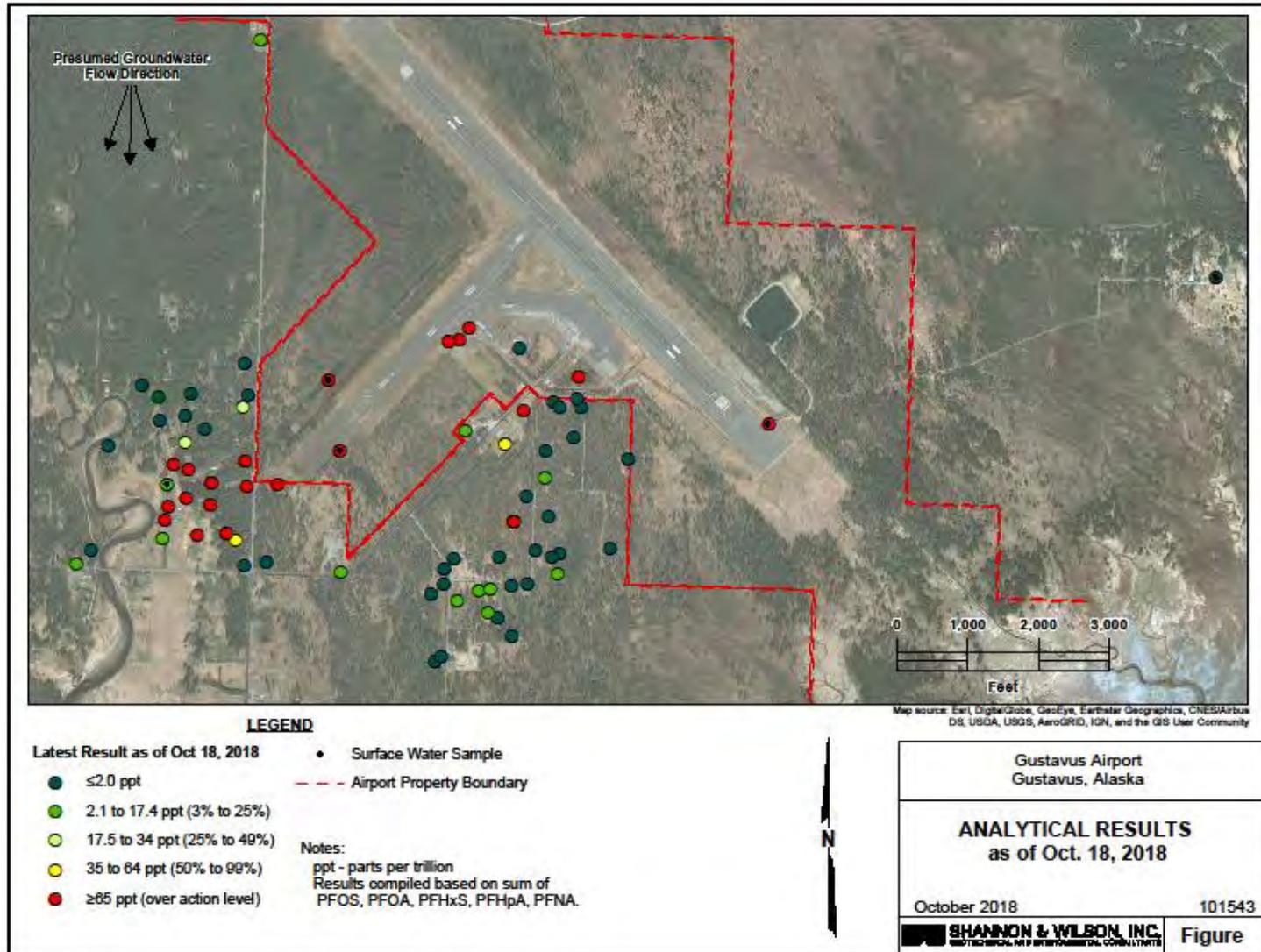
2nd Sampling Area: Tracking Old Drainage Ditch



3rd Sampling Area: Determining W & S Plume Edges



Results to Date



Work Moving Forward

PFAS sampling results determine scope of action

- For wells testing above 65ppt – provide alternative drinking water source and develop permanent source of drinking water
- For wells testing 35-70ppt – retest quarterly
- For wells testing 17.5-35ppt – retest annually

- Sampling may include source area delineation and groundwater monitoring

Future action may involve on-site and off-site projects, including:

- Determine extent of PFAS plume
- Site characterization (e.g., extent of contamination, identifying sources and dates)
- Provide long-term source of alternative drinking water if necessary

Risk Management

State of Alaska myAlaska My Government Resident Business in Alaska Visiting Alaska State Employees

Alaska Department of Administration
Division of Risk Management

search

Risk Management State of Alaska

Home General Information Agency Assistance



The Division of Risk Management administers the self-insurance program for each State agency, handling all third party claims.

For more information please visit:
<http://doa.alaska.gov/drm/>

Risk Management

All residents who believe they are impacted by the contamination may contact Risk Management to receive claim filing instructions.

For claim filing instructions contact:
Alaska Department of Administration
Division of Risk Management
Sheri Gray, Risk Manager
PO Box 110218
Juneau, AK 99811-0218
Phone: 907-465-5724
Fax: 907-465-3690
Email: sheri.gray@Alaska.gov

Additional contacts:

Scott Jordan - Director
907-465-5723

Community Outreach

DOT&PF is committed to being open and transparent

Press Releases:

- Sign up for GovDelivery
- <https://public.govdelivery.com/accounts/AKDOT/subscriber/new>

Website:

- Alaska.gov/go/C732

Email:

- airportwater@alaska.gov
- Subject – sign up

Contact:

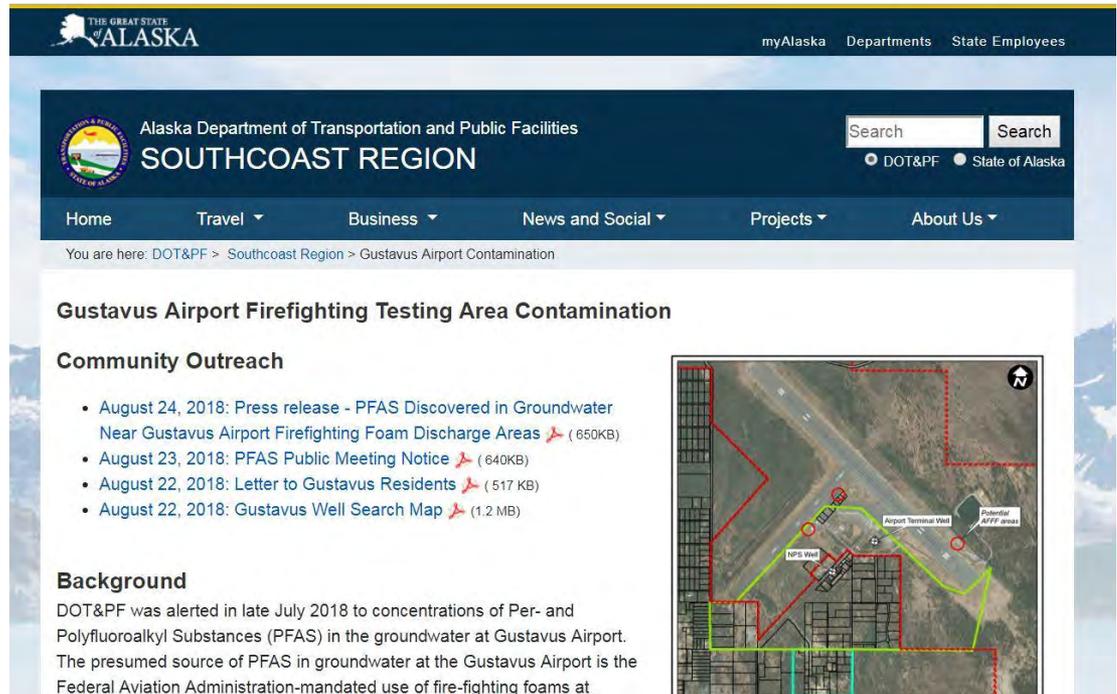
Aurah Landau

Public Information Officer

Southcoast Region, DOT&PF

O: 907-465-4503

C: 907-500-2100



The screenshot shows the website for the Alaska Department of Transportation and Public Facilities, Southcoast Region. The page title is "Gustavus Airport Firefighting Testing Area Contamination". Under the "Community Outreach" section, there is a list of four items:

- August 24, 2018: Press release - PFAS Discovered in Groundwater Near Gustavus Airport Firefighting Foam Discharge Areas (650KB)
- August 23, 2018: PFAS Public Meeting Notice (640KB)
- August 22, 2018: Letter to Gustavus Residents (517 KB)
- August 22, 2018: Gustavus Well Search Map (1.2 MB)

Under the "Background" section, the text reads: "DOT&PF was alerted in late July 2018 to concentrations of Per- and Polyfluoroalkyl Substances (PFAS) in the groundwater at Gustavus Airport. The presumed source of PFAS in groundwater at the Gustavus Airport is the Federal Aviation Administration-mandated use of fire-fighting foams at".

To the right of the text is a map showing the airport terminal, a well, and a potential firefighting area.



Questions?

PUBLIC INFORMATION

ATSDR fliers

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.

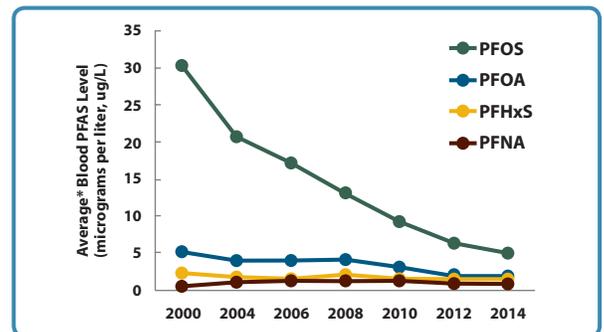
Blood PFAS levels decreased in people exposed to PFAS in drinking water after a water filtration system was installed.

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.

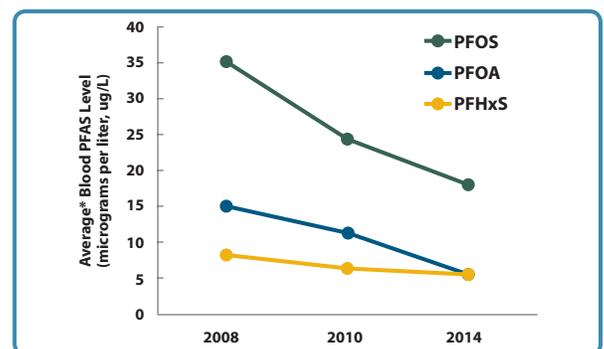
Blood Levels of the Most Common PFAS in People in the United States from 2000-2014



* 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

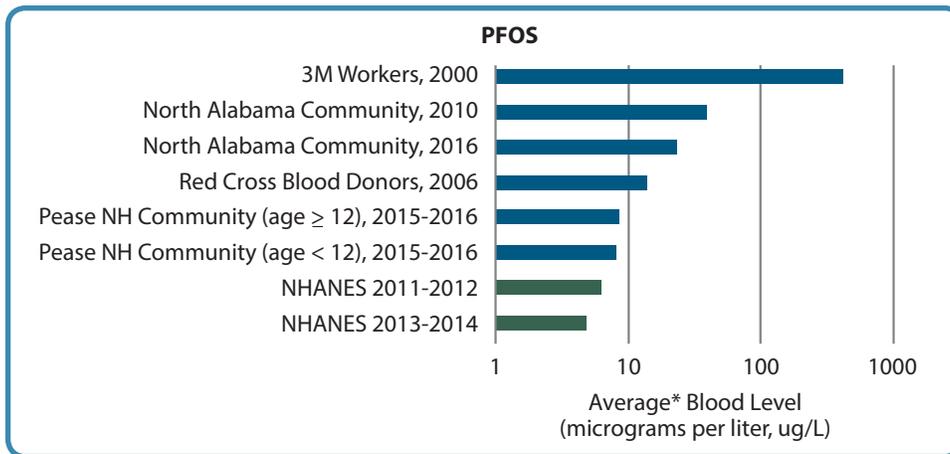
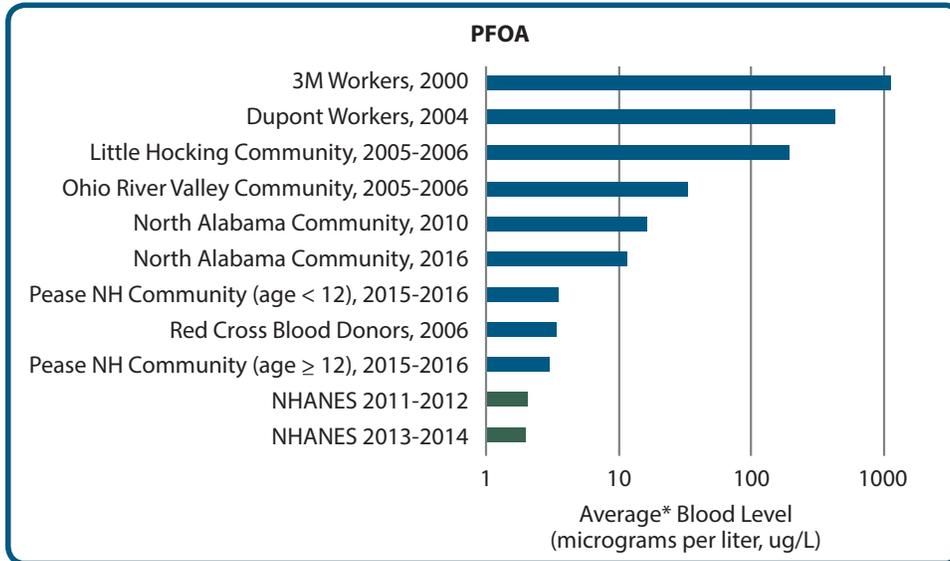
Data Source: Minnesota Department of Health, Environmental Tracking and Biomonitoring. East Metro PFC3 Biomonitoring Project, December 2015 Report to the Community.

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

PFOS – Perfluorooctane sulfonic acid

PFOA – Perfluorooctanoic acid

PFHxS – Perfluorohexane sulfonic acid

PFNA – Perfluorononanoic acid

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/pfccomrpt2009.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>

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:

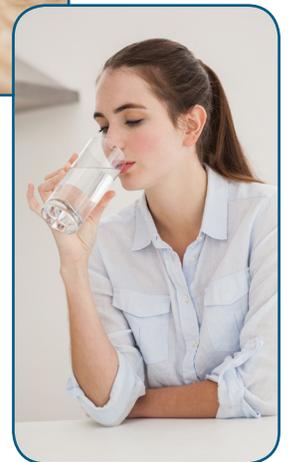
- Food packaging materials
- Nonstick cookware
- Stain resistant carpet treatments
- Water resistant clothing
- Cleaning products
- Paints, varnishes and sealants
- Firefighting foam
- Some cosmetics



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/newevents/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

PUBLIC INFORMATION

EPA flier

Overview

EPA has established health advisories for PFOA and PFOS based on the agency's assessment of the latest peer-reviewed science to provide drinking water system operators, and state, tribal and local officials who have the primary responsibility for overseeing these systems, with information on the health risks of these chemicals, so they can take the appropriate actions to protect their residents. EPA is committed to supporting states and public water systems as they determine the appropriate steps to reduce exposure to PFOA and PFOS in drinking water. As science on health effects of these chemicals evolves, EPA will continue to evaluate new evidence.

Background on PFOA and PFOS

PFOA and PFOS are fluorinated organic chemicals that are part of a larger group of chemicals referred to as perfluoroalkyl substances (PFASs). PFOA and PFOS have been the most extensively produced and studied of these chemicals. They have been used to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials (e.g., cookware) that are resistant to water, grease or stains. They are also used for firefighting at airfields and in a number of industrial processes.

Because these chemicals have been used in an array of consumer products, most people have been exposed to them. Between 2000 and 2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer. In 2006, eight major companies voluntarily agreed to phase out their global production of PFOA and PFOA-related chemicals, although there are a limited number of ongoing uses. Scientists have found PFOA and PFOS in the blood of nearly all the people they tested, but these studies show that the levels of PFOA and PFOS in blood have been decreasing. While consumer products and food are a large source of exposure to these chemicals for most people, drinking water can be an additional source in the small percentage of communities where these chemicals have contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example, an industrial facility where these chemicals were produced or used to manufacture other products or an airfield at which they were used for firefighting.

EPA's 2016 Lifetime Health Advisories

EPA develops health advisories to provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. In 2009, EPA published provisional health advisories for PFOA and PFOS based on the evidence available at that time. The science has evolved since then and EPA is now replacing the 2009 provisional advisories with new, lifetime health advisories.

FACT SHEET

PFOA & PFOS Drinking Water Health Advisories

EPA's 2016 Lifetime Health Advisories, continued

To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water, EPA established the health advisory levels at 70 parts per trillion. When both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 parts per trillion health advisory level. This health advisory level offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water.

How the Health Advisories were developed

EPA's health advisories are based on the best available peer-reviewed studies of the effects of PFOA and PFOS on laboratory animals (rats and mice) and were also informed by epidemiological studies of human populations that have been exposed to PFASs. These studies indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver effects (e.g., tissue damage), immune effects (e.g., antibody production and immunity), thyroid effects and other effects (e.g., cholesterol changes).

EPA's health advisory levels were calculated to offer a margin of protection against adverse health effects to the most sensitive populations: fetuses during pregnancy and breastfed infants. The health advisory levels are calculated based on the drinking water intake of lactating women, who drink more water than other people and can pass these chemicals along to nursing infants through breastmilk.

Recommended Actions for Drinking Water Systems

Steps to Assess Contamination

If water sampling results confirm that drinking water contains PFOA and PFOS at individual or combined concentrations greater than 70 parts per trillion, water systems should quickly undertake additional sampling to assess the level, scope and localized source of contamination to inform next steps

Steps to Inform

If water sampling results confirm that drinking water contains PFOA and PFOS at individual or combined concentrations greater than 70 parts per trillion, water systems should promptly notify their State drinking water safety agency (or with EPA in jurisdictions for which EPA is the primary drinking water safety agency) and consult with the relevant agency on the best approach to conduct additional sampling.

Drinking water systems and public health officials should also promptly provide consumers with information about the levels of PFOA and PFOS in their drinking water. This notice should include specific information on the risks to fetuses during pregnancy and breastfed and formula-fed infants from exposure to drinking water with an individual or combined concentration of PFOA and PFOS above EPA's health advisory level of 70 parts per trillion. In addition, the notification should include actions they are taking and identify options that consumers may consider to reduce risk such as seeking an alternative drinking water source, or in the case of parents of formula-fed infants, using formula that does not require adding water.

FACT SHEET

PFOA & PFOS Drinking Water Health Advisories

Recommended Actions for Drinking Water Systems, continued

Steps to Limit Exposure

A number of options are available to drinking water systems to lower concentrations of PFOA and PFOS in their drinking water supply. In some cases, drinking water systems can reduce concentrations of perfluoroalkyl substances, including PFOA and PFOS, by closing contaminated wells or changing rates of blending of water sources. Alternatively, public water systems can treat source water with activated carbon or high pressure membrane systems (e.g., reverse osmosis) to remove PFOA and PFOS from drinking water. These treatment systems are used by some public water systems today, but should be carefully designed and maintained to ensure that they are effective for treating PFOA and PFOS. In some communities, entities have provided bottled water to consumers while steps to reduce or remove PFOA or PFOS from drinking water or to establish a new water supply are completed.

Many home drinking water treatment units are certified by independent accredited third party organizations against American National Standards Institute (ANSI) standards to verify their contaminant removal claims. NSF International (NSF®) has developed a protocol for NSF/ANSI Standards 53 and 58 that establishes minimum requirements for materials, design and construction, and performance of point-of-use (POU) activated carbon drinking water treatment systems and reverse osmosis systems that are designed to reduce PFOA and PFOS in public water supplies. The protocol has been established to certify systems (e.g., home treatment systems) that meet the minimum requirements. The systems are evaluated for contaminant reduction by challenging them with an influent of $1.5 \pm 30\%$ $\mu\text{g}/\text{L}$ (total of both PFOA and PFOS) and must reduce this concentration by more than 95% to $0.07 \mu\text{g}/\text{L}$ or less (total of both PFOA and PFOS) throughout the manufacturer's stated life of the treatment system. Product certification to this protocol for testing home treatment systems verifies that devices effectively reduces PFOA and PFOS to acceptable levels.

Other Actions Relating to PFOA and PFOS

Between 2000 and 2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer, 3M. EPA also issued regulations to limit future manufacturing, including importation, of PFOS and its precursors, without first having EPA review the new use. A limited set of existing uses for PFOS (fire resistant aviation hydraulic fluids, photography and film products, photomicro lithography process to produce semiconductors, metal finishing and plating baths, component of an etchant) was excluded from these regulations because these uses were ongoing and alternatives were not available.

In 2006, EPA asked eight major companies to commit to working toward the elimination of their production and use of PFOA, and chemicals that degrade to PFOA, from emissions and products by the end of 2015. All eight companies have indicated that they have phased out PFOA, and chemicals that degrade to PFOA, from emissions and products by the end of 2015. Additionally, PFOA is included in EPA's proposed Toxic Substance Control Act's Significant New Use Rule (SNUR) issued in January 2015 which will ensure that EPA has an opportunity to review any efforts to reintroduce the chemical into the marketplace and take action, as necessary, to address potential concerns.

FACT SHEET

PFOA & PFOS Drinking Water Health Advisories

Other Actions Relating to PFOA and PFOS, continued

EPA has not established national primary drinking water regulations for PFOA and PFOS. EPA is evaluating PFOA and PFOS as drinking water contaminants in accordance with the process required by the Safe Drinking Water Act (SDWA). To regulate a contaminant under SDWA, EPA must find that it: (1) may have adverse health effects; (2) occurs frequently (or there is a substantial likelihood that it occurs frequently) at levels of public health concern; and (3) there is a meaningful opportunity for health risk reduction for people served by public water systems.

EPA included PFOA and PFOS among the list of contaminants that water systems are required to monitor under the third Unregulated Contaminant Monitoring Rule (UCMR 3) in 2012. Results of this monitoring effort are updated regularly and can be found on the publicly-available National Contaminant Occurrence Database (NCOD) (<https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3>). In accordance with SDWA, EPA will consider the occurrence data from UCMR 3, along with the peer reviewed health effects assessments supporting the PFOA and PFOS Health Advisories, to make a regulatory determination on whether to initiate the process to develop a national primary drinking water regulation.

In addition, EPA plans to begin a separate effort to determine the range of PFAS for which an Integrated Risk Information System (IRIS) assessment is needed. The IRIS Program identifies and characterizes the health hazards of chemicals found in the environment. IRIS assessments inform the first two steps of the risk assessment process: hazard identification, and dose-response. As indicated in the 2015 IRIS Multi-Year Agenda, the IRIS Program will be working with other EPA offices to determine the range of PFAS compounds and the scope of assessment required to best meet Agency needs. More about this effort can be found at <https://www.epa.gov/iris/iris-agenda>.

Non-Drinking Water Exposure to PFOA and PFOS

These health advisories only apply to exposure scenarios involving drinking water. They are not appropriate for use, in identifying risk levels for ingestion of food sources, including: fish, meat produced from livestock that consumes contaminated water, or crops irrigated with contaminated water.

The health advisories are based on exposure from drinking water ingestion, not from skin contact or breathing. The advisory values are calculated based on drinking water consumption and household use of drinking water during food preparation (e.g., cooking or to prepare coffee, tea or soup). To develop the advisories, EPA considered non-drinking water sources of exposure to PFOA and PFOS, including: air, food, dust, and consumer products. In January 2016 the Food and Drug Administration amended its regulations to no longer allow PFOA and PFOS to be added in food packaging, which will likely decrease one source of non-drinking water exposure.

Where Can I Learn More?

- EPA's Drinking Water Health Advisories for PFOA and PFOS can be found at: <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>
- PFOA and PFOS data collected under EPA's Unregulated Contaminant Monitoring Rule are available: <https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule>
- EPA's stewardship program for PFAS related to TSCA: <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/and-polyfluoroalkyl-substances-pfas-under-tsca>
- EPA's research activities on PFASs can be found at: <http://www.epa.gov/chemical-research/perfluorinated-chemical-pfc-research>
- The Agency for Toxic Substances and Disease Registry's Perfluorinated Chemicals and Your Health webpage at: <http://www.atsdr.cdc.gov/PFC/>



PUBLIC INFORMATION

DHSS presentation

HEALTH EFFECTS OF PFAS

DR. KRISTIN BRIDGES, PHD

PUBLIC HEALTH SCIENTIST

ENVIRONMENTAL PUBLIC HEALTH PROGRAM

ALASKA DEPARTMENT OF HEALTH AND SOCIAL SERVICES



PFAS

PER- AND POLY-FLUOROALKYL SUBSTANCES

- HUMAN-MADE CLASS OF CHEMICALS WITH A WIDE VARIETY OF APPLICATIONS



Oil



Heat



Water

- EXTREMELY STABLE IN THE ENVIRONMENT  WIDELY DISTRIBUTED

Contaminated water



Firefighting foams



Contaminated food



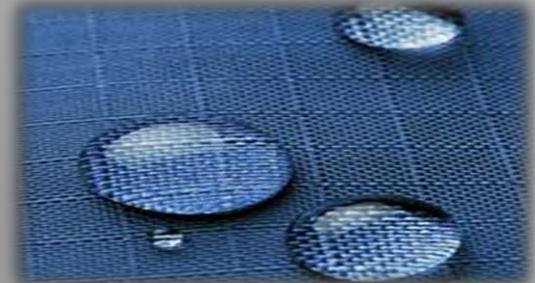
HOW CAN I BE EXPOSED TO PFAS?



Hand to mouth transfer



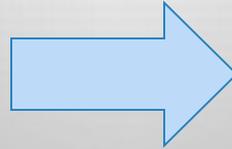
Maternal Transfer



PFAS treated fabrics

WHAT IF I'M EXPOSED?

Globally Distributed



Human Exposure

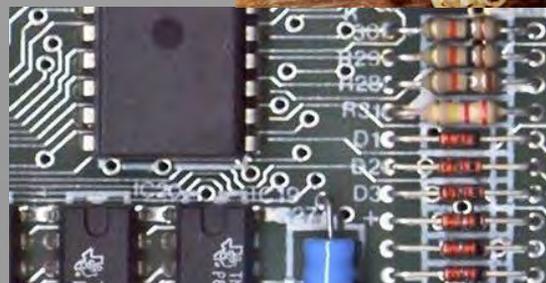
NHANES survey found
PFAS present in the
blood of nearly every
person tested (> 2,000
people)

EXPOSURE DOESN'T ALWAYS LEAD TO HEALTH EFFECTS!



PFAS Use in products

- Fire Fighting Foams
- Cookware, pizza boxes, fast food wrappers, popcorn bags...
- Stain repellants for carpets, clothing, furniture...
- Personal care products – shampoo, conditioner, toothpaste, floss...
- Polishes, waxes, and paints
- Electronics manufacturing





Contaminated Site Regulatory Process

Site Discovery

- Spill occurs and is reported
- Contamination discovered
- Compounds found to be harmful

Characterization

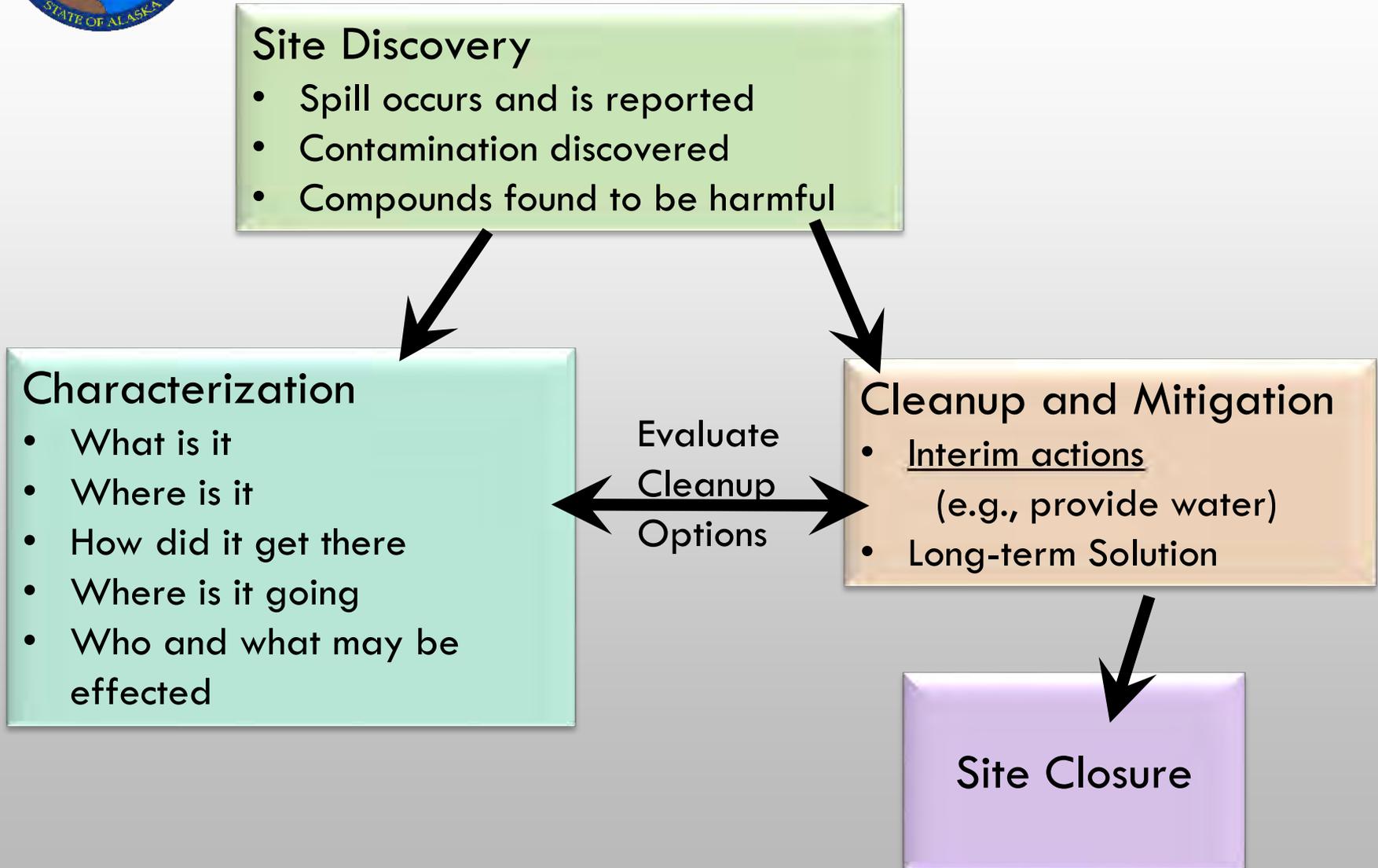
- What is it
- Where is it
- How did it get there
- Where is it going
- Who and what may be effected

Cleanup and Mitigation

- Interim actions
(e.g., provide water)
- Long-term Solution

Evaluate
Cleanup
Options

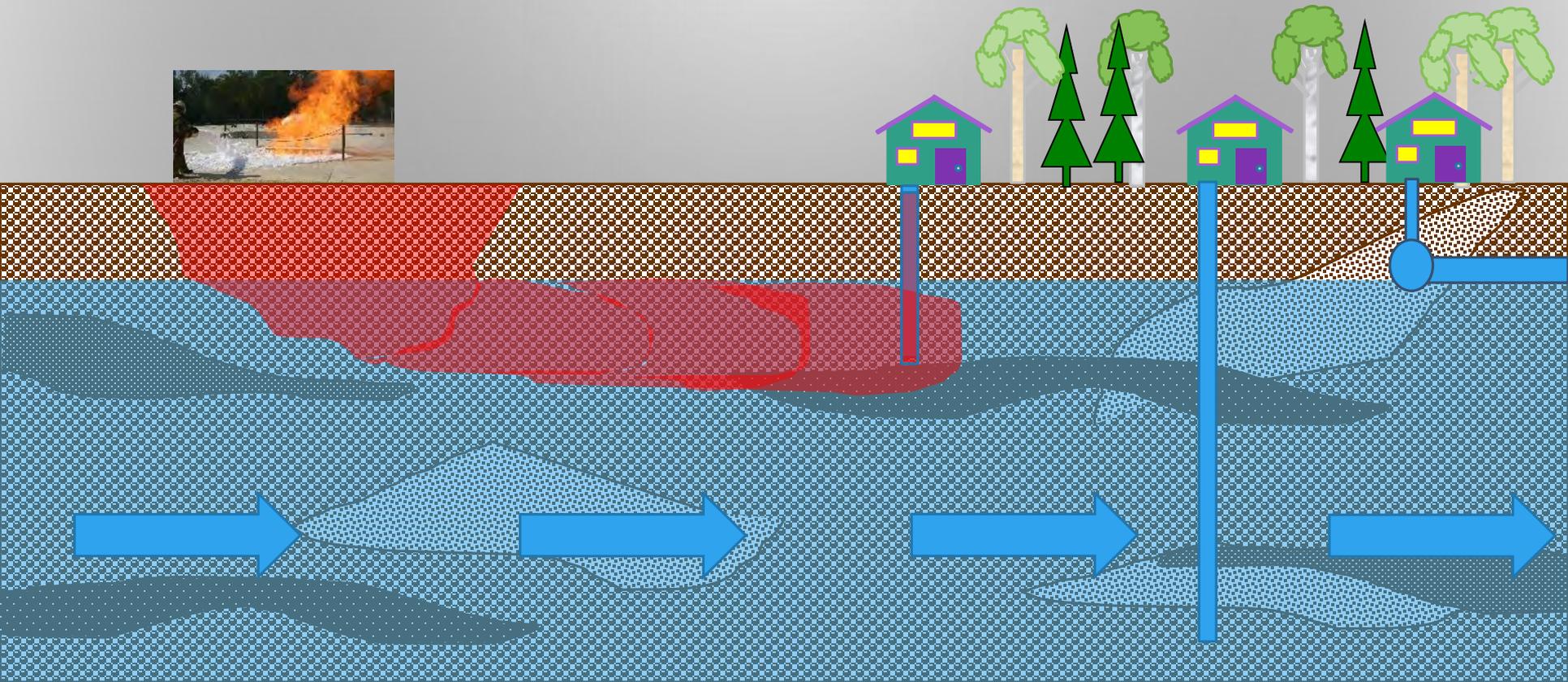
Site Closure





Contaminant Transport in Groundwater

- Soluble contaminants can be transported in groundwater
- As groundwater moves, it will carry dissolved substances with it
- If an ongoing source exists, plume will expand





PFAS AWARENESS

2012-2015

- Third Unregulated Contaminant Monitoring Rule (UCRM3)

2016

- EPA Lifetime Health Advisory level 70 ppt PFOA+PFOS
- DEC groundwater cleanup 400 ppt PFOA and 400 ppt PFOS

2018

- DEC action level 70 ppt for five PFAS



DEC PFAS ACTION LEVELS (Aug 2018)

Contaminant	
perfluorooctanesulfonic acid (PFOS)	Summed Action Level 70 ppt
perfluorooctanoic acid (PFOA)	
perfluorononanoic acid (PFNA)	
perfluorohexanesulfonic acid (PFHxS)	
perfluoroheptanoic acid (PFHpA)	
perfluorobutanesulfonic acid (PFBS)	Action Level 2000 ppt



GUSTAVUS WATER WELL SAMPLES TO DATE

SUMMARY OF INITIAL GUSTAVUS SAMPLE RESULTS - REVISED

Analyte			Perluoro-butane sulfonic acid (PFBS)	Perfluoro-heptanoic acid (PFHpA)	Perfluoro-nonanoic acid (PFNA)	Perfluoro-hexane sulfonic acid (PFHxS)	Perfluorooctanoic acid (PFOA)	Perfluorooctane sulfonate (PFOS)	Sum of 5 PFAS _§
ADEC Action Level			2,000	70 _§					70 _§
Sample Name	Well Owner	Sample Date	ppt	ppt	ppt	ppt	ppt	ppt	ppt
<i>Alaska Airlines Well AE20399</i>	ADOT&PF	6/27/18	3.7 JH*	7.4 JH*	0.39 JL*	26 JL*	3.1 JL*	250 JL*	287 J*
<i>Gustavus Water Plant AE20398</i>	NPS	6/27/18	<1.9 B*	8.0 JH*	0.41 JL*	14 JL*	5.5 JL*	16 JL*	44 J*

ppt parts per trillion, equivalent to nanograms per liter

ADEC Alaska Department of Environmental Conservation

ADOT&PF Alaska Department of Transportation & Public Facilities

NPS National Park Service

§ Sum of 5 PFAS is equal to the sum of PFOS, PFOA, PFHxS, PFHpA, and PFNA. Action level is 70 ppt; results are compared to 65 ppt. ADEC technical memorandum issued August 20, 2018.

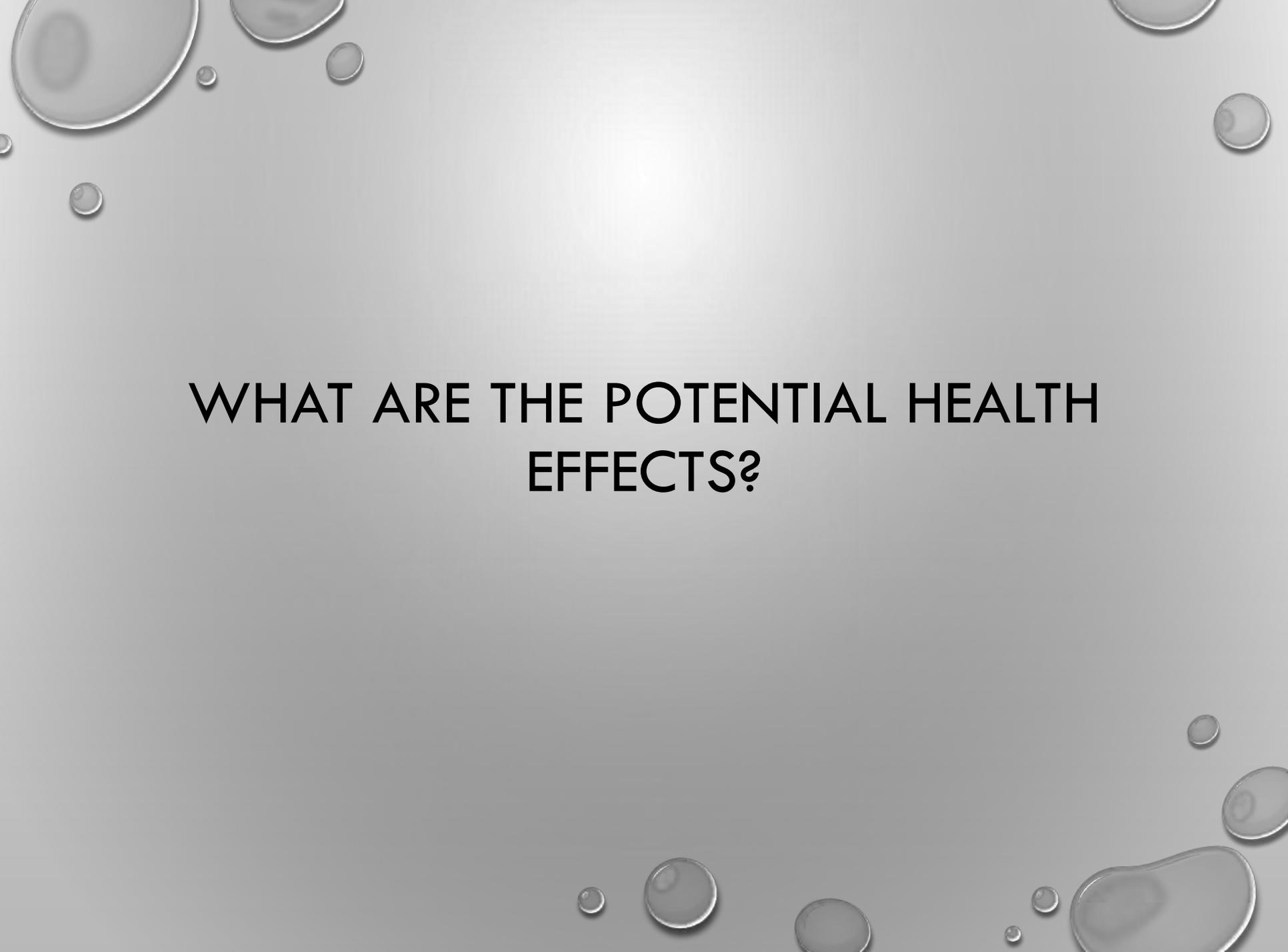
Bold Concentration exceeds action level.

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

B* Result considered non-detect due to method blank contamination. Listed as less than the reporting limit. Flag applied by Shannon & Wilson, Inc.

JH* Estimated concentration, biased high, due to method blank contamination. Flag applied by Shannon & Wilson, Inc.

JL* Estimated concentration, biased low, due to extraction outside the specified holding time. Flag applied by Shannon & Wilson, Inc.

The background is a light gray gradient with several realistic water droplets of various sizes scattered around the edges. The droplets have highlights and shadows, giving them a three-dimensional appearance.

**WHAT ARE THE POTENTIAL HEALTH
EFFECTS?**

WHAT DOES THE SCIENCE SAY?

- PFAS ARE AN “EMERGING” CONTAMINANT
 - SCIENCE IS STILL EVOLVING
 - CURRENT GUIDANCE BASED OFF OF:
 - EPIDEMIOLOGICAL STUDIES
 - EVIDENCE FROM ANIMAL TOXICITY TESTS
- STUDIES OF HIGHLY EXPOSED COMMUNITIES SHOW A PROBABLE LINK BETWEEN EXPOSURE TO CERTAIN TYPES OF PFAS AND EFFECTS ON:
 - GASTROINTESTINAL SYSTEM- ULCERATIVE COLITIS
 - LIVER- LIVER DAMAGE, ABNORMAL FAT METABOLISM, HIGH CHOLESTEROL
 - KIDNEY- KIDNEY CANCER AND CHRONIC KIDNEY DISEASE
 - CARDIOVASCULAR SYSTEM- PREGNANCY-INDUCED HYPERTENSION
 - IMMUNE SYSTEM- DECREASED RESPONSE TO VACCINES
 - REPRODUCTIVE SYSTEM- TESTICULAR CANCER AND DECREASED FERTILITY
 - ENDOCRINE SYSTEM- THYROID DISEASE
 - DEVELOPMENT- REDUCED BIRTH WEIGHT



LIMITATIONS OF EXISTING DATA

EPIDEMIOLOGICAL STUDIES

- CONFOUNDING VARIABLES
- IS THERE ANOTHER POSSIBLE EXPLANATION FOR EFFECTS?
 - PRESENCE OF OTHER CONTAMINANTS
 - GENETICS, AGE, GENDER
 - SOCIOECONOMIC AND NUTRITION STATUS

ANIMALS EXPOSURES

- HIGHER EXPOSURE LEVELS
- DIFFERENCES IN PHYSIOLOGY BETWEEN SPECIES AFFECT:
 - ABSORPTION, DISTRIBUTION, METABOLISM, EXCRETION
 - SENSITIVITY TO CONTAMINANT EXPOSURE

Scientists are still uncertain how long-term, chronic PFAS exposure to may impact human health.

ANYTHING ELSE?

Developing embryos and children through age 18 are considered to be “susceptible populations” according to the U.S. Agency for Toxic Substances and Disease Registry toxicological profile for PFAS

- THIS IS BECAUSE OF:
 - TRANSFER FROM MOTHER TO CHILD DURING PREGNANCY AND BREASTFEEDING
 - HAND-TO-MOUTH TRANSFER AFTER HANDLING OBJECTS/CRAWLING
 - HIGHER CONCENTRATION PER KG OF BODY WEIGHT
 - CONTAMINANTS THAT CAUSE DEVELOPMENTAL AND ENDOCRINE EFFECTS CAN HAVE PERMANENT EFFECTS AT LOWER CONCENTRATIONS IN CHILDREN
- THE BENEFITS OF BREASTFEEDING OUTWEIGH THE POTENTIAL RISKS
 - WE RECOMMEND YOU CONTINUE BREASTFEEDING,
 - IT IS ESSENTIAL THAT PREGNANT AND NURSING WOMEN DO NOT CONTINUE TO DRINK PFAS-CONTAMINATED WATER

Questions About:

HUMAN HEALTH EFFECTS

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CONTAMINATED SITES

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DHSS RECOMMENDATIONS

IF PFAS EXCEEDS DEC'S 70 PPT ACTION LEVEL, YOU SHOULD:

FIND AN ALTERNATIVE WATER SOURCE FOR



Drinking



Giving to pets



Brushing your teeth

YOU CAN CONTINUE USING THE WATER FOR



Showering/Bathing



General cleaning



Laundry

Appendix C

ANALYTICAL RESULTS

CONTENTS

- Analytical lab reports
- LDC 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: 320-40832-1
Client Project/Site: PFAS, Commercial
Revision: 2

For:
Admiralty Environmental, LLC
641 W. Willoughby Ave
Suite 301
Juneau, Alaska 99801

Attn: Hope Oneill

Cesar C Cortes

Authorized for release by:
8/22/2018 5:22:11 PM

Cesar Cortes, Project Management Assistant I
(916)373-5600
cesar.cortes@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.

- 1
- 2
- 3
- 4
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- 15



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Definitions/Glossary

Client: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
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: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Job ID: 320-40832-1

Laboratory: TestAmerica Sacramento

Narrative

Revision 2 - August 22, 2018

Final report revised to include all data (analyte PFOA was missing re-extracted results in 320-40832-1 Revision 1).

Revision 1 - August 22, 2018

This report has been revised to report additional analytes.

Receipt

The samples were received on 7/3/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.8° C.

Method 537 (modified)

The method blank contained Perfluorooctanoic acid (PFOA) greater than one-half the Reporting Limit and Perfluorooctane Sulfonic Acid (PFOS) greater than the RL, preparation batch 320-233425 and analytical batch 320-236310. Samples Gustavus Water Plant AE20398 (320-40832-1) and Alaska Airlines Well AE20399 (320-40832-2) were re-extracted outside of hold time. Both sets of data are reported.

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

Detection Summary

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Client Sample ID: Gustavus Water Plant AE20398

Lab Sample ID: 320-40832-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.4	J B	1.9	0.19	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.0	B	1.9	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	13	B	1.9	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	4.0	B	1.9	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS)	15	B	1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11	B	1.9	0.80	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - RE	14	H B	1.9	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA) - RE	0.41	J H	1.9	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - RE	16	H	1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA) - RE	5.5	H	1.9	0.79	ng/L	1		537 (modified)	Total/NA

Client Sample ID: Alaska Airlines Well AE20399

Lab Sample ID: 320-40832-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.7	B	1.8	0.18	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.4	B	1.8	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	25	B	1.8	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	4.5	B	1.8	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS)	200	B	1.8	0.50	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.9	B	1.8	0.78	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - RE	26	H B	1.8	0.16	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA) - RE	0.39	J H	1.8	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctane Sulfonate (PFOS) - RE	250	H	1.8	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA) - RE	3.1	H	1.8	0.78	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Client Sample ID: Gustavus Water Plant AE20398

Lab Sample ID: 320-40832-1

Date Collected: 06/27/18 07:45

Matrix: Water

Date Received: 07/03/18 09:30

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.4	J B	1.9	0.19	ng/L		07/11/18 12:04	07/28/18 09:57	1
Perfluoroheptanoic acid (PFHpA)	8.0	B	1.9	0.23	ng/L		07/11/18 12:04	07/28/18 09:57	1
Perfluorohexanesulfonic acid (PFHxS)	13	B	1.9	0.16	ng/L		07/11/18 12:04	07/28/18 09:57	1
Perfluorononanoic acid (PFNA)	4.0	B	1.9	0.25	ng/L		07/11/18 12:04	07/28/18 09:57	1
Perfluorooctane Sulfonate (PFOS)	15	B	1.9	0.51	ng/L		07/11/18 12:04	07/28/18 09:57	1
Perfluorooctanoic acid (PFOA)	11	B	1.9	0.80	ng/L		07/11/18 12:04	07/28/18 09:57	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	110		25 - 150				07/11/18 12:04	07/28/18 09:57	1
13C4 PFOS	111		25 - 150				07/11/18 12:04	07/28/18 09:57	1
18O2 PFHxS	109		25 - 150				07/11/18 12:04	07/28/18 09:57	1
13C3-PFBS	115		25 - 150				07/11/18 12:04	07/28/18 09:57	1
13C5 PFNA	106		25 - 150				07/11/18 12:04	07/28/18 09:57	1
13C4-PFHpA	107		25 - 150				07/11/18 12:04	07/28/18 09:57	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	14	H B	1.9	0.16	ng/L		07/26/18 17:38	07/27/18 23:39	1
Perfluorononanoic acid (PFNA)	0.41	J H	1.9	0.25	ng/L		07/26/18 17:38	07/27/18 23:39	1
Perfluorooctane Sulfonate (PFOS)	16	H	1.9	0.51	ng/L		07/26/18 17:38	07/27/18 23:39	1
Perfluorooctanoic acid (PFOA)	5.5	H	1.9	0.79	ng/L		07/26/18 17:38	07/27/18 23:39	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	99		25 - 150				07/26/18 17:38	07/27/18 23:39	1
13C4 PFOS	98		25 - 150				07/26/18 17:38	07/27/18 23:39	1
18O2 PFHxS	98		25 - 150				07/26/18 17:38	07/27/18 23:39	1
13C5 PFNA	104		25 - 150				07/26/18 17:38	07/27/18 23:39	1

Client Sample ID: Alaska Airlines Well AE20399

Lab Sample ID: 320-40832-2

Date Collected: 06/27/18 08:05

Matrix: Water

Date Received: 07/03/18 09:30

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.7	B	1.8	0.18	ng/L		07/11/18 12:04	07/25/18 12:53	1
Perfluoroheptanoic acid (PFHpA)	7.4	B	1.8	0.23	ng/L		07/11/18 12:04	07/25/18 12:53	1
Perfluorohexanesulfonic acid (PFHxS)	25	B	1.8	0.16	ng/L		07/11/18 12:04	07/25/18 12:53	1
Perfluorononanoic acid (PFNA)	4.5	B	1.8	0.25	ng/L		07/11/18 12:04	07/25/18 12:53	1
Perfluorooctane Sulfonate (PFOS)	200	B	1.8	0.50	ng/L		07/11/18 12:04	07/25/18 12:53	1
Perfluorooctanoic acid (PFOA)	4.9	B	1.8	0.78	ng/L		07/11/18 12:04	07/25/18 12:53	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	92		25 - 150				07/11/18 12:04	07/25/18 12:53	1
13C4 PFOS	87		25 - 150				07/11/18 12:04	07/25/18 12:53	1
18O2 PFHxS	91		25 - 150				07/11/18 12:04	07/25/18 12:53	1
13C3-PFBS	89		25 - 150				07/11/18 12:04	07/25/18 12:53	1
13C5 PFNA	87		25 - 150				07/11/18 12:04	07/25/18 12:53	1
13C4-PFHpA	89		25 - 150				07/11/18 12:04	07/25/18 12:53	1

TestAmerica Sacramento

Client Sample Results

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Client Sample ID: Alaska Airlines Well AE20399

Lab Sample ID: 320-40832-2

Date Collected: 06/27/18 08:05

Matrix: Water

Date Received: 07/03/18 09:30

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	26	H B	1.8	0.16	ng/L		07/26/18 17:38	07/27/18 23:47	1
Perfluorononanoic acid (PFNA)	0.39	J H	1.8	0.25	ng/L		07/26/18 17:38	07/27/18 23:47	1
Perfluorooctane Sulfonate (PFOS)	250	H	1.8	0.49	ng/L		07/26/18 17:38	07/27/18 23:47	1
Perfluorooctanoic acid (PFOA)	3.1	H	1.8	0.78	ng/L		07/26/18 17:38	07/27/18 23:47	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFOA	100		25 - 150				07/26/18 17:38	07/27/18 23:47	1
13C4 PFOS	95		25 - 150				07/26/18 17:38	07/27/18 23:47	1
18O2 PFHxS	100		25 - 150				07/26/18 17:38	07/27/18 23:47	1
13C5 PFNA	96		25 - 150				07/26/18 17:38	07/27/18 23:47	1

Isotope Dilution Summary

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Method: 537 (modified) - 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)	PFHxS (25-150)	3C3-PFB (25-150)	PFNA (25-150)	PFHpA (25-150)
320-40832-1 - RE	Gustavus Water Plant AE20398	99	98	98		104	
320-40832-1	Gustavus Water Plant AE20398	110	111	109	115	106	107
320-40832-2	Alaska Airlines Well AE20399	92	87	91	89	87	89
320-40832-2 - RE	Alaska Airlines Well AE20399	100	95	100		96	
LCS 320-233425/2-A	Lab Control Sample	83	82	89	85	83	85
LCS 320-236289/2-A	Lab Control Sample	106	113	114	116	115	110
LCSD 320-233425/3-A	Lab Control Sample Dup	100	94	103	105	91	98
LCSD 320-236289/3-A	Lab Control Sample Dup	101	106	105	104	110	102
MB 320-233425/1-A	Method Blank	103	96	97	94	98	99
MB 320-236289/1-A	Method Blank	101	106	105	101	106	102

Surrogate Legend

PFOA = 13C4 PFOA
 PFOS = 13C4 PFOS
 PFHxS = 18O2 PFHxS
 13C3-PFBS = 13C3-PFBS
 PFNA = 13C5 PFNA
 PFHpA = 13C4-PFHpA

QC Sample Results

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-233425/1-A
Matrix: Water
Analysis Batch: 236310

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 233425

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.585	J	2.0	0.20	ng/L		07/11/18 12:04	07/26/18 12:22	1
Perfluoroheptanoic acid (PFHpA)	1.17	J	2.0	0.25	ng/L		07/11/18 12:04	07/26/18 12:22	1
Perfluorohexanesulfonic acid (PFHxS)	2.88		2.0	0.17	ng/L		07/11/18 12:04	07/26/18 12:22	1
Perfluorononanoic acid (PFNA)	2.96		2.0	0.27	ng/L		07/11/18 12:04	07/26/18 12:22	1
Perfluorooctane Sulfonate (PFOS)	23.9		2.0	0.54	ng/L		07/11/18 12:04	07/26/18 12:22	1
Perfluorooctanoic acid (PFOA)	1.21	J	2.0	0.85	ng/L		07/11/18 12:04	07/26/18 12:22	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	103		25 - 150	07/11/18 12:04	07/26/18 12:22	1
13C4 PFOS	96		25 - 150	07/11/18 12:04	07/26/18 12:22	1
18O2 PFHxS	97		25 - 150	07/11/18 12:04	07/26/18 12:22	1
13C3-PFBS	94		25 - 150	07/11/18 12:04	07/26/18 12:22	1
13C5 PFNA	98		25 - 150	07/11/18 12:04	07/26/18 12:22	1
13C4-PFHpA	99		25 - 150	07/11/18 12:04	07/26/18 12:22	1

Lab Sample ID: LCS 320-233425/2-A
Matrix: Water
Analysis Batch: 235347

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 233425

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	35.4	33.9		ng/L		96	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	40.1		ng/L		100	66 - 126
Perfluorohexanesulfonic acid (PFHxS)	36.4	31.3		ng/L		86	63 - 123
Perfluorononanoic acid (PFNA)	40.0	39.1		ng/L		98	68 - 128
Perfluorooctane Sulfonate (PFOS)	37.1	43.2		ng/L		116	67 - 127
Perfluorooctanoic acid (PFOA)	40.0	39.2		ng/L		98	64 - 124

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA	83		25 - 150
13C4 PFOS	82		25 - 150
18O2 PFHxS	89		25 - 150
13C3-PFBS	85		25 - 150
13C5 PFNA	83		25 - 150
13C4-PFHpA	85		25 - 150

Lab Sample ID: LCSD 320-233425/3-A
Matrix: Water
Analysis Batch: 235347

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 233425

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	35.4	28.9		ng/L		82	73 - 133	16	30
Perfluoroheptanoic acid (PFHpA)	40.0	48.8		ng/L		122	66 - 126	19	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	28.7		ng/L		79	63 - 123	9	30
Perfluorononanoic acid (PFNA)	40.0	40.3		ng/L		101	68 - 128	3	30

TestAmerica Sacramento

QC Sample Results

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

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

Lab Sample ID: LCSD 320-233425/3-A
Matrix: Water
Analysis Batch: 235347

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 233425

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctane Sulfonate (PFOS)	37.1	37.5		ng/L		101	67 - 127	14	30
Perfluorooctanoic acid (PFOA)	40.0	39.7		ng/L		99	64 - 124	1	30
LCSD LCSD									
Isotope Dilution	%Recovery	Qualifier	Limits						
13C4 PFOA	100		25 - 150						
13C4 PFOS	94		25 - 150						
18O2 PFHxS	103		25 - 150						
13C3-PFBS	105		25 - 150						
13C5 PFNA	91		25 - 150						
13C4-PFHpa	98		25 - 150						

Lab Sample ID: MB 320-236289/1-A
Matrix: Water
Analysis Batch: 236645

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 236289

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		07/26/18 10:27	07/27/18 23:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		07/26/18 10:27	07/27/18 23:15	1
Perfluorohexanesulfonic acid (PFHxS)	0.286	J	2.0	0.17	ng/L		07/26/18 10:27	07/27/18 23:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		07/26/18 10:27	07/27/18 23:15	1
Perfluorooctane Sulfonate (PFOS)	ND		2.0	0.54	ng/L		07/26/18 10:27	07/27/18 23:15	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		07/26/18 10:27	07/27/18 23:15	1
MB MB									
Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac			
13C4 PFOA	101		25 - 150	07/26/18 10:27	07/27/18 23:15	1			
13C4 PFOS	106		25 - 150	07/26/18 10:27	07/27/18 23:15	1			
18O2 PFHxS	105		25 - 150	07/26/18 10:27	07/27/18 23:15	1			
13C3-PFBS	101		25 - 150	07/26/18 10:27	07/27/18 23:15	1			
13C5 PFNA	106		25 - 150	07/26/18 10:27	07/27/18 23:15	1			
13C4-PFHpa	102		25 - 150	07/26/18 10:27	07/27/18 23:15	1			

Lab Sample ID: LCS 320-236289/2-A
Matrix: Water
Analysis Batch: 236645

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236289

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	35.4	33.8		ng/L		96	73 - 133
Perfluoroheptanoic acid (PFHpA)	40.0	38.9		ng/L		97	66 - 126
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.1		ng/L		88	63 - 123
Perfluorononanoic acid (PFNA)	40.0	36.5		ng/L		91	68 - 128
Perfluorooctane Sulfonate (PFOS)	37.1	37.8		ng/L		102	67 - 127
Perfluorooctanoic acid (PFOA)	40.0	36.8		ng/L		92	64 - 124
LCS LCS							
Isotope Dilution	%Recovery	Qualifier	Limits				
13C4 PFOA	106		25 - 150				
13C4 PFOS	113		25 - 150				

TestAmerica Sacramento

QC Sample Results

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

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

Lab Sample ID: LCS 320-236289/2-A
Matrix: Water
Analysis Batch: 236645

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236289

<i>Isotope Dilution</i>	<i>LCS LCS</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
18O2 PFHxS	114		25 - 150
13C3-PFBS	116		25 - 150
13C5 PFNA	115		25 - 150
13C4-PFHpA	110		25 - 150

Lab Sample ID: LCSD 320-236289/3-A
Matrix: Water
Analysis Batch: 236645

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 236289

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec.</i>		<i>RPD</i>	<i>RPD Limit</i>
							<i>Limits</i>	<i>RPD</i>		
Perfluorobutanesulfonic acid (PFBS)	35.4	35.4		ng/L		100	73 - 133	5	30	
Perfluoroheptanoic acid (PFHpA)	40.0	40.4		ng/L		101	66 - 126	4	30	
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.9		ng/L		90	63 - 123	3	30	
Perfluorononanoic acid (PFNA)	40.0	36.4		ng/L		91	68 - 128	1	30	
Perfluorooctane Sulfonate (PFOS)	37.1	38.2		ng/L		103	67 - 127	1	30	
Perfluorooctanoic acid (PFOA)	40.0	36.8		ng/L		92	64 - 124	0	30	

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C4 PFOA	101		25 - 150
13C4 PFOS	106		25 - 150
18O2 PFHxS	105		25 - 150
13C3-PFBS	104		25 - 150
13C5 PFNA	110		25 - 150
13C4-PFHpA	102		25 - 150

QC Association Summary

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

LCMS

Prep Batch: 233425

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40832-1	Gustavus Water Plant AE20398	Total/NA	Water	3535	
320-40832-2	Alaska Airlines Well AE20399	Total/NA	Water	3535	
MB 320-233425/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-233425/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-233425/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 235347

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 320-233425/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	233425
LCSD 320-233425/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	233425

Analysis Batch: 236249

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40832-2	Alaska Airlines Well AE20399	Total/NA	Water	537 (modified)	233425

Prep Batch: 236289

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40832-1 - RE	Gustavus Water Plant AE20398	Total/NA	Water	3535	
320-40832-2 - RE	Alaska Airlines Well AE20399	Total/NA	Water	3535	
MB 320-236289/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-236289/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-236289/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 236310

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-233425/1-A	Method Blank	Total/NA	Water	537 (modified)	233425

Analysis Batch: 236645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40832-1 - RE	Gustavus Water Plant AE20398	Total/NA	Water	537 (modified)	236289
320-40832-2 - RE	Alaska Airlines Well AE20399	Total/NA	Water	537 (modified)	236289
MB 320-236289/1-A	Method Blank	Total/NA	Water	537 (modified)	236289
LCS 320-236289/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	236289
LCSD 320-236289/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	236289

Analysis Batch: 236715

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-40832-1	Gustavus Water Plant AE20398	Total/NA	Water	537 (modified)	233425

Lab Chronicle

Client: Admiralty Environmental, LLC
 Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Client Sample ID: Gustavus Water Plant AE20398

Lab Sample ID: 320-40832-1

Date Collected: 06/27/18 07:45

Matrix: Water

Date Received: 07/03/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535	RE		267.3 mL	10.00 mL	236289	07/26/18 17:38	TWL	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			236645	07/27/18 23:39	AAR	TAL SAC
Total/NA	Prep	3535			266.2 mL	10.0 mL	233425	07/11/18 12:04	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			236715	07/28/18 09:57	AAR	TAL SAC

Client Sample ID: Alaska Airlines Well AE20399

Lab Sample ID: 320-40832-2

Date Collected: 06/27/18 08:05

Matrix: Water

Date Received: 07/03/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535	RE		273.4 mL	10.00 mL	236289	07/26/18 17:38	TWL	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			236645	07/27/18 23:47	AAR	TAL SAC
Total/NA	Prep	3535			271.4 mL	10.0 mL	233425	07/11/18 12:04	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			236249	07/25/18 12:53	ABH	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
537 (modified)	3535	Water	Perfluorobutanesulfonic acid (PFBS)
537 (modified)	3535	Water	Perfluoroheptanoic acid (PFHpA)
537 (modified)	3535	Water	Perfluorohexanesulfonic acid (PFHxS)
537 (modified)	3535	Water	Perfluorononanoic acid (PFNA)
537 (modified)	3535	Water	Perfluorooctane Sulfonate (PFOS)
537 (modified)	3535	Water	Perfluorooctanoic acid (PFOA)

Method Summary

Client: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

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

Laboratory References:

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



Sample Summary

Client: Admiralty Environmental, LLC
Project/Site: PFAS, Commercial

TestAmerica Job ID: 320-40832-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-40832-1	Gustavus Water Plant AE20398	Water	06/27/18 07:45	07/03/18 09:30
320-40832-2	Alaska Airlines Well AE20399	Water	06/27/18 08:05	07/03/18 09:30

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Chain of Custody Record



Client Information Client Contact: Hope O'Neill Company: Admiralty Environmental, LLC Address: 641 W Willoughby Ave Suite 301 City: Juneau State, Zip: AK, 99801 Phone: 907-463-4415 Email: Honelli@admiraltyenv.com Project Name: PFAS, Commercial Site:		Lab P/N: Cortes, Cesar C E-Mail: cesar.cortes@testamericainc.com Carrier Tracking No(s): COC No: 320-22080-4994.1 Page: Page 1 of 1 Job #:	
Analysis Requested Due Date Requested: TAT Requested (days): PO #: Purchase Order not required WO #: 907-463-4415 Project #: 32011397 SOW#:		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
Sample Identification Sample Date: 6/27/18 Sample Time: 0745 Sample Type (C=Comp, G=grab): G Matrix (W=Water, S=Solid, O=Other): Water Preservation Code:		Field Filtered Sample (Yes or No): Perform MS/MSD (Yes or No): PFC, IDA - PFOA/PFOS Only:	
Gustavus Water Plant A62099 Alaska. AVIUS WOL A62099		Total Number of Containers:	
Special Instructions/Note: 320-40832 Chain of Custody		Special Instructions/Note:	
Possible Hazard Identification <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological			
Deliverable Requested I, II, III, IV, Other (specify)			
Empty Kit Relinquished by Relinquished by: [Signature] Relinquished by: [Signature] Relinquished by:		Sample Disposal / A fee may be assessed if samples are retained longer than 1 month <input type="checkbox"/> Return To Client <input checked="" type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	
Special Instructions/QC Requirements		Special Instructions/QC Requirements	
Time:		Method of Shipment:	
Date/Time: 7/18/18 Date/Time: 930 Date/Time:		Received by: [Signature] Received by: [Signature] Received by:	
Company: [Signature] Company: [Signature] Company:		Company: PACAC Company: Company:	
Custody Seal Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Cooler Temperature(s) °C and Other Remarks: 5.8	



Login Sample Receipt Checklist

Client: Admiralty Environmental, LLC

Job Number: 320-40832-1

Login Number: 40832
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	187341, 187342
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:

August 21, 2018

CS Report Name:

Gustavus Airport

Report Date:

August 21, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-40832-1 (reissue)

ADEC File Number:

Hazard Identification Number:

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 PFASs. 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 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:

The sample cooler was recorded at 1.61° C and 5.8° C upon receipt at the laboratory receiving office and Test America, respectively.

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

Yes No

Comments:

Analysis of PFASs 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability is not affected; 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 5.8° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD).

The case narrative also notes PFOA and PFOS detections in the method blank associated with the original run. PFOS was detected in the method blank at concentrations greater than ten times the reporting limit. For the purposes of this data set, the second batch of samples will be reported with the appropriate qualifier for extraction outside of hold time.

Please note, the case narrative does not provide additional information for the four additional analytes.

- c. Were all corrective actions documented?

Yes No

Comments:

The laboratory re-extracted the PFOS and PFOA samples due to the method blank detection (PFHxS as well, but it is not noted).

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

Comments:

The case narrative does not note an effect on data quality.

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 noted the samples were re-extracted outside of hold time due to contamination in the method blank associated with the original batch. For the purposes of this data set, the out of hold time data will be reported.

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 out-of-hold time results, where available (PFOS, PFOA, and PFHxS), will be used for the purposes of reporting this data set. The results will be flagged, "JL" and are considered estimated, biased low, due to hold time exceedance.

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:

The following analytes were detected in the method blank associated with the original batch:
 -PFOA at 1.21 J ppt (re-extracted due to detection)
 -PFOS at 23.9 ppt (re-extracted due to detection)
 -PFHxS at 2.88 ppt (re-extracted due to detection)
 -PFBS at 0.585 J ppt (not re-extracted, only the original batch result exists for the analyte)
 -PFHpA at 1.17 J ppt (not re-extracted, only the original batch result exists for the analyte)
 -PFNA at 2.96 ppt (not re-extracted, only the original batch result exists for the analyte)

Additionally, PFHxS was detected in the re-extracted batch at 0.286 J ppt.

iii. If above LOQ, what samples are affected?

Comments:

Project sample results within 5 times the MB concentration are considered non-detect, flagged with a "UB". Project sample results greater than 5 times the MB concentration and less than 10 times the MB concentration are considered estimated, biased high, flagged with a "JH".

The re-extracted results will be used for the purposes of reporting data associated with this sample set for PFOS, PFOA, and PFHxS; these results are not considered to be affected by the MB detections.

The following samples are affected by method blank detections.

-Samples within 5-10 times the MB concentration are: PFHpA (both samples) and sample *AK Air Well* for PFBS.

-Samples less than 5 times the MB concentration are: PFNA (both samples) and sample *Gustavus Water Plant* for PFBS.

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

Yes No

Comments:

Yes; see above.

v. Data quality or usability affected?

Comments:

The data quality and usability were affected by the method blanks; 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:

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; 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:

N/A; there were no IDA recovery failures associated with this work order.

- iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFASs are not volatile compounds; therefore, 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 sample was not submitted with this work order.

ii. Submitted blind to lab?

 Yes No

Comments:

N/A; a field duplicate 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 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 for this project are 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:

Please note the laboratory has applied “B” flags and “H” flags that are not appropriate, based on our QA/QC review. These will not be used for the purposes of reporting. Flags will only be applied where noted above.

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: 320-42647-1
Client Project/Site: Gustavus DOT

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

Attn: Kristen Freiburger



Authorized for release by:
9/7/2018 1:59:52 PM

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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.

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

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: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Job ID: 320-42647-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-42647-1

Receipt

The samples were received on 8/30/2018 11:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 5.0° C and 5.8° C.

Receipt Exceptions

The container label for the following samples did not match the information listed on the Chain-of-Custody (COC): PW-031 (320-42647-3) and PW-061 (320-42647-6). Sample#3 container label list ID as 031, while COC list PW-031. Sample#6 container label list ID as 061, while COC list PW-061. Labeled according to COC.

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 320-243729.

Method(s) PFAS Prep: The samples are brown in color and have brown sediment at the bottom of the containers: NPS Well (320-42647-1) and PW-034 (320-42647-4).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-243730.

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: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: NPS Well

Lab Sample ID: 320-42647-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.3	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.8	J	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)	23		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: Airport Terminal

Lab Sample ID: 320-42647-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	250		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-031

Lab Sample ID: 320-42647-3

No Detections.

Client Sample ID: PW-034

Lab Sample ID: 320-42647-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-038

Lab Sample ID: 320-42647-5

No Detections.

Client Sample ID: PW-061

Lab Sample ID: 320-42647-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.3	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.3	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-008

Lab Sample ID: 320-42647-7

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-008 (Continued)

Lab Sample ID: 320-42647-7

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

Client Sample ID: PW-010

Lab Sample ID: 320-42647-8

No Detections.

Client Sample ID: SW-2000

Lab Sample ID: 320-42647-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.7	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.6		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: PW-012

Lab Sample ID: 320-42647-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.9		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.81	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.77	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.7		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: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: NPS Well

Lab Sample ID: 320-42647-1

Date Collected: 08/27/18 13:25

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.3	J	2.0	0.92	ng/L		09/04/18 13:07	09/05/18 22:07	1
Perfluorohexanesulfonic acid (PFHxS)	12		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 22:07	1
Perfluoroheptanoic acid (PFHpA)	1.8	J	2.0	0.80	ng/L		09/04/18 13:07	09/05/18 22:07	1
Perfluorooctanoic acid (PFOA)	4.6		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 22:07	1
Perfluorooctanesulfonic acid (PFOS)	23		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 22:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 22:07	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	108		25 - 150				09/04/18 13:07	09/05/18 22:07	1
¹³ C ₄ -PFHpA	109		25 - 150				09/04/18 13:07	09/05/18 22:07	1
¹³ C ₄ PFOA	125		25 - 150				09/04/18 13:07	09/05/18 22:07	1
¹³ C ₄ PFOS	111		25 - 150				09/04/18 13:07	09/05/18 22:07	1
¹³ C ₅ PFNA	124		25 - 150				09/04/18 13:07	09/05/18 22:07	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: Airport Terminal

Lab Sample ID: 320-42647-2

Date Collected: 08/27/18 12:40

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.5		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 22:26	1
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 22:26	1
Perfluoroheptanoic acid (PFHpA)	5.7		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 22:26	1
Perfluorooctanoic acid (PFOA)	4.3		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 22:26	1
Perfluorooctanesulfonic acid (PFOS)	250		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 22:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 22:26	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	108		25 - 150				09/04/18 13:07	09/05/18 22:26	1
<i>13C4-PFHpA</i>	108		25 - 150				09/04/18 13:07	09/05/18 22:26	1
<i>13C4 PFOA</i>	126		25 - 150				09/04/18 13:07	09/05/18 22:26	1
<i>13C4 PFOS</i>	106		25 - 150				09/04/18 13:07	09/05/18 22:26	1
<i>13C5 PFNA</i>	129		25 - 150				09/04/18 13:07	09/05/18 22:26	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-031

Date Collected: 08/27/18 16:05

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-3

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 22:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 22:44	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 22:44	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 22:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 22:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 22:44	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	104		25 - 150	09/04/18 13:07	09/05/18 22:44	1
13C4-PFHpA	105		25 - 150	09/04/18 13:07	09/05/18 22:44	1
13C4 PFOA	127		25 - 150	09/04/18 13:07	09/05/18 22:44	1
13C4 PFOS	109		25 - 150	09/04/18 13:07	09/05/18 22:44	1
13C5 PFNA	134		25 - 150	09/04/18 13:07	09/05/18 22:44	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-034

Date Collected: 08/28/18 14:10

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-4

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 23:02	1
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L		09/04/18 13:07	09/05/18 23:02	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 23:02	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 23:02	1
Perfluorooctanesulfonic acid (PFOS)	1.5	J	2.0	1.3	ng/L		09/04/18 13:07	09/05/18 23:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 23:02	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	104		25 - 150				09/04/18 13:07	09/05/18 23:02	1
13C4-PFHpA	113		25 - 150				09/04/18 13:07	09/05/18 23:02	1
13C4 PFOA	127		25 - 150				09/04/18 13:07	09/05/18 23:02	1
13C4 PFOS	110		25 - 150				09/04/18 13:07	09/05/18 23:02	1
13C5 PFNA	139		25 - 150				09/04/18 13:07	09/05/18 23:02	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-038
Date Collected: 08/28/18 13:32
Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 23:21	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:07	09/05/18 23:21	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/05/18 23:21	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 23:21	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:07	09/05/18 23:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 23:21	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	103		25 - 150				09/04/18 13:07	09/05/18 23:21	1
¹³ C ₄ -PFHpA	105		25 - 150				09/04/18 13:07	09/05/18 23:21	1
¹³ C ₄ PFOA	126		25 - 150				09/04/18 13:07	09/05/18 23:21	1
¹³ C ₄ PFOS	105		25 - 150				09/04/18 13:07	09/05/18 23:21	1
¹³ C ₅ PFNA	128		25 - 150				09/04/18 13:07	09/05/18 23:21	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-061
Date Collected: 08/27/18 16:12
Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-6
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/05/18 23:57	1
Perfluorohexanesulfonic acid (PFHxS)	1.3	J	2.0	0.87	ng/L		09/04/18 13:07	09/05/18 23:57	1
Perfluoroheptanoic acid (PFHpA)	1.3	J	2.0	0.80	ng/L		09/04/18 13:07	09/05/18 23:57	1
Perfluorooctanoic acid (PFOA)	3.8		2.0	0.75	ng/L		09/04/18 13:07	09/05/18 23:57	1
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L		09/04/18 13:07	09/05/18 23:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/05/18 23:57	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	101		25 - 150				09/04/18 13:07	09/05/18 23:57	1
13C4-PFHpA	115		25 - 150				09/04/18 13:07	09/05/18 23:57	1
13C4 PFOA	121		25 - 150				09/04/18 13:07	09/05/18 23:57	1
13C4 PFOS	110		25 - 150				09/04/18 13:07	09/05/18 23:57	1
13C5 PFNA	133		25 - 150				09/04/18 13:07	09/05/18 23:57	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-008

Date Collected: 08/28/18 14:28

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-7

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/06/18 00:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:07	09/06/18 00:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/06/18 00:16	1
Perfluorooctanoic acid (PFOA)	1.3	J	2.0	0.75	ng/L		09/04/18 13:07	09/06/18 00:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:07	09/06/18 00:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/06/18 00:16	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	102		25 - 150				09/04/18 13:07	09/06/18 00:16	1
13C4-PFHpA	109		25 - 150				09/04/18 13:07	09/06/18 00:16	1
13C4 PFOA	127		25 - 150				09/04/18 13:07	09/06/18 00:16	1
13C4 PFOS	106		25 - 150				09/04/18 13:07	09/06/18 00:16	1
13C5 PFNA	122		25 - 150				09/04/18 13:07	09/06/18 00:16	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-010

Date Collected: 08/29/18 09:28

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-8

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:07	09/06/18 00:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:07	09/06/18 00:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:07	09/06/18 00:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:07	09/06/18 00:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:07	09/06/18 00:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:07	09/06/18 00:34	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	103		25 - 150	09/04/18 13:07	09/06/18 00:34	1
¹³ C ₄ -PFHpA	109		25 - 150	09/04/18 13:07	09/06/18 00:34	1
¹³ C ₄ PFOA	125		25 - 150	09/04/18 13:07	09/06/18 00:34	1
¹³ C ₄ PFOS	109		25 - 150	09/04/18 13:07	09/06/18 00:34	1
¹³ C ₅ PFNA	125		25 - 150	09/04/18 13:07	09/06/18 00:34	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: SW-2000

Lab Sample ID: 320-42647-9

Date Collected: 08/29/18 09:40

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.7	J	2.0	0.92	ng/L		09/04/18 13:13	09/06/18 11:16	1
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 11:16	1
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 11:16	1
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 11:16	1
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 11:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 11:16	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150				09/04/18 13:13	09/06/18 11:16	1
13C4-PFHpa	115		25 - 150				09/04/18 13:13	09/06/18 11:16	1
13C4 PFOA	131		25 - 150				09/04/18 13:13	09/06/18 11:16	1
13C4 PFOS	116		25 - 150				09/04/18 13:13	09/06/18 11:16	1
13C5 PFNA	125		25 - 150				09/04/18 13:13	09/06/18 11:16	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-012

Date Collected: 08/29/18 13:21

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-10

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L		09/04/18 13:13	09/06/18 11:34	1
Perfluorohexanesulfonic acid (PFHxS)	8.9		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 11:34	1
Perfluoroheptanoic acid (PFHpA)	0.81	J	2.0	0.80	ng/L		09/04/18 13:13	09/06/18 11:34	1
Perfluorooctanoic acid (PFOA)	0.77	J	2.0	0.75	ng/L		09/04/18 13:13	09/06/18 11:34	1
Perfluorooctanesulfonic acid (PFOS)	7.7		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 11:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 11:34	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150				09/04/18 13:13	09/06/18 11:34	1
13C4-PFHpa	106		25 - 150				09/04/18 13:13	09/06/18 11:34	1
13C4 PFOA	126		25 - 150				09/04/18 13:13	09/06/18 11:34	1
13C4 PFOS	115		25 - 150				09/04/18 13:13	09/06/18 11:34	1
13C5 PFNA	126		25 - 150				09/04/18 13:13	09/06/18 11:34	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

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	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-42647-1	NPS Well	108	109	125	111	124
320-42647-2	Airport Terminal	108	108	126	106	129
320-42647-3	PW-031	104	105	127	109	134
320-42647-4	PW-034	104	113	127	110	139
320-42647-5	PW-038	103	105	126	105	128
320-42647-6	PW-061	101	115	121	110	133
320-42647-7	PW-008	102	109	127	106	122
320-42647-8	PW-010	103	109	125	109	125
320-42647-9	SW-2000	113	115	131	116	125
320-42647-10	PW-012	108	106	126	115	126
LCS 320-243729/2-A	Lab Control Sample	98	117	118	104	121
LCS 320-243730/2-A	Lab Control Sample	105	105	118	113	128
LCSD 320-243729/3-A	Lab Control Sample Dup	100	114	119	108	117
LCSD 320-243730/3-A	Lab Control Sample Dup	107	110	121	114	123
MB 320-243729/1-A	Method Blank	101	115	114	106	118
MB 320-243730/1-A	Method Blank	101	98	117	112	116

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: Gustavus DOT

TestAmerica Job ID: 320-42647-1

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

Lab Sample ID: MB 320-243729/1-A

Matrix: Water

Analysis Batch: 243992

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 243729

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:05	09/05/18 17:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:05	09/05/18 17:14	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	101		25 - 150	09/04/18 13:05	09/05/18 17:14	1
13C4-PFHpA	115		25 - 150	09/04/18 13:05	09/05/18 17:14	1
13C4 PFOA	114		25 - 150	09/04/18 13:05	09/05/18 17:14	1
13C4 PFOS	106		25 - 150	09/04/18 13:05	09/05/18 17:14	1
13C5 PFNA	118		25 - 150	09/04/18 13:05	09/05/18 17:14	1

Lab Sample ID: LCS 320-243729/2-A

Matrix: Water

Analysis Batch: 243992

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 243729

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	22.4		ng/L		126	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	22.6		ng/L		124	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	23.1		ng/L		115	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	23.4		ng/L		117	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	20.9		ng/L		112	69 - 144
Perfluorononanoic acid (PFNA)	20.0	23.3		ng/L		116	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	98		25 - 150
13C4-PFHpA	117		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	104		25 - 150
13C5 PFNA	121		25 - 150

Lab Sample ID: LCSD 320-243729/3-A

Matrix: Water

Analysis Batch: 243992

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 243729

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	21.3		ng/L		120	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	21.9		ng/L		120	73 - 157	3	30
Perfluoroheptanoic acid (PFHpA)	20.0	23.3		ng/L		116	71 - 138	1	30
Perfluorooctanoic acid (PFOA)	20.0	23.7		ng/L		118	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)	18.6	20.1		ng/L		108	69 - 144	4	30
Perfluorononanoic acid (PFNA)	20.0	24.7		ng/L		124	73 - 147	6	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	100		25 - 150
13C4-PFHpa	114		25 - 150
13C4 PFOA	119		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	117		25 - 150

Lab Sample ID: MB 320-243730/1-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243730

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/04/18 13:13	09/06/18 07:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/04/18 13:13	09/06/18 07:36	1

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
18O2 PFHxS	101		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4-PFHpa	98		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4 PFOA	117		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C4 PFOS	112		25 - 150	09/04/18 13:13	09/06/18 07:36	1
13C5 PFNA	116		25 - 150	09/04/18 13:13	09/06/18 07:36	1

Lab Sample ID: LCS 320-243730/2-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243730

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	20.2		ng/L		114	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	21.4		ng/L		118	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	23.4		ng/L		117	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	24.7		ng/L		123	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	20.4		ng/L		110	69 - 144
Perfluorononanoic acid (PFNA)	20.0	23.2		ng/L		116	73 - 147

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
18O2 PFHxS	105		25 - 150
13C4-PFHpa	105		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	113		25 - 150
13C5 PFNA	128		25 - 150

Lab Sample ID: LCSD 320-243730/3-A
Matrix: Water
Analysis Batch: 244213

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243730

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	
								RPD	Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	21.0		ng/L		119	72 - 151	4	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	22.1		ng/L		121	73 - 157	3	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-243730/3-A

Matrix: Water

Analysis Batch: 244213

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 243730

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20.0	22.5		ng/L		113	71 - 138	4	30
Perfluorooctanoic acid (PFOA)	20.0	24.4		ng/L		122	70 - 140	1	30
Perfluorooctanesulfonic acid (PFOS)	18.6	20.7		ng/L		111	69 - 144	1	30
Perfluorononanoic acid (PFNA)	20.0	23.3		ng/L		117	73 - 147	1	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	107		25 - 150
13C4-PFHpA	110		25 - 150
13C4 PFOA	121		25 - 150
13C4 PFOS	114		25 - 150
13C5 PFNA	123		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

LCMS

Prep Batch: 243729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42647-1	NPS Well	Total/NA	Water	PFAS Prep	
320-42647-2	Airport Terminal	Total/NA	Water	PFAS Prep	
320-42647-3	PW-031	Total/NA	Water	PFAS Prep	
320-42647-4	PW-034	Total/NA	Water	PFAS Prep	
320-42647-5	PW-038	Total/NA	Water	PFAS Prep	
320-42647-6	PW-061	Total/NA	Water	PFAS Prep	
320-42647-7	PW-008	Total/NA	Water	PFAS Prep	
320-42647-8	PW-010	Total/NA	Water	PFAS Prep	
MB 320-243729/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243729/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243729/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 243730

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42647-9	SW-2000	Total/NA	Water	PFAS Prep	
320-42647-10	PW-012	Total/NA	Water	PFAS Prep	
MB 320-243730/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243730/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243730/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 243992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42647-1	NPS Well	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-2	Airport Terminal	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-3	PW-031	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-4	PW-034	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-5	PW-038	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-6	PW-061	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-7	PW-008	Total/NA	Water	WS-LC-0025 At1	243729
320-42647-8	PW-010	Total/NA	Water	WS-LC-0025 At1	243729
MB 320-243729/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243729
LCS 320-243729/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243729
LCSD 320-243729/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243729

Analysis Batch: 244213

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42647-9	SW-2000	Total/NA	Water	WS-LC-0025 At1	243730
320-42647-10	PW-012	Total/NA	Water	WS-LC-0025 At1	243730
MB 320-243730/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243730

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

LCMS (Continued)

Analysis Batch: 244213 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 320-243730/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243730
LCSD 320-243730/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243730

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Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: NPS Well

Date Collected: 08/27/18 13:25

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-1

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 22:07	S1M	TAL SAC

Client Sample ID: Airport Terminal

Date Collected: 08/27/18 12:40

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-2

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 22:26	S1M	TAL SAC

Client Sample ID: PW-031

Date Collected: 08/27/18 16:05

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-3

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 22:44	S1M	TAL SAC

Client Sample ID: PW-034

Date Collected: 08/28/18 14:10

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-4

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 23:02	S1M	TAL SAC

Client Sample ID: PW-038

Date Collected: 08/28/18 13:32

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-5

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 23:21	S1M	TAL SAC

Client Sample ID: PW-061

Date Collected: 08/27/18 16:12

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-6

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/05/18 23:57	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Client Sample ID: PW-008

Date Collected: 08/28/18 14:28

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-7

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/06/18 00:16	S1M	TAL SAC

Client Sample ID: PW-010

Date Collected: 08/29/18 09:28

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-8

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	243729	09/04/18 13:07	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			243992	09/06/18 00:34	S1M	TAL SAC

Client Sample ID: SW-2000

Date Collected: 08/29/18 09:40

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-9

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	243730	09/04/18 13:13	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244213	09/06/18 11:16	D1R	TAL SAC

Client Sample ID: PW-012

Date Collected: 08/29/18 13:21

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42647-10

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	243730	09/04/18 13:13	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244213	09/06/18 11:34	D1R	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: Gustavus DOT

TestAmerica Job ID: 320-42647-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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

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Sample Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42647-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42647-1	NPS Well	Water	08/27/18 13:25	08/30/18 11:25
320-42647-2	Airport Terminal	Water	08/27/18 12:40	08/30/18 11:25
320-42647-3	PW-031	Water	08/27/18 16:05	08/30/18 11:25
320-42647-4	PW-034	Water	08/28/18 14:10	08/30/18 11:25
320-42647-5	PW-038	Water	08/28/18 13:32	08/30/18 11:25
320-42647-6	PW-061	Water	08/27/18 16:12	08/30/18 11:25
320-42647-7	PW-008	Water	08/28/18 14:28	08/30/18 11:25
320-42647-8	PW-010	Water	08/29/18 09:28	08/30/18 11:25
320-42647-9	SW-2000	Water	08/29/18 09:40	08/30/18 11:25
320-42647-10	PW-012	Water	08/29/18 13:21	08/30/18 11:25

CHAIN-OF-CUSTODY RECORD

Laboratory Page 1 of 1
 Attn: Test America
David Attkel

Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush
 5-day
 Please Specify

Quote No: _____
 J-Flags: Yes No

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
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Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
NPS Well		1325	8/27/18	2	Groundwater
Airport Terminal		1240		2	
PW-031		1605		2	
PW-034		1410	8/28/18	2	
PW-038		1332		2	
PW-061		1612	8/27/18	2	
PW-008		1428	8/28/18	2	
PW-010		0928	8/29/18	2	
SW-2000		0940		2	Surface water
PW-012		1321		2	Groundwater



Project Information	Sample Receipt	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Number: 101543 Name: KRF Gustavus DOR Contact: KRF Gustavus DOR Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Sampler: KRF/MON/ARH	Total No. of Containers: 20 COC Seals/Intact? Y/N/NA Received Good Cond./Cold Temp: Delivery Method: Goldsneak	Signature: <u>[Signature]</u> Printed Name: <u>Kristen Freiburger</u> Company: <u>Shannon & Wilson, Inc</u> Time: <u>1515</u> Date: <u>9/29/18</u>	Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____	Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____
Notes: Request 5-day rush please put these samples on their own work order		Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>David Attkel</u> Company: <u>SA</u> Time: <u>1125</u> Date: <u>6/30/18</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____

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

* Sample label ID listed as 583146 8/29/18
 + Sample label TN listed as 583146 8/29/18

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-42647-1

Login Number: 42647

List Source: TestAmerica Sacramento

List Number: 1

Creator: Her, David A

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	IDs on containers do not match the COC. Logged in per COC.
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").	N/A	
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:

September 8, 2018

CS Report Name:

Gustavus Airport

Report Date:

September 7, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42647-1

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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:

The sample coolers were recorded at 5.0 and 5.8° C upon receipt at the laboratory.

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

 Yes No

Comments:

Analysis of PFAS compounds 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 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 notes the following sample jars did not match the COC: sample *PW-031* listed "031" on the sample jars and sample *PW-061* listed "061" on the samples jars. The laboratory logged the samples in per the COC. The results are not affected.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 coolers upon receipt at the laboratory was 5.0° C and 5.8° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) with preparation batches 320-243729 and 320-243730. It also notes two samples were observed to have a brown color and sediment in the bottom.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

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 for all samples.

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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

This packet contains some samples that are part of a field-duplicate pair; however, due to rushing the results and the associated costs, the field-duplicates were not submitted together. RPDs will be calculated during the data review process of the laboratory packet where the duplicate sample is reported.

ii. Submitted blind to lab?

Yes No

Comments:

N/A; a field duplicate 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 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 for this project are 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:

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: 320-42821-1
Client Project/Site: GusAirport PFAs

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

Attn: Kristen Freiburger



Authorized for release by:
9/14/2018 2:59:53 PM

David Alltucker, Project Manager I
(916)374-4383
david.alltucker@testamericainc.com

LINKS

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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.

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Job ID: 320-42821-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-42821-1

Receipt

The samples were received on 9/5/2018 1:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.5° 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 320-244977.

Method(s) PFAS Prep: The samples have brown sediment at the bottom of the container and are brown in color: PW-075 (320-42821-1), PW-017 (320-42821-4), PW-018 (320-42821-6), PW-020 (320-42821-7), PW-019 (320-42821-9), PW-015 (320-42821-12), PW-014 (320-42821-13), PW-039 (320-42821-15) and PW-139 (320-42821-16).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-245067.

Method(s) PFAS Prep: The samples have brown sediment at the bottom of the containers: PW-047 (320-42821-19), PW-037 (320-42821-20) and PW-048 (320-42821-21).

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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-075

Lab Sample ID: 320-42821-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-070

Lab Sample ID: 320-42821-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.0	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-022

Lab Sample ID: 320-42821-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	58		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)	6.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	520		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-017

Lab Sample ID: 320-42821-4

No Detections.

Client Sample ID: PW-016

Lab Sample ID: 320-42821-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	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

Client Sample ID: PW-018

Lab Sample ID: 320-42821-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.5		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-020

Lab Sample ID: 320-42821-7

No Detections.

Client Sample ID: PW-021

Lab Sample ID: 320-42821-8

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-019

Lab Sample ID: 320-42821-9

No Detections.

Client Sample ID: PW-046

Lab Sample ID: 320-42821-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	120		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	29		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	82		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	83		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	1900		40	17	ng/L	20		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-146

Lab Sample ID: 320-42821-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	110		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	27		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	77		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	79		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	1700		40	17	ng/L	20		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-015

Lab Sample ID: 320-42821-12

No Detections.

Client Sample ID: PW-014

Lab Sample ID: 320-42821-13

No Detections.

Client Sample ID: PW-044

Lab Sample ID: 320-42821-14

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

Client Sample ID: PW-039

Lab Sample ID: 320-42821-15

No Detections.

Client Sample ID: PW-139

Lab Sample ID: 320-42821-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.79	J	2.0	0.75	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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-059

Lab Sample ID: 320-42821-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-045

Lab Sample ID: 320-42821-18

No Detections.

Client Sample ID: PW-047

Lab Sample ID: 320-42821-19

No Detections.

Client Sample ID: PW-037

Lab Sample ID: 320-42821-20

No Detections.

Client Sample ID: PW-048

Lab Sample ID: 320-42821-21

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-075

Date Collected: 08/31/18 12:57

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-1

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 15:05	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 15:05	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 15:05	1
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L		09/11/18 10:10	09/11/18 15:05	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 15:05	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 15:05	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O2 PFHxS	108		25 - 150	09/11/18 10:10	09/11/18 15:05	1
¹³ C4-PFHpA	108		25 - 150	09/11/18 10:10	09/11/18 15:05	1
¹³ C4 PFOA	102		25 - 150	09/11/18 10:10	09/11/18 15:05	1
¹³ C4 PFOS	104		25 - 150	09/11/18 10:10	09/11/18 15:05	1
¹³ C5 PFNA	97		25 - 150	09/11/18 10:10	09/11/18 15:05	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-070

Date Collected: 08/31/18 18:00

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.8	J	2.0	0.92	ng/L		09/11/18 15:33	09/12/18 05:46	1
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L		09/11/18 15:33	09/12/18 05:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 15:33	09/12/18 05:46	1
Perfluorooctanoic acid (PFOA)	1.0	J	2.0	0.75	ng/L		09/11/18 15:33	09/12/18 05:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 15:33	09/12/18 05:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 15:33	09/12/18 05:46	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	106		25 - 150				09/11/18 15:33	09/12/18 05:46	1
13C4-PFHpA	107		25 - 150				09/11/18 15:33	09/12/18 05:46	1
13C4 PFOA	102		25 - 150				09/11/18 15:33	09/12/18 05:46	1
13C4 PFOS	104		25 - 150				09/11/18 15:33	09/12/18 05:46	1
13C5 PFNA	97		25 - 150				09/11/18 15:33	09/12/18 05:46	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-022

Date Collected: 08/30/18 15:45

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-3

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	6.4		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 15:23	1
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 15:23	1
Perfluoroheptanoic acid (PFHpA)	4.8		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 15:23	1
Perfluorooctanoic acid (PFOA)	6.9		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 15:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 15:23	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	111		25 - 150	09/11/18 10:10	09/11/18 15:23	1
13C4-PFHpA	112		25 - 150	09/11/18 10:10	09/11/18 15:23	1
13C4 PFOA	108		25 - 150	09/11/18 10:10	09/11/18 15:23	1
13C4 PFOS	101		25 - 150	09/11/18 10:10	09/11/18 15:23	1
13C5 PFNA	93		25 - 150	09/11/18 10:10	09/11/18 15:23	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	520		20	13	ng/L		09/11/18 10:10	09/13/18 05:02	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	115		25 - 150	09/11/18 10:10	09/13/18 05:02	10

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-017
Date Collected: 08/30/18 10:14
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-4
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 15:41	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 15:41	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 15:41	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 15:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 15:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 15:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	106		25 - 150				09/11/18 10:10	09/11/18 15:41	1
¹³ C ₄ -PFHpA	109		25 - 150				09/11/18 10:10	09/11/18 15:41	1
¹³ C ₄ PFOA	100		25 - 150				09/11/18 10:10	09/11/18 15:41	1
¹³ C ₄ PFOS	105		25 - 150				09/11/18 10:10	09/11/18 15:41	1
¹³ C ₅ PFNA	98		25 - 150				09/11/18 10:10	09/11/18 15:41	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-016
Date Collected: 08/30/18 09:18
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 16:00	1
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L		09/11/18 10:10	09/11/18 16:00	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 16:00	1
Perfluorooctanoic acid (PFOA)	1.3	J	2.0	0.75	ng/L		09/11/18 10:10	09/11/18 16:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 16:00	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 16:00	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	103		25 - 150				09/11/18 10:10	09/11/18 16:00	1
13C4-PFHpA	104		25 - 150				09/11/18 10:10	09/11/18 16:00	1
13C4 PFOA	96		25 - 150				09/11/18 10:10	09/11/18 16:00	1
13C4 PFOS	102		25 - 150				09/11/18 10:10	09/11/18 16:00	1
13C5 PFNA	89		25 - 150				09/11/18 10:10	09/11/18 16:00	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-018

Date Collected: 08/30/18 11:50

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-6

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 16:18	1
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L		09/11/18 10:10	09/11/18 16:18	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 16:18	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 16:18	1
Perfluorooctanesulfonic acid (PFOS)	2.5		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 16:18	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 16:18	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	106		25 - 150				09/11/18 10:10	09/11/18 16:18	1
13C4-PFHpA	105		25 - 150				09/11/18 10:10	09/11/18 16:18	1
13C4 PFOA	99		25 - 150				09/11/18 10:10	09/11/18 16:18	1
13C4 PFOS	105		25 - 150				09/11/18 10:10	09/11/18 16:18	1
13C5 PFNA	92		25 - 150				09/11/18 10:10	09/11/18 16:18	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-020
Date Collected: 08/30/18 13:10
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-7
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 16:36	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 16:36	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 16:36	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 16:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 16:36	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 16:36	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O2 PFHxS	108		25 - 150				09/11/18 10:10	09/11/18 16:36	1
¹³ C4-PFHpA	113		25 - 150				09/11/18 10:10	09/11/18 16:36	1
¹³ C4 PFOA	103		25 - 150				09/11/18 10:10	09/11/18 16:36	1
¹³ C4 PFOS	108		25 - 150				09/11/18 10:10	09/11/18 16:36	1
¹³ C5 PFNA	99		25 - 150				09/11/18 10:10	09/11/18 16:36	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-021

Date Collected: 08/30/18 13:56

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-8

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 16:55	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 16:55	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 16:55	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 16:55	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 16:55	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 16:55	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	106		25 - 150	09/11/18 10:10	09/11/18 16:55	1
¹³ C ₄ -PFHpA	110		25 - 150	09/11/18 10:10	09/11/18 16:55	1
¹³ C ₄ PFOA	102		25 - 150	09/11/18 10:10	09/11/18 16:55	1
¹³ C ₄ PFOS	103		25 - 150	09/11/18 10:10	09/11/18 16:55	1
¹³ C ₅ PFNA	100		25 - 150	09/11/18 10:10	09/11/18 16:55	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-019
Date Collected: 08/30/18 12:40
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-9
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 17:31	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 17:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 17:31	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 17:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 17:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 17:31	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	111		25 - 150				09/11/18 10:10	09/11/18 17:31	1
13C4-PFHpA	109		25 - 150				09/11/18 10:10	09/11/18 17:31	1
13C4 PFOA	98		25 - 150				09/11/18 10:10	09/11/18 17:31	1
13C4 PFOS	106		25 - 150				09/11/18 10:10	09/11/18 17:31	1
13C5 PFNA	100		25 - 150				09/11/18 10:10	09/11/18 17:31	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-046

Date Collected: 08/30/18 11:33

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-10

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	120		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 17:50	1
Perfluoroheptanoic acid (PFHpA)	29		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 17:50	1
Perfluorooctanoic acid (PFOA)	82		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 17:50	1
Perfluorooctanesulfonic acid (PFOS)	83		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 17:50	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 17:50	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	92		25 - 150	09/11/18 10:10	09/11/18 17:50	1
13C4-PFHpA	86		25 - 150	09/11/18 10:10	09/11/18 17:50	1
13C4 PFOA	102		25 - 150	09/11/18 10:10	09/11/18 17:50	1
13C4 PFOS	105		25 - 150	09/11/18 10:10	09/11/18 17:50	1
13C5 PFNA	97		25 - 150	09/11/18 10:10	09/11/18 17:50	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	1900		40	17	ng/L		09/11/18 10:10	09/13/18 05:20	20

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	112		25 - 150	09/11/18 10:10	09/13/18 05:20	20

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-146

Date Collected: 08/30/18 11:35

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-11

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	110		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 18:08	1
Perfluoroheptanoic acid (PFHpA)	27		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 18:08	1
Perfluorooctanoic acid (PFOA)	77		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 18:08	1
Perfluorooctanesulfonic acid (PFOS)	79		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 18:08	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 18:08	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	87		25 - 150				09/11/18 10:10	09/11/18 18:08	1
13C4-PFHpA	84		25 - 150				09/11/18 10:10	09/11/18 18:08	1
13C4 PFOA	102		25 - 150				09/11/18 10:10	09/11/18 18:08	1
13C4 PFOS	106		25 - 150				09/11/18 10:10	09/11/18 18:08	1
13C5 PFNA	96		25 - 150				09/11/18 10:10	09/11/18 18:08	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	1700		40	17	ng/L		09/11/18 10:10	09/13/18 05:38	20
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	117		25 - 150				09/11/18 10:10	09/13/18 05:38	20

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-015

Date Collected: 08/29/18 16:43

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-12

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 18:27	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 18:27	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 18:27	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 18:27	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 18:27	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 18:27	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	109		25 - 150	09/11/18 10:10	09/11/18 18:27	1
¹³ C ₄ -PFHpA	112		25 - 150	09/11/18 10:10	09/11/18 18:27	1
¹³ C ₄ PFOA	107		25 - 150	09/11/18 10:10	09/11/18 18:27	1
¹³ C ₄ PFOS	105		25 - 150	09/11/18 10:10	09/11/18 18:27	1
¹³ C ₅ PFNA	100		25 - 150	09/11/18 10:10	09/11/18 18:27	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-014

Date Collected: 08/29/18 16:11

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-13

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 18:45	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 18:45	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 18:45	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 18:45	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 18:45	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 18:45	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	109		25 - 150	09/11/18 10:10	09/11/18 18:45	1
¹³ C ₄ -PFHpA	114		25 - 150	09/11/18 10:10	09/11/18 18:45	1
¹³ C ₄ PFOA	107		25 - 150	09/11/18 10:10	09/11/18 18:45	1
¹³ C ₄ PFOS	112		25 - 150	09/11/18 10:10	09/11/18 18:45	1
¹³ C ₅ PFNA	107		25 - 150	09/11/18 10:10	09/11/18 18:45	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-044
Date Collected: 08/29/18 13:36
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-14
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 19:03	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 19:03	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 19:03	1
Perfluorooctanoic acid (PFOA)	1.3	J	2.0	0.75	ng/L		09/11/18 10:10	09/11/18 19:03	1
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 19:03	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 19:03	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>18O2 PFHxS</i>	<i>111</i>		<i>25 - 150</i>				<i>09/11/18 10:10</i>	<i>09/11/18 19:03</i>	<i>1</i>
<i>13C4-PFHpA</i>	<i>115</i>		<i>25 - 150</i>				<i>09/11/18 10:10</i>	<i>09/11/18 19:03</i>	<i>1</i>
<i>13C4 PFOA</i>	<i>109</i>		<i>25 - 150</i>				<i>09/11/18 10:10</i>	<i>09/11/18 19:03</i>	<i>1</i>
<i>13C4 PFOS</i>	<i>111</i>		<i>25 - 150</i>				<i>09/11/18 10:10</i>	<i>09/11/18 19:03</i>	<i>1</i>
<i>13C5 PFNA</i>	<i>103</i>		<i>25 - 150</i>				<i>09/11/18 10:10</i>	<i>09/11/18 19:03</i>	<i>1</i>

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-039
Date Collected: 08/29/18 14:38
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-15
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 19:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 19:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 19:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 19:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 19:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 19:22	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	101		25 - 150				09/11/18 10:10	09/11/18 19:22	1
13C4-PFHpA	111		25 - 150				09/11/18 10:10	09/11/18 19:22	1
13C4 PFOA	101		25 - 150				09/11/18 10:10	09/11/18 19:22	1
13C4 PFOS	104		25 - 150				09/11/18 10:10	09/11/18 19:22	1
13C5 PFNA	95		25 - 150				09/11/18 10:10	09/11/18 19:22	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-139
Date Collected: 08/29/18 14:40
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-16
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 19:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 19:40	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 19:40	1
Perfluorooctanoic acid (PFOA)	0.79	J	2.0	0.75	ng/L		09/11/18 10:10	09/11/18 19:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 19:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 19:40	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	112		25 - 150				09/11/18 10:10	09/11/18 19:40	1
¹³ C ₄ -PFHpA	113		25 - 150				09/11/18 10:10	09/11/18 19:40	1
¹³ C ₄ PFOA	110		25 - 150				09/11/18 10:10	09/11/18 19:40	1
¹³ C ₄ PFOS	109		25 - 150				09/11/18 10:10	09/11/18 19:40	1
¹³ C ₅ PFNA	105		25 - 150				09/11/18 10:10	09/11/18 19:40	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-059
Date Collected: 08/29/18 15:52
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-17
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 19:58	1
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L		09/11/18 10:10	09/11/18 19:58	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 19:58	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 19:58	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 19:58	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 19:58	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	103		25 - 150				09/11/18 10:10	09/11/18 19:58	1
13C4-PFHpA	108		25 - 150				09/11/18 10:10	09/11/18 19:58	1
13C4 PFOA	102		25 - 150				09/11/18 10:10	09/11/18 19:58	1
13C4 PFOS	102		25 - 150				09/11/18 10:10	09/11/18 19:58	1
13C5 PFNA	98		25 - 150				09/11/18 10:10	09/11/18 19:58	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-045

Date Collected: 08/29/18 16:48

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-18

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 20:17	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 20:17	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 20:17	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 20:17	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 20:17	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 20:17	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	107		25 - 150				09/11/18 10:10	09/11/18 20:17	1
¹³ C ₄ -PFHpA	106		25 - 150				09/11/18 10:10	09/11/18 20:17	1
¹³ C ₄ PFOA	103		25 - 150				09/11/18 10:10	09/11/18 20:17	1
¹³ C ₄ PFOS	104		25 - 150				09/11/18 10:10	09/11/18 20:17	1
¹³ C ₅ PFNA	99		25 - 150				09/11/18 10:10	09/11/18 20:17	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-047

Date Collected: 08/31/18 11:54

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-19

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 15:33	09/12/18 06:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 15:33	09/12/18 06:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 15:33	09/12/18 06:04	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 15:33	09/12/18 06:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 15:33	09/12/18 06:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 15:33	09/12/18 06:04	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	107		25 - 150	09/11/18 15:33	09/12/18 06:04	1
13C4-PFHpA	105		25 - 150	09/11/18 15:33	09/12/18 06:04	1
13C4 PFOA	106		25 - 150	09/11/18 15:33	09/12/18 06:04	1
13C4 PFOS	105		25 - 150	09/11/18 15:33	09/12/18 06:04	1
13C5 PFNA	103		25 - 150	09/11/18 15:33	09/12/18 06:04	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-037
Date Collected: 08/31/18 13:40
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-20
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 15:33	09/12/18 06:23	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 15:33	09/12/18 06:23	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 15:33	09/12/18 06:23	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 15:33	09/12/18 06:23	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 15:33	09/12/18 06:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 15:33	09/12/18 06:23	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	108		25 - 150				09/11/18 15:33	09/12/18 06:23	1
¹³ C ₄ -PFHpA	112		25 - 150				09/11/18 15:33	09/12/18 06:23	1
¹³ C ₄ PFOA	103		25 - 150				09/11/18 15:33	09/12/18 06:23	1
¹³ C ₄ PFOS	109		25 - 150				09/11/18 15:33	09/12/18 06:23	1
¹³ C ₅ PFNA	100		25 - 150				09/11/18 15:33	09/12/18 06:23	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-048
Date Collected: 08/31/18 16:28
Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-21
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 15:33	09/12/18 06:41	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 15:33	09/12/18 06:41	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 15:33	09/12/18 06:41	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 15:33	09/12/18 06:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 15:33	09/12/18 06:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 15:33	09/12/18 06:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	105		25 - 150				09/11/18 15:33	09/12/18 06:41	1
13C4-PFHpA	108		25 - 150				09/11/18 15:33	09/12/18 06:41	1
13C4 PFOA	107		25 - 150				09/11/18 15:33	09/12/18 06:41	1
13C4 PFOS	113		25 - 150				09/11/18 15:33	09/12/18 06:41	1
13C5 PFNA	100		25 - 150				09/11/18 15:33	09/12/18 06:41	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

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	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-42821-1	PW-075	108	108	102	104	97
320-42821-2	PW-070	106	107	102	104	97
320-42821-3	PW-022	111	112	108	101	93
320-42821-3 - DL	PW-022				115	
320-42821-4	PW-017	106	109	100	105	98
320-42821-5	PW-016	103	104	96	102	89
320-42821-6	PW-018	106	105	99	105	92
320-42821-7	PW-020	108	113	103	108	99
320-42821-8	PW-021	106	110	102	103	100
320-42821-9	PW-019	111	109	98	106	100
320-42821-10	PW-046	92	86	102	105	97
320-42821-10 - DL	PW-046	112				
320-42821-11	PW-146	87	84	102	106	96
320-42821-11 - DL	PW-146	117				
320-42821-12	PW-015	109	112	107	105	100
320-42821-13	PW-014	109	114	107	112	107
320-42821-14	PW-044	111	115	109	111	103
320-42821-15	PW-039	101	111	101	104	95
320-42821-16	PW-139	112	113	110	109	105
320-42821-17	PW-059	103	108	102	102	98
320-42821-18	PW-045	107	106	103	104	99
320-42821-19	PW-047	107	105	106	105	103
320-42821-20	PW-037	108	112	103	109	100
320-42821-21	PW-048	105	108	107	113	100
LCS 320-244977/2-A	Lab Control Sample	99	101	92	99	89
LCS 320-245067/2-A	Lab Control Sample	114	111	116	114	101
LCSD 320-244977/3-A	Lab Control Sample Dup	103	109	93	107	87
LCSD 320-245067/3-A	Lab Control Sample Dup	105	105	102	110	96
MB 320-244977/1-A	Method Blank	98	102	92	95	79
MB 320-245067/1-A	Method Blank	103	115	107	115	100

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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

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

Lab Sample ID: MB 320-244977/1-A

Matrix: Water

Analysis Batch: 245045

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 244977

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:09	09/11/18 14:10	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	98		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4-PFHpA	102		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4 PFOA	92		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4 PFOS	95		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C5 PFNA	79		25 - 150	09/11/18 10:09	09/11/18 14:10	1

Lab Sample ID: LCS 320-244977/2-A

Matrix: Water

Analysis Batch: 245045

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 244977

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	19.0		ng/L		108	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.4		ng/L		101	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.7		ng/L		98	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	18.9		ng/L		94	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	16.5		ng/L		89	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	99		25 - 150
13C4-PFHpA	101		25 - 150
13C4 PFOA	92		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	89		25 - 150

Lab Sample ID: LCSD 320-244977/3-A

Matrix: Water

Analysis Batch: 245045

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 244977

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.6		ng/L		105	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.8		ng/L		103	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.2		ng/L		96	71 - 138	2	30
Perfluorooctanoic acid (PFOA)	20.0	19.6		ng/L		98	70 - 140	4	30
Perfluorooctanesulfonic acid (PFOS)	18.6	16.6		ng/L		89	69 - 144	0	30
Perfluorononanoic acid (PFNA)	20.0	19.7		ng/L		98	73 - 147	3	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

	<i>LCS</i>	<i>LCS</i>	
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
18O2 PFHxS	103		25 - 150
13C4-PFHpA	109		25 - 150
13C4 PFOA	93		25 - 150
13C4 PFOS	107		25 - 150
13C5 PFNA	87		25 - 150

Lab Sample ID: MB 320-245067/1-A
Matrix: Water
Analysis Batch: 245099

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 245067

<i>Analyte</i>	<i>MB</i>	<i>MB</i>	<i>RL</i>	<i>MDL</i>	<i>Unit</i>	<i>D</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
	<i>Result</i>	<i>Qualifier</i>							
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 15:33	09/12/18 04:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 15:33	09/12/18 04:51	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 15:33	09/12/18 04:51	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 15:33	09/12/18 04:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 15:33	09/12/18 04:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 15:33	09/12/18 04:51	1

	<i>MB</i>	<i>MB</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>						
18O2 PFHxS	103		25 - 150				09/11/18 15:33	09/12/18 04:51	1
13C4-PFHpA	115		25 - 150				09/11/18 15:33	09/12/18 04:51	1
13C4 PFOA	107		25 - 150				09/11/18 15:33	09/12/18 04:51	1
13C4 PFOS	115		25 - 150				09/11/18 15:33	09/12/18 04:51	1
13C5 PFNA	100		25 - 150				09/11/18 15:33	09/12/18 04:51	1

Lab Sample ID: LCS 320-245067/2-A
Matrix: Water
Analysis Batch: 245099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 245067

<i>Analyte</i>	<i>Spike</i>	<i>LCS</i>	<i>LCS</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>
	<i>Added</i>	<i>Result</i>	<i>Qualifier</i>				<i>%Rec.</i>
Perfluorobutanesulfonic acid (PFBS)	17.7	16.9		ng/L		96	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.7		ng/L		97	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.1		ng/L		95	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	17.1		ng/L		86	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	16.9		ng/L		91	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.6		ng/L		98	73 - 147

	<i>LCS</i>	<i>LCS</i>	
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
18O2 PFHxS	114		25 - 150
13C4-PFHpA	111		25 - 150
13C4 PFOA	116		25 - 150
13C4 PFOS	114		25 - 150
13C5 PFNA	101		25 - 150

Lab Sample ID: LCS 320-245067/3-A
Matrix: Water
Analysis Batch: 245099

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 245067

<i>Analyte</i>	<i>Spike</i>	<i>LCS</i>	<i>LCS</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>	<i>RPD</i>	<i>RPD</i>
	<i>Added</i>	<i>Result</i>	<i>Qualifier</i>				<i>%Rec.</i>	<i>RPD</i>	<i>Limit</i>
Perfluorobutanesulfonic acid (PFBS)	17.7	18.1		ng/L		102	72 - 151	7	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.8		ng/L		98	73 - 157	0	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-245067/3-A

Matrix: Water

Analysis Batch: 245099

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 245067

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20.0	18.6		ng/L		93	71 - 138	2	30
Perfluorooctanoic acid (PFOA)	20.0	19.4		ng/L		97	70 - 140	12	30
Perfluorooctanesulfonic acid (PFOS)	18.6	15.9		ng/L		86	69 - 144	6	30
Perfluorononanoic acid (PFNA)	20.0	19.8		ng/L		99	73 - 147	1	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	105		25 - 150
13C4-PFHpA	105		25 - 150
13C4 PFOA	102		25 - 150
13C4 PFOS	110		25 - 150
13C5 PFNA	96		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

LCMS

Prep Batch: 244977

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-1	PW-075	Total/NA	Water	PFAS Prep	
320-42821-3	PW-022	Total/NA	Water	PFAS Prep	
320-42821-3 - DL	PW-022	Total/NA	Water	PFAS Prep	
320-42821-4	PW-017	Total/NA	Water	PFAS Prep	
320-42821-5	PW-016	Total/NA	Water	PFAS Prep	
320-42821-6	PW-018	Total/NA	Water	PFAS Prep	
320-42821-7	PW-020	Total/NA	Water	PFAS Prep	
320-42821-8	PW-021	Total/NA	Water	PFAS Prep	
320-42821-9	PW-019	Total/NA	Water	PFAS Prep	
320-42821-10 - DL	PW-046	Total/NA	Water	PFAS Prep	
320-42821-10	PW-046	Total/NA	Water	PFAS Prep	
320-42821-11 - DL	PW-146	Total/NA	Water	PFAS Prep	
320-42821-11	PW-146	Total/NA	Water	PFAS Prep	
320-42821-12	PW-015	Total/NA	Water	PFAS Prep	
320-42821-13	PW-014	Total/NA	Water	PFAS Prep	
320-42821-14	PW-044	Total/NA	Water	PFAS Prep	
320-42821-15	PW-039	Total/NA	Water	PFAS Prep	
320-42821-16	PW-139	Total/NA	Water	PFAS Prep	
320-42821-17	PW-059	Total/NA	Water	PFAS Prep	
320-42821-18	PW-045	Total/NA	Water	PFAS Prep	
MB 320-244977/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-244977/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-244977/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 245045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-1	PW-075	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-3	PW-022	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-4	PW-017	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-5	PW-016	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-6	PW-018	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-7	PW-020	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-8	PW-021	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-9	PW-019	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-10	PW-046	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-11	PW-146	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-12	PW-015	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-13	PW-014	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-14	PW-044	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-15	PW-039	Total/NA	Water	WS-LC-0025 At1	244977

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

LCMS (Continued)

Analysis Batch: 245045 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-16	PW-139	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-17	PW-059	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-18	PW-045	Total/NA	Water	WS-LC-0025 At1	244977
MB 320-244977/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	244977
LCS 320-244977/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	244977
LCSD 320-244977/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	244977

Prep Batch: 245067

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-2	PW-070	Total/NA	Water	PFAS Prep	
320-42821-19	PW-047	Total/NA	Water	PFAS Prep	
320-42821-20	PW-037	Total/NA	Water	PFAS Prep	
320-42821-21	PW-048	Total/NA	Water	PFAS Prep	
MB 320-245067/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-245067/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-245067/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 245099

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-2	PW-070	Total/NA	Water	WS-LC-0025 At1	245067
320-42821-19	PW-047	Total/NA	Water	WS-LC-0025 At1	245067
320-42821-20	PW-037	Total/NA	Water	WS-LC-0025 At1	245067
320-42821-21	PW-048	Total/NA	Water	WS-LC-0025 At1	245067
MB 320-245067/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	245067
LCS 320-245067/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	245067
LCSD 320-245067/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	245067

Analysis Batch: 245370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42821-3 - DL	PW-022	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-10 - DL	PW-046	Total/NA	Water	WS-LC-0025 At1	244977
320-42821-11 - DL	PW-146	Total/NA	Water	WS-LC-0025 At1	244977

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-075

Date Collected: 08/31/18 12:57

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-1

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 15:05	S1M	TAL SAC

Client Sample ID: PW-070

Date Collected: 08/31/18 18:00

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-2

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	245067	09/11/18 15:33	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245099	09/12/18 05:46	S1M	TAL SAC

Client Sample ID: PW-022

Date Collected: 08/30/18 15:45

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-3

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 15:23	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			245370	09/13/18 05:02	D1R	TAL SAC

Client Sample ID: PW-017

Date Collected: 08/30/18 10:14

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-4

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 15:41	S1M	TAL SAC

Client Sample ID: PW-016

Date Collected: 08/30/18 09:18

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-5

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 16:00	S1M	TAL SAC

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-018

Lab Sample ID: 320-42821-6

Date Collected: 08/30/18 11:50

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 16:18	S1M	TAL SAC

Client Sample ID: PW-020

Lab Sample ID: 320-42821-7

Date Collected: 08/30/18 13:10

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 16:36	S1M	TAL SAC

Client Sample ID: PW-021

Lab Sample ID: 320-42821-8

Date Collected: 08/30/18 13:56

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 16:55	S1M	TAL SAC

Client Sample ID: PW-019

Lab Sample ID: 320-42821-9

Date Collected: 08/30/18 12:40

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 17:31	S1M	TAL SAC

Client Sample ID: PW-046

Lab Sample ID: 320-42821-10

Date Collected: 08/30/18 11:33

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 17:50	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	20			245370	09/13/18 05:20	D1R	TAL SAC

Client Sample ID: PW-146

Lab Sample ID: 320-42821-11

Date Collected: 08/30/18 11:35

Matrix: Water

Date Received: 09/05/18 13:20

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	244977	09/11/18 10:10	QCP	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-146

Date Collected: 08/30/18 11:35

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-11

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 18:08	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	20			245370	09/13/18 05:38	D1R	TAL SAC

Client Sample ID: PW-015

Date Collected: 08/29/18 16:43

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-12

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 18:27	S1M	TAL SAC

Client Sample ID: PW-014

Date Collected: 08/29/18 16:11

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-13

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 18:45	S1M	TAL SAC

Client Sample ID: PW-044

Date Collected: 08/29/18 13:36

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-14

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 19:03	S1M	TAL SAC

Client Sample ID: PW-039

Date Collected: 08/29/18 14:38

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-15

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 19:22	S1M	TAL SAC

Client Sample ID: PW-139

Date Collected: 08/29/18 14:40

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-16

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 19:40	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Client Sample ID: PW-059

Date Collected: 08/29/18 15:52

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-17

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 19:58	S1M	TAL SAC

Client Sample ID: PW-045

Date Collected: 08/29/18 16:48

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-18

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 20:17	S1M	TAL SAC

Client Sample ID: PW-047

Date Collected: 08/31/18 11:54

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-19

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	245067	09/11/18 15:33	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245099	09/12/18 06:04	S1M	TAL SAC

Client Sample ID: PW-037

Date Collected: 08/31/18 13:40

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-20

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	245067	09/11/18 15:33	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245099	09/12/18 06:23	S1M	TAL SAC

Client Sample ID: PW-048

Date Collected: 08/31/18 16:28

Date Received: 09/05/18 13:20

Lab Sample ID: 320-42821-21

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	245067	09/11/18 15:33	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245099	09/12/18 06:41	S1M	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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: GusAirport PFAs

TestAmerica Job ID: 320-42821-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42821-1	PW-075	Water	08/31/18 12:57	09/05/18 13:20
320-42821-2	PW-070	Water	08/31/18 18:00	09/05/18 13:20
320-42821-3	PW-022	Water	08/30/18 15:45	09/05/18 13:20
320-42821-4	PW-017	Water	08/30/18 10:14	09/05/18 13:20
320-42821-5	PW-016	Water	08/30/18 09:18	09/05/18 13:20
320-42821-6	PW-018	Water	08/30/18 11:50	09/05/18 13:20
320-42821-7	PW-020	Water	08/30/18 13:10	09/05/18 13:20
320-42821-8	PW-021	Water	08/30/18 13:56	09/05/18 13:20
320-42821-9	PW-019	Water	08/30/18 12:40	09/05/18 13:20
320-42821-10	PW-046	Water	08/30/18 11:33	09/05/18 13:20
320-42821-11	PW-146	Water	08/30/18 11:35	09/05/18 13:20
320-42821-12	PW-015	Water	08/29/18 16:43	09/05/18 13:20
320-42821-13	PW-014	Water	08/29/18 16:11	09/05/18 13:20
320-42821-14	PW-044	Water	08/29/18 13:36	09/05/18 13:20
320-42821-15	PW-039	Water	08/29/18 14:38	09/05/18 13:20
320-42821-16	PW-139	Water	08/29/18 14:40	09/05/18 13:20
320-42821-17	PW-059	Water	08/29/18 15:52	09/05/18 13:20
320-42821-18	PW-045	Water	08/29/18 16:48	09/05/18 13:20
320-42821-19	PW-047	Water	08/31/18 11:54	09/05/18 13:20
320-42821-20	PW-037	Water	08/31/18 13:40	09/05/18 13:20
320-42821-21	PW-048	Water	08/31/18 16:28	09/05/18 13:20

CHAIN-OF-CUSTODY RECORD

Page 1 of 3
 Laboratory TEST AMERICA
 Attn: D. ALHUCKY

Analytical Methods (include preservative if used)

Quote No: _____
 Turn Around Time: Normal Rush
 J-Flags: Yes No

Please Specify _____



320-42821 Chain of Custody

Total Number of Containers

Remarks/Matrix Composition/Grab? Sample Containers

Sample Identity	Lab No.	Time	Date Sampled	DTAS #	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-075		1257	8/31/18	X	2	GROUNDWATER
PW-070		1800	8/31/18	X	2	
PW-022		1545	8/30/18	X	2	
PW-017		1014	8/30/18	X	2	
PW-016		0918	8/30/18	X	2	
PW-018		1150	8/30/18	X	2	
PW-020		1310	8/30/18	X	2	
PW-021		1356	8/30/18	X	2	
PW-019		1240	8/30/18	X	2	
PW-046		1133	8/30/18	X	2	

Project Information
 Number: 101543-001
 Name: Gus Airport + PFAS
 Contact: KRF
 Ongoing Project? Yes No
 Sampler: KRF, MDN, ARM

Sample Receipt
 Total No. of Containers: 42
 COC Seals/Intact? Y/N/A
 Received Good Cond./Cold
 Temp:
 Delivery Method: Golfstreak

Notes:

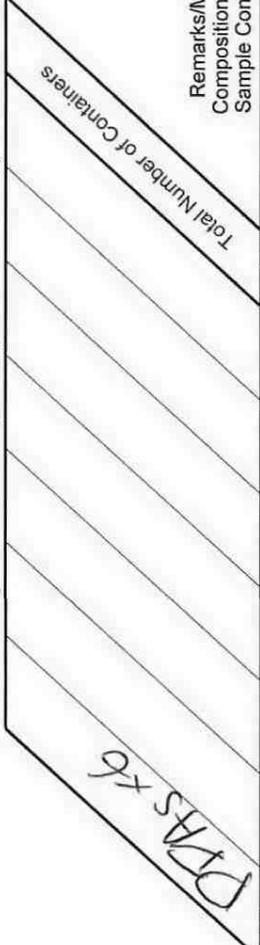
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
 Yellow - w/shipment - for consignee files
 Pink - Shannon & Wilson - job file

Relinquished By:	Relinquished By:	Relinquished By:
Signature: <u>[Signature]</u> Printed Name: <u>[Name]</u> Date: <u>8/14</u> Company: <u>Shannon + Wilson, Inc</u>	Signature: _____ Printed Name: _____ Date: _____ Company: _____	Signature: _____ Printed Name: _____ Date: _____ Company: _____
Received By: <u>[Signature]</u> Time: <u>1330</u> Printed Name: <u>[Name]</u> Date: <u>8/15/18</u> Company: <u>[Company]</u>	Received By: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____	Received By: _____ Time: _____ Printed Name: _____ Date: _____ Company: _____

No. 35613
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CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)



Quote No: _____
 J-Flags: Yes No

Turn Around Time:
 Normal Rush
 Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-146		1135	8/30/18	X	
PW-015		1643	8/29/18	X	
PW-014		1611	8/29/18	X	
PW-044		1336	8/29/18	X	
PW-039		1438	8/29/18	X	
PW-139		1440	8/29/18	X	
PW-059		1552	8/29/18	X	
PW-045		1648	8/29/18	X	
PW-047		1154	8/31/18	X	
PW-037		1340	8/31/18	X	

Project Information
 Number: 101543-001
 Name: Gustavus Airport
 Contact: KRF
 Ongoing Project? Yes No
 Sampler: MDN/ARH

Sample Receipt
 Total No. of Containers: _____
 COC Seals/Intact? Y/N/NA _____
 Received Good Cond./Cold: see PG 1
 Temp: _____
 Delivery Method: _____

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Shannon & Wilson</u> Company: <u>Shannon & Wilson</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>4:15</u> Date: <u>9/4</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>Daniel Han</u> Company: <u>H. Sae</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>1300</u> Date: <u>9/5/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

Notes:
 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: 320-42821-1

Login Number: 42821

List Number: 1

Creator: Her, David A

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
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 17, 2018

CS Report Name:

Gustavus Airport

Report Date:

September 14, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42821-1

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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:

The sample cooler was recorded at 4.5° C upon receipt at the laboratory.

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

 Yes No

Comments:

Analysis of PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 4.5° C. It further notes that several samples contained sediment at the bottom of the containers or were brown in color.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-244977 and 245067.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

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 for each sample.

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 ADEC action level for drinking water 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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

Yes, two field duplicates pairs were submitted with this work order.

ii. Submitted blind to lab?

Yes No

Comments:

Field duplicate pairs *PW-046 / PW-146* and *PW-039 / PW-139* were 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 RPDs, where calculable for detected values, were less than 30% for each analyte. The maximum RPD was 11%.

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 for this project are 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:

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: 320-42653-1
Client Project/Site: Gustavus DOT
Revision: 1

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

Attn: Kristen Freiburger



Authorized for release by:
9/17/2018 10:24:42 AM

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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.

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Job ID: 320-42653-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-42653-1

Receipt

The samples were received on 8/30/2018 11:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 5.0° C and 5.8° 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 320-243916.

Method(s) PFAS Prep: These samples have black sediment at the bottom of the containers: PW-007 (320-42653-7) and SW-2001 (320-42653-14).

Method(s) PFAS Prep: These samples have brown sediment at the bottom of the containers: PW-001 (320-42653-1), PW-002 (320-42653-2), PW-003 (320-42653-3), PW-007 (320-42653-7), PW-011 (320-42653-9), PW-032 (320-42653-10), PW-043 (320-42653-12), PW-033 (320-42653-16) and PW-041 (320-42653-19).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-243918.

Method(s) PFAS Prep: These samples have brown sediment at the bottom of the containers: PW-138 (320-42653-20) and PW-013 (320-42653-22).

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-244977.

Method(s) PFAS Prep: The sample has black sediment and is black in color: SW-2001 (320-42653-14)

Method(s) PFAS Prep: Due to the matrix, the initial volume(s) used for the following samples deviated from the standard procedure: PW-006 (320-42653-6) and PW-106 (320-42653-21). The reporting limits (RLs) have been adjusted proportionately. Samples were initially prepared at 1x dilutions, but due to high level were re-prepped at 100x dilution to bring high level analytes within calibration range.

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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-001

Lab Sample ID: 320-42653-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	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)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	3.0		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	350		20	8.7	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	2300		20	13	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-002

Lab Sample ID: 320-42653-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.4		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.0		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	160		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-003

Lab Sample ID: 320-42653-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-004

Lab Sample ID: 320-42653-4

No Detections.

Client Sample ID: PW-005

Lab Sample ID: 320-42653-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.90	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-006

Lab Sample ID: 320-42653-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	160		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	48		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	240		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	48		2.0	0.65	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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-006 (Continued)

Lab Sample ID: 320-42653-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS) - DL	7400		2000	870	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	39000		2000	1300	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-007

Lab Sample ID: 320-42653-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-009

Lab Sample ID: 320-42653-8

No Detections.

Client Sample ID: PW-011

Lab Sample ID: 320-42653-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.4		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	93		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-032

Lab Sample ID: 320-42653-10

No Detections.

Client Sample ID: PW-042

Lab Sample ID: 320-42653-11

No Detections.

Client Sample ID: PW-043

Lab Sample ID: 320-42653-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.94	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	7.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: SW-2100

Lab Sample ID: 320-42653-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.6	J	2.0	0.92	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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: SW-2100 (Continued)

Lab Sample ID: 320-42653-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.6		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.6		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: SW-2001

Lab Sample ID: 320-42653-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.7		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)	3.1		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	5.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	200		2.0	1.3	ng/L	1			WS-LC-0025 At1	Total/NA

Client Sample ID: SW-2002

Lab Sample ID: 320-42653-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil	Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.2		2.0	0.92	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	70		2.0	0.87	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.8		2.0	0.80	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	9.9		2.0	0.75	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L	1			WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	410		20	13	ng/L	10			WS-LC-0025 At1	Total/NA

Client Sample ID: PW-033

Lab Sample ID: 320-42653-16

No Detections.

Client Sample ID: PW-036

Lab Sample ID: 320-42653-17

No Detections.

Client Sample ID: PW-040

Lab Sample ID: 320-42653-18

No Detections.

Client Sample ID: PW-041

Lab Sample ID: 320-42653-19

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-138

Lab Sample ID: 320-42653-20

No Detections.

Client Sample ID: PW-106

Lab Sample ID: 320-42653-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	170		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	48		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	240		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	48		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	7300		2000	870	ng/L	10		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	40000		2000	1300	ng/L	10		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-013

Lab Sample ID: 320-42653-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	57		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	230		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	130		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	8.9		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	860		100	44	ng/L	50		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	5500		100	64	ng/L	50		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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-001

Date Collected: 08/28/18 10:23

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-1

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	20		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 01:20	1
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 01:20	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 01:20	1
Perfluorononanoic acid (PFNA)	3.0		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 01:20	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	113		25 - 150				09/05/18 12:29	09/07/18 01:20	1
13C4-PFHpA	112		25 - 150				09/05/18 12:29	09/07/18 01:20	1
13C4 PFOA	130		25 - 150				09/05/18 12:29	09/07/18 01:20	1
13C5 PFNA	104		25 - 150				09/05/18 12:29	09/07/18 01:20	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	350		20	8.7	ng/L		09/05/18 12:29	09/09/18 17:03	10
Perfluorooctanesulfonic acid (PFOS)	2300		20	13	ng/L		09/05/18 12:29	09/09/18 17:03	10
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	104		25 - 150				09/05/18 12:29	09/09/18 17:03	10
13C4 PFOS	103		25 - 150				09/05/18 12:29	09/09/18 17:03	10

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-002

Date Collected: 08/28/18 09:22

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.2		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 01:39	1
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 01:39	1
Perfluoroheptanoic acid (PFHpA)	4.4		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 01:39	1
Perfluorooctanoic acid (PFOA)	3.0		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 01:39	1
Perfluorooctanesulfonic acid (PFOS)	160		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 01:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 01:39	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	113		25 - 150				09/05/18 12:29	09/07/18 01:39	1
¹³ C ₄ -PFHpA	112		25 - 150				09/05/18 12:29	09/07/18 01:39	1
¹³ C ₄ PFOA	128		25 - 150				09/05/18 12:29	09/07/18 01:39	1
¹³ C ₄ PFOS	116		25 - 150				09/05/18 12:29	09/07/18 01:39	1
¹³ C ₅ PFNA	123		25 - 150				09/05/18 12:29	09/07/18 01:39	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-003
Date Collected: 08/28/18 11:22
Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-3
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 01:57	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 01:57	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 01:57	1
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L		09/05/18 12:29	09/07/18 01:57	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 01:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 01:57	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>18O2 PFHxS</i>	<i>125</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 01:57</i>	<i>1</i>
<i>13C4-PFHpA</i>	<i>121</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 01:57</i>	<i>1</i>
<i>13C4 PFOA</i>	<i>131</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 01:57</i>	<i>1</i>
<i>13C4 PFOS</i>	<i>125</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 01:57</i>	<i>1</i>
<i>13C5 PFNA</i>	<i>134</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 01:57</i>	<i>1</i>

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-004

Date Collected: 08/28/18 11:59

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-4

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 02:15	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 02:15	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 02:15	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 02:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 02:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 02:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	121		25 - 150				09/05/18 12:29	09/07/18 02:15	1
13C4-PFHpA	128		25 - 150				09/05/18 12:29	09/07/18 02:15	1
13C4 PFOA	126		25 - 150				09/05/18 12:29	09/07/18 02:15	1
13C4 PFOS	131		25 - 150				09/05/18 12:29	09/07/18 02:15	1
13C5 PFNA	138		25 - 150				09/05/18 12:29	09/07/18 02:15	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-005

Date Collected: 08/28/18 12:23

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-5

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 02:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 02:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 02:34	1
Perfluorooctanoic acid (PFOA)	0.90	J	2.0	0.75	ng/L		09/05/18 12:29	09/07/18 02:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 02:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 02:34	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	126		25 - 150				09/05/18 12:29	09/07/18 02:34	1
13C4-PFHpA	125		25 - 150				09/05/18 12:29	09/07/18 02:34	1
13C4 PFOA	138		25 - 150				09/05/18 12:29	09/07/18 02:34	1
13C4 PFOS	128		25 - 150				09/05/18 12:29	09/07/18 02:34	1
13C5 PFNA	135		25 - 150				09/05/18 12:29	09/07/18 02:34	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-006

Date Collected: 08/28/18 12:57

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-6

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	160		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 02:52	1
Perfluoroheptanoic acid (PFHpA)	48		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 02:52	1
Perfluorooctanoic acid (PFOA)	240		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 02:52	1
Perfluorononanoic acid (PFNA)	48		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 02:52	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	61		25 - 150				09/05/18 12:29	09/07/18 02:52	1
13C4-PFHpA	58		25 - 150				09/05/18 12:29	09/07/18 02:52	1
13C4 PFOA	116		25 - 150				09/05/18 12:29	09/07/18 02:52	1
13C5 PFNA	51		25 - 150				09/05/18 12:29	09/07/18 02:52	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	7400		2000	870	ng/L		09/11/18 10:10	09/11/18 21:30	10
Perfluorooctanesulfonic acid (PFOS)	39000		2000	1300	ng/L		09/11/18 10:10	09/11/18 21:30	10
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	106		25 - 150				09/11/18 10:10	09/11/18 21:30	10
13C4 PFOS	105		25 - 150				09/11/18 10:10	09/11/18 21:30	10

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-007

Date Collected: 08/28/18 13:51

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-7

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 03:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 03:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 03:29	1
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L		09/05/18 12:29	09/07/18 03:29	1
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 03:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 03:29	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>18O2 PFHxS</i>	<i>123</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 03:29</i>	<i>1</i>
<i>13C4-PFHpA</i>	<i>120</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 03:29</i>	<i>1</i>
<i>13C4 PFOA</i>	<i>138</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 03:29</i>	<i>1</i>
<i>13C4 PFOS</i>	<i>125</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 03:29</i>	<i>1</i>
<i>13C5 PFNA</i>	<i>132</i>		<i>25 - 150</i>				<i>09/05/18 12:29</i>	<i>09/07/18 03:29</i>	<i>1</i>

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-009

Date Collected: 08/28/18 16:40

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-8

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 03:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 03:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 03:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 03:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 03:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 03:47	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	125		25 - 150	09/05/18 12:29	09/07/18 03:47	1
13C4-PFHpA	122		25 - 150	09/05/18 12:29	09/07/18 03:47	1
13C4 PFOA	141		25 - 150	09/05/18 12:29	09/07/18 03:47	1
13C4 PFOS	126		25 - 150	09/05/18 12:29	09/07/18 03:47	1
13C5 PFNA	135		25 - 150	09/05/18 12:29	09/07/18 03:47	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-011

Date Collected: 08/29/18 10:19

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-9

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 04:06	1
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 04:06	1
Perfluoroheptanoic acid (PFHpA)	3.4		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 04:06	1
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 04:06	1
Perfluorooctanesulfonic acid (PFOS)	93		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 04:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 04:06	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	112		25 - 150				09/05/18 12:29	09/07/18 04:06	1
<i>13C4-PFHpa</i>	109		25 - 150				09/05/18 12:29	09/07/18 04:06	1
<i>13C4 PFOA</i>	135		25 - 150				09/05/18 12:29	09/07/18 04:06	1
<i>13C4 PFOS</i>	120		25 - 150				09/05/18 12:29	09/07/18 04:06	1
<i>13C5 PFNA</i>	119		25 - 150				09/05/18 12:29	09/07/18 04:06	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-032

Date Collected: 08/28/18 09:59

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-10

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 04:24	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 04:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 04:24	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 04:24	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 04:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 04:24	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	121		25 - 150				09/05/18 12:29	09/07/18 04:24	1
13C4-PFHpA	116		25 - 150				09/05/18 12:29	09/07/18 04:24	1
13C4 PFOA	136		25 - 150				09/05/18 12:29	09/07/18 04:24	1
13C4 PFOS	125		25 - 150				09/05/18 12:29	09/07/18 04:24	1
13C5 PFNA	132		25 - 150				09/05/18 12:29	09/07/18 04:24	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-042
Date Collected: 08/29/18 09:28
Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-11
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 04:42	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 04:42	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 04:42	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 04:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 04:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 04:42	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	118		25 - 150				09/05/18 12:29	09/07/18 04:42	1
13C4-PFHpA	116		25 - 150				09/05/18 12:29	09/07/18 04:42	1
13C4 PFOA	126		25 - 150				09/05/18 12:29	09/07/18 04:42	1
13C4 PFOS	121		25 - 150				09/05/18 12:29	09/07/18 04:42	1
13C5 PFNA	125		25 - 150				09/05/18 12:29	09/07/18 04:42	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-043

Date Collected: 08/29/18 10:08

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-12

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 05:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 05:01	1
Perfluoroheptanoic acid (PFHpA)	0.94	J	2.0	0.80	ng/L		09/05/18 12:29	09/07/18 05:01	1
Perfluorooctanoic acid (PFOA)	7.6		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 05:01	1
Perfluorooctanesulfonic acid (PFOS)	6.6		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 05:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 05:01	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	120		25 - 150				09/05/18 12:29	09/07/18 05:01	1
13C4-PFHpA	122		25 - 150				09/05/18 12:29	09/07/18 05:01	1
13C4 PFOA	145		25 - 150				09/05/18 12:29	09/07/18 05:01	1
13C4 PFOS	122		25 - 150				09/05/18 12:29	09/07/18 05:01	1
13C5 PFNA	137		25 - 150				09/05/18 12:29	09/07/18 05:01	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: SW-2100

Lab Sample ID: 320-42653-13

Date Collected: 08/29/18 09:35

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.6	J	2.0	0.92	ng/L		09/05/18 12:29	09/07/18 05:19	1
Perfluorohexanesulfonic acid (PFHxS)	27		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 05:19	1
Perfluoroheptanoic acid (PFHpA)	3.6		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 05:19	1
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 05:19	1
Perfluorooctanesulfonic acid (PFOS)	110		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 05:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 05:19	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	116		25 - 150				09/05/18 12:29	09/07/18 05:19	1
<i>13C4-PFHxA</i>	127		25 - 150				09/05/18 12:29	09/07/18 05:19	1
<i>13C4 PFOA</i>	135		25 - 150				09/05/18 12:29	09/07/18 05:19	1
<i>13C4 PFOS</i>	121		25 - 150				09/05/18 12:29	09/07/18 05:19	1
<i>13C5 PFNA</i>	128		25 - 150				09/05/18 12:29	09/07/18 05:19	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: SW-2001

Lab Sample ID: 320-42653-14

Date Collected: 08/29/18 09:57

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.7		2.0	0.92	ng/L		09/11/18 10:10	09/11/18 20:53	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		09/11/18 10:10	09/11/18 20:53	1
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L		09/11/18 10:10	09/11/18 20:53	1
Perfluorooctanoic acid (PFOA)	5.9		2.0	0.75	ng/L		09/11/18 10:10	09/11/18 20:53	1
Perfluorooctanesulfonic acid (PFOS)	200		2.0	1.3	ng/L		09/11/18 10:10	09/11/18 20:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:10	09/11/18 20:53	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	100		25 - 150				09/11/18 10:10	09/11/18 20:53	1
<i>13C4-PFHpa</i>	102		25 - 150				09/11/18 10:10	09/11/18 20:53	1
<i>13C4 PFOA</i>	100		25 - 150				09/11/18 10:10	09/11/18 20:53	1
<i>13C4 PFOS</i>	100		25 - 150				09/11/18 10:10	09/11/18 20:53	1
<i>13C5 PFNA</i>	91		25 - 150				09/11/18 10:10	09/11/18 20:53	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: SW-2002

Lab Sample ID: 320-42653-15

Date Collected: 08/29/18 10:16

Matrix: Water

Date Received: 08/30/18 11:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.2		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 17:56	1
Perfluorohexanesulfonic acid (PFHxS)	70		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 17:56	1
Perfluoroheptanoic acid (PFHpA)	8.8		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 17:56	1
Perfluorooctanoic acid (PFOA)	9.9		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 17:56	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.65	ng/L		09/05/18 12:29	09/07/18 17:56	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	99		25 - 150	09/05/18 12:29	09/07/18 17:56	1
13C4-PFHpA	101		25 - 150	09/05/18 12:29	09/07/18 17:56	1
13C4 PFOA	106		25 - 150	09/05/18 12:29	09/07/18 17:56	1
13C5 PFNA	98		25 - 150	09/05/18 12:29	09/07/18 17:56	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	410		20	13	ng/L		09/05/18 12:29	09/09/18 17:40	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	105		25 - 150	09/05/18 12:29	09/09/18 17:40	10

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-033
Date Collected: 08/28/18 12:10
Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-16
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 18:14	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 18:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 18:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 18:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 18:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 18:14	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	106		25 - 150				09/05/18 12:29	09/07/18 18:14	1
¹³ C ₄ -PFHpA	108		25 - 150				09/05/18 12:29	09/07/18 18:14	1
¹³ C ₄ PFOA	110		25 - 150				09/05/18 12:29	09/07/18 18:14	1
¹³ C ₄ PFOS	103		25 - 150				09/05/18 12:29	09/07/18 18:14	1
¹³ C ₅ PFNA	110		25 - 150				09/05/18 12:29	09/07/18 18:14	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-036

Date Collected: 08/28/18 11:10

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-17

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 18:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 18:51	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 18:51	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 18:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 18:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 18:51	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	106		25 - 150	09/05/18 12:29	09/07/18 18:51	1
¹³ C ₄ -PFHpA	97		25 - 150	09/05/18 12:29	09/07/18 18:51	1
¹³ C ₄ PFOA	107		25 - 150	09/05/18 12:29	09/07/18 18:51	1
¹³ C ₄ PFOS	100		25 - 150	09/05/18 12:29	09/07/18 18:51	1
¹³ C ₅ PFNA	103		25 - 150	09/05/18 12:29	09/07/18 18:51	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-040

Date Collected: 08/28/18 15:44

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-18

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 19:09	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 19:09	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 19:09	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 19:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 19:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 19:09	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	112		25 - 150	09/05/18 12:29	09/07/18 19:09	1
¹³ C ₄ -PFHpA	108		25 - 150	09/05/18 12:29	09/07/18 19:09	1
¹³ C ₄ PFOA	113		25 - 150	09/05/18 12:29	09/07/18 19:09	1
¹³ C ₄ PFOS	110		25 - 150	09/05/18 12:29	09/07/18 19:09	1
¹³ C ₅ PFNA	107		25 - 150	09/05/18 12:29	09/07/18 19:09	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-041

Date Collected: 08/28/18 17:09

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-19

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:29	09/07/18 19:28	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:29	09/07/18 19:28	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:29	09/07/18 19:28	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:29	09/07/18 19:28	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:29	09/07/18 19:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:29	09/07/18 19:28	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	108		25 - 150	09/05/18 12:29	09/07/18 19:28	1
¹³ C ₄ -PFHpA	107		25 - 150	09/05/18 12:29	09/07/18 19:28	1
¹³ C ₄ PFOA	113		25 - 150	09/05/18 12:29	09/07/18 19:28	1
¹³ C ₄ PFOS	106		25 - 150	09/05/18 12:29	09/07/18 19:28	1
¹³ C ₅ PFNA	113		25 - 150	09/05/18 12:29	09/07/18 19:28	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-138

Date Collected: 08/28/18 13:35

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-20

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:37	09/07/18 20:59	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:37	09/07/18 20:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:37	09/07/18 20:59	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:37	09/07/18 20:59	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:37	09/07/18 20:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:37	09/07/18 20:59	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	104		25 - 150	09/05/18 12:37	09/07/18 20:59	1
¹³ C ₄ -PFHpA	99		25 - 150	09/05/18 12:37	09/07/18 20:59	1
¹³ C ₄ PFOA	109		25 - 150	09/05/18 12:37	09/07/18 20:59	1
¹³ C ₄ PFOS	100		25 - 150	09/05/18 12:37	09/07/18 20:59	1
¹³ C ₅ PFNA	103		25 - 150	09/05/18 12:37	09/07/18 20:59	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-106

Date Collected: 08/28/18 12:07

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-21

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	170		2.0	0.92	ng/L		09/05/18 12:37	09/07/18 21:18	1
Perfluoroheptanoic acid (PFHpA)	48		2.0	0.80	ng/L		09/05/18 12:37	09/07/18 21:18	1
Perfluorooctanoic acid (PFOA)	240		2.0	0.75	ng/L		09/05/18 12:37	09/07/18 21:18	1
Perfluorononanoic acid (PFNA)	48		2.0	0.65	ng/L		09/05/18 12:37	09/07/18 21:18	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	56		25 - 150				09/05/18 12:37	09/07/18 21:18	1
13C4-PFHpA	54		25 - 150				09/05/18 12:37	09/07/18 21:18	1
13C4 PFOA	100		25 - 150				09/05/18 12:37	09/07/18 21:18	1
13C5 PFNA	45		25 - 150				09/05/18 12:37	09/07/18 21:18	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	7300		2000	870	ng/L		09/11/18 10:10	09/13/18 05:57	10
Perfluorooctanesulfonic acid (PFOS)	40000		2000	1300	ng/L		09/11/18 10:10	09/13/18 05:57	10
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	113		25 - 150				09/11/18 10:10	09/13/18 05:57	10
13C4 PFOS	102		25 - 150				09/11/18 10:10	09/13/18 05:57	10

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-013

Date Collected: 08/29/18 15:06

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-22

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	57		2.0	0.92	ng/L		09/05/18 12:37	09/07/18 21:36	1
Perfluoroheptanoic acid (PFHpA)	230		2.0	0.80	ng/L		09/05/18 12:37	09/07/18 21:36	1
Perfluorooctanoic acid (PFOA)	130		2.0	0.75	ng/L		09/05/18 12:37	09/07/18 21:36	1
Perfluorononanoic acid (PFNA)	8.9		2.0	0.65	ng/L		09/05/18 12:37	09/07/18 21:36	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	92		25 - 150				09/05/18 12:37	09/07/18 21:36	1
13C4-PFHpA	87		25 - 150				09/05/18 12:37	09/07/18 21:36	1
13C4 PFOA	85		25 - 150				09/05/18 12:37	09/07/18 21:36	1
13C5 PFNA	76		25 - 150				09/05/18 12:37	09/07/18 21:36	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	860		100	44	ng/L		09/05/18 12:37	09/10/18 11:22	50
Perfluorooctanesulfonic acid (PFOS)	5500		100	64	ng/L		09/05/18 12:37	09/10/18 11:22	50
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	115		25 - 150				09/05/18 12:37	09/10/18 11:22	50
13C4 PFOS	116		25 - 150				09/05/18 12:37	09/10/18 11:22	50

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

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	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-42653-1	PW-001	113	112	130		104
320-42653-1 - DL	PW-001	104			103	
320-42653-2	PW-002	113	112	128	116	123
320-42653-3	PW-003	125	121	131	125	134
320-42653-4	PW-004	121	128	126	131	138
320-42653-5	PW-005	126	125	138	128	135
320-42653-6	PW-006	61	58	116		51
320-42653-6 - DL	PW-006	106			105	
320-42653-7	PW-007	123	120	138	125	132
320-42653-8	PW-009	125	122	141	126	135
320-42653-9	PW-011	112	109	135	120	119
320-42653-10	PW-032	121	116	136	125	132
320-42653-11	PW-042	118	116	126	121	125
320-42653-12	PW-043	120	122	145	122	137
320-42653-13	SW-2100	116	127	135	121	128
320-42653-14	SW-2001	100	102	100	100	91
320-42653-15	SW-2002	99	101	106		98
320-42653-15 - DL	SW-2002				105	
320-42653-16	PW-033	106	108	110	103	110
320-42653-17	PW-036	106	97	107	100	103
320-42653-18	PW-040	112	108	113	110	107
320-42653-19	PW-041	108	107	113	106	113
320-42653-20	PW-138	104	99	109	100	103
320-42653-21	PW-106	56	54	100		45
320-42653-21 - DL	PW-106	113			102	
320-42653-22	PW-013	92	87	85		76
320-42653-22 - DL	PW-013	115			116	
LCS 320-243916/2-A	Lab Control Sample	121	120	125	124	126
LCS 320-243918/2-A	Lab Control Sample	106	98	99	99	102
LCS 320-244977/2-A	Lab Control Sample	99	101	92	99	89
LCSD 320-243916/3-A	Lab Control Sample Dup	109	115	129	118	120
LCSD 320-243918/3-A	Lab Control Sample Dup	99	99	104	102	103
LCSD 320-244977/3-A	Lab Control Sample Dup	103	109	93	107	87
MB 320-243916/1-A	Method Blank	122	124	128	122	126
MB 320-243918/1-A	Method Blank	105	102	112	107	98
MB 320-244977/1-A	Method Blank	98	102	92	95	79

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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

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

Lab Sample ID: MB 320-243916/1-A

Matrix: Water

Analysis Batch: 244261

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 243916

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:28	09/07/18 00:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:28	09/07/18 00:07	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	122		25 - 150	09/05/18 12:28	09/07/18 00:07	1
13C4-PFHpA	124		25 - 150	09/05/18 12:28	09/07/18 00:07	1
13C4 PFOA	128		25 - 150	09/05/18 12:28	09/07/18 00:07	1
13C4 PFOS	122		25 - 150	09/05/18 12:28	09/07/18 00:07	1
13C5 PFNA	126		25 - 150	09/05/18 12:28	09/07/18 00:07	1

Lab Sample ID: LCS 320-243916/2-A

Matrix: Water

Analysis Batch: 244261

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 243916

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.5		ng/L		99	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.2		ng/L		100	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	21.0		ng/L		105	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	21.4		ng/L		107	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.1		ng/L		92	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.8		ng/L		99	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	121		25 - 150
13C4-PFHpA	120		25 - 150
13C4 PFOA	125		25 - 150
13C4 PFOS	124		25 - 150
13C5 PFNA	126		25 - 150

Lab Sample ID: LCSD 320-243916/3-A

Matrix: Water

Analysis Batch: 244261

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 243916

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.6		ng/L		105	72 - 151	6	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	19.1		ng/L		105	73 - 157	5	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.0		ng/L		100	71 - 138	5	30
Perfluorooctanoic acid (PFOA)	20.0	20.3		ng/L		102	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	69 - 144	3	30
Perfluorononanoic acid (PFNA)	20.0	20.6		ng/L		103	73 - 147	4	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
18O2 PFHxS	109		25 - 150
13C4-PFHpa	115		25 - 150
13C4 PFOA	129		25 - 150
13C4 PFOS	118		25 - 150
13C5 PFNA	120		25 - 150

Lab Sample ID: MB 320-243918/1-A
Matrix: Water
Analysis Batch: 244484

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 243918

<i>Analyte</i>	<i>MB Result</i>	<i>MB Qualifier</i>	<i>RL</i>	<i>MDL</i>	<i>Unit</i>	<i>D</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/05/18 12:37	09/07/18 20:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/05/18 12:37	09/07/18 20:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/05/18 12:37	09/07/18 20:04	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/05/18 12:37	09/07/18 20:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/05/18 12:37	09/07/18 20:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/05/18 12:37	09/07/18 20:04	1

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	105		25 - 150	09/05/18 12:37	09/07/18 20:04	1
13C4-PFHpa	102		25 - 150	09/05/18 12:37	09/07/18 20:04	1
13C4 PFOA	112		25 - 150	09/05/18 12:37	09/07/18 20:04	1
13C4 PFOS	107		25 - 150	09/05/18 12:37	09/07/18 20:04	1
13C5 PFNA	98		25 - 150	09/05/18 12:37	09/07/18 20:04	1

Lab Sample ID: LCS 320-243918/2-A
Matrix: Water
Analysis Batch: 244484

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 243918

<i>Analyte</i>	<i>Spike Added</i>	<i>LCS Result</i>	<i>LCS Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>
Perfluorobutanesulfonic acid (PFBS)	17.7	17.3		ng/L		98	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.4		ng/L		101	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.5		ng/L		103	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	21.7		ng/L		108	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	18.0		ng/L		97	69 - 144
Perfluorononanoic acid (PFNA)	20.0	20.9		ng/L		104	73 - 147

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
18O2 PFHxS	106		25 - 150
13C4-PFHpa	98		25 - 150
13C4 PFOA	99		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	102		25 - 150

Lab Sample ID: LCSD 320-243918/3-A
Matrix: Water
Analysis Batch: 244484

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 243918

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanesulfonic acid (PFBS)	17.7	19.2		ng/L		108	72 - 151	10	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	19.5		ng/L		107	73 - 157	6	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-243918/3-A

Matrix: Water

Analysis Batch: 244484

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 243918

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20.0	20.6		ng/L		103	71 - 138	0	30
Perfluorooctanoic acid (PFOA)	20.0	21.2		ng/L		106	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144	1	30
Perfluorononanoic acid (PFNA)	20.0	21.3		ng/L		107	73 - 147	2	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	99		25 - 150
13C4-PFHpA	99		25 - 150
13C4 PFOA	104		25 - 150
13C4 PFOS	102		25 - 150
13C5 PFNA	103		25 - 150

Lab Sample ID: MB 320-244977/1-A

Matrix: Water

Analysis Batch: 245045

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 244977

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		09/11/18 10:09	09/11/18 14:10	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		09/11/18 10:09	09/11/18 14:10	1

Isotope Dilution	MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
18O2 PFHxS	98		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4-PFHpA	102		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4 PFOA	92		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C4 PFOS	95		25 - 150	09/11/18 10:09	09/11/18 14:10	1
13C5 PFNA	79		25 - 150	09/11/18 10:09	09/11/18 14:10	1

Lab Sample ID: LCS 320-244977/2-A

Matrix: Water

Analysis Batch: 245045

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 244977

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	19.0		ng/L		108	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.4		ng/L		101	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.7		ng/L		98	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	18.9		ng/L		94	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	16.5		ng/L		89	69 - 144
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147

Isotope Dilution	LCS		Limits
	%Recovery	Qualifier	
18O2 PFHxS	99		25 - 150
13C4-PFHpA	101		25 - 150

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-244977/2-A
Matrix: Water
Analysis Batch: 245045

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 244977

<i>Isotope Dilution</i>	<i>LCS LCS</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
13C4 PFOA	92		25 - 150
13C4 PFOS	99		25 - 150
13C5 PFNA	89		25 - 150

Lab Sample ID: LCSD 320-244977/3-A
Matrix: Water
Analysis Batch: 245045

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 244977

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec.</i>		<i>RPD</i>	<i>Limit</i>
							<i>Limits</i>	<i>RPD</i>		
Perfluorobutanesulfonic acid (PFBS)	17.7	18.6		ng/L		105	72 - 151	3	30	
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.8		ng/L		103	73 - 157	2	30	
Perfluoroheptanoic acid (PFHpA)	20.0	19.2		ng/L		96	71 - 138	2	30	
Perfluorooctanoic acid (PFOA)	20.0	19.6		ng/L		98	70 - 140	4	30	
Perfluorooctanesulfonic acid (PFOS)	18.6	16.6		ng/L		89	69 - 144	0	30	
Perfluorononanoic acid (PFNA)	20.0	19.7		ng/L		98	73 - 147	3	30	

<i>Isotope Dilution</i>	<i>LCSD LCSD</i>		<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
18O2 PFHxS	103		25 - 150
13C4-PFHpA	109		25 - 150
13C4 PFOA	93		25 - 150
13C4 PFOS	107		25 - 150
13C5 PFNA	87		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

LCMS

Prep Batch: 243916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-1	PW-001	Total/NA	Water	PFAS Prep	
320-42653-1 - DL	PW-001	Total/NA	Water	PFAS Prep	
320-42653-2	PW-002	Total/NA	Water	PFAS Prep	
320-42653-3	PW-003	Total/NA	Water	PFAS Prep	
320-42653-4	PW-004	Total/NA	Water	PFAS Prep	
320-42653-5	PW-005	Total/NA	Water	PFAS Prep	
320-42653-6	PW-006	Total/NA	Water	PFAS Prep	
320-42653-7	PW-007	Total/NA	Water	PFAS Prep	
320-42653-8	PW-009	Total/NA	Water	PFAS Prep	
320-42653-9	PW-011	Total/NA	Water	PFAS Prep	
320-42653-10	PW-032	Total/NA	Water	PFAS Prep	
320-42653-11	PW-042	Total/NA	Water	PFAS Prep	
320-42653-12	PW-043	Total/NA	Water	PFAS Prep	
320-42653-13	SW-2100	Total/NA	Water	PFAS Prep	
320-42653-15	SW-2002	Total/NA	Water	PFAS Prep	
320-42653-15 - DL	SW-2002	Total/NA	Water	PFAS Prep	
320-42653-16	PW-033	Total/NA	Water	PFAS Prep	
320-42653-17	PW-036	Total/NA	Water	PFAS Prep	
320-42653-18	PW-040	Total/NA	Water	PFAS Prep	
320-42653-19	PW-041	Total/NA	Water	PFAS Prep	
MB 320-243916/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243916/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243916/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 243918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-20	PW-138	Total/NA	Water	PFAS Prep	
320-42653-21	PW-106	Total/NA	Water	PFAS Prep	
320-42653-22	PW-013	Total/NA	Water	PFAS Prep	
320-42653-22 - DL	PW-013	Total/NA	Water	PFAS Prep	
MB 320-243918/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-243918/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-243918/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 244261

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-1	PW-001	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-2	PW-002	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-3	PW-003	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-4	PW-004	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-5	PW-005	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-6	PW-006	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-7	PW-007	Total/NA	Water	WS-LC-0025	243916
				At1	
320-42653-8	PW-009	Total/NA	Water	WS-LC-0025	243916
				At1	

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

LCMS (Continued)

Analysis Batch: 244261 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-9	PW-011	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-10	PW-032	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-11	PW-042	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-12	PW-043	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-13	SW-2100	Total/NA	Water	WS-LC-0025 At1	243916
MB 320-243916/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243916
LCS 320-243916/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243916
LCSD 320-243916/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243916

Analysis Batch: 244484

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-15	SW-2002	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-16	PW-033	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-17	PW-036	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-18	PW-040	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-19	PW-041	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-20	PW-138	Total/NA	Water	WS-LC-0025 At1	243918
320-42653-21	PW-106	Total/NA	Water	WS-LC-0025 At1	243918
320-42653-22	PW-013	Total/NA	Water	WS-LC-0025 At1	243918
MB 320-243918/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	243918
LCS 320-243918/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	243918
LCSD 320-243918/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	243918

Analysis Batch: 244627

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-1 - DL	PW-001	Total/NA	Water	WS-LC-0025 At1	243916
320-42653-15 - DL	SW-2002	Total/NA	Water	WS-LC-0025 At1	243916

Analysis Batch: 244724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-22 - DL	PW-013	Total/NA	Water	WS-LC-0025 At1	243918

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

LCMS (Continued)

Prep Batch: 244977

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-6 - DL	PW-006	Total/NA	Water	PFAS Prep	
320-42653-14	SW-2001	Total/NA	Water	PFAS Prep	
320-42653-21 - DL	PW-106	Total/NA	Water	PFAS Prep	
MB 320-244977/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-244977/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-244977/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 245045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-6 - DL	PW-006	Total/NA	Water	WS-LC-0025 At1	244977
320-42653-14	SW-2001	Total/NA	Water	WS-LC-0025 At1	244977
MB 320-244977/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	244977
LCS 320-244977/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	244977
LCSD 320-244977/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	244977

Analysis Batch: 245370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42653-21 - DL	PW-106	Total/NA	Water	WS-LC-0025 At1	244977

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-001

Date Collected: 08/28/18 10:23

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-1

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 01:20	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			244627	09/09/18 17:03	D1R	TAL SAC

Client Sample ID: PW-002

Date Collected: 08/28/18 09:22

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-2

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 01:39	S1M	TAL SAC

Client Sample ID: PW-003

Date Collected: 08/28/18 11:22

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-3

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 01:57	S1M	TAL SAC

Client Sample ID: PW-004

Date Collected: 08/28/18 11:59

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-4

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 02:15	S1M	TAL SAC

Client Sample ID: PW-005

Date Collected: 08/28/18 12:23

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-5

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 02:34	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-006

Lab Sample ID: 320-42653-6

Date Collected: 08/28/18 12:57

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 02:52	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		0.01 mL	1.66 mL	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			245045	09/11/18 21:30	S1M	TAL SAC

Client Sample ID: PW-007

Lab Sample ID: 320-42653-7

Date Collected: 08/28/18 13:51

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 03:29	S1M	TAL SAC

Client Sample ID: PW-009

Lab Sample ID: 320-42653-8

Date Collected: 08/28/18 16:40

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 03:47	S1M	TAL SAC

Client Sample ID: PW-011

Lab Sample ID: 320-42653-9

Date Collected: 08/29/18 10:19

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 04:06	S1M	TAL SAC

Client Sample ID: PW-032

Lab Sample ID: 320-42653-10

Date Collected: 08/28/18 09:59

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 04:24	S1M	TAL SAC

Client Sample ID: PW-042

Lab Sample ID: 320-42653-11

Date Collected: 08/29/18 09:28

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-042

Lab Sample ID: 320-42653-11

Date Collected: 08/29/18 09:28

Matrix: Water

Date Received: 08/30/18 11:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 04:42	S1M	TAL SAC

Client Sample ID: PW-043

Lab Sample ID: 320-42653-12

Date Collected: 08/29/18 10:08

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 05:01	S1M	TAL SAC

Client Sample ID: SW-2100

Lab Sample ID: 320-42653-13

Date Collected: 08/29/18 09:35

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244261	09/07/18 05:19	S1M	TAL SAC

Client Sample ID: SW-2001

Lab Sample ID: 320-42653-14

Date Collected: 08/29/18 09:57

Matrix: Water

Date Received: 08/30/18 11:25

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	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			245045	09/11/18 20:53	S1M	TAL SAC

Client Sample ID: SW-2002

Lab Sample ID: 320-42653-15

Date Collected: 08/29/18 10:16

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 17:56	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			244627	09/09/18 17:40	D1R	TAL SAC

Client Sample ID: PW-033

Lab Sample ID: 320-42653-16

Date Collected: 08/28/18 12:10

Matrix: Water

Date Received: 08/30/18 11:25

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 18:14	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-036

Date Collected: 08/28/18 11:10

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-17

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 18:51	S1M	TAL SAC

Client Sample ID: PW-040

Date Collected: 08/28/18 15:44

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-18

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 19:09	S1M	TAL SAC

Client Sample ID: PW-041

Date Collected: 08/28/18 17:09

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-19

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	243916	09/05/18 12:29	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 19:28	S1M	TAL SAC

Client Sample ID: PW-138

Date Collected: 08/28/18 13:35

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-20

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	243918	09/05/18 12:37	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 20:59	S1M	TAL SAC

Client Sample ID: PW-106

Date Collected: 08/28/18 12:07

Date Received: 08/30/18 11:25

Lab Sample ID: 320-42653-21

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	243918	09/05/18 12:37	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 21:18	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		0.01 mL	1.66 mL	244977	09/11/18 10:10	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			245370	09/13/18 05:57	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Client Sample ID: PW-013

Lab Sample ID: 320-42653-22

Date Collected: 08/29/18 15:06

Matrix: Water

Date Received: 08/30/18 11:25

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	243918	09/05/18 12:37	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			244484	09/07/18 21:36	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	243918	09/05/18 12:37	QCP	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	50			244724	09/10/18 11:22	D1R	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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: Gustavus DOT

TestAmerica Job ID: 320-42653-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42653-1	PW-001	Water	08/28/18 10:23	08/30/18 11:25
320-42653-2	PW-002	Water	08/28/18 09:22	08/30/18 11:25
320-42653-3	PW-003	Water	08/28/18 11:22	08/30/18 11:25
320-42653-4	PW-004	Water	08/28/18 11:59	08/30/18 11:25
320-42653-5	PW-005	Water	08/28/18 12:23	08/30/18 11:25
320-42653-6	PW-006	Water	08/28/18 12:57	08/30/18 11:25
320-42653-7	PW-007	Water	08/28/18 13:51	08/30/18 11:25
320-42653-8	PW-009	Water	08/28/18 16:40	08/30/18 11:25
320-42653-9	PW-011	Water	08/29/18 10:19	08/30/18 11:25
320-42653-10	PW-032	Water	08/28/18 09:59	08/30/18 11:25
320-42653-11	PW-042	Water	08/29/18 09:28	08/30/18 11:25
320-42653-12	PW-043	Water	08/29/18 10:08	08/30/18 11:25
320-42653-13	SW-2100	Water	08/29/18 09:35	08/30/18 11:25
320-42653-14	SW-2001	Water	08/29/18 09:57	08/30/18 11:25
320-42653-15	SW-2002	Water	08/29/18 10:16	08/30/18 11:25
320-42653-16	PW-033	Water	08/28/18 12:10	08/30/18 11:25
320-42653-17	PW-036	Water	08/28/18 11:10	08/30/18 11:25
320-42653-18	PW-040	Water	08/28/18 15:44	08/30/18 11:25
320-42653-19	PW-041	Water	08/28/18 17:09	08/30/18 11:25
320-42653-20	PW-138	Water	08/28/18 13:35	08/30/18 11:25
320-42653-21	PW-106	Water	08/28/18 12:07	08/30/18 11:25
320-42653-22	PW-013	Water	08/29/18 15:06	08/30/18 11:25

CHAIN-OF-CUSTODY RECORD

Laboratory Page 1 of 3
 Attn: Test America
David Attkicker
 Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush
 Please Specify

Quote No: _____

J-Flags: Yes No

PFS to UCR

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-001		1023	8/28/18	2	Grand water
PW-002		0922		2	
PW-003		1122		2	
PW-004		1159		2	
PW-005		1223		2	
PW-006		1257		2	
PW-007		1351		2	
PW-009		1640		2	
PW-011		1019	8/29/18	2	
PW-032		0959	8/28/18	2	



Project Information	Sample Receipt	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Number: 101543	Total No. of Containers: 42	Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>	Signature: _____
Name: Gustavus DOT	COC Seals/Intact? Y/N/NA	Printed Name: Kristin Eriburger	Printed Name: David H. DLK	Printed Name: _____
Contact: KRF	Received Good Cond./Cold	Date: 9/25/18	Date: 11/25	Date: _____
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Temp: _____	Company: Shannon & Wilson, Inc.	Company: TFSa	Company: _____
Sampler: KRF/MDN/ARM	Delivery Method: Gsidstrek	Received By: 1.	Received By: 2.	Received By: 3.
Notes: Standard turn around				
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - job file				

No. 35609

5.80
5.00

CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

Total Number of Containers PRRS x 6 CCR									

Turn Around Time:
 Normal Rush

Quote No: _____

J-Flags: Yes No

Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled		Remarks/Matrix Composition/Grab? Sample Containers
PW-043 42		0928	8/28/18	X	Groundwater
PW-044 43		1028		X	
SW-2100		0935		X	Surface water
SW-2001		0957		X	
SW-2002		1016		X	
PW-033		1210	8/28/18	X	Groundwater
PW-036		1110		X	
PW-040		1544		X	
PW-041		1709		X	
PW-138		1335		X	

Project Information	Sample Receipt	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Number: _____ Name: _____ Contact: _____ Ongoing Project? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Sampler: _____	Total No. of Containers: _____ COC Seals/Intact? Y/N/NA _____ Received Good Cond./Cold _____ Temp: _____ Delivery Method: _____	Signature: _____ Printed Name: <u>Kristen Freiburger</u> Company: <u>Shannon & Wilson, Inc.</u> Time: <u>1335</u> Date: <u>8/28/18</u>	Signature: _____ Printed Name: <u>David Altricker</u> Company: <u>Test America</u> Time: <u>0916</u> Date: <u>8/28</u>	Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____
Notes: <u>see</u>		Received By: 1. Signature: _____ Printed Name: <u>David Altricker</u> Company: <u>Test America</u> Time: <u>1123</u> Date: <u>8/30/18</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____ Time: _____ Date: _____

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



CHAIN-OF-CUSTODY RECORD

Page 3 of 3
 Laboratory Test America
 Attn: David Altrock

Analytical Methods (include preservative if used)

Total Number of Containers	
FAS to OGR	

Quote No: _____

J-Flags: Yes No

Turn Around Time:
 Normal Rush

Please Specify _____

Remarks/Matrix
 Composition/Grab?
 Sample Containers

Sample Identity	Lab No.	Time	Date Sampled	Date	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-106		1207	8/25/18		2	Groundwater
PW-013		1506	8/29/18		2	

Project Information

Number: _____

Name: _____

Contact: _____

Ongoing Project? Yes No

Sampler: _____

Sample Receipt

Total No. of Containers: _____

COC Seals/Intact? Y/N/NA _____

Received Good Cond./Cold _____

Temp: _____

Delivery Method: _____

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Kristen Freiburger</u> Company: <u>Shannon & Wilson Inc</u>	Signature: <u>[Signature]</u> Printed Name: <u>David H. Duff</u> Company: <u>TA-Suc</u>	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1315</u> Date: <u>8/29/18</u>	Time: <u>815/18</u> Date: <u>1125</u>	Time: _____ Date: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>David H. Duff</u> Company: <u>TA-Suc</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>1123</u> Date: <u>8/30/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

Notes:

Set

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: 320-42653-1

Login Number: 42653

List Source: TestAmerica Sacramento

List Number: 1

Creator: Her, David A

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.	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").	N/A	
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 17, 2018

CS Report Name:

Gustavus Airport

Report Date:

September 17, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-42653-1 Revised

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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:

The sample coolers were recorded at 5.0 and 5.8° C upon receipt at the laboratory.

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

Yes No

Comments:

Analysis of PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 coolers upon receipt at the laboratory was 5.0° C and 5.8° C. It further notes that several samples contained black or brown sediment at the bottom of the containers, and that sample SW-2001 was black in color.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-243916, 243918, and 244977.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

5. Samples Results

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

Yes No

Comments:

Sample *PW-138* was initially logged as *PW-0138*. The revised laboratory report includes the correct sample name as listed on the COC.

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 for each sample.

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 ADEC action level for drinking water 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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

Yes, several field duplicates were submitted with this work order. Additionally, this packet contains two field-duplicate samples associated with primary samples from work order 320-42647.

ii. Submitted blind to lab?

Yes No

Comments:

Field duplicate pair *PW-006* / *PW-106* was submitted with this work order. Duplicate samples *PW-138* and *SW-2100* correspond with samples *PW-038* and *SW-2000* from a previous 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 RPDs, where calculable for detected values, were less than 30% for each analyte. The maximum RPD was 6%.

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 for this project are 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:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-43691-1
Client Project/Site: Gustavus Airport

For:
Shannon & Wilson, Inc
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Attn: Kristen Freiburger



Authorized for release by:
10/18/2018 12:54:33 PM

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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.

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

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: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Job ID: 320-43691-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-43691-1

Receipt

The samples were received on 9/29/2018 12:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 5.4° C and 5.8° 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 320-250331.

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-250332.

Method(s) PFAS Prep: The following samples are yellow prior to extraction: PW-413 (320-43691-2), PW-418 (320-43691-3), PW-319 (320-43691-4), PW-214 (320-43691-5), PW-219 (320-43691-6), PW-211 (320-43691-9), PW-405 (320-43691-11), PW-401 (320-43691-13), PW-400 (320-43691-14), PW-403 (320-43691-15), PW-006-PRE (320-43691-16), PW-310 (320-43691-17), PW-408 (320-43691-18) and PW-300 (320-43691-19).

Method(s) PFAS Prep: The following samples are yellow with black particulates prior to extraction: PW-406 (320-43691-12) and SW-2003 (320-43691-20). batch 320-250331

Method(s) PFAS Prep: The following samples are a yellow color prior to extraction: PW-210 (320-43691-22), PW-402 (320-43691-25), PW-203 (320-43691-28), PW-011-PRE (320-43691-29), PW-200 (320-43691-30), PW-204 (320-43691-32), NPSWELL-PRE (320-43691-33), PW-174 (320-43691-34) and PW-074 (320-43691-35). batch 320-250332

Method(s) PFAS Prep: The following sample was observed to be light gray in color. PW-406 (320-43691-12)

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-251878.

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: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: SW-2004

Lab Sample ID: 320-43691-1

No Detections.

Client Sample ID: PW-413

Lab Sample ID: 320-43691-2

No Detections.

Client Sample ID: PW-418

Lab Sample ID: 320-43691-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.9		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)	4.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	74		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-319

Lab Sample ID: 320-43691-4

No Detections.

Client Sample ID: PW-214

Lab Sample ID: 320-43691-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.88	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-219

Lab Sample ID: 320-43691-6

No Detections.

Client Sample ID: PW-216

Lab Sample ID: 320-43691-7

No Detections.

Client Sample ID: PW-006-BERKEY

Lab Sample ID: 320-43691-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.90	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-211

Lab Sample ID: 320-43691-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.3		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	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: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-211 (Continued)

Lab Sample ID: 320-43691-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	9.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-006-CISTESN

Lab Sample ID: 320-43691-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.3		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorononanoic acid (PFNA)	5.2		2.0	0.65	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	590		40	17	ng/L	20		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	4100		40	26	ng/L	20		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-405

Lab Sample ID: 320-43691-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.8		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	44		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	86		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-406

Lab Sample ID: 320-43691-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.6		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		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: PW-401

Lab Sample ID: 320-43691-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	18		2.0	0.87	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: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-401 (Continued)

Lab Sample ID: 320-43691-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	40		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-400

Lab Sample ID: 320-43691-14

No Detections.

Client Sample ID: PW-403

Lab Sample ID: 320-43691-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.4		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	83		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-006-PRE

Lab Sample ID: 320-43691-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.0		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.4	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	210		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-310

Lab Sample ID: 320-43691-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-408

Lab Sample ID: 320-43691-18

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-408 (Continued)

Lab Sample ID: 320-43691-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	30		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)	2.5		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	130		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-300

Lab Sample ID: 320-43691-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.6		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	89		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: SW-2003

Lab Sample ID: 320-43691-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	5.1		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.89	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)	6.3		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-210

Lab Sample ID: 320-43691-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	95		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-209

Lab Sample ID: 320-43691-23

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-209 (Continued)

Lab Sample ID: 320-43691-23

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.3		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

Client Sample ID: PW-212

Lab Sample ID: 320-43691-24

No Detections.

Client Sample ID: PW-402

Lab Sample ID: 320-43691-25

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.7		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.3		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	72		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-202

Lab Sample ID: 320-43691-26

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.1		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20		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)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	68		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: NPSWELL-POST

Lab Sample ID: 320-43691-27

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.2		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

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-203

Lab Sample ID: 320-43691-28

No Detections.

Client Sample ID: PW-011-PRE

Lab Sample ID: 320-43691-29

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	34		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	80		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-200

Lab Sample ID: 320-43691-30

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.4		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	37		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-011-POST

Lab Sample ID: 320-43691-31

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.8		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	86		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-204

Lab Sample ID: 320-43691-32

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	3.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.93	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.4		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: NPSWELL-PRE

Lab Sample ID: 320-43691-33

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: NPSWELL-PRE (Continued)

Lab Sample ID: 320-43691-33

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	4.3		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: PW-174

Lab Sample ID: 320-43691-34

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-074

Lab Sample ID: 320-43691-35

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-201

Lab Sample ID: 320-43691-36

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-206

Lab Sample ID: 320-43691-37

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: SW-2004

Date Collected: 09/27/18 10:20

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-1

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 16:44	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 16:44	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 16:44	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 16:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 16:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 16:44	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	117		25 - 150	10/12/18 16:24	10/14/18 16:44	1
13C4 PFHpA	123		25 - 150	10/12/18 16:24	10/14/18 16:44	1
13C4 PFOA	127		25 - 150	10/12/18 16:24	10/14/18 16:44	1
13C4 PFOS	116		25 - 150	10/12/18 16:24	10/14/18 16:44	1
13C5 PFNA	118		25 - 150	10/12/18 16:24	10/14/18 16:44	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-413

Date Collected: 09/27/18 13:30

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 17:02	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 17:02	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 17:02	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 17:02	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 17:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 17:02	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	116		25 - 150	10/12/18 16:24	10/14/18 17:02	1
¹³ C ₄ PFHpA	125		25 - 150	10/12/18 16:24	10/14/18 17:02	1
¹³ C ₄ PFOA	123		25 - 150	10/12/18 16:24	10/14/18 17:02	1
¹³ C ₄ PFOS	100		25 - 150	10/12/18 16:24	10/14/18 17:02	1
¹³ C ₅ PFNA	113		25 - 150	10/12/18 16:24	10/14/18 17:02	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-418

Lab Sample ID: 320-43691-3

Date Collected: 09/27/18 16:30

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.9		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 17:21	1
Perfluorohexanesulfonic acid (PFHxS)	40		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 17:21	1
Perfluoroheptanoic acid (PFHpA)	4.1		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 17:21	1
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 17:21	1
Perfluorooctanesulfonic acid (PFOS)	74		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 17:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 17:21	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	116		25 - 150				10/12/18 16:24	10/14/18 17:21	1
¹³ C ₄ PFHpA	127		25 - 150				10/12/18 16:24	10/14/18 17:21	1
¹³ C ₄ PFOA	124		25 - 150				10/12/18 16:24	10/14/18 17:21	1
¹³ C ₄ PFOS	107		25 - 150				10/12/18 16:24	10/14/18 17:21	1
¹³ C ₅ PFNA	114		25 - 150				10/12/18 16:24	10/14/18 17:21	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-319

Date Collected: 09/27/18 11:46

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-4

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 17:39	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 17:39	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 17:39	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 17:39	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 17:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 17:39	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	117		25 - 150	10/12/18 16:24	10/14/18 17:39	1
¹³ C ₄ PFHpA	124		25 - 150	10/12/18 16:24	10/14/18 17:39	1
¹³ C ₄ PFOA	130		25 - 150	10/12/18 16:24	10/14/18 17:39	1
¹³ C ₄ PFOS	110		25 - 150	10/12/18 16:24	10/14/18 17:39	1
¹³ C ₅ PFNA	116		25 - 150	10/12/18 16:24	10/14/18 17:39	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-214
Date Collected: 09/27/18 09:27
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-5
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 17:57	1
Perfluorohexanesulfonic acid (PFHxS)	0.88	J	2.0	0.87	ng/L		10/12/18 16:24	10/14/18 17:57	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 17:57	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 17:57	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 17:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 17:57	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>18O2 PFHxS</i>	<i>120</i>		<i>25 - 150</i>				<i>10/12/18 16:24</i>	<i>10/14/18 17:57</i>	<i>1</i>
<i>13C4 PFHpA</i>	<i>120</i>		<i>25 - 150</i>				<i>10/12/18 16:24</i>	<i>10/14/18 17:57</i>	<i>1</i>
<i>13C4 PFOA</i>	<i>126</i>		<i>25 - 150</i>				<i>10/12/18 16:24</i>	<i>10/14/18 17:57</i>	<i>1</i>
<i>13C4 PFOS</i>	<i>115</i>		<i>25 - 150</i>				<i>10/12/18 16:24</i>	<i>10/14/18 17:57</i>	<i>1</i>
<i>13C5 PFNA</i>	<i>119</i>		<i>25 - 150</i>				<i>10/12/18 16:24</i>	<i>10/14/18 17:57</i>	<i>1</i>

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-219

Date Collected: 09/27/18 11:49

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-6

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 18:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 18:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 18:16	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 18:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 18:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 18:16	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	121		25 - 150	10/12/18 16:24	10/14/18 18:16	1
¹³ C ₄ PFHpA	129		25 - 150	10/12/18 16:24	10/14/18 18:16	1
¹³ C ₄ PFOA	132		25 - 150	10/12/18 16:24	10/14/18 18:16	1
¹³ C ₄ PFOS	111		25 - 150	10/12/18 16:24	10/14/18 18:16	1
¹³ C ₅ PFNA	121		25 - 150	10/12/18 16:24	10/14/18 18:16	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-216

Date Collected: 09/27/18 10:21

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-7

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 18:34	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 18:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 18:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 18:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 18:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 18:34	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	119		25 - 150				10/12/18 16:24	10/14/18 18:34	1
13C4 PFHpA	126		25 - 150				10/12/18 16:24	10/14/18 18:34	1
13C4 PFOA	127		25 - 150				10/12/18 16:24	10/14/18 18:34	1
13C4 PFOS	112		25 - 150				10/12/18 16:24	10/14/18 18:34	1
13C5 PFNA	123		25 - 150				10/12/18 16:24	10/14/18 18:34	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-006-BERKEY

Lab Sample ID: 320-43691-8

Date Collected: 09/26/18 10:58

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 19:11	1
Perfluorohexanesulfonic acid (PFHxS)	0.90	J	2.0	0.87	ng/L		10/12/18 16:24	10/14/18 19:11	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 19:11	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 19:11	1
Perfluorooctanesulfonic acid (PFOS)	5.6		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 19:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 19:11	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	117		25 - 150				10/12/18 16:24	10/14/18 19:11	1
13C4 PFHpA	125		25 - 150				10/12/18 16:24	10/14/18 19:11	1
13C4 PFOA	124		25 - 150				10/12/18 16:24	10/14/18 19:11	1
13C4 PFOS	107		25 - 150				10/12/18 16:24	10/14/18 19:11	1
13C5 PFNA	116		25 - 150				10/12/18 16:24	10/14/18 19:11	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-211

Date Collected: 09/26/18 15:11

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-9

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 19:29	1
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L		10/12/18 16:24	10/14/18 19:29	1
Perfluoroheptanoic acid (PFHpA)	3.3		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 19:29	1
Perfluorooctanoic acid (PFOA)	15		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 19:29	1
Perfluorooctanesulfonic acid (PFOS)	9.1		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 19:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 19:29	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	117		25 - 150				10/12/18 16:24	10/14/18 19:29	1
13C4 PFHpA	129		25 - 150				10/12/18 16:24	10/14/18 19:29	1
13C4 PFOA	129		25 - 150				10/12/18 16:24	10/14/18 19:29	1
13C4 PFOS	109		25 - 150				10/12/18 16:24	10/14/18 19:29	1
13C5 PFNA	120		25 - 150				10/12/18 16:24	10/14/18 19:29	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-006-CISTESN

Lab Sample ID: 320-43691-10

Date Collected: 09/26/18 10:51

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.4		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 19:47	1
Perfluoroheptanoic acid (PFHpA)	4.3		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 19:47	1
Perfluorooctanoic acid (PFOA)	19		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 19:47	1
Perfluorononanoic acid (PFNA)	5.2		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 19:47	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	110		25 - 150				10/12/18 16:24	10/14/18 19:47	1
13C4 PFHpA	115		25 - 150				10/12/18 16:24	10/14/18 19:47	1
13C4 PFOA	126		25 - 150				10/12/18 16:24	10/14/18 19:47	1
13C5 PFNA	88		25 - 150				10/12/18 16:24	10/14/18 19:47	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	590		40	17	ng/L		10/12/18 16:24	10/15/18 16:24	20
Perfluorooctanesulfonic acid (PFOS)	4100		40	26	ng/L		10/12/18 16:24	10/15/18 16:24	20
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	129		25 - 150				10/12/18 16:24	10/15/18 16:24	20
13C4 PFOS	122		25 - 150				10/12/18 16:24	10/15/18 16:24	20

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-405
Date Collected: 09/25/18 15:32
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-11
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.8		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 20:06	1
Perfluorohexanesulfonic acid (PFHxS)	44		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 20:06	1
Perfluoroheptanoic acid (PFHpA)	4.1		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 20:06	1
Perfluorooctanoic acid (PFOA)	3.9		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 20:06	1
Perfluorooctanesulfonic acid (PFOS)	86		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 20:06	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 20:06	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	119		25 - 150				10/12/18 16:24	10/14/18 20:06	1
¹³ C ₄ PFHpA	129		25 - 150				10/12/18 16:24	10/14/18 20:06	1
¹³ C ₄ PFOA	127		25 - 150				10/12/18 16:24	10/14/18 20:06	1
¹³ C ₄ PFOS	112		25 - 150				10/12/18 16:24	10/14/18 20:06	1
¹³ C ₅ PFNA	124		25 - 150				10/12/18 16:24	10/14/18 20:06	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-406

Lab Sample ID: 320-43691-12

Date Collected: 09/25/18 16:49

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.6		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 20:24	1
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 20:24	1
Perfluoroheptanoic acid (PFHpA)	5.2		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 20:24	1
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 20:24	1
Perfluorooctanesulfonic acid (PFOS)	150		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 20:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 20:24	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150				10/12/18 16:24	10/14/18 20:24	1
13C4 PFHpA	126		25 - 150				10/12/18 16:24	10/14/18 20:24	1
13C4 PFOA	126		25 - 150				10/12/18 16:24	10/14/18 20:24	1
13C4 PFOS	109		25 - 150				10/12/18 16:24	10/14/18 20:24	1
13C5 PFNA	123		25 - 150				10/12/18 16:24	10/14/18 20:24	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-401

Date Collected: 09/25/18 13:01

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-13

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.4		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 20:42	1
Perfluorohexanesulfonic acid (PFHxS)	18		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 20:42	1
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L		10/12/18 16:24	10/14/18 20:42	1
Perfluorooctanoic acid (PFOA)	1.4	J	2.0	0.75	ng/L		10/12/18 16:24	10/14/18 20:42	1
Perfluorooctanesulfonic acid (PFOS)	40		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 20:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 20:42	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	114		25 - 150				10/12/18 16:24	10/14/18 20:42	1
¹³ C ₄ PFHpA	124		25 - 150				10/12/18 16:24	10/14/18 20:42	1
¹³ C ₄ PFOA	123		25 - 150				10/12/18 16:24	10/14/18 20:42	1
¹³ C ₄ PFOS	111		25 - 150				10/12/18 16:24	10/14/18 20:42	1
¹³ C ₅ PFNA	117		25 - 150				10/12/18 16:24	10/14/18 20:42	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-400
Date Collected: 09/25/18 10:42
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-14
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 21:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 21:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 21:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 21:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 21:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 21:01	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	112		25 - 150				10/12/18 16:24	10/14/18 21:01	1
¹³ C ₄ PFHpA	124		25 - 150				10/12/18 16:24	10/14/18 21:01	1
¹³ C ₄ PFOA	119		25 - 150				10/12/18 16:24	10/14/18 21:01	1
¹³ C ₄ PFOS	101		25 - 150				10/12/18 16:24	10/14/18 21:01	1
¹³ C ₅ PFNA	119		25 - 150				10/12/18 16:24	10/14/18 21:01	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-403

Date Collected: 09/25/18 14:31

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-15

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	5.7		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 21:19	1
Perfluorohexanesulfonic acid (PFHxS)	41		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 21:19	1
Perfluoroheptanoic acid (PFHpA)	3.4		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 21:19	1
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 21:19	1
Perfluorooctanesulfonic acid (PFOS)	83		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 21:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 21:19	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	116		25 - 150				10/12/18 16:24	10/14/18 21:19	1
¹³ C ₄ PFHpA	119		25 - 150				10/12/18 16:24	10/14/18 21:19	1
¹³ C ₄ PFOA	129		25 - 150				10/12/18 16:24	10/14/18 21:19	1
¹³ C ₄ PFOS	110		25 - 150				10/12/18 16:24	10/14/18 21:19	1
¹³ C ₅ PFNA	118		25 - 150				10/12/18 16:24	10/14/18 21:19	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-006-PRE

Lab Sample ID: 320-43691-16

Date Collected: 09/26/18 10:34

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.0		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 21:38	1
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 21:38	1
Perfluoroheptanoic acid (PFHpA)	1.4	J	2.0	0.80	ng/L		10/12/18 16:24	10/14/18 21:38	1
Perfluorooctanoic acid (PFOA)	2.3		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 21:38	1
Perfluorooctanesulfonic acid (PFOS)	210		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 21:38	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 21:38	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	108		25 - 150				10/12/18 16:24	10/14/18 21:38	1
<i>13C4 PFHpA</i>	120		25 - 150				10/12/18 16:24	10/14/18 21:38	1
<i>13C4 PFOA</i>	127		25 - 150				10/12/18 16:24	10/14/18 21:38	1
<i>13C4 PFOS</i>	106		25 - 150				10/12/18 16:24	10/14/18 21:38	1
<i>13C5 PFNA</i>	114		25 - 150				10/12/18 16:24	10/14/18 21:38	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-310

Date Collected: 09/26/18 12:34

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-17

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 21:56	1
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 21:56	1
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 21:56	1
Perfluorooctanoic acid (PFOA)	2.6		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 21:56	1
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 21:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 21:56	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	122		25 - 150				10/12/18 16:24	10/14/18 21:56	1
¹³ C ₄ PFHpA	126		25 - 150				10/12/18 16:24	10/14/18 21:56	1
¹³ C ₄ PFOA	132		25 - 150				10/12/18 16:24	10/14/18 21:56	1
¹³ C ₄ PFOS	116		25 - 150				10/12/18 16:24	10/14/18 21:56	1
¹³ C ₅ PFNA	126		25 - 150				10/12/18 16:24	10/14/18 21:56	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-408
Date Collected: 09/26/18 18:03
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-18
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.1		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 22:33	1
Perfluorohexanesulfonic acid (PFHxS)	30		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 22:33	1
Perfluoroheptanoic acid (PFHpA)	4.8		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 22:33	1
Perfluorooctanoic acid (PFOA)	2.5		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 22:33	1
Perfluorooctanesulfonic acid (PFOS)	130		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 22:33	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 22:33	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150				10/12/18 16:24	10/14/18 22:33	1
13C4 PFHpA	118		25 - 150				10/12/18 16:24	10/14/18 22:33	1
13C4 PFOA	118		25 - 150				10/12/18 16:24	10/14/18 22:33	1
13C4 PFOS	106		25 - 150				10/12/18 16:24	10/14/18 22:33	1
13C5 PFNA	114		25 - 150				10/12/18 16:24	10/14/18 22:33	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-300

Date Collected: 09/24/18 18:50

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-19

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 23:09	1
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 23:09	1
Perfluoroheptanoic acid (PFHpA)	3.6		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 23:09	1
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 23:09	1
Perfluorooctanesulfonic acid (PFOS)	89		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 23:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 23:09	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>18O2 PFHxS</i>	120		25 - 150				10/12/18 16:24	10/14/18 23:09	1
<i>13C4 PFHpA</i>	129		25 - 150				10/12/18 16:24	10/14/18 23:09	1
<i>13C4 PFOA</i>	135		25 - 150				10/12/18 16:24	10/14/18 23:09	1
<i>13C4 PFOS</i>	117		25 - 150				10/12/18 16:24	10/14/18 23:09	1
<i>13C5 PFNA</i>	123		25 - 150				10/12/18 16:24	10/14/18 23:09	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: SW-2003

Lab Sample ID: 320-43691-20

Date Collected: 09/26/18 11:22

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 22:51	1
Perfluorohexanesulfonic acid (PFHxS)	5.1		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 22:51	1
Perfluoroheptanoic acid (PFHpA)	0.89	J	2.0	0.80	ng/L		10/12/18 16:24	10/14/18 22:51	1
Perfluorooctanoic acid (PFOA)	1.3	J	2.0	0.75	ng/L		10/12/18 16:24	10/14/18 22:51	1
Perfluorooctanesulfonic acid (PFOS)	6.3		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 22:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 22:51	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	122		25 - 150				10/12/18 16:24	10/14/18 22:51	1
13C4 PFHpA	130		25 - 150				10/12/18 16:24	10/14/18 22:51	1
13C4 PFOA	131		25 - 150				10/12/18 16:24	10/14/18 22:51	1
13C4 PFOS	114		25 - 150				10/12/18 16:24	10/14/18 22:51	1
13C5 PFNA	122		25 - 150				10/12/18 16:24	10/14/18 22:51	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-210

Date Collected: 09/26/18 12:37

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-22

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.7		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 02:35	1
Perfluorohexanesulfonic acid (PFHxS)	32		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 02:35	1
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 02:35	1
Perfluorooctanoic acid (PFOA)	2.8		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 02:35	1
Perfluorooctanesulfonic acid (PFOS)	95		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 02:35	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 02:35	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150				10/08/18 04:17	10/12/18 02:35	1
13C4 PFHpA	112		25 - 150				10/08/18 04:17	10/12/18 02:35	1
13C4 PFOA	124		25 - 150				10/08/18 04:17	10/12/18 02:35	1
13C4 PFOS	108		25 - 150				10/08/18 04:17	10/12/18 02:35	1
13C5 PFNA	117		25 - 150				10/08/18 04:17	10/12/18 02:35	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-209

Lab Sample ID: 320-43691-23

Date Collected: 09/26/18 11:11

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.2		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 02:53	1
Perfluorohexanesulfonic acid (PFHxS)	26		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 02:53	1
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 02:53	1
Perfluorooctanoic acid (PFOA)	3.3		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 02:53	1
Perfluorooctanesulfonic acid (PFOS)	100		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 02:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 02:53	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150				10/08/18 04:17	10/12/18 02:53	1
13C4 PFHpA	109		25 - 150				10/08/18 04:17	10/12/18 02:53	1
13C4 PFOA	128		25 - 150				10/08/18 04:17	10/12/18 02:53	1
13C4 PFOS	111		25 - 150				10/08/18 04:17	10/12/18 02:53	1
13C5 PFNA	122		25 - 150				10/08/18 04:17	10/12/18 02:53	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-212

Date Collected: 09/26/18 15:46

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-24

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 03:12	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 03:12	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 03:12	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 03:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 03:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 03:12	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	106		25 - 150	10/08/18 04:17	10/12/18 03:12	1
13C4 PFHpA	107		25 - 150	10/08/18 04:17	10/12/18 03:12	1
13C4 PFOA	128		25 - 150	10/08/18 04:17	10/12/18 03:12	1
13C4 PFOS	115		25 - 150	10/08/18 04:17	10/12/18 03:12	1
13C5 PFNA	119		25 - 150	10/08/18 04:17	10/12/18 03:12	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-402

Date Collected: 09/25/18 13:46

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-25

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.7		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 03:30	1
Perfluorohexanesulfonic acid (PFHxS)	36		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 03:30	1
Perfluoroheptanoic acid (PFHpA)	3.3		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 03:30	1
Perfluorooctanoic acid (PFOA)	3.4		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 03:30	1
Perfluorooctanesulfonic acid (PFOS)	72		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 03:30	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 03:30	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150				10/08/18 04:17	10/12/18 03:30	1
13C4 PFHpA	110		25 - 150				10/08/18 04:17	10/12/18 03:30	1
13C4 PFOA	124		25 - 150				10/08/18 04:17	10/12/18 03:30	1
13C4 PFOS	112		25 - 150				10/08/18 04:17	10/12/18 03:30	1
13C5 PFNA	117		25 - 150				10/08/18 04:17	10/12/18 03:30	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-202

Date Collected: 09/25/18 13:49

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-26

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.1		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 03:49	1
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 03:49	1
Perfluoroheptanoic acid (PFHpA)	2.7		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 03:49	1
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 03:49	1
Perfluorooctanesulfonic acid (PFOS)	68		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 03:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 03:49	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	107		25 - 150				10/08/18 04:17	10/12/18 03:49	1
13C4 PFHpA	111		25 - 150				10/08/18 04:17	10/12/18 03:49	1
13C4 PFOA	130		25 - 150				10/08/18 04:17	10/12/18 03:49	1
13C4 PFOS	110		25 - 150				10/08/18 04:17	10/12/18 03:49	1
13C5 PFNA	121		25 - 150				10/08/18 04:17	10/12/18 03:49	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: NPSWELL-POST

Lab Sample ID: 320-43691-27

Date Collected: 09/25/18 11:34

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L		10/08/18 04:17	10/12/18 04:07	1
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 04:07	1
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L		10/08/18 04:17	10/12/18 04:07	1
Perfluorooctanoic acid (PFOA)	4.2		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 04:07	1
Perfluorooctanesulfonic acid (PFOS)	20		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 04:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 04:07	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	111		25 - 150				10/08/18 04:17	10/12/18 04:07	1
13C4 PFHpA	110		25 - 150				10/08/18 04:17	10/12/18 04:07	1
13C4 PFOA	131		25 - 150				10/08/18 04:17	10/12/18 04:07	1
13C4 PFOS	112		25 - 150				10/08/18 04:17	10/12/18 04:07	1
13C5 PFNA	116		25 - 150				10/08/18 04:17	10/12/18 04:07	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-203
Date Collected: 09/25/18 15:43
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-28
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 04:25	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 04:25	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 04:25	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 04:25	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 04:25	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 04:25	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150				10/08/18 04:17	10/12/18 04:25	1
13C4 PFHpA	116		25 - 150				10/08/18 04:17	10/12/18 04:25	1
13C4 PFOA	126		25 - 150				10/08/18 04:17	10/12/18 04:25	1
13C4 PFOS	114		25 - 150				10/08/18 04:17	10/12/18 04:25	1
13C5 PFNA	128		25 - 150				10/08/18 04:17	10/12/18 04:25	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-011-PRE

Lab Sample ID: 320-43691-29

Date Collected: 09/25/18 09:29

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 05:02	1
Perfluorohexanesulfonic acid (PFHxS)	34		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 05:02	1
Perfluoroheptanoic acid (PFHpA)	3.1		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 05:02	1
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 05:02	1
Perfluorooctanesulfonic acid (PFOS)	80		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 05:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 05:02	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	107		25 - 150				10/08/18 04:17	10/12/18 05:02	1
¹³ C ₄ PFHpA	106		25 - 150				10/08/18 04:17	10/12/18 05:02	1
¹³ C ₄ PFOA	124		25 - 150				10/08/18 04:17	10/12/18 05:02	1
¹³ C ₄ PFOS	108		25 - 150				10/08/18 04:17	10/12/18 05:02	1
¹³ C ₅ PFNA	117		25 - 150				10/08/18 04:17	10/12/18 05:02	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-200
Date Collected: 09/24/18 19:00
Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-30
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.4		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 05:20	1
Perfluorohexanesulfonic acid (PFHxS)	37		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 05:20	1
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 05:20	1
Perfluorooctanoic acid (PFOA)	3.1		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 05:20	1
Perfluorooctanesulfonic acid (PFOS)	92		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 05:20	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 05:20	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	114		25 - 150				10/08/18 04:17	10/12/18 05:20	1
13C4 PFHpA	120		25 - 150				10/08/18 04:17	10/12/18 05:20	1
13C4 PFOA	137		25 - 150				10/08/18 04:17	10/12/18 05:20	1
13C4 PFOS	117		25 - 150				10/08/18 04:17	10/12/18 05:20	1
13C5 PFNA	124		25 - 150				10/08/18 04:17	10/12/18 05:20	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-011-POST

Lab Sample ID: 320-43691-31

Date Collected: 09/25/18 09:26

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.9		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 05:39	1
Perfluorohexanesulfonic acid (PFHxS)	31		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 05:39	1
Perfluoroheptanoic acid (PFHpA)	2.8		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 05:39	1
Perfluorooctanoic acid (PFOA)	2.9		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 05:39	1
Perfluorooctanesulfonic acid (PFOS)	86		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 05:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 05:39	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	116		25 - 150				10/08/18 04:17	10/12/18 05:39	1
13C4 PFHpA	110		25 - 150				10/08/18 04:17	10/12/18 05:39	1
13C4 PFOA	130		25 - 150				10/08/18 04:17	10/12/18 05:39	1
13C4 PFOS	107		25 - 150				10/08/18 04:17	10/12/18 05:39	1
13C5 PFNA	121		25 - 150				10/08/18 04:17	10/12/18 05:39	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-204

Date Collected: 09/25/18 16:30

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-32

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 05:57	1
Perfluorohexanesulfonic acid (PFHxS)	3.3		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 05:57	1
Perfluoroheptanoic acid (PFHpA)	0.93	J	2.0	0.80	ng/L		10/08/18 04:17	10/12/18 05:57	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 05:57	1
Perfluorooctanesulfonic acid (PFOS)	5.4		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 05:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 05:57	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	112		25 - 150				10/08/18 04:17	10/12/18 05:57	1
13C4 PFHpA	115		25 - 150				10/08/18 04:17	10/12/18 05:57	1
13C4 PFOA	132		25 - 150				10/08/18 04:17	10/12/18 05:57	1
13C4 PFOS	107		25 - 150				10/08/18 04:17	10/12/18 05:57	1
13C5 PFNA	127		25 - 150				10/08/18 04:17	10/12/18 05:57	1

Client Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: NPSWELL-PRE

Lab Sample ID: 320-43691-33

Date Collected: 09/25/18 11:37

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.2	J	2.0	0.92	ng/L		10/08/18 04:17	10/12/18 06:15	1
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 06:15	1
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L		10/08/18 04:17	10/12/18 06:15	1
Perfluorooctanoic acid (PFOA)	4.3		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 06:15	1
Perfluorooctanesulfonic acid (PFOS)	22		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 06:15	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 06:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	114		25 - 150				10/08/18 04:17	10/12/18 06:15	1
13C4 PFHpA	117		25 - 150				10/08/18 04:17	10/12/18 06:15	1
13C4 PFOA	132		25 - 150				10/08/18 04:17	10/12/18 06:15	1
13C4 PFOS	116		25 - 150				10/08/18 04:17	10/12/18 06:15	1
13C5 PFNA	123		25 - 150				10/08/18 04:17	10/12/18 06:15	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-174

Date Collected: 09/25/18 10:19

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-34

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 06:34	1
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L		10/08/18 04:17	10/12/18 06:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 06:34	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 06:34	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 06:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 06:34	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	119		25 - 150				10/08/18 04:17	10/12/18 06:34	1
13C4 PFHpA	117		25 - 150				10/08/18 04:17	10/12/18 06:34	1
13C4 PFOA	133		25 - 150				10/08/18 04:17	10/12/18 06:34	1
13C4 PFOS	115		25 - 150				10/08/18 04:17	10/12/18 06:34	1
13C5 PFNA	131		25 - 150				10/08/18 04:17	10/12/18 06:34	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-074

Date Collected: 09/25/18 10:29

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-35

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 06:52	1
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L		10/08/18 04:17	10/12/18 06:52	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 06:52	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 06:52	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 06:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 06:52	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	114		25 - 150				10/08/18 04:17	10/12/18 06:52	1
13C4 PFHpA	119		25 - 150				10/08/18 04:17	10/12/18 06:52	1
13C4 PFOA	133		25 - 150				10/08/18 04:17	10/12/18 06:52	1
13C4 PFOS	109		25 - 150				10/08/18 04:17	10/12/18 06:52	1
13C5 PFNA	136		25 - 150				10/08/18 04:17	10/12/18 06:52	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-201

Date Collected: 09/25/18 12:37

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-36

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 07:11	1
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L		10/08/18 04:17	10/12/18 07:11	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 07:11	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 07:11	1
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L		10/08/18 04:17	10/12/18 07:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 07:11	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	115		25 - 150				10/08/18 04:17	10/12/18 07:11	1
13C4 PFHpA	117		25 - 150				10/08/18 04:17	10/12/18 07:11	1
13C4 PFOA	129		25 - 150				10/08/18 04:17	10/12/18 07:11	1
13C4 PFOS	111		25 - 150				10/08/18 04:17	10/12/18 07:11	1
13C5 PFNA	119		25 - 150				10/08/18 04:17	10/12/18 07:11	1

Client Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-206

Date Collected: 09/28/18 14:27

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-37

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/08/18 04:17	10/12/18 07:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/08/18 04:17	10/12/18 07:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/08/18 04:17	10/12/18 07:29	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/08/18 04:17	10/12/18 07:29	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/08/18 04:17	10/12/18 07:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/08/18 04:17	10/12/18 07:29	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	111		25 - 150				10/08/18 04:17	10/12/18 07:29	1
13C4 PFHpA	112		25 - 150				10/08/18 04:17	10/12/18 07:29	1
13C4 PFOA	124		25 - 150				10/08/18 04:17	10/12/18 07:29	1
13C4 PFOS	107		25 - 150				10/08/18 04:17	10/12/18 07:29	1
13C5 PFNA	116		25 - 150				10/08/18 04:17	10/12/18 07:29	1

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

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	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-43691-1	SW-2004	117	123	127	116	118
320-43691-2	PW-413	116	125	123	100	113
320-43691-3	PW-418	116	127	124	107	114
320-43691-4	PW-319	117	124	130	110	116
320-43691-5	PW-214	120	120	126	115	119
320-43691-6	PW-219	121	129	132	111	121
320-43691-7	PW-216	119	126	127	112	123
320-43691-8	PW-006-BERKEY	117	125	124	107	116
320-43691-9	PW-211	117	129	129	109	120
320-43691-10	PW-006-CISTESN	110	115	126		88
320-43691-10 - DL	PW-006-CISTESN	129			122	
320-43691-11	PW-405	119	129	127	112	124
320-43691-12	PW-406	113	126	126	109	123
320-43691-13	PW-401	114	124	123	111	117
320-43691-14	PW-400	112	124	119	101	119
320-43691-15	PW-403	116	119	129	110	118
320-43691-16	PW-006-PRE	108	120	127	106	114
320-43691-17	PW-310	122	126	132	116	126
320-43691-18	PW-408	113	118	118	106	114
320-43691-19	PW-300	120	129	135	117	123
320-43691-20	SW-2003	122	130	131	114	122
320-43691-22	PW-210	109	112	124	108	117
320-43691-23	PW-209	110	109	128	111	122
320-43691-24	PW-212	106	107	128	115	119
320-43691-25	PW-402	110	110	124	112	117
320-43691-26	PW-202	107	111	130	110	121
320-43691-27	NPSWELL-POST	111	110	131	112	116
320-43691-28	PW-203	109	116	126	114	128
320-43691-29	PW-011-PRE	107	106	124	108	117
320-43691-30	PW-200	114	120	137	117	124
320-43691-31	PW-011-POST	116	110	130	107	121
320-43691-32	PW-204	112	115	132	107	127
320-43691-33	NPSWELL-PRE	114	117	132	116	123
320-43691-34	PW-174	119	117	133	115	131
320-43691-35	PW-074	114	119	133	109	136
320-43691-36	PW-201	115	117	129	111	119
320-43691-37	PW-206	111	112	124	107	116
LCS 320-250332/2-A	Lab Control Sample	104	111	119	106	120
LCS 320-251878/2-A	Lab Control Sample	110	122	118	109	117
LCSD 320-250332/3-A	Lab Control Sample Dup	108	114	118	112	118
LCSD 320-251878/3-A	Lab Control Sample Dup	108	118	118	100	106
MB 320-250332/1-A	Method Blank	109	115	127	112	122
MB 320-251878/1-A	Method Blank	115	126	116	105	115

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS

TestAmerica Sacramento

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

PFNA = 13C5 PFNA

1

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QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

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

Lab Sample ID: MB 320-250332/1-A

Matrix: Water

Analysis Batch: 251336

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 250332

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/05/18 11:54	10/12/18 01:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/05/18 11:54	10/12/18 01:40	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/05/18 11:54	10/12/18 01:40	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/05/18 11:54	10/12/18 01:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/05/18 11:54	10/12/18 01:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/05/18 11:54	10/12/18 01:40	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150	10/05/18 11:54	10/12/18 01:40	1
13C4 PFHpA	115		25 - 150	10/05/18 11:54	10/12/18 01:40	1
13C4 PFOA	127		25 - 150	10/05/18 11:54	10/12/18 01:40	1
13C4 PFOS	112		25 - 150	10/05/18 11:54	10/12/18 01:40	1
13C5 PFNA	122		25 - 150	10/05/18 11:54	10/12/18 01:40	1

Lab Sample ID: LCS 320-250332/2-A

Matrix: Water

Analysis Batch: 251336

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 250332

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.3		ng/L		98	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	16.6		ng/L		91	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.7		ng/L		99	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	17.8		ng/L		89	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	16.9		ng/L		91	69 - 144
Perfluorononanoic acid (PFNA)	20.0	18.1		ng/L		91	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4 PFHpA	111		25 - 150
13C4 PFOA	119		25 - 150
13C4 PFOS	106		25 - 150
13C5 PFNA	120		25 - 150

Lab Sample ID: LCSD 320-250332/3-A

Matrix: Water

Analysis Batch: 251336

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 250332

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.5		ng/L		99	72 - 151	1	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.0		ng/L		99	73 - 157	8	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.8		ng/L		104	71 - 138	5	30
Perfluorooctanoic acid (PFOA)	20.0	20.2		ng/L		101	70 - 140	13	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.3		ng/L		93	69 - 144	2	30
Perfluorononanoic acid (PFNA)	20.0	19.8		ng/L		99	73 - 147	9	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	108		25 - 150
13C4 PFHpA	114		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	112		25 - 150
13C5 PFNA	118		25 - 150

Lab Sample ID: MB 320-251878/1-A
Matrix: Water
Analysis Batch: 252105

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 251878

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/12/18 16:24	10/14/18 15:49	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/12/18 16:24	10/14/18 15:49	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/12/18 16:24	10/14/18 15:49	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/12/18 16:24	10/14/18 15:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/12/18 16:24	10/14/18 15:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/12/18 16:24	10/14/18 15:49	1

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
18O2 PFHxS	115		25 - 150	10/12/18 16:24	10/14/18 15:49	1
13C4 PFHpA	126		25 - 150	10/12/18 16:24	10/14/18 15:49	1
13C4 PFOA	116		25 - 150	10/12/18 16:24	10/14/18 15:49	1
13C4 PFOS	105		25 - 150	10/12/18 16:24	10/14/18 15:49	1
13C5 PFNA	115		25 - 150	10/12/18 16:24	10/14/18 15:49	1

Lab Sample ID: LCS 320-251878/2-A
Matrix: Water
Analysis Batch: 252105

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 251878

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.6		ng/L		100	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.0		ng/L		99	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.3		ng/L		102	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	19.4		ng/L		97	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.3		ng/L		93	69 - 144
Perfluorononanoic acid (PFNA)	20.0	17.7		ng/L		89	73 - 147

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
18O2 PFHxS	110		25 - 150
13C4 PFHpA	122		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	109		25 - 150
13C5 PFNA	117		25 - 150

Lab Sample ID: LCSD 320-251878/3-A
Matrix: Water
Analysis Batch: 252105

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 251878

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.6		ng/L		99	72 - 151	0	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.2		ng/L		100	73 - 157	1	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-251878/3-A

Matrix: Water

Analysis Batch: 252105

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 251878

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20.0	20.7		ng/L		103	71 - 138	2	30
Perfluorooctanoic acid (PFOA)	20.0	18.9		ng/L		94	70 - 140	3	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144	3	30
Perfluorononanoic acid (PFNA)	20.0	20.1		ng/L		100	73 - 147	12	30

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	108		25 - 150
13C4 PFHpA	118		25 - 150
13C4 PFOA	118		25 - 150
13C4 PFOS	100		25 - 150
13C5 PFNA	106		25 - 150

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

LCMS

Prep Batch: 250332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-22	PW-210	Total/NA	Water	PFAS Prep	
320-43691-23	PW-209	Total/NA	Water	PFAS Prep	
320-43691-24	PW-212	Total/NA	Water	PFAS Prep	
320-43691-25	PW-402	Total/NA	Water	PFAS Prep	
320-43691-26	PW-202	Total/NA	Water	PFAS Prep	
320-43691-27	NPSWELL-POST	Total/NA	Water	PFAS Prep	
320-43691-28	PW-203	Total/NA	Water	PFAS Prep	
320-43691-29	PW-011-PRE	Total/NA	Water	PFAS Prep	
320-43691-30	PW-200	Total/NA	Water	PFAS Prep	
320-43691-31	PW-011-POST	Total/NA	Water	PFAS Prep	
320-43691-32	PW-204	Total/NA	Water	PFAS Prep	
320-43691-33	NPSWELL-PRE	Total/NA	Water	PFAS Prep	
320-43691-34	PW-174	Total/NA	Water	PFAS Prep	
320-43691-35	PW-074	Total/NA	Water	PFAS Prep	
320-43691-36	PW-201	Total/NA	Water	PFAS Prep	
320-43691-37	PW-206	Total/NA	Water	PFAS Prep	
MB 320-250332/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-250332/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-250332/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 251336

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-22	PW-210	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-23	PW-209	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-24	PW-212	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-25	PW-402	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-26	PW-202	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-27	NPSWELL-POST	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-28	PW-203	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-29	PW-011-PRE	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-30	PW-200	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-31	PW-011-POST	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-32	PW-204	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-33	NPSWELL-PRE	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-34	PW-174	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-35	PW-074	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-36	PW-201	Total/NA	Water	WS-LC-0025 At1	250332
320-43691-37	PW-206	Total/NA	Water	WS-LC-0025 At1	250332

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

LCMS (Continued)

Analysis Batch: 251336 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-250332/1-A	Method Blank	Total/NA	Water	WS-LC-0025	250332
LCS 320-250332/2-A	Lab Control Sample	Total/NA	Water	At1 WS-LC-0025	250332
LCSD 320-250332/3-A	Lab Control Sample Dup	Total/NA	Water	At1 WS-LC-0025	250332

Prep Batch: 251878

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-1	SW-2004	Total/NA	Water	PFAS Prep	
320-43691-2	PW-413	Total/NA	Water	PFAS Prep	
320-43691-3	PW-418	Total/NA	Water	PFAS Prep	
320-43691-4	PW-319	Total/NA	Water	PFAS Prep	
320-43691-5	PW-214	Total/NA	Water	PFAS Prep	
320-43691-6	PW-219	Total/NA	Water	PFAS Prep	
320-43691-7	PW-216	Total/NA	Water	PFAS Prep	
320-43691-8	PW-006-BERKEY	Total/NA	Water	PFAS Prep	
320-43691-9	PW-211	Total/NA	Water	PFAS Prep	
320-43691-10	PW-006-CISTESN	Total/NA	Water	PFAS Prep	
320-43691-10 - DL	PW-006-CISTESN	Total/NA	Water	PFAS Prep	
320-43691-11	PW-405	Total/NA	Water	PFAS Prep	
320-43691-12	PW-406	Total/NA	Water	PFAS Prep	
320-43691-13	PW-401	Total/NA	Water	PFAS Prep	
320-43691-14	PW-400	Total/NA	Water	PFAS Prep	
320-43691-15	PW-403	Total/NA	Water	PFAS Prep	
320-43691-16	PW-006-PRE	Total/NA	Water	PFAS Prep	
320-43691-17	PW-310	Total/NA	Water	PFAS Prep	
320-43691-18	PW-408	Total/NA	Water	PFAS Prep	
320-43691-19	PW-300	Total/NA	Water	PFAS Prep	
320-43691-20	SW-2003	Total/NA	Water	PFAS Prep	
MB 320-251878/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-251878/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-251878/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 252105

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-1	SW-2004	Total/NA	Water	WS-LC-0025	251878
320-43691-2	PW-413	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-3	PW-418	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-4	PW-319	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-5	PW-214	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-6	PW-219	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-7	PW-216	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-8	PW-006-BERKEY	Total/NA	Water	At1 WS-LC-0025	251878
320-43691-9	PW-211	Total/NA	Water	At1 WS-LC-0025	251878

TestAmerica Sacramento

QC Association Summary

Client: Shannon & Wilson, Inc
 Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

LCMS (Continued)

Analysis Batch: 252105 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-10	PW-006-CISTESN	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-11	PW-405	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-12	PW-406	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-13	PW-401	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-14	PW-400	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-15	PW-403	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-16	PW-006-PRE	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-17	PW-310	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-18	PW-408	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-19	PW-300	Total/NA	Water	WS-LC-0025 At1	251878
320-43691-20	SW-2003	Total/NA	Water	WS-LC-0025 At1	251878
MB 320-251878/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	251878
LCS 320-251878/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	251878
LCSD 320-251878/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	251878

Analysis Batch: 252321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-10 - DL	PW-006-CISTESN	Total/NA	Water	WS-LC-0025 At1	251878

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: SW-2004

Date Collected: 09/27/18 10:20

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-1

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 16:44	S1M	TAL SAC

Client Sample ID: PW-413

Date Collected: 09/27/18 13:30

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-2

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 17:02	S1M	TAL SAC

Client Sample ID: PW-418

Date Collected: 09/27/18 16:30

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-3

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 17:21	S1M	TAL SAC

Client Sample ID: PW-319

Date Collected: 09/27/18 11:46

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-4

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 17:39	S1M	TAL SAC

Client Sample ID: PW-214

Date Collected: 09/27/18 09:27

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-5

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 17:57	S1M	TAL SAC

Client Sample ID: PW-219

Date Collected: 09/27/18 11:49

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-6

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 18:16	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-216

Lab Sample ID: 320-43691-7

Date Collected: 09/27/18 10:21

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 18:34	S1M	TAL SAC

Client Sample ID: PW-006-BERKEY

Lab Sample ID: 320-43691-8

Date Collected: 09/26/18 10:58

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 19:11	S1M	TAL SAC

Client Sample ID: PW-211

Lab Sample ID: 320-43691-9

Date Collected: 09/26/18 15:11

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 19:29	S1M	TAL SAC

Client Sample ID: PW-006-CISTESN

Lab Sample ID: 320-43691-10

Date Collected: 09/26/18 10:51

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 19:47	S1M	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	20			252321	10/15/18 16:24	AAR	TAL SAC

Client Sample ID: PW-405

Lab Sample ID: 320-43691-11

Date Collected: 09/25/18 15:32

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 20:06	S1M	TAL SAC

Client Sample ID: PW-406

Lab Sample ID: 320-43691-12

Date Collected: 09/25/18 16:49

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-406

Lab Sample ID: 320-43691-12

Date Collected: 09/25/18 16:49

Matrix: Water

Date Received: 09/29/18 12:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 20:24	S1M	TAL SAC

Client Sample ID: PW-401

Lab Sample ID: 320-43691-13

Date Collected: 09/25/18 13:01

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 20:42	S1M	TAL SAC

Client Sample ID: PW-400

Lab Sample ID: 320-43691-14

Date Collected: 09/25/18 10:42

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 21:01	S1M	TAL SAC

Client Sample ID: PW-403

Lab Sample ID: 320-43691-15

Date Collected: 09/25/18 14:31

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 21:19	S1M	TAL SAC

Client Sample ID: PW-006-PRE

Lab Sample ID: 320-43691-16

Date Collected: 09/26/18 10:34

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 21:38	S1M	TAL SAC

Client Sample ID: PW-310

Lab Sample ID: 320-43691-17

Date Collected: 09/26/18 12:34

Matrix: Water

Date Received: 09/29/18 12:45

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 21:56	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-408

Date Collected: 09/26/18 18:03

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-18

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 22:33	S1M	TAL SAC

Client Sample ID: PW-300

Date Collected: 09/24/18 18:50

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-19

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 23:09	S1M	TAL SAC

Client Sample ID: SW-2003

Date Collected: 09/26/18 11:22

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-20

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	251878	10/12/18 16:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			252105	10/14/18 22:51	S1M	TAL SAC

Client Sample ID: PW-210

Date Collected: 09/26/18 12:37

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-22

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 02:35	S1M	TAL SAC

Client Sample ID: PW-209

Date Collected: 09/26/18 11:11

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-23

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 02:53	S1M	TAL SAC

Client Sample ID: PW-212

Date Collected: 09/26/18 15:46

Date Received: 09/29/18 12:45

Lab Sample ID: 320-43691-24

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 03:12	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-402

Lab Sample ID: 320-43691-25

Date Collected: 09/25/18 13:46

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 03:30	S1M	TAL SAC

Client Sample ID: PW-202

Lab Sample ID: 320-43691-26

Date Collected: 09/25/18 13:49

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 03:49	S1M	TAL SAC

Client Sample ID: NPSWELL-POST

Lab Sample ID: 320-43691-27

Date Collected: 09/25/18 11:34

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 04:07	S1M	TAL SAC

Client Sample ID: PW-203

Lab Sample ID: 320-43691-28

Date Collected: 09/25/18 15:43

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 04:25	S1M	TAL SAC

Client Sample ID: PW-011-PRE

Lab Sample ID: 320-43691-29

Date Collected: 09/25/18 09:29

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 05:02	S1M	TAL SAC

Client Sample ID: PW-200

Lab Sample ID: 320-43691-30

Date Collected: 09/24/18 19:00

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 05:20	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-011-POST

Lab Sample ID: 320-43691-31

Date Collected: 09/25/18 09:26

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 05:39	S1M	TAL SAC

Client Sample ID: PW-204

Lab Sample ID: 320-43691-32

Date Collected: 09/25/18 16:30

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 05:57	S1M	TAL SAC

Client Sample ID: NPSWELL-PRE

Lab Sample ID: 320-43691-33

Date Collected: 09/25/18 11:37

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 06:15	S1M	TAL SAC

Client Sample ID: PW-174

Lab Sample ID: 320-43691-34

Date Collected: 09/25/18 10:19

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 06:34	S1M	TAL SAC

Client Sample ID: PW-074

Lab Sample ID: 320-43691-35

Date Collected: 09/25/18 10:29

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 06:52	S1M	TAL SAC

Client Sample ID: PW-201

Lab Sample ID: 320-43691-36

Date Collected: 09/25/18 12:37

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 07:11	S1M	TAL SAC

TestAmerica Sacramento

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Client Sample ID: PW-206

Lab Sample ID: 320-43691-37

Date Collected: 09/28/18 14:27

Matrix: Water

Date Received: 09/29/18 12:45

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	250332	10/08/18 04:17	MNV	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			251336	10/12/18 07:29	S1M	TAL SAC

Laboratory References:

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

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- 15

Accreditation/Certification Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: Gustavus Airport

TestAmerica Job ID: 320-43691-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43691-1	SW-2004	Water	09/27/18 10:20	09/29/18 12:45
320-43691-2	PW-413	Water	09/27/18 13:30	09/29/18 12:45
320-43691-3	PW-418	Water	09/27/18 16:30	09/29/18 12:45
320-43691-4	PW-319	Water	09/27/18 11:46	09/29/18 12:45
320-43691-5	PW-214	Water	09/27/18 09:27	09/29/18 12:45
320-43691-6	PW-219	Water	09/27/18 11:49	09/29/18 12:45
320-43691-7	PW-216	Water	09/27/18 10:21	09/29/18 12:45
320-43691-8	PW-006-BERKEY	Water	09/26/18 10:58	09/29/18 12:45
320-43691-9	PW-211	Water	09/26/18 15:11	09/29/18 12:45
320-43691-10	PW-006-CISTESN	Water	09/26/18 10:51	09/29/18 12:45
320-43691-11	PW-405	Water	09/25/18 15:32	09/29/18 12:45
320-43691-12	PW-406	Water	09/25/18 16:49	09/29/18 12:45
320-43691-13	PW-401	Water	09/25/18 13:01	09/29/18 12:45
320-43691-14	PW-400	Water	09/25/18 10:42	09/29/18 12:45
320-43691-15	PW-403	Water	09/25/18 14:31	09/29/18 12:45
320-43691-16	PW-006-PRE	Water	09/26/18 10:34	09/29/18 12:45
320-43691-17	PW-310	Water	09/26/18 12:34	09/29/18 12:45
320-43691-18	PW-408	Water	09/26/18 18:03	09/29/18 12:45
320-43691-19	PW-300	Water	09/24/18 18:50	09/29/18 12:45
320-43691-20	SW-2003	Water	09/26/18 11:22	09/29/18 12:45
320-43691-22	PW-210	Water	09/26/18 12:37	09/29/18 12:45
320-43691-23	PW-209	Water	09/26/18 11:11	09/29/18 12:45
320-43691-24	PW-212	Water	09/26/18 15:46	09/29/18 12:45
320-43691-25	PW-402	Water	09/25/18 13:46	09/29/18 12:45
320-43691-26	PW-202	Water	09/25/18 13:49	09/29/18 12:45
320-43691-27	NPSWELL-POST	Water	09/25/18 11:34	09/29/18 12:45
320-43691-28	PW-203	Water	09/25/18 15:43	09/29/18 12:45
320-43691-29	PW-011-PRE	Water	09/25/18 09:29	09/29/18 12:45
320-43691-30	PW-200	Water	09/24/18 19:00	09/29/18 12:45
320-43691-31	PW-011-POST	Water	09/25/18 09:26	09/29/18 12:45
320-43691-32	PW-204	Water	09/25/18 16:30	09/29/18 12:45
320-43691-33	NPSWELL-PRE	Water	09/25/18 11:37	09/29/18 12:45
320-43691-34	PW-174	Water	09/25/18 10:19	09/29/18 12:45
320-43691-35	PW-074	Water	09/25/18 10:29	09/29/18 12:45
320-43691-36	PW-201	Water	09/25/18 12:37	09/29/18 12:45
320-43691-37	PW-206	Water	09/28/18 14:27	09/29/18 12:45

CHAIN-OF-CUSTODY RECORD

Laboratory Test America Page 1 of 4
 Attn: _____

Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush
 Please Specify _____

Quote No: _____

J-Flags: Yes No



Remarks/Matrix Composition/Grab? Sample Containers

VCMRPFS-K6

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
SW-2004		1020	9/27/18	2 groundwater
City Hall		1253	9/27/18	2 groundwater
PW-413		1330	9/27/18	2 groundwater
Firehouse		1335	9/27/18	2 groundwater
PW-418		1630	9/27/18	2 groundwater
PW-319		1146	9/27/18	2 groundwater
PW-214		0927	9/27/18	2 groundwater
PW-219		1149	9/27/18	2 groundwater
PW-216		1021	9/27/18	2 groundwater
PW-006-Becky		1058	9/26/18	2 groundwater

Project Information
 Number: 101543
 Name: Gustavos Airport
 Contact: XRF
 Ongoing Project? Yes No
 Sampler: XRF/ARM

Sample Receipt
 Total No. of Containers: 74
 COC Seals/Intact? Y/N/A
 Received Good Cond./Cold
 Temp:
 Delivery Method: Grabbed

Notes:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: _____ Printed Name: <u>Kristen Freidinger</u> Date: <u>9/28/18</u> Company: <u>Shannon & Wilson</u>	Signature: _____ Printed Name: _____ Date: _____ Company: _____	Signature: _____ Printed Name: _____ Date: _____ Company: _____
Received By: <u>1-911</u> Signature: _____ Printed Name: <u>Davolta</u> Date: <u>9/29/18</u> Company: <u>TA-S&W</u>	Received By: <u>2.</u> Signature: _____ Printed Name: _____ Date: _____ Company: _____	Received By: <u>3.</u> Signature: _____ Printed Name: _____ Date: _____ Company: _____

S-W 5-4



CHAIN-OF-CUSTODY RECORD

Laboratory _____
 Attn: _____

Page 2 of 4

Analytical Methods (include preservative if used)

Turn Around Time: <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush Please Specify _____	Quote No: _____	J-Flags: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers

UICMR PTHS x6

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-211		1511	9/26/18	2	Groundwater
PW-006-Cristen		1051	9/26/18	2	
PW-405		1532	9/25/18	2	
PW-406		1649	9/25/18	2	
PW-401		1301	9/25/18	2	
PW-400		1042	9/25/18	2	
PW-403		1431	9/25/18	2	
PW-006-PRE		1034	9/26/18	2	
PW-310		1234	9/26/18	2	
PW-408		1803	9/26/18	2	

Project Information

Number: _____
 Name: _____
 Contact: _____
 Ongoing Project? Yes No
 Sampler: _____

Sample Receipt

Total No. of Containers: _____
 COP Seals/Matrix Y/N/NA _____
 Recycled Good Container? Yes No
 Temp: _____
 Delivery Method: _____

Notes:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: _____ Printed Name: <u>Kristen Freiberg</u> Company: <u>Shannon & Wilson</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>15:30</u> Date: <u>9/28/18</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: _____ Printed Name: <u>David H</u> Company: <u>SA-Sci</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>16:15</u> Date: <u>9/20/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

CHAIN-OF-CUSTODY RECORD

Laboratory Attn: _____

Page 3 of 4

Analytical Methods (include preservative if used)

UCMR PTAS x 6	Total Number of Containers
---------------	----------------------------

Quote No: _____

J-Flags: Yes No

Turn Around Time:
 Normal Rush

Please Specify _____

Remarks/Matrix Composition/Grab? Sample Containers

Sample Identity	Lab No.	Time	Date Sampled
PW-300		1850	9/24/18
SW-2003		1122	9/26/18
PW-006 POST		1031	9/24/18
PW-210		1237	9/26/18
PW-209		1111	9/26/18
PW-212		1546	9/26/18
PW-402		1346	9/25/18
PW-202		1349	9/25/18
NPSwell-POST		1134	9/25/18
PW-203		1543	9/25/18

Remarks/Matrix Composition/Grab? Sample Containers
2 groundwater
2 HOLD
2
2
2
2
2
2
2

Project Information

Number: _____

Name: SFE

Contact: _____

Ongoing Project? Yes No

Sampler: _____

Sample Receipt

Total No. of Containers: _____

COC Seals/Intact? Y/N/NA _____

Received Goop/Cond./Cold _____

Temp: _____

Delivery Method: _____

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Kristen Freiburger</u> Company: <u>Shannon & Wilson</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1530</u> Date: <u>9/28/18</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>D. V. D. D.</u> Company: <u>[Signature]</u>	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>1245</u> Date: <u>9/28/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

Notes:

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

S.60 S.40

No. 35667



CHAIN-OF-CUSTODY RECORD

Attn: _____

Analytical Methods (include preservative if used)

Quote No: _____

J-Flags: Yes No

Turn Around Time:
 Normal Rush

Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-01 PRE		0929	9/25/18	2	Groundwater
PW-200		1900	9/24/18	2	
PW-011-Post		0926	9/25/18	2	
PW-204		1630	9/25/18	2	
NPSwell-Pre		1137	9/25/18	2	
PW-174		1019	9/25/18	2	
PW-074		1029	9/25/18	2	
PW-201		1237	9/25/18	2	
PW-206		1427	9/28/18	2	

Project Information

Number: _____
 Name: SEE PAGE 1
 Contact: _____
 Ongoing Project? Yes No
 Sampler: _____

Sample Receipt

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Kristen Freiburger</u> Date: <u>9/28/18</u> Company: <u>Shannon & Wilson, Inc.</u>	Signature: _____ Printed Name: _____ Date: _____ Company: _____	Signature: _____ Printed Name: _____ Date: _____ Company: _____
Received By: 1. Signature: <u>[Signature]</u> Printed Name: <u>Daniel H.</u> Date: <u>9/28/18</u> Company: <u>Shannon & Wilson, Inc.</u>	Received By: 2. Signature: _____ Printed Name: _____ Date: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Date: _____ Company: _____

Notes:

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: 320-43691-1

Login Number: 43691
List Number: 1
Creator: Hytrek, Cheryl

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.	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 <math><6\text{mm}</math> (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:

October 18, 2018

CS Report Name:

Gustavus Airport

Report Date:

October 18, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43691-1

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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:

The sample coolers were recorded at 5.4 and 5.8° C upon receipt at the laboratory.

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

 Yes No

Comments:

Analysis of PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 coolers upon receipt at the laboratory were 5.4 and 5.8° C. It further notes that several samples were yellow and/or light gray prior to extraction, or contained black particulates.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-250331 (please note, this batch was not used for the reported results), 320-250332 and 320-251878.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

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 for each sample.

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 the applicable ADEC action level for drinking water and proposed ADEC groundwater cleanup levels for PFAS.

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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

Yes, two field duplicates pairs were submitted with this work order.

ii. Submitted blind to lab?

Yes No

Comments:

Field duplicate pairs *PW-074 / PW-174*, *PW-219/PW-319* and *PW-200 / PW-300* were 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 RPDs, where calculable for detected values, were less than 30% for each analyte.

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 for this project are 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:

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: 320-43691-2
Client Project/Site: Gustavus Airport
Revision: 1

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

Attn: Kristen Freiburger



Authorized for release by:
10/25/2018 2:55:51 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.

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Definitions/Glossary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

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: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Job ID: 320-43691-2

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-43691-2

Receipt

The samples were received on 9/29/2018 12:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 5.4° C and 5.8° C.

LCMS

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

Organic Prep

Method(s) PFAS Prep: The following sample was observed to be yellow in color. PW-006 POST (320-43691-21)

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

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Detection Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Client Sample ID: PW-006 POST

Lab Sample ID: 320-43691-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.6		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)	1.4	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	360		20	13	ng/L	10		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: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Client Sample ID: PW-006 POST

Lab Sample ID: 320-43691-21

Date Collected: 09/26/18 10:31

Matrix: Water

Date Received: 09/29/18 12:45

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.6		2.0	0.92	ng/L		10/19/18 12:24	10/20/18 20:35	1
Perfluorohexanesulfonic acid (PFHxS)	120		2.0	0.87	ng/L		10/19/18 12:24	10/20/18 20:35	1
Perfluoroheptanoic acid (PFHpA)	1.4	J	2.0	0.80	ng/L		10/19/18 12:24	10/20/18 20:35	1
Perfluorooctanoic acid (PFOA)	2.4		2.0	0.75	ng/L		10/19/18 12:24	10/20/18 20:35	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/19/18 12:24	10/20/18 20:35	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150	10/19/18 12:24	10/20/18 20:35	1
13C4 PFHpA	114		25 - 150	10/19/18 12:24	10/20/18 20:35	1
13C4 PFOA	120		25 - 150	10/19/18 12:24	10/20/18 20:35	1
13C5 PFNA	121		25 - 150	10/19/18 12:24	10/20/18 20:35	1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	360		20	13	ng/L		10/19/18 12:24	10/22/18 11:40	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	100		25 - 150	10/19/18 12:24	10/22/18 11:40	10

Isotope Dilution Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

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	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-43691-21	PW-006 POST	108	114	120		121
320-43691-21 - DL	PW-006 POST				100	
LCS 320-253414/2-A	Lab Control Sample	113	117	122	108	125
LCSD 320-253414/19-A	Lab Control Sample Dup	113	112	125	108	124
MB 320-253414/1-A	Method Blank	111	118	124	108	120

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: Gustavus Airport

TestAmerica Job ID: 320-43691-2

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

Lab Sample ID: MB 320-253414/1-A

Matrix: Water

Analysis Batch: 253661

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 253414

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		10/19/18 12:24	10/20/18 19:40	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		10/19/18 12:24	10/20/18 19:40	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		10/19/18 12:24	10/20/18 19:40	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		10/19/18 12:24	10/20/18 19:40	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		10/19/18 12:24	10/20/18 19:40	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		10/19/18 12:24	10/20/18 19:40	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	111		25 - 150	10/19/18 12:24	10/20/18 19:40	1
13C4 PFHpA	118		25 - 150	10/19/18 12:24	10/20/18 19:40	1
13C4 PFOA	124		25 - 150	10/19/18 12:24	10/20/18 19:40	1
13C4 PFOS	108		25 - 150	10/19/18 12:24	10/20/18 19:40	1
13C5 PFNA	120		25 - 150	10/19/18 12:24	10/20/18 19:40	1

Lab Sample ID: LCS 320-253414/2-A

Matrix: Water

Analysis Batch: 253661

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 253414

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.1		ng/L		97	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.5		ng/L		96	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.1		ng/L		101	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	19.0		ng/L		95	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144
Perfluorononanoic acid (PFNA)	20.0	18.7		ng/L		94	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	113		25 - 150
13C4 PFHpA	117		25 - 150
13C4 PFOA	122		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	125		25 - 150

Lab Sample ID: LCSD 320-253414/19-A

Matrix: Water

Analysis Batch: 253661

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 253414

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.7		ng/L		100	72 - 151	3	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.6		ng/L		97	73 - 157	0	30
Perfluoroheptanoic acid (PFHpA)	20.0	19.7		ng/L		99	71 - 138	2	30
Perfluorooctanoic acid (PFOA)	20.0	18.0		ng/L		90	70 - 140	5	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.9		ng/L		97	69 - 144	1	30
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147	3	30

TestAmerica Sacramento

QC Sample Results

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>LCSD Qualifier</i>	<i>Limits</i>
<i>18O2 PFHxS</i>	113		25 - 150
<i>13C4 PFHpA</i>	112		25 - 150
<i>13C4 PFOA</i>	125		25 - 150
<i>13C4 PFOS</i>	108		25 - 150
<i>13C5 PFNA</i>	124		25 - 150

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QC Association Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

LCMS

Prep Batch: 253414

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-21	PW-006 POST	Total/NA	Water	PFAS Prep	
320-43691-21 - DL	PW-006 POST	Total/NA	Water	PFAS Prep	
MB 320-253414/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-253414/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-253414/19-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 253661

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-21	PW-006 POST	Total/NA	Water	WS-LC-0025 At1	253414
MB 320-253414/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	253414
LCS 320-253414/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	253414
LCSD 320-253414/19-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	253414

Analysis Batch: 253899

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-43691-21 - DL	PW-006 POST	Total/NA	Water	WS-LC-0025 At1	253414

Lab Chronicle

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Client Sample ID: PW-006 POST

Lab Sample ID: 320-43691-21

Date Collected: 09/26/18 10:31

Matrix: Water

Date Received: 09/29/18 12:45

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	253414	10/19/18 12:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			253661	10/20/18 20:35	D1R	TAL SAC
Total/NA	Prep	PFAS Prep	DL		1.00 mL	1.66 mL	253414	10/19/18 12:24	DTH	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1	DL	10			253899	10/22/18 11:40	ABH	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: Gustavus Airport

TestAmerica Job ID: 320-43691-2

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

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

TestAmerica Sacramento

Method Summary

Client: Shannon & Wilson, Inc
Project/Site: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: Gustavus Airport

TestAmerica Job ID: 320-43691-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-43691-21	PW-006 POST	Water	09/26/18 10:31	09/29/18 12:45

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CHAIN-OF-CUSTODY RECORD

Laboratory Test America Page 1 of 4
 Attn: _____

Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush
 Please Specify _____

Quote No: _____

J-Flags: Yes No



Remarks/Matrix
 Composition/Grab?
 Sample Containers

Total Number of Containers

VCMRPFS-K6

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
SW-2004		1020	9/27/18	2 groundwater
City Hall		1253	9/27/18	2 groundwater
PW-413		1330	9/27/18	2 groundwater
Firehouse		1335	9/27/18	2 groundwater
PW-418		1630	9/27/18	2 groundwater
PW-319		1146	9/27/18	2 groundwater
PW-214		0927	9/27/18	2 groundwater
PW-219		1149	9/27/18	2 groundwater
PW-216		1021	9/27/18	2 groundwater
PW-006-Becky		1058	9/26/18	2 groundwater

Project Information
 Number: 101543
 Name: Gustavos Airport
 Contact: XRF
 Ongoing Project? Yes No
 Sampler: XRF/ARM

Sample Receipt
 Total No. of Containers: 74
 COC Seals/Intact? Y/N/A
 Received Good Cond./Cold
 Temp:
 Delivery Method: Grabbed

Notes:

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: _____ Printed Name: <u>Kristen Freidinger</u> Date: <u>9/28/18</u> Company: <u>Shannon & Wilson</u>	Signature: _____ Printed Name: _____ Date: _____ Company: _____	Signature: _____ Printed Name: _____ Date: _____ Company: _____
Received By: <u>1-911</u> Signature: _____ Printed Name: <u>Davolta</u> Date: <u>9/29/18</u> Company: <u>TA-S&W</u>	Received By: <u>2.</u> Signature: _____ Printed Name: _____ Date: _____ Company: _____	Received By: <u>3.</u> Signature: _____ Printed Name: _____ Date: _____ Company: _____

S-6 5-4



CHAIN-OF-CUSTODY RECORD

Laboratory Attn: _____

Page 2 of 4

Analytical Methods (include preservative if used)

UICMR PTHS x6			
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Quote No: _____

J-Flags: Yes No

Turn Around Time:
 Normal Rush

Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-211		1511	9/26/18	2	Groundwater
PW-006-Cristen		1051	9/26/18	2	
PW-405		1532	9/25/18	2	
PW-406		1649	9/25/18	2	
PW-401		1301	9/25/18	2	
PW-400		1042	9/25/18	2	
PW-403		1431	9/25/18	2	
PW-006-PRE		1034	9/26/18	2	
PW-310		1234	9/26/18	2	
PW-408		1803	9/26/18	2	

Project Information

Number: _____

Name: _____

Contact: _____

Ongoing Project? Yes No

Sampler: _____

Sample Receipt

Total No. of Containers: _____

COC Seals/Matrix Y/N/NA _____

Received Good/Container Fold _____

Temp: _____

Delivery Method: _____

Relinquished By: 1.

Signature: _____

Printed Name: Kristen Freiburg

Company: Shannon & Wilson

Time: 15:30

Date: 9/28/18

Relinquished By: 2.

Signature: _____

Printed Name: _____

Company: _____

Time: _____

Date: _____

Relinquished By: 3.

Signature: _____

Printed Name: _____

Company: _____

Time: _____

Date: _____

Notes:

Received By: 1.

Signature: _____

Printed Name: David H

Company: SA-Sci

Time: 16:15

Date: 9/28/18

Received By: 2.

Signature: _____

Printed Name: _____

Company: _____

Time: _____

Date: _____

Received By: 3.

Signature: _____

Printed Name: _____

Company: _____

Time: _____

Date: _____

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



5.50c 5.4c

No. 35663

CHAIN-OF-CUSTODY RECORD

Laboratory Attn: _____
 Page 3 of 4

Analytical Methods (include preservative if used)

UCMR PTAS x 6	Total Number of Containers
---------------	----------------------------

Quote No: _____
 J-Flags: Yes No

Turn Around Time:
 Normal Rush
 Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled	Remarks/Matrix Composition/Grab? Sample Containers
PW-300		1850	9/24/18	2 ground water
SW-2003		1122	9/26/18	2
PW-006 POST		1031	9/24/18	2 HOLD
PW-210		1237	9/26/18	2
PW-209		1111	9/26/18	2
PW-212		1546	9/26/18	2
PW-402		1346	9/25/18	2
PW-202		1349	9/25/18	2
NPSwell-POST		1134	9/25/18	2
PW-203		1543	9/25/18	2

Project Information
 Number: _____
 Name: SFE
 Contact: _____
 Ongoing Project? Yes No
 Sampler: _____

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <i>[Signature]</i> Printed Name: Kristen Freiburger Company: Shannon & Wilson	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: 1530 Date: 9/28/18	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: <i>[Signature]</i> Printed Name: Duvalter Company: JF-Saw	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: 1245 Date: 9/28/18	Time: _____ Date: _____	Time: _____ Date: _____

Notes:

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



No. 35667

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-43691-2

Login Number: 43691
List Number: 1
Creator: Hytrek, Cheryl

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.	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 <math><6\text{mm}</math> (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:

October 26, 2018

CS Report Name:

Gustavus Airport

Report Date:

October 25, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-43691-2

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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 PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 coolers upon receipt at the laboratory were 5.4 and 5.8° C. It further notes the sample was yellow and/or light gray prior to extraction.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

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 for each sample.

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 the applicable ADEC action level for drinking water and proposed ADEC groundwater cleanup levels for PFAS.

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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

Yes, two field duplicates pairs were submitted with this work order.

ii. Submitted blind to lab?

Yes No

Comments:

Field duplicate pairs were not submitted with this work order; however, they have been submitted at the proper frequency for the overall project.

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

Samples for this project are 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:

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: 320-44967-1
Client Project/Site: Gustavus Airport PFAS

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

Attn: Kristen Freiburger



Authorized for release by:
11/19/2018 2:37:20 PM

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

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Definitions/Glossary

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

TestAmerica Job ID: 320-44967-1

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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Job ID: 320-44967-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-44967-1

Receipt

The samples were received on 11/5/2018 11:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.5° C and 5.8° C.

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 were observed to be a yellow color: PW-434 (320-44967-3), PW-432 (320-44967-4), PW-401 (320-44967-5), PW-436 (320-44967-7), PW-230 (320-44967-8), PW-232 (320-44967-10), PW-233 (320-44967-11), PW-336 (320-44967-14), PW-236 (320-44967-15), PW-440 (320-44967-16), PW-213 (320-44967-17), PW-218 (320-44967-18) and PW-237 (320-44967-20). preparation batch 320-259145

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-259145.

Method(s) PFAS Prep: The following sample was observed to be an orange color: PW-234 (320-44967-12). preparation batch 320-259145

Method(s) PFAS Prep: The following samples were observed to have floating particulates in the sample containers: PW-435 (320-44967-6) and PW-231 (320-44967-9). preparation batch 320-259145

Method(s) PFAS Prep: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-259147.

Method(s) PFAS Prep: The following samples were observed to be a yellow color: PW-238 (320-44967-21), PW-239 (320-44967-22), PW-221 (320-44967-26), PW-431 (320-44967-28), PW-460 (320-44967-29), PW-248 (320-44967-30), PW-247 (320-44967-31), PW-249 (320-44967-32) and PW-349 (320-44967-33). preparation batch 320-259147

Method(s) PFAS Prep: The following samples were observed to be an orange color: PW-341 (320-44967-24) and PW-241 (320-44967-25). preparation batch 320-259147

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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-530

Lab Sample ID: 320-44967-1

No Detections.

Client Sample ID: PW-430

Lab Sample ID: 320-44967-2

No Detections.

Client Sample ID: PW-434

Lab Sample ID: 320-44967-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	4.6		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.82	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.85	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.8		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-432

Lab Sample ID: 320-44967-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-401

Lab Sample ID: 320-44967-5

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 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.6	J	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: PW-435

Lab Sample ID: 320-44967-6

No Detections.

Client Sample ID: PW-436

Lab Sample ID: 320-44967-7

No Detections.

Client Sample ID: PW-230

Lab Sample ID: 320-44967-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-231

Lab Sample ID: 320-44967-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.6		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.96	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-232

Lab Sample ID: 320-44967-10

No Detections.

Client Sample ID: PW-233

Lab Sample ID: 320-44967-11

No Detections.

Client Sample ID: PW-234

Lab Sample ID: 320-44967-12

No Detections.

Client Sample ID: PW-255

Lab Sample ID: 320-44967-13

No Detections.

Client Sample ID: PW-336

Lab Sample ID: 320-44967-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.96	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-236

Lab Sample ID: 320-44967-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.0	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-440

Lab Sample ID: 320-44967-16

No Detections.

Client Sample ID: PW-213

Lab Sample ID: 320-44967-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.2		2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	2.3		2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	51		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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-218

Lab Sample ID: 320-44967-18

No Detections.

Client Sample ID: PW-235

Lab Sample ID: 320-44967-19

No Detections.

Client Sample ID: PW-237

Lab Sample ID: 320-44967-20

No Detections.

Client Sample ID: PW-238

Lab Sample ID: 320-44967-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	3.5		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.77	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-239

Lab Sample ID: 320-44967-22

No Detections.

Client Sample ID: PW-240

Lab Sample ID: 320-44967-23

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	3.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-341

Lab Sample ID: 320-44967-24

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	5.8		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.98	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.9		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-241

Lab Sample ID: 320-44967-25

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	6.1		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.89	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.7		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-221

Lab Sample ID: 320-44967-26

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-461

Lab Sample ID: 320-44967-27

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-431

Lab Sample ID: 320-44967-28

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	5.4		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.1		2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-460

Lab Sample ID: 320-44967-29

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.4	J	2.0	0.92	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-248

Lab Sample ID: 320-44967-30

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	6.3		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.97	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.8	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-247

Lab Sample ID: 320-44967-31

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.7		2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-249

Lab Sample ID: 320-44967-32

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanoic acid (PFOA)	0.84	J	2.0	0.75	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-349

Lab Sample ID: 320-44967-33

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-349 (Continued)

Lab Sample ID: 320-44967-33

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.5	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.4	J	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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-530

Date Collected: 10/31/18 09:20

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-1

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 14:57	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 14:57	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 14:57	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 14:57	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 14:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 14:57	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	112		25 - 150	11/17/18 10:19	11/17/18 14:57	1
¹³ C ₄ PFHpA	119		25 - 150	11/17/18 10:19	11/17/18 14:57	1
¹³ C ₄ PFOA	112		25 - 150	11/17/18 10:19	11/17/18 14:57	1
¹³ C ₄ PFOS	105		25 - 150	11/17/18 10:19	11/17/18 14:57	1
¹³ C ₅ PFNA	111		25 - 150	11/17/18 10:19	11/17/18 14:57	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-430

Date Collected: 10/31/18 09:34

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 15:16	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 15:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 15:16	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 15:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 15:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 15:16	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150	11/17/18 10:19	11/17/18 15:16	1
13C4 PFHpA	117		25 - 150	11/17/18 10:19	11/17/18 15:16	1
13C4 PFOA	117		25 - 150	11/17/18 10:19	11/17/18 15:16	1
13C4 PFOS	102		25 - 150	11/17/18 10:19	11/17/18 15:16	1
13C5 PFNA	114		25 - 150	11/17/18 10:19	11/17/18 15:16	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-434

Date Collected: 10/31/18 12:37

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-3

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 15:34	1
Perfluorohexanesulfonic acid (PFHxS)	4.6		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 15:34	1
Perfluoroheptanoic acid (PFHpA)	0.82	J	2.0	0.80	ng/L		11/17/18 10:19	11/17/18 15:34	1
Perfluorooctanoic acid (PFOA)	0.85	J	2.0	0.75	ng/L		11/17/18 10:19	11/17/18 15:34	1
Perfluorooctanesulfonic acid (PFOS)	2.8		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 15:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 15:34	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	106		25 - 150				11/17/18 10:19	11/17/18 15:34	1
13C4 PFHpA	119		25 - 150				11/17/18 10:19	11/17/18 15:34	1
13C4 PFOA	118		25 - 150				11/17/18 10:19	11/17/18 15:34	1
13C4 PFOS	105		25 - 150				11/17/18 10:19	11/17/18 15:34	1
13C5 PFNA	116		25 - 150				11/17/18 10:19	11/17/18 15:34	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-432

Date Collected: 10/31/18 11:40

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-4

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 15:52	1
Perfluorohexanesulfonic acid (PFHxS)	2.5		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 15:52	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 15:52	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 15:52	1
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 15:52	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 15:52	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	106		25 - 150				11/17/18 10:19	11/17/18 15:52	1
13C4 PFHpA	118		25 - 150				11/17/18 10:19	11/17/18 15:52	1
13C4 PFOA	114		25 - 150				11/17/18 10:19	11/17/18 15:52	1
13C4 PFOS	104		25 - 150				11/17/18 10:19	11/17/18 15:52	1
13C5 PFNA	110		25 - 150				11/17/18 10:19	11/17/18 15:52	1



Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-401

Date Collected: 10/31/18 13:39

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-5

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.3		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 16:11	1
Perfluorohexanesulfonic acid (PFHxS)	20		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 16:11	1
Perfluoroheptanoic acid (PFHpA)	1.7	J	2.0	0.80	ng/L		11/17/18 10:19	11/17/18 16:11	1
Perfluorooctanoic acid (PFOA)	1.6	J	2.0	0.75	ng/L		11/17/18 10:19	11/17/18 16:11	1
Perfluorooctanesulfonic acid (PFOS)	36		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 16:11	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 16:11	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	105		25 - 150				11/17/18 10:19	11/17/18 16:11	1
13C4 PFHpA	117		25 - 150				11/17/18 10:19	11/17/18 16:11	1
13C4 PFOA	115		25 - 150				11/17/18 10:19	11/17/18 16:11	1
13C4 PFOS	103		25 - 150				11/17/18 10:19	11/17/18 16:11	1
13C5 PFNA	114		25 - 150				11/17/18 10:19	11/17/18 16:11	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-435

Date Collected: 10/31/18 14:42

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-6

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 16:29	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 16:29	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 16:29	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 16:29	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 16:29	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 16:29	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150	11/17/18 10:19	11/17/18 16:29	1
13C4 PFHpA	117		25 - 150	11/17/18 10:19	11/17/18 16:29	1
13C4 PFOA	115		25 - 150	11/17/18 10:19	11/17/18 16:29	1
13C4 PFOS	99		25 - 150	11/17/18 10:19	11/17/18 16:29	1
13C5 PFNA	112		25 - 150	11/17/18 10:19	11/17/18 16:29	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-436

Date Collected: 10/31/18 15:34

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-7

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 16:47	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 16:47	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 16:47	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 16:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 16:47	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 16:47	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150	11/17/18 10:19	11/17/18 16:47	1
13C4 PFHpA	122		25 - 150	11/17/18 10:19	11/17/18 16:47	1
13C4 PFOA	118		25 - 150	11/17/18 10:19	11/17/18 16:47	1
13C4 PFOS	103		25 - 150	11/17/18 10:19	11/17/18 16:47	1
13C5 PFNA	117		25 - 150	11/17/18 10:19	11/17/18 16:47	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-230

Date Collected: 10/31/18 09:30

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-8

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 17:24	1
Perfluorohexanesulfonic acid (PFHxS)	1.2	J	2.0	0.87	ng/L		11/17/18 10:19	11/17/18 17:24	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 17:24	1
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	ng/L		11/17/18 10:19	11/17/18 17:24	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 17:24	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 17:24	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150				11/17/18 10:19	11/17/18 17:24	1
13C4 PFHpA	128		25 - 150				11/17/18 10:19	11/17/18 17:24	1
13C4 PFOA	116		25 - 150				11/17/18 10:19	11/17/18 17:24	1
13C4 PFOS	104		25 - 150				11/17/18 10:19	11/17/18 17:24	1
13C5 PFNA	121		25 - 150				11/17/18 10:19	11/17/18 17:24	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-231

Date Collected: 10/31/18 10:38

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-9

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 17:42	1
Perfluorohexanesulfonic acid (PFHxS)	2.6		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 17:42	1
Perfluoroheptanoic acid (PFHpA)	0.96	J	2.0	0.80	ng/L		11/17/18 10:19	11/17/18 17:42	1
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	ng/L		11/17/18 10:19	11/17/18 17:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 17:42	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 17:42	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150				11/17/18 10:19	11/17/18 17:42	1
13C4 PFHpA	121		25 - 150				11/17/18 10:19	11/17/18 17:42	1
13C4 PFOA	122		25 - 150				11/17/18 10:19	11/17/18 17:42	1
13C4 PFOS	105		25 - 150				11/17/18 10:19	11/17/18 17:42	1
13C5 PFNA	123		25 - 150				11/17/18 10:19	11/17/18 17:42	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-232

Date Collected: 10/31/18 11:29

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-10

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 18:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 18:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 18:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 18:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 18:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 18:01	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	105		25 - 150	11/17/18 10:19	11/17/18 18:01	1
13C4 PFHpA	124		25 - 150	11/17/18 10:19	11/17/18 18:01	1
13C4 PFOA	123		25 - 150	11/17/18 10:19	11/17/18 18:01	1
13C4 PFOS	103		25 - 150	11/17/18 10:19	11/17/18 18:01	1
13C5 PFNA	118		25 - 150	11/17/18 10:19	11/17/18 18:01	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-233

Date Collected: 10/31/18 12:07

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-11

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 18:19	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 18:19	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 18:19	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 18:19	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 18:19	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 18:19	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	106		25 - 150	11/17/18 10:19	11/17/18 18:19	1
13C4 PFHpA	125		25 - 150	11/17/18 10:19	11/17/18 18:19	1
13C4 PFOA	118		25 - 150	11/17/18 10:19	11/17/18 18:19	1
13C4 PFOS	105		25 - 150	11/17/18 10:19	11/17/18 18:19	1
13C5 PFNA	123		25 - 150	11/17/18 10:19	11/17/18 18:19	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-234

Date Collected: 10/31/18 13:20

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-12

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 18:37	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 18:37	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 18:37	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 18:37	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 18:37	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 18:37	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	107		25 - 150				11/17/18 10:19	11/17/18 18:37	1
13C4 PFHpA	130		25 - 150				11/17/18 10:19	11/17/18 18:37	1
13C4 PFOA	124		25 - 150				11/17/18 10:19	11/17/18 18:37	1
13C4 PFOS	109		25 - 150				11/17/18 10:19	11/17/18 18:37	1
13C5 PFNA	128		25 - 150				11/17/18 10:19	11/17/18 18:37	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-255

Date Collected: 10/31/18 14:30

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-13

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 18:56	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 18:56	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 18:56	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 18:56	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 18:56	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 18:56	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	106		25 - 150	11/17/18 10:19	11/17/18 18:56	1
13C4 PFHpA	122		25 - 150	11/17/18 10:19	11/17/18 18:56	1
13C4 PFOA	120		25 - 150	11/17/18 10:19	11/17/18 18:56	1
13C4 PFOS	105		25 - 150	11/17/18 10:19	11/17/18 18:56	1
13C5 PFNA	120		25 - 150	11/17/18 10:19	11/17/18 18:56	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-336

Date Collected: 10/31/18 15:09

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-14

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 19:14	1
Perfluorohexanesulfonic acid (PFHxS)	0.96	J	2.0	0.87	ng/L		11/17/18 10:19	11/17/18 19:14	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 19:14	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 19:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 19:14	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 19:14	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	100		25 - 150				11/17/18 10:19	11/17/18 19:14	1
13C4 PFHpA	114		25 - 150				11/17/18 10:19	11/17/18 19:14	1
13C4 PFOA	117		25 - 150				11/17/18 10:19	11/17/18 19:14	1
13C4 PFOS	101		25 - 150				11/17/18 10:19	11/17/18 19:14	1
13C5 PFNA	115		25 - 150				11/17/18 10:19	11/17/18 19:14	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-236

Date Collected: 10/31/18 15:19

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-15

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 19:32	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	J	2.0	0.87	ng/L		11/17/18 10:19	11/17/18 19:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 19:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 19:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 19:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 19:32	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	105		25 - 150				11/17/18 10:19	11/17/18 19:32	1
13C4 PFHpA	121		25 - 150				11/17/18 10:19	11/17/18 19:32	1
13C4 PFOA	124		25 - 150				11/17/18 10:19	11/17/18 19:32	1
13C4 PFOS	104		25 - 150				11/17/18 10:19	11/17/18 19:32	1
13C5 PFNA	119		25 - 150				11/17/18 10:19	11/17/18 19:32	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-440

Date Collected: 11/01/18 14:39

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-16

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 19:51	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 19:51	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 19:51	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 19:51	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 19:51	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 19:51	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	96		25 - 150	11/17/18 10:19	11/17/18 19:51	1
¹³ C ₄ PFHpA	113		25 - 150	11/17/18 10:19	11/17/18 19:51	1
¹³ C ₄ PFOA	113		25 - 150	11/17/18 10:19	11/17/18 19:51	1
¹³ C ₄ PFOS	97		25 - 150	11/17/18 10:19	11/17/18 19:51	1
¹³ C ₅ PFNA	112		25 - 150	11/17/18 10:19	11/17/18 19:51	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-213

Date Collected: 11/01/18 15:32

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-17

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.2		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 20:09	1
Perfluorohexanesulfonic acid (PFHxS)	24		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 20:09	1
Perfluoroheptanoic acid (PFHpA)	2.2		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 20:09	1
Perfluorooctanoic acid (PFOA)	2.3		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 20:09	1
Perfluorooctanesulfonic acid (PFOS)	51		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 20:09	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 20:09	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
¹⁸ O ₂ PFHxS	108		25 - 150				11/17/18 10:19	11/17/18 20:09	1
¹³ C ₄ PFHpA	120		25 - 150				11/17/18 10:19	11/17/18 20:09	1
¹³ C ₄ PFOA	121		25 - 150				11/17/18 10:19	11/17/18 20:09	1
¹³ C ₄ PFOS	106		25 - 150				11/17/18 10:19	11/17/18 20:09	1
¹³ C ₅ PFNA	119		25 - 150				11/17/18 10:19	11/17/18 20:09	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-218

Date Collected: 11/01/18 16:50

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-18

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 20:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 20:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 20:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 20:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 20:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 20:46	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	102		25 - 150	11/17/18 10:19	11/17/18 20:46	1
13C4 PFHpA	117		25 - 150	11/17/18 10:19	11/17/18 20:46	1
13C4 PFOA	119		25 - 150	11/17/18 10:19	11/17/18 20:46	1
13C4 PFOS	100		25 - 150	11/17/18 10:19	11/17/18 20:46	1
13C5 PFNA	120		25 - 150	11/17/18 10:19	11/17/18 20:46	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-235

Date Collected: 11/01/18 09:25

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-19

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 21:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 21:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 21:04	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 21:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 21:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 21:04	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	97		25 - 150	11/17/18 10:19	11/17/18 21:04	1
13C4 PFHpA	107		25 - 150	11/17/18 10:19	11/17/18 21:04	1
13C4 PFOA	108		25 - 150	11/17/18 10:19	11/17/18 21:04	1
13C4 PFOS	99		25 - 150	11/17/18 10:19	11/17/18 21:04	1
13C5 PFNA	111		25 - 150	11/17/18 10:19	11/17/18 21:04	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-237

Date Collected: 11/01/18 11:20

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-20

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 21:22	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 21:22	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 21:22	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 21:22	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 21:22	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 21:22	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	102		25 - 150				11/17/18 10:19	11/17/18 21:22	1
13C4 PFHpA	116		25 - 150				11/17/18 10:19	11/17/18 21:22	1
13C4 PFOA	117		25 - 150				11/17/18 10:19	11/17/18 21:22	1
13C4 PFOS	99		25 - 150				11/17/18 10:19	11/17/18 21:22	1
13C5 PFNA	118		25 - 150				11/17/18 10:19	11/17/18 21:22	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-238

Date Collected: 11/01/18 13:18

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-21

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/17/18 22:54	1
Perfluorohexanesulfonic acid (PFHxS)	3.5		2.0	0.87	ng/L		11/17/18 10:27	11/17/18 22:54	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/17/18 22:54	1
Perfluorooctanoic acid (PFOA)	0.77	J	2.0	0.75	ng/L		11/17/18 10:27	11/17/18 22:54	1
Perfluorooctanesulfonic acid (PFOS)	2.0		2.0	1.3	ng/L		11/17/18 10:27	11/17/18 22:54	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/17/18 22:54	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	95		25 - 150				11/17/18 10:27	11/17/18 22:54	1
13C4 PFHpA	111		25 - 150				11/17/18 10:27	11/17/18 22:54	1
13C4 PFOA	110		25 - 150				11/17/18 10:27	11/17/18 22:54	1
13C4 PFOS	97		25 - 150				11/17/18 10:27	11/17/18 22:54	1
13C5 PFNA	112		25 - 150				11/17/18 10:27	11/17/18 22:54	1



Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-239

Date Collected: 11/01/18 14:44

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-22

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/17/18 23:12	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:27	11/17/18 23:12	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/17/18 23:12	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/17/18 23:12	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/17/18 23:12	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/17/18 23:12	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	99		25 - 150				11/17/18 10:27	11/17/18 23:12	1
13C4 PFHpA	108		25 - 150				11/17/18 10:27	11/17/18 23:12	1
13C4 PFOA	117		25 - 150				11/17/18 10:27	11/17/18 23:12	1
13C4 PFOS	99		25 - 150				11/17/18 10:27	11/17/18 23:12	1
13C5 PFNA	112		25 - 150				11/17/18 10:27	11/17/18 23:12	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-240

Date Collected: 11/01/18 15:23

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-23

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/17/18 23:31	1
Perfluorohexanesulfonic acid (PFHxS)	3.3		2.0	0.87	ng/L		11/17/18 10:27	11/17/18 23:31	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/17/18 23:31	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/17/18 23:31	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/17/18 23:31	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/17/18 23:31	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	96		25 - 150				11/17/18 10:27	11/17/18 23:31	1
13C4 PFHpA	111		25 - 150				11/17/18 10:27	11/17/18 23:31	1
13C4 PFOA	110		25 - 150				11/17/18 10:27	11/17/18 23:31	1
13C4 PFOS	100		25 - 150				11/17/18 10:27	11/17/18 23:31	1
13C5 PFNA	114		25 - 150				11/17/18 10:27	11/17/18 23:31	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-341

Date Collected: 11/01/18 15:41

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-24

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/17/18 23:49	1
Perfluorohexanesulfonic acid (PFHxS)	5.8		2.0	0.87	ng/L		11/17/18 10:27	11/17/18 23:49	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/17/18 23:49	1
Perfluorooctanoic acid (PFOA)	0.98	J	2.0	0.75	ng/L		11/17/18 10:27	11/17/18 23:49	1
Perfluorooctanesulfonic acid (PFOS)	2.9		2.0	1.3	ng/L		11/17/18 10:27	11/17/18 23:49	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/17/18 23:49	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	98		25 - 150				11/17/18 10:27	11/17/18 23:49	1
13C4 PFHpA	111		25 - 150				11/17/18 10:27	11/17/18 23:49	1
13C4 PFOA	114		25 - 150				11/17/18 10:27	11/17/18 23:49	1
13C4 PFOS	100		25 - 150				11/17/18 10:27	11/17/18 23:49	1
13C5 PFNA	113		25 - 150				11/17/18 10:27	11/17/18 23:49	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-241

Date Collected: 11/01/18 15:51

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-25

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 00:07	1
Perfluorohexanesulfonic acid (PFHxS)	6.1		2.0	0.87	ng/L		11/17/18 10:27	11/18/18 00:07	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 00:07	1
Perfluorooctanoic acid (PFOA)	0.89	J	2.0	0.75	ng/L		11/17/18 10:27	11/18/18 00:07	1
Perfluorooctanesulfonic acid (PFOS)	2.7		2.0	1.3	ng/L		11/17/18 10:27	11/18/18 00:07	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 00:07	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	102		25 - 150				11/17/18 10:27	11/18/18 00:07	1
13C4 PFHpA	113		25 - 150				11/17/18 10:27	11/18/18 00:07	1
13C4 PFOA	122		25 - 150				11/17/18 10:27	11/18/18 00:07	1
13C4 PFOS	106		25 - 150				11/17/18 10:27	11/18/18 00:07	1
13C5 PFNA	115		25 - 150				11/17/18 10:27	11/18/18 00:07	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-221

Date Collected: 11/01/18 16:38

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-26

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 00:26	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:27	11/18/18 00:26	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 00:26	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/18/18 00:26	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/18/18 00:26	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 00:26	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	103		25 - 150	11/17/18 10:27	11/18/18 00:26	1
13C4 PFHpA	109		25 - 150	11/17/18 10:27	11/18/18 00:26	1
13C4 PFOA	116		25 - 150	11/17/18 10:27	11/18/18 00:26	1
13C4 PFOS	102		25 - 150	11/17/18 10:27	11/18/18 00:26	1
13C5 PFNA	116		25 - 150	11/17/18 10:27	11/18/18 00:26	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-461

Date Collected: 11/02/18 14:59

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-27

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 00:44	1
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L		11/17/18 10:27	11/18/18 00:44	1
Perfluoroheptanoic acid (PFHpA)	1.6	J	2.0	0.80	ng/L		11/17/18 10:27	11/18/18 00:44	1
Perfluorooctanoic acid (PFOA)	1.2	J	2.0	0.75	ng/L		11/17/18 10:27	11/18/18 00:44	1
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L		11/17/18 10:27	11/18/18 00:44	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 00:44	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	103		25 - 150				11/17/18 10:27	11/18/18 00:44	1
13C4 PFHpA	112		25 - 150				11/17/18 10:27	11/18/18 00:44	1
13C4 PFOA	116		25 - 150				11/17/18 10:27	11/18/18 00:44	1
13C4 PFOS	99		25 - 150				11/17/18 10:27	11/18/18 00:44	1
13C5 PFNA	117		25 - 150				11/17/18 10:27	11/18/18 00:44	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-431

Date Collected: 11/02/18 16:02

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-28

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 01:21	1
Perfluorohexanesulfonic acid (PFHxS)	5.4		2.0	0.87	ng/L		11/17/18 10:27	11/18/18 01:21	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 01:21	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/18/18 01:21	1
Perfluorooctanesulfonic acid (PFOS)	6.1		2.0	1.3	ng/L		11/17/18 10:27	11/18/18 01:21	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 01:21	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	103		25 - 150				11/17/18 10:27	11/18/18 01:21	1
13C4 PFHpA	117		25 - 150				11/17/18 10:27	11/18/18 01:21	1
13C4 PFOA	122		25 - 150				11/17/18 10:27	11/18/18 01:21	1
13C4 PFOS	107		25 - 150				11/17/18 10:27	11/18/18 01:21	1
13C5 PFNA	125		25 - 150				11/17/18 10:27	11/18/18 01:21	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-460

Date Collected: 11/02/18 13:22

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-29

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.4	J	2.0	0.92	ng/L		11/17/18 10:27	11/18/18 01:39	1
Perfluorohexanesulfonic acid (PFHxS)	1.7	J	2.0	0.87	ng/L		11/17/18 10:27	11/18/18 01:39	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 01:39	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/18/18 01:39	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/18/18 01:39	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 01:39	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	100		25 - 150				11/17/18 10:27	11/18/18 01:39	1
13C4 PFHpA	111		25 - 150				11/17/18 10:27	11/18/18 01:39	1
13C4 PFOA	117		25 - 150				11/17/18 10:27	11/18/18 01:39	1
13C4 PFOS	102		25 - 150				11/17/18 10:27	11/18/18 01:39	1
13C5 PFNA	118		25 - 150				11/17/18 10:27	11/18/18 01:39	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-248

Date Collected: 11/02/18 13:21

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-30

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 01:57	1
Perfluorohexanesulfonic acid (PFHxS)	6.3		2.0	0.87	ng/L		11/17/18 10:27	11/18/18 01:57	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 01:57	1
Perfluorooctanoic acid (PFOA)	0.97	J	2.0	0.75	ng/L		11/17/18 10:27	11/18/18 01:57	1
Perfluorooctanesulfonic acid (PFOS)	1.8	J	2.0	1.3	ng/L		11/17/18 10:27	11/18/18 01:57	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 01:57	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	98		25 - 150				11/17/18 10:27	11/18/18 01:57	1
13C4 PFHpA	111		25 - 150				11/17/18 10:27	11/18/18 01:57	1
13C4 PFOA	117		25 - 150				11/17/18 10:27	11/18/18 01:57	1
13C4 PFOS	99		25 - 150				11/17/18 10:27	11/18/18 01:57	1
13C5 PFNA	113		25 - 150				11/17/18 10:27	11/18/18 01:57	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-247

Date Collected: 11/02/18 14:26

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-31

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 02:16	1
Perfluorohexanesulfonic acid (PFHxS)	2.7		2.0	0.87	ng/L		11/17/18 10:27	11/18/18 02:16	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 02:16	1
Perfluorooctanoic acid (PFOA)	1.1	J	2.0	0.75	ng/L		11/17/18 10:27	11/18/18 02:16	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/18/18 02:16	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 02:16	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	102		25 - 150				11/17/18 10:27	11/18/18 02:16	1
13C4 PFHpA	112		25 - 150				11/17/18 10:27	11/18/18 02:16	1
13C4 PFOA	116		25 - 150				11/17/18 10:27	11/18/18 02:16	1
13C4 PFOS	100		25 - 150				11/17/18 10:27	11/18/18 02:16	1
13C5 PFNA	124		25 - 150				11/17/18 10:27	11/18/18 02:16	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-249

Date Collected: 11/02/18 14:58

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-32

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 02:34	1
Perfluorohexanesulfonic acid (PFHxS)	1.4	J	2.0	0.87	ng/L		11/17/18 10:27	11/18/18 02:34	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 02:34	1
Perfluorooctanoic acid (PFOA)	0.84	J	2.0	0.75	ng/L		11/17/18 10:27	11/18/18 02:34	1
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3	ng/L		11/17/18 10:27	11/18/18 02:34	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 02:34	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	97		25 - 150				11/17/18 10:27	11/18/18 02:34	1
13C4 PFHpA	107		25 - 150				11/17/18 10:27	11/18/18 02:34	1
13C4 PFOA	111		25 - 150				11/17/18 10:27	11/18/18 02:34	1
13C4 PFOS	96		25 - 150				11/17/18 10:27	11/18/18 02:34	1
13C5 PFNA	113		25 - 150				11/17/18 10:27	11/18/18 02:34	1

Client Sample Results

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-349

Date Collected: 11/02/18 14:48

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-33

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/18/18 02:53	1
Perfluorohexanesulfonic acid (PFHxS)	1.5	J	2.0	0.87	ng/L		11/17/18 10:27	11/18/18 02:53	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/18/18 02:53	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/18/18 02:53	1
Perfluorooctanesulfonic acid (PFOS)	1.4	J	2.0	1.3	ng/L		11/17/18 10:27	11/18/18 02:53	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/18/18 02:53	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	101		25 - 150				11/17/18 10:27	11/18/18 02:53	1
13C4 PFHpA	110		25 - 150				11/17/18 10:27	11/18/18 02:53	1
13C4 PFOA	116		25 - 150				11/17/18 10:27	11/18/18 02:53	1
13C4 PFOS	101		25 - 150				11/17/18 10:27	11/18/18 02:53	1
13C5 PFNA	121		25 - 150				11/17/18 10:27	11/18/18 02:53	1



Isotope Dilution Summary

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

TestAmerica Job ID: 320-44967-1

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	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-44967-1	PW-530	112	119	112	105	111
320-44967-2	PW-430	108	117	117	102	114
320-44967-3	PW-434	106	119	118	105	116
320-44967-4	PW-432	106	118	114	104	110
320-44967-5	PW-401	105	117	115	103	114
320-44967-6	PW-435	108	117	115	99	112
320-44967-7	PW-436	108	122	118	103	117
320-44967-8	PW-230	108	128	116	104	121
320-44967-9	PW-231	109	121	122	105	123
320-44967-10	PW-232	105	124	123	103	118
320-44967-11	PW-233	106	125	118	105	123
320-44967-12	PW-234	107	130	124	109	128
320-44967-13	PW-255	106	122	120	105	120
320-44967-14	PW-336	100	114	117	101	115
320-44967-15	PW-236	105	121	124	104	119
320-44967-16	PW-440	96	113	113	97	112
320-44967-17	PW-213	108	120	121	106	119
320-44967-18	PW-218	102	117	119	100	120
320-44967-19	PW-235	97	107	108	99	111
320-44967-20	PW-237	102	116	117	99	118
320-44967-21	PW-238	95	111	110	97	112
320-44967-22	PW-239	99	108	117	99	112
320-44967-23	PW-240	96	111	110	100	114
320-44967-24	PW-341	98	111	114	100	113
320-44967-25	PW-241	102	113	122	106	115
320-44967-26	PW-221	103	109	116	102	116
320-44967-27	PW-461	103	112	116	99	117
320-44967-28	PW-431	103	117	122	107	125
320-44967-29	PW-460	100	111	117	102	118
320-44967-30	PW-248	98	111	117	99	113
320-44967-31	PW-247	102	112	116	100	124
320-44967-32	PW-249	97	107	111	96	113
320-44967-33	PW-349	101	110	116	101	121
LCS 320-259145/2-A	Lab Control Sample	109	112	109	111	103
LCS 320-259147/2-A	Lab Control Sample	100	113	114	101	113
LCSD 320-259145/3-A	Lab Control Sample Dup	110	117	111	108	105
LCSD 320-259147/3-A	Lab Control Sample Dup	100	111	115	100	112
MB 320-259145/1-A	Method Blank	100	103	102	97	100
MB 320-259147/1-A	Method Blank	102	108	114	105	113

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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

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

Lab Sample ID: MB 320-259145/1-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 259145

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:19	11/17/18 14:02	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:19	11/17/18 14:02	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:19	11/17/18 14:02	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:19	11/17/18 14:02	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:19	11/17/18 14:02	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:19	11/17/18 14:02	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	100		25 - 150	11/17/18 10:19	11/17/18 14:02	1
13C4 PFHpA	103		25 - 150	11/17/18 10:19	11/17/18 14:02	1
13C4 PFOA	102		25 - 150	11/17/18 10:19	11/17/18 14:02	1
13C4 PFOS	97		25 - 150	11/17/18 10:19	11/17/18 14:02	1
13C5 PFNA	100		25 - 150	11/17/18 10:19	11/17/18 14:02	1

Lab Sample ID: LCS 320-259145/2-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 259145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.7		ng/L		100	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.8		ng/L		98	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.8		ng/L		99	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	18.9		ng/L		94	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.8		ng/L		96	69 - 144
Perfluorononanoic acid (PFNA)	20.0	20.0		ng/L		100	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	109		25 - 150
13C4 PFHpA	112		25 - 150
13C4 PFOA	109		25 - 150
13C4 PFOS	111		25 - 150
13C5 PFNA	103		25 - 150

Lab Sample ID: LCSD 320-259145/3-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 259145

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	17.4		ng/L		98	72 - 151	2	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.4		ng/L		96	73 - 157	2	30
Perfluoroheptanoic acid (PFHpA)	20.0	20.4		ng/L		102	71 - 138	3	30
Perfluorooctanoic acid (PFOA)	20.0	18.9		ng/L		94	70 - 140	0	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	69 - 144	0	30
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147	4	30

TestAmerica Sacramento

QC Sample Results

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

TestAmerica Job ID: 320-44967-1

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
18O2 PFHxS	110		25 - 150
13C4 PFHpA	117		25 - 150
13C4 PFOA	111		25 - 150
13C4 PFOS	108		25 - 150
13C5 PFNA	105		25 - 150

Lab Sample ID: MB 320-259147/1-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 259147

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		11/17/18 10:27	11/17/18 21:59	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		11/17/18 10:27	11/17/18 21:59	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		11/17/18 10:27	11/17/18 21:59	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		11/17/18 10:27	11/17/18 21:59	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		11/17/18 10:27	11/17/18 21:59	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		11/17/18 10:27	11/17/18 21:59	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
18O2 PFHxS	102		25 - 150	11/17/18 10:27	11/17/18 21:59	1
13C4 PFHpA	108		25 - 150	11/17/18 10:27	11/17/18 21:59	1
13C4 PFOA	114		25 - 150	11/17/18 10:27	11/17/18 21:59	1
13C4 PFOS	105		25 - 150	11/17/18 10:27	11/17/18 21:59	1
13C5 PFNA	113		25 - 150	11/17/18 10:27	11/17/18 21:59	1

Lab Sample ID: LCS 320-259147/2-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 259147

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.3		ng/L		98	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.9		ng/L		98	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	19.2		ng/L		96	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	18.2		ng/L		91	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	17.4		ng/L		94	69 - 144
Perfluorononanoic acid (PFNA)	20.0	18.6		ng/L		93	73 - 147

Isotope Dilution	LCS		Limits
	%Recovery	Qualifier	
18O2 PFHxS	100		25 - 150
13C4 PFHpA	113		25 - 150
13C4 PFOA	114		25 - 150
13C4 PFOS	101		25 - 150
13C5 PFNA	113		25 - 150

Lab Sample ID: LCSD 320-259147/3-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 259147

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	18.1		ng/L		103	72 - 151	5	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.2		ng/L		100	73 - 157	2	30

TestAmerica Sacramento

QC Sample Results

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

TestAmerica Job ID: 320-44967-1

Method: WS-LC-0025 At1 - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-259147/3-A
Matrix: Water
Analysis Batch: 259862

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 259147

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	20.0	20.9		ng/L		105	71 - 138	8	30
Perfluorooctanoic acid (PFOA)	20.0	19.6		ng/L		98	70 - 140	7	30
Perfluorooctanesulfonic acid (PFOS)	18.6	17.9		ng/L		96	69 - 144	3	30
Perfluorononanoic acid (PFNA)	20.0	20.4		ng/L		102	73 - 147	9	30
LCSD LCSD									
Isotope Dilution	%Recovery	Qualifier	Limits						
18O2 PFHxS	100		25 - 150						
13C4 PFHpA	111		25 - 150						
13C4 PFOA	115		25 - 150						
13C4 PFOS	100		25 - 150						
13C5 PFNA	112		25 - 150						



QC Association Summary

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

TestAmerica Job ID: 320-44967-1

LCMS

Prep Batch: 259145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44967-1	PW-530	Total/NA	Water	PFAS Prep	
320-44967-2	PW-430	Total/NA	Water	PFAS Prep	
320-44967-3	PW-434	Total/NA	Water	PFAS Prep	
320-44967-4	PW-432	Total/NA	Water	PFAS Prep	
320-44967-5	PW-401	Total/NA	Water	PFAS Prep	
320-44967-6	PW-435	Total/NA	Water	PFAS Prep	
320-44967-7	PW-436	Total/NA	Water	PFAS Prep	
320-44967-8	PW-230	Total/NA	Water	PFAS Prep	
320-44967-9	PW-231	Total/NA	Water	PFAS Prep	
320-44967-10	PW-232	Total/NA	Water	PFAS Prep	
320-44967-11	PW-233	Total/NA	Water	PFAS Prep	
320-44967-12	PW-234	Total/NA	Water	PFAS Prep	
320-44967-13	PW-255	Total/NA	Water	PFAS Prep	
320-44967-14	PW-336	Total/NA	Water	PFAS Prep	
320-44967-15	PW-236	Total/NA	Water	PFAS Prep	
320-44967-16	PW-440	Total/NA	Water	PFAS Prep	
320-44967-17	PW-213	Total/NA	Water	PFAS Prep	
320-44967-18	PW-218	Total/NA	Water	PFAS Prep	
320-44967-19	PW-235	Total/NA	Water	PFAS Prep	
320-44967-20	PW-237	Total/NA	Water	PFAS Prep	
MB 320-259145/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-259145/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-259145/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Prep Batch: 259147

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44967-21	PW-238	Total/NA	Water	PFAS Prep	
320-44967-22	PW-239	Total/NA	Water	PFAS Prep	
320-44967-23	PW-240	Total/NA	Water	PFAS Prep	
320-44967-24	PW-341	Total/NA	Water	PFAS Prep	
320-44967-25	PW-241	Total/NA	Water	PFAS Prep	
320-44967-26	PW-221	Total/NA	Water	PFAS Prep	
320-44967-27	PW-461	Total/NA	Water	PFAS Prep	
320-44967-28	PW-431	Total/NA	Water	PFAS Prep	
320-44967-29	PW-460	Total/NA	Water	PFAS Prep	
320-44967-30	PW-248	Total/NA	Water	PFAS Prep	
320-44967-31	PW-247	Total/NA	Water	PFAS Prep	
320-44967-32	PW-249	Total/NA	Water	PFAS Prep	
320-44967-33	PW-349	Total/NA	Water	PFAS Prep	
MB 320-259147/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-259147/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-259147/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 259862

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44967-1	PW-530	Total/NA	Water	WS-LC-0025	259145
				At1	
320-44967-2	PW-430	Total/NA	Water	WS-LC-0025	259145
				At1	
320-44967-3	PW-434	Total/NA	Water	WS-LC-0025	259145
				At1	

TestAmerica Sacramento

QC Association Summary

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

TestAmerica Job ID: 320-44967-1

LCMS (Continued)

Analysis Batch: 259862 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44967-4	PW-432	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-5	PW-401	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-6	PW-435	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-7	PW-436	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-8	PW-230	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-9	PW-231	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-10	PW-232	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-11	PW-233	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-12	PW-234	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-13	PW-255	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-14	PW-336	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-15	PW-236	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-16	PW-440	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-17	PW-213	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-18	PW-218	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-19	PW-235	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-20	PW-237	Total/NA	Water	WS-LC-0025 At1	259145
320-44967-21	PW-238	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-22	PW-239	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-23	PW-240	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-24	PW-341	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-25	PW-241	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-26	PW-221	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-27	PW-461	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-28	PW-431	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-29	PW-460	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-30	PW-248	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-31	PW-247	Total/NA	Water	WS-LC-0025 At1	259147
320-44967-32	PW-249	Total/NA	Water	WS-LC-0025 At1	259147

TestAmerica Sacramento

QC Association Summary

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

TestAmerica Job ID: 320-44967-1

LCMS (Continued)

Analysis Batch: 259862 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44967-33	PW-349	Total/NA	Water	WS-LC-0025 At1	259147
MB 320-259145/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	259145
MB 320-259147/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	259147
LCS 320-259145/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	259145
LCS 320-259147/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	259147
LCSD 320-259145/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	259145
LCSD 320-259147/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	259147

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-530

Date Collected: 10/31/18 09:20

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-1

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 14:57	D1R	TAL SAC

Client Sample ID: PW-430

Date Collected: 10/31/18 09:34

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-2

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 15:16	D1R	TAL SAC

Client Sample ID: PW-434

Date Collected: 10/31/18 12:37

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-3

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 15:34	D1R	TAL SAC

Client Sample ID: PW-432

Date Collected: 10/31/18 11:40

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-4

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 15:52	D1R	TAL SAC

Client Sample ID: PW-401

Date Collected: 10/31/18 13:39

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-5

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 16:11	D1R	TAL SAC

Client Sample ID: PW-435

Date Collected: 10/31/18 14:42

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-6

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 16:29	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-436

Lab Sample ID: 320-44967-7

Date Collected: 10/31/18 15:34

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 16:47	D1R	TAL SAC

Client Sample ID: PW-230

Lab Sample ID: 320-44967-8

Date Collected: 10/31/18 09:30

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 17:24	D1R	TAL SAC

Client Sample ID: PW-231

Lab Sample ID: 320-44967-9

Date Collected: 10/31/18 10:38

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 17:42	D1R	TAL SAC

Client Sample ID: PW-232

Lab Sample ID: 320-44967-10

Date Collected: 10/31/18 11:29

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 18:01	D1R	TAL SAC

Client Sample ID: PW-233

Lab Sample ID: 320-44967-11

Date Collected: 10/31/18 12:07

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 18:19	D1R	TAL SAC

Client Sample ID: PW-234

Lab Sample ID: 320-44967-12

Date Collected: 10/31/18 13:20

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 18:37	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-255

Lab Sample ID: 320-44967-13

Date Collected: 10/31/18 14:30

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 18:56	D1R	TAL SAC

Client Sample ID: PW-336

Lab Sample ID: 320-44967-14

Date Collected: 10/31/18 15:09

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 19:14	D1R	TAL SAC

Client Sample ID: PW-236

Lab Sample ID: 320-44967-15

Date Collected: 10/31/18 15:19

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 19:32	D1R	TAL SAC

Client Sample ID: PW-440

Lab Sample ID: 320-44967-16

Date Collected: 11/01/18 14:39

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 19:51	D1R	TAL SAC

Client Sample ID: PW-213

Lab Sample ID: 320-44967-17

Date Collected: 11/01/18 15:32

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 20:09	D1R	TAL SAC

Client Sample ID: PW-218

Lab Sample ID: 320-44967-18

Date Collected: 11/01/18 16:50

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 20:46	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-235

Lab Sample ID: 320-44967-19

Date Collected: 11/01/18 09:25

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 21:04	D1R	TAL SAC

Client Sample ID: PW-237

Lab Sample ID: 320-44967-20

Date Collected: 11/01/18 11:20

Matrix: Water

Date Received: 11/05/18 11:40

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	259145	11/17/18 10:19	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 21:22	D1R	TAL SAC

Client Sample ID: PW-238

Lab Sample ID: 320-44967-21

Date Collected: 11/01/18 13:18

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 22:54	D1R	TAL SAC

Client Sample ID: PW-239

Lab Sample ID: 320-44967-22

Date Collected: 11/01/18 14:44

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 23:12	D1R	TAL SAC

Client Sample ID: PW-240

Lab Sample ID: 320-44967-23

Date Collected: 11/01/18 15:23

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 23:31	D1R	TAL SAC

Client Sample ID: PW-341

Lab Sample ID: 320-44967-24

Date Collected: 11/01/18 15:41

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/17/18 23:49	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-241

Date Collected: 11/01/18 15:51

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-25

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 00:07	D1R	TAL SAC

Client Sample ID: PW-221

Date Collected: 11/01/18 16:38

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-26

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 00:26	D1R	TAL SAC

Client Sample ID: PW-461

Date Collected: 11/02/18 14:59

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-27

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 00:44	D1R	TAL SAC

Client Sample ID: PW-431

Date Collected: 11/02/18 16:02

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-28

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 01:21	D1R	TAL SAC

Client Sample ID: PW-460

Date Collected: 11/02/18 13:22

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-29

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 01:39	D1R	TAL SAC

Client Sample ID: PW-248

Date Collected: 11/02/18 13:21

Date Received: 11/05/18 11:40

Lab Sample ID: 320-44967-30

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 01:57	D1R	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-44967-1

Client Sample ID: PW-247

Lab Sample ID: 320-44967-31

Date Collected: 11/02/18 14:26

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 02:16	D1R	TAL SAC

Client Sample ID: PW-249

Lab Sample ID: 320-44967-32

Date Collected: 11/02/18 14:58

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 02:34	D1R	TAL SAC

Client Sample ID: PW-349

Lab Sample ID: 320-44967-33

Date Collected: 11/02/18 14:48

Matrix: Water

Date Received: 11/05/18 11:40

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	259147	11/17/18 10:27	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			259862	11/18/18 02:53	D1R	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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	11-30-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-44967-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: Gustavus Airport PFAS

TestAmerica Job ID: 320-44967-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-44967-1	PW-530	Water	10/31/18 09:20	11/05/18 11:40
320-44967-2	PW-430	Water	10/31/18 09:34	11/05/18 11:40
320-44967-3	PW-434	Water	10/31/18 12:37	11/05/18 11:40
320-44967-4	PW-432	Water	10/31/18 11:40	11/05/18 11:40
320-44967-5	PW-401	Water	10/31/18 13:39	11/05/18 11:40
320-44967-6	PW-435	Water	10/31/18 14:42	11/05/18 11:40
320-44967-7	PW-436	Water	10/31/18 15:34	11/05/18 11:40
320-44967-8	PW-230	Water	10/31/18 09:30	11/05/18 11:40
320-44967-9	PW-231	Water	10/31/18 10:38	11/05/18 11:40
320-44967-10	PW-232	Water	10/31/18 11:29	11/05/18 11:40
320-44967-11	PW-233	Water	10/31/18 12:07	11/05/18 11:40
320-44967-12	PW-234	Water	10/31/18 13:20	11/05/18 11:40
320-44967-13	PW-255	Water	10/31/18 14:30	11/05/18 11:40
320-44967-14	PW-336	Water	10/31/18 15:09	11/05/18 11:40
320-44967-15	PW-236	Water	10/31/18 15:19	11/05/18 11:40
320-44967-16	PW-440	Water	11/01/18 14:39	11/05/18 11:40
320-44967-17	PW-213	Water	11/01/18 15:32	11/05/18 11:40
320-44967-18	PW-218	Water	11/01/18 16:50	11/05/18 11:40
320-44967-19	PW-235	Water	11/01/18 09:25	11/05/18 11:40
320-44967-20	PW-237	Water	11/01/18 11:20	11/05/18 11:40
320-44967-21	PW-238	Water	11/01/18 13:18	11/05/18 11:40
320-44967-22	PW-239	Water	11/01/18 14:44	11/05/18 11:40
320-44967-23	PW-240	Water	11/01/18 15:23	11/05/18 11:40
320-44967-24	PW-341	Water	11/01/18 15:41	11/05/18 11:40
320-44967-25	PW-241	Water	11/01/18 15:51	11/05/18 11:40
320-44967-26	PW-221	Water	11/01/18 16:38	11/05/18 11:40
320-44967-27	PW-461	Water	11/02/18 14:59	11/05/18 11:40
320-44967-28	PW-431	Water	11/02/18 16:02	11/05/18 11:40
320-44967-29	PW-460	Water	11/02/18 13:22	11/05/18 11:40
320-44967-30	PW-248	Water	11/02/18 13:21	11/05/18 11:40
320-44967-31	PW-247	Water	11/02/18 14:26	11/05/18 11:40
320-44967-32	PW-249	Water	11/02/18 14:58	11/05/18 11:40
320-44967-33	PW-349	Water	11/02/18 14:48	11/05/18 11:40

CHAIN-OF-CUSTODY RECORD

Laboratory Test America Page 1 of 4
 Attn: David Altricker

Analytical Methods (include preservative if used)

Quote No: _____
 J-Flags: Yes No

Turn Around Time:
 Normal Rush
 Please Specify _____

320-44967 Chain of Custody



Total Number of Containers

Remarks/Matrix Composition/Grab? Sample Containers

Sample Identity	Lab No.	Time	Date Sampled	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
PW-530		9:20	10/31/18	[Signature]		
PW-430		9:34		[Signature]		
PW-434		12:37		[Signature]		
PW-432		11:44		[Signature]		
PW-401		1:39		[Signature]		
PW-435		1:42		[Signature]		
PW-436		1:54		[Signature]		
PW-230		9:30		[Signature]		
PW-231		10:38		[Signature]		
PW-232		11:29		[Signature]		

Project Information
 Number: 101543-001
 Name: Gustavus Airport PFA's
 Contact: KRF
 Ongoing Project? Yes No
 Sampler: KRF, CAB

Sample Receipt
 Total No. of Containers: 66
 COC Seals/Intact? Y/N/A
 Received Good Cond./Cold
 Temp:
 Delivery Method: Goldstreak

Notes:

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

Relinquished By: 1.
 Signature: [Signature]
 Printed Name: Kristen Freiburger
 Date: 11/3/18
 Company: Shannon & Wilson

Relinquished By: 2.
 Signature: _____
 Printed Name: _____
 Date: _____
 Company: _____

Relinquished By: 3.
 Signature: _____
 Printed Name: _____
 Date: _____
 Company: _____

CHAIN-OF-CUSTODY RECORD

Page 2 of 4
 Laboratory Test American
 Attn: David Alltocker

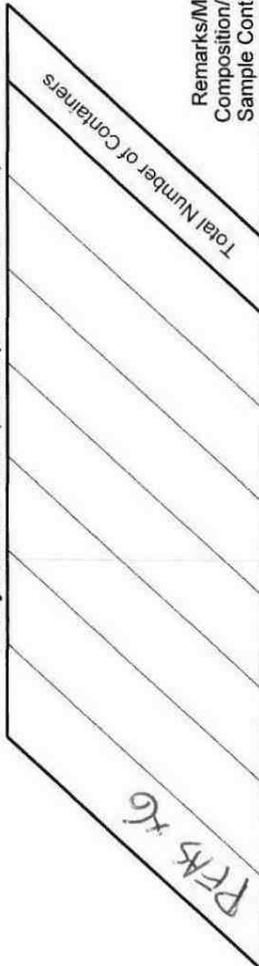
Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush

Please Specify

Quote No: _____

J-Flags: Yes No



Sample Identity	Lab No.	Time	Date Sampled		Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-233		1207	10/31/18	X	2	Groundwater
PW-234		1320		X	2	
PW-255		1430		X	2	
PW-336		1509		X	2	
PW-236		1519		X	2	
PW-440		1439	11/1/18	X	2	
PW-213		1532		X	2	
PW-218		1050		X	2	
PW-235		925		X	2	
PW-237		11:20		X	2	

Project Information

Number: _____

Name: Agape

Contact: _____

Ongoing Project? Yes No

Sampler: _____

Sample Receipt

Total No. of Containers: _____

COC Seals/Intact? Y/N/NA _____

Received Good Cond./Cold _____

Temp: _____

Delivery Method: _____

Notes:

see page 2

ONE

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: _____ Date: _____	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Sanifer Darlington</u> Company: _____	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1140</u> Date: <u>10/31/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

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

No. 35728
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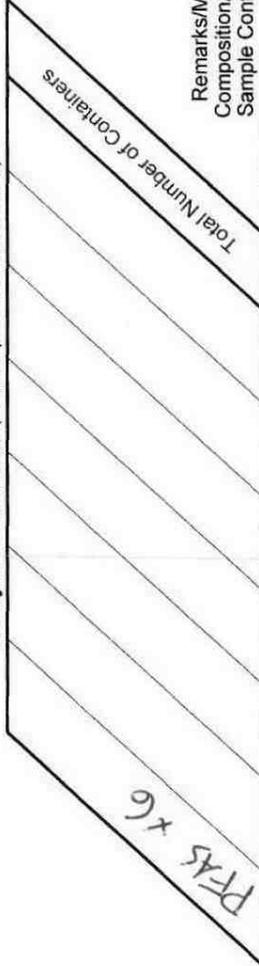
CHAIN-OF-CUSTODY RECORD

Laboratory Test American Page 3 of 4
 Attn: David Althecker

Analytical Methods (include preservative if used)

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

Sample Identity	Lab No.	Time	Date Sampled	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.	Remarks/Matrix Composition/Grab? Sample Containers
PW-238		1318	11/1/18	X			Groundwater
PW-239		1444		X			
PW-240		1523		X			
PW-341		1541		X			
PW-241		1551		X			
PW-221		1638		X			
PW-261		14:59 11/2/18		X			
PW-461		14:59 11/2/18		X			
PW-431		16:02		X			
PW-460		13:22		X			



Project Information
 Number: _____
 Name: _____
 Contact: _____
 Ongoing Project? Yes No
 Sampler: _____

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

Relinquished By: 1.
 Signature: _____
 Printed Name: _____
 Company: _____
 Time: _____
 Date: _____

Relinquished By: 2.
 Signature: _____
 Printed Name: _____
 Company: _____
 Time: _____
 Date: _____

Relinquished By: 3.
 Signature: _____
 Printed Name: _____
 Company: _____
 Time: _____
 Date: _____

Received By: 1.
 Signature: [Signature]
 Printed Name: Shirley Burlington
 Company: PAW Sac
 Time: 1140
 Date: 5/10/18

Received By: 2.
 Signature: _____
 Printed Name: _____
 Company: _____
 Time: _____
 Date: _____

Received By: 3.
 Signature: _____
 Printed Name: _____
 Company: _____
 Time: _____
 Date: _____

Notes:
[Handwritten notes]

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



5.80

No. 35731

CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

Quote No: _____
 J-Flags: Yes No

Turn Around Time:
 Normal Rush
 Please Specify _____

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-248		1321	11/2/18	2	Groundwater
PW-247		1426		2	
PW-249		1458		2	
PW-349		1448		2	

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: _____ Date: _____	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>Schiffelberg</u> Company: <u>CAW</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>1146</u> Date: <u>11/2/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

Sample Receipt

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

Project Information

Number: _____
 Name: _____
 Contact: _____
 Ongoing Project? Yes No
 Sampler: _____

Notes:
Done

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: 320-44967-1

Login Number: 44967

List Number: 1

Creator: Her, David A

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.	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	Refer to Job Narrative for details.
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 <math><6\text{mm}</math> (1/4").	N/A	
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:

November 20, 2018

CS Report Name:

Gustavus Airport

Report Date:

November 19, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-44967-1

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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 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:

The sample coolers were recorded at 3.5 and 5.8° C upon receipt at the laboratory.

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

 Yes No

Comments:

Analysis of PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality or usability are not affected; 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 coolers upon receipt at the laboratory were 3.5 and 5.8° C. It further notes that several samples were yellow, orange and/or had floating particles.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batches 320-259145 and 320-259147.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

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

Comments:

The case narrative does not note an effect on data quality.

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 for each sample.

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 the applicable ADEC action level for drinking water and proposed ADEC groundwater cleanup levels for PFAS.

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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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:

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:

N/A; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

PFAS compounds are not volatile; therefore, 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:

Yes, four field-duplicates pairs were submitted with this work order.

ii. Submitted blind to lab?

Yes No

Comments:

Field duplicate pairs *PW-336 / PW-236*, *PW-341/PW-241*, *PW-349/PW-249*, and *PW-530 / PW-430* were 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 RPDs, where calculable for detected values, were less than 30% for each analyte.

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 for this project are 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:

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: 320-46041-1
Client Project/Site: Gustavus PFAS

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

Attn: Kristen Freiburger



Authorized for release by:
12/19/2018 8:16:11 AM

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

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Definitions/Glossary

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

TestAmerica Job ID: 320-46041-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
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: Gustavus PFAS

TestAmerica Job ID: 320-46041-1

Job ID: 320-46041-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative
320-46041-1

Receipt

The samples were received on 12/11/2018 11:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.9° 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 320-265284.

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: Gustavus PFAS

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-442

Lab Sample ID: 320-46041-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L	1		WS-LC-0025 At1	Total/NA

Client Sample ID: PW-066

Lab Sample ID: 320-46041-2

No Detections.

Client Sample ID: PW-275

Lab Sample ID: 320-46041-3

No Detections.

Client Sample ID: PW-375

Lab Sample ID: 320-46041-4

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

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

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-442
Date Collected: 12/07/18 16:55
Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-1
Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 11:13	12/15/18 12:28	1
Perfluorohexanesulfonic acid (PFHxS)	1.1	J	2.0	0.87	ng/L		12/14/18 11:13	12/15/18 12:28	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 11:13	12/15/18 12:28	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 11:13	12/15/18 12:28	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 11:13	12/15/18 12:28	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 11:13	12/15/18 12:28	1
<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>18O2 PFHxS</i>	<i>106</i>		<i>25 - 150</i>				<i>12/14/18 11:13</i>	<i>12/15/18 12:28</i>	<i>1</i>
<i>13C4 PFHpA</i>	<i>108</i>		<i>25 - 150</i>				<i>12/14/18 11:13</i>	<i>12/15/18 12:28</i>	<i>1</i>
<i>13C4 PFOA</i>	<i>110</i>		<i>25 - 150</i>				<i>12/14/18 11:13</i>	<i>12/15/18 12:28</i>	<i>1</i>
<i>13C4 PFOS</i>	<i>108</i>		<i>25 - 150</i>				<i>12/14/18 11:13</i>	<i>12/15/18 12:28</i>	<i>1</i>
<i>13C5 PFNA</i>	<i>103</i>		<i>25 - 150</i>				<i>12/14/18 11:13</i>	<i>12/15/18 12:28</i>	<i>1</i>

Client Sample Results

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

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-066

Date Collected: 12/08/18 12:30

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-2

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 11:13	12/15/18 12:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/14/18 11:13	12/15/18 12:46	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 11:13	12/15/18 12:46	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 11:13	12/15/18 12:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 11:13	12/15/18 12:46	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 11:13	12/15/18 12:46	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150				12/14/18 11:13	12/15/18 12:46	1
13C4 PFHpA	114		25 - 150				12/14/18 11:13	12/15/18 12:46	1
13C4 PFOA	109		25 - 150				12/14/18 11:13	12/15/18 12:46	1
13C4 PFOS	111		25 - 150				12/14/18 11:13	12/15/18 12:46	1
13C5 PFNA	111		25 - 150				12/14/18 11:13	12/15/18 12:46	1

Client Sample Results

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

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-275

Date Collected: 12/09/18 10:19

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-3

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 11:13	12/15/18 13:23	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/14/18 11:13	12/15/18 13:23	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 11:13	12/15/18 13:23	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 11:13	12/15/18 13:23	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 11:13	12/15/18 13:23	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 11:13	12/15/18 13:23	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	117		25 - 150	12/14/18 11:13	12/15/18 13:23	1
13C4 PFHpA	115		25 - 150	12/14/18 11:13	12/15/18 13:23	1
13C4 PFOA	122		25 - 150	12/14/18 11:13	12/15/18 13:23	1
13C4 PFOS	116		25 - 150	12/14/18 11:13	12/15/18 13:23	1
13C5 PFNA	114		25 - 150	12/14/18 11:13	12/15/18 13:23	1

Client Sample Results

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

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-375

Date Collected: 12/09/18 10:09

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-4

Matrix: Water

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 11:13	12/15/18 13:41	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/14/18 11:13	12/15/18 13:41	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 11:13	12/15/18 13:41	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 11:13	12/15/18 13:41	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 11:13	12/15/18 13:41	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 11:13	12/15/18 13:41	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
18O2 PFHxS	117		25 - 150				12/14/18 11:13	12/15/18 13:41	1
13C4 PFHpA	115		25 - 150				12/14/18 11:13	12/15/18 13:41	1
13C4 PFOA	121		25 - 150				12/14/18 11:13	12/15/18 13:41	1
13C4 PFOS	118		25 - 150				12/14/18 11:13	12/15/18 13:41	1
13C5 PFNA	109		25 - 150				12/14/18 11:13	12/15/18 13:41	1

Isotope Dilution Summary

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

TestAmerica Job ID: 320-46041-1

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	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)
320-46041-1	PW-442	106	108	110	108	103
320-46041-2	PW-066	113	114	109	111	111
320-46041-3	PW-275	117	115	122	116	114
320-46041-4	PW-375	117	115	121	118	109
LCS 320-265284/2-A	Lab Control Sample	104	105	103	109	97
LCSD 320-265284/3-A	Lab Control Sample Dup	114	110	110	109	106
MB 320-265284/1-A	Method Blank	110	113	111	110	109

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: Gustavus PFAS

TestAmerica Job ID: 320-46041-1

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

Lab Sample ID: MB 320-265284/1-A

Matrix: Water

Analysis Batch: 265413

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 265284

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.92	ng/L		12/14/18 11:13	12/15/18 10:01	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.87	ng/L		12/14/18 11:13	12/15/18 10:01	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.80	ng/L		12/14/18 11:13	12/15/18 10:01	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.75	ng/L		12/14/18 11:13	12/15/18 10:01	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	1.3	ng/L		12/14/18 11:13	12/15/18 10:01	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.65	ng/L		12/14/18 11:13	12/15/18 10:01	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150	12/14/18 11:13	12/15/18 10:01	1
13C4 PFHpA	113		25 - 150	12/14/18 11:13	12/15/18 10:01	1
13C4 PFOA	111		25 - 150	12/14/18 11:13	12/15/18 10:01	1
13C4 PFOS	110		25 - 150	12/14/18 11:13	12/15/18 10:01	1
13C5 PFNA	109		25 - 150	12/14/18 11:13	12/15/18 10:01	1

Lab Sample ID: LCS 320-265284/2-A

Matrix: Water

Analysis Batch: 265413

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 265284

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	19.4		ng/L		109	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.9		ng/L		104	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	20.9		ng/L		105	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	20.9		ng/L		104	70 - 140
Perfluorooctanesulfonic acid (PFOS)	18.6	18.5		ng/L		100	69 - 144
Perfluorononanoic acid (PFNA)	20.0	22.3		ng/L		111	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4 PFHpA	105		25 - 150
13C4 PFOA	103		25 - 150
13C4 PFOS	109		25 - 150
13C5 PFNA	97		25 - 150

Lab Sample ID: LCSD 320-265284/3-A

Matrix: Water

Analysis Batch: 265413

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 265284

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	17.7	19.3		ng/L		109	72 - 151	0	30
Perfluorohexanesulfonic acid (PFHxS)	18.2	18.9		ng/L		104	73 - 157	0	30
Perfluoroheptanoic acid (PFHpA)	20.0	22.5		ng/L		113	71 - 138	7	30
Perfluorooctanoic acid (PFOA)	20.0	21.4		ng/L		107	70 - 140	2	30
Perfluorooctanesulfonic acid (PFOS)	18.6	19.1		ng/L		103	69 - 144	3	30
Perfluorononanoic acid (PFNA)	20.0	22.4		ng/L		112	73 - 147	0	30

TestAmerica Sacramento

QC Sample Results

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

TestAmerica Job ID: 320-46041-1

<i>Isotope Dilution</i>	<i>LCS D</i>	<i>LCS D</i>	<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>18O2 PFHxS</i>	114		25 - 150
<i>13C4 PFHpA</i>	110		25 - 150
<i>13C4 PFOA</i>	110		25 - 150
<i>13C4 PFOS</i>	109		25 - 150
<i>13C5 PFNA</i>	106		25 - 150

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QC Association Summary

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

TestAmerica Job ID: 320-46041-1

LCMS

Prep Batch: 265284

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-46041-1	PW-442	Total/NA	Water	PFAS Prep	
320-46041-2	PW-066	Total/NA	Water	PFAS Prep	
320-46041-3	PW-275	Total/NA	Water	PFAS Prep	
320-46041-4	PW-375	Total/NA	Water	PFAS Prep	
MB 320-265284/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-265284/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
LCSD 320-265284/3-A	Lab Control Sample Dup	Total/NA	Water	PFAS Prep	

Analysis Batch: 265413

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-46041-1	PW-442	Total/NA	Water	WS-LC-0025 At1	265284
320-46041-2	PW-066	Total/NA	Water	WS-LC-0025 At1	265284
320-46041-3	PW-275	Total/NA	Water	WS-LC-0025 At1	265284
320-46041-4	PW-375	Total/NA	Water	WS-LC-0025 At1	265284
MB 320-265284/1-A	Method Blank	Total/NA	Water	WS-LC-0025 At1	265284
LCS 320-265284/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 At1	265284
LCSD 320-265284/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025 At1	265284

Lab Chronicle

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

TestAmerica Job ID: 320-46041-1

Client Sample ID: PW-442

Date Collected: 12/07/18 16:55

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-1

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	265284	12/14/18 11:13	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 12:28	D1R	TAL SAC

Client Sample ID: PW-066

Date Collected: 12/08/18 12:30

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-2

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	265284	12/14/18 11:13	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 12:46	D1R	TAL SAC

Client Sample ID: PW-275

Date Collected: 12/09/18 10:19

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-3

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	265284	12/14/18 11:13	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 13:23	D1R	TAL SAC

Client Sample ID: PW-375

Date Collected: 12/09/18 10:09

Date Received: 12/11/18 11:15

Lab Sample ID: 320-46041-4

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	265284	12/14/18 11:13	JRM	TAL SAC
Total/NA	Analysis	WS-LC-0025 At1		1			265413	12/15/18 13:41	D1R	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: Gustavus PFAS

TestAmerica Job ID: 320-46041-1

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	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

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

TestAmerica Job ID: 320-46041-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025 At1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	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: Gustavus PFAS

TestAmerica Job ID: 320-46041-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-46041-1	PW-442	Water	12/07/18 16:55	12/11/18 11:15
320-46041-2	PW-066	Water	12/08/18 12:30	12/11/18 11:15
320-46041-3	PW-275	Water	12/09/18 10:19	12/11/18 11:15
320-46041-4	PW-375	Water	12/09/18 10:09	12/11/18 11:15

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CHAIN-OF-CUSTODY RECORD

Analytical Methods (include preservative if used)

Turn Around Time:
 Normal Rush
 Please Specify

Quote No: _____
 J-Flags: Yes No

Sample Identity	Lab No.	Time	Date Sampled	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
PW-442		1655	12/7/18	2	Groundwater
PW-066		1230	12/8/18	2	
PW-275		1019	12/8/18	2	
PW-375		1009	12/9/18	2	



Project Information
 Number: 101543-001
 Name: Gustavus PFAS
 Contact: KRF
 Ongoing Project? Yes No
 Sampler: CAB/APW

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

Notes:
 Please bill to 101543-001

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>Adam Wyborny</u> Printed Name: <u>Adam Wyborny</u> Company: <u>Shannon & Wilson, Inc.</u>	Signature: _____ Printed Name: _____ Company: _____	Signature: _____ Printed Name: _____ Company: _____
Time: <u>10:00</u> Date: <u>12/10/18</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1. Signature: _____ Printed Name: <u>City Tree</u> Company: _____	Received By: 2. Signature: _____ Printed Name: _____ Company: _____	Received By: 3. Signature: _____ Printed Name: _____ Company: _____
Time: <u>11:5</u> Date: <u>12/11/18</u>	Time: _____ Date: _____	Time: _____ Date: _____

Login Sample Receipt Checklist

Client: Shannon & Wilson, Inc

Job Number: 320-46041-1

Login Number: 46041

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	SEALS
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	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 <math><6\text{mm}</math> (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:

Amber Masters

Title:

Environmental Scientist

Date:

December 19, 2018

CS Report Name:

Gustavus Airport

Report Date:

December 19, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

TestAmerica Laboratories, Inc.

Laboratory Report Number:

320-46041-1

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

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 PFASs. 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:

N/A; all 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:

- 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:

The sample cooler was recorded at 5.9° C upon receipt at the laboratory.

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

 Yes No

Comments:

Analysis of PFAS compounds 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 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 noted in the sample receipt documentation.

- e. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected; 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 5.9° C.

The case narrative notes there was insufficient sample volume available to perform a matrix spike (MS) and MS duplicate (MSD) associated with preparation batch 320-265284.

- c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narrative.

- 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.

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 for all samples.

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; PFAS compounds were not detected in method blank sample.

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

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified 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 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/or usability are 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; there were no IDA recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and/or usability are not 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:

PFAS compounds are not volatile; therefore, 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:

ii. Submitted blind to lab?

Yes No

Comments:

The field duplicate samples *PW-275* and *PW-375* were 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:

PFAS compounds were not detected in the field duplicate samples. Relative precision cannot be assessed when there are no measurable detections.

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

Comments:

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

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

Yes No Not Applicable

Samples for this project are 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:

There were no other data flags/qualifiers required.



Laboratory Report of Analysis

To: Shannon & Wilson-Fairbanks
2355 Hill Rd.
Fairbanks, AK 99701
(907)479-0600

Report Number: **1186919**

Client Project: **101543-001 Gustavus PFAS**

Dear Kristen Freiburger,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Jennifer at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Jennifer Dawkins
Project Manager
Jennifer.Dawkins@sgs.com

Date



Case Narrative

SGS Client: Shannon & Wilson-Fairbanks

SGS Project: 1186919

Project Name/Site: 101543-001 Gustavus PFAS

Refer to sample receipt form for information on sample condition.

PW-406

1186919001 PS

EPA 537- PFCs 5.1 DOD were analyzed by SGS of Orlando, FL.

Speciated Arsenic (Arsenate, Arsenite) was analyzed by Brooks Applied of Bothell, WA.

WTI/5078]

1491254 MB

2510B - Conductivity - Conductivity of the MB is detected above the LOQ. The conductivity of the samples are 10 times greater than the MB.

1186919005DUP

1491314 DUP

2540D - Total Suspended Solids - Sample duplicate RPD was outside of acceptance limits. The difference between sample and duplicate results is less than the LOQ.

1186919005MS

1491434 MS

4500NH3-G - Ammonia - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.

1186919002MSD

1491650 MSD

4500NO3-F - Nitrate/Nitrite - MSD recovery for Total Nitrate/Nitrite is outside of QC criteria. Refer to LCS for accuracy requirements.

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to the associated field samples.

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry (Provisionally Certified as of 12/06/2018 for Uranium by EPA200.8, TDS by SM 2540C and Nitrate by SM 4500-NO3-F) & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
PW-406	1186919001	12/07/2018	12/10/2018	Water (Surface, Eff., Ground)
PW-405	1186919002	12/08/2018	12/10/2018	Water (Surface, Eff., Ground)
PW-505	1186919003	12/08/2018	12/10/2018	Water (Surface, Eff., Ground)
PW-202	1186919004	12/08/2018	12/10/2018	Water (Surface, Eff., Ground)
PW-408	1186919005	12/08/2018	12/10/2018	Water (Surface, Eff., Ground)
PW-200	1186919006	12/09/2018	12/10/2018	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
SM21 2320B	Alkalinity as CaCO3 QC
SM21 4500-NH3 G	Ammonia-N (W) SM21 4500-NH3 G
SM21 2510B	Conductivity SM2510B
SM21 2340B	Hardness as CaCO3 by ICP-MS
EPA 300.0	Ion Chromatographic Analysis (W)
EP200.8	Metals in Water by 200.8 ICP-MS
SM21 4500NO3-F	Nitrate/Nitrite Flow injection Pres.
EPA 1664B	Oil & Grease HEM by EPA 1664
SM21 4500-H B	pH Analysis
SM23 4500S D	Sulfide by Colorimetric
SM21 2540C	Total Dissolved Solids SM18 2540C
SM 5310B	Total Organic Carbon
SM21 2540D	Total Suspended Solids SM20 2540D



Detectable Results Summary

Client Sample ID: **PW-406**
 Lab Sample ID: 1186919001

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	64100	ug/L
Hardness as CaCO3	198000	ug/L
Iron	7740	ug/L
Magnesium	9210	ug/L
Manganese	218	ug/L
Potassium	8540	ug/L
Sodium	100000	ug/L
Alkalinity	224000	ug/L
Ammonia-N	0.292	mg/L
Chloride	127000	ug/L
Conductivity	882	umhos/cm
Fluoride	151J	ug/L
Oil & Grease HEM	2150J	ug/L
pH	7.6	pH units
Sulfate	15400	ug/L
Total Nitrate/Nitrite-N	36.8J	ug/L
Total Organic Carbon	3030	ug/L
Total Suspended Solids	14000	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	481000	ug/L

Client Sample ID: **PW-405**
 Lab Sample ID: 1186919002

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Calcium	69400	ug/L
Hardness as CaCO3	215000	ug/L
Iron	1980	ug/L
Magnesium	10100	ug/L
Manganese	218	ug/L
Potassium	6370	ug/L
Sodium	57000	ug/L
Alkalinity	239000	ug/L
Ammonia-N	0.0958J	mg/L
Chloride	74900	ug/L
Conductivity	727	umhos/cm
Fluoride	123J	ug/L
Oil & Grease HEM	2000J	ug/L
pH	7.6	pH units
Sulfate	12100	ug/L
Total Organic Carbon	2080	ug/L
Total Suspended Solids	4540	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	384000	ug/L

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Detectable Results Summary

Client Sample ID: **PW-505**
 Lab Sample ID: 1186919003

Metals by ICP/MS

Parameter	Result	Units
Calcium	71500	ug/L
Hardness as CaCO3	220000	ug/L
Iron	2120	ug/L
Magnesium	10100	ug/L
Manganese	230	ug/L
Potassium	6670	ug/L
Sodium	57300	ug/L
Alkalinity	233000	ug/L
Ammonia-N	0.0452J	mg/L
Chloride	74500	ug/L
Conductivity	726	umhos/cm
Fluoride	122J	ug/L
Oil & Grease HEM	2500J	ug/L
pH	7.6	pH units
Sulfate	12100	ug/L
Total Nitrate/Nitrite-N	68.8J	ug/L
Total Organic Carbon	2270	ug/L
Total Suspended Solids	5760	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	393000	ug/L

Client Sample ID: **PW-202**
 Lab Sample ID: 1186919004

Metals by ICP/MS

Parameter	Result	Units
Calcium	96000	ug/L
Hardness as CaCO3	264000	ug/L
Iron	6020	ug/L
Magnesium	5870	ug/L
Manganese	146	ug/L
Potassium	1660	ug/L
Sodium	8890	ug/L
Alkalinity	257000	ug/L
Ammonia-N	0.135	mg/L
Chloride	15800	ug/L
Conductivity	592	umhos/cm
Fluoride	84.0J	ug/L
Oil & Grease HEM	2710J	ug/L
pH	7.6	pH units
Sulfate	19000	ug/L
Total Nitrate/Nitrite-N	65.0J	ug/L
Total Organic Carbon	2750	ug/L
Total Suspended Solids	13200	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	317000	ug/L

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Detectable Results Summary

Client Sample ID: **PW-408**
Lab Sample ID: 1186919005

Metals by ICP/MS

Parameter	Result	Units
Calcium	65800	ug/L
Hardness as CaCO3	220000	ug/L
Iron	4190	ug/L
Magnesium	13500	ug/L
Manganese	225	ug/L
Potassium	7050	ug/L
Sodium	78100	ug/L
Alkalinity	217000	ug/L
Ammonia-N	0.274	mg/L
Chloride	127000	ug/L
Conductivity	845	umhos/cm
Fluoride	125J	ug/L
Oil & Grease HEM	2580J	ug/L
pH	7.6	pH units
Sulfate	13400	ug/L
Total Organic Carbon	2530	ug/L
Total Suspended Solids	13800	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	455000	ug/L

Client Sample ID: **PW-200**
Lab Sample ID: 1186919006

Metals by ICP/MS

Parameter	Result	Units
Calcium	64900	ug/L
Hardness as CaCO3	202000	ug/L
Iron	2440	ug/L
Magnesium	9700	ug/L
Manganese	339	ug/L
Potassium	6110	ug/L
Sodium	51300	ug/L
Alkalinity	232000	ug/L
Ammonia-N	0.120	mg/L
Chloride	68200	ug/L
Conductivity	689	umhos/cm
Fluoride	126J	ug/L
Oil & Grease HEM	2980J	ug/L
pH	7.6	pH units
Sulfate	9050	ug/L
Total Nitrate/Nitrite-N	31.6J	ug/L
Total Organic Carbon	2200	ug/L
Total Suspended Solids	5630	ug/L
Waters Department (Provisional Cert for TDS) Total Dissolved Solids	379000	ug/L

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Results of **PW-406**

Client Sample ID: **PW-406**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919001
Lab Project ID: 1186919

Collection Date: 12/07/18 14:07
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	64100	500	150	ug/L	1		12/13/18 14:36
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:36
Iron	7740	250	78.0	ug/L	1		12/13/18 14:36
Magnesium	9210	50.0	15.0	ug/L	1		12/13/18 14:36
Manganese	218	1.00	0.310	ug/L	1		12/13/18 14:36
Potassium	8540	500	150	ug/L	1		12/13/18 14:36
Sodium	100000	500	150	ug/L	1		12/13/18 14:36

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:36
Container ID: 1186919001-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	198000	5000	5000	ug/L	1		12/13/18 14:36

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:36
Container ID: 1186919001-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of PW-406

Client Sample ID: **PW-406**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919001
Lab Project ID: 1186919

Collection Date: 12/07/18 14:07
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Oil & Grease HEM	2150 J	4300	1080	ug/L	1		12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919001-E

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Chloride	127000	2000	500	ug/L	10		12/18/18 14:33
Fluoride	151 J	200	50.0	ug/L	1		12/14/18 19:24
Sulfate	15400	200	50.0	ug/L	1		12/14/18 19:24

Batch Information

Analytical Batch: WIC5858
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/18/18 14:33
Container ID: 1186919001-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/14/18 19:24
Container ID: 1186919001-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	3030	1000	400	ug/L	1		12/14/18 02:18

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 02:18
Container ID: 1186919001-C

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
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Results of PW-406

Client Sample ID: **PW-406**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919001
Lab Project ID: 1186919

Collection Date: 12/07/18 14:07
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	224000	10000	2500	ug/L	1		12/12/18 11:54

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 11:54
Container ID: 1186919001-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Conductivity	882	1.00	0.477	umhos/cm	1		12/12/18 11:54

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 11:54
Container ID: 1186919001-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Suspended Solids	14000	2220	689	ug/L	1		12/12/18 17:11

Batch Information

Analytical Batch: STS6108
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/12/18 17:11
Container ID: 1186919001-D

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
pH	7.6	0.100	0.100	pH units	1		12/12/18 11:54



Results of **PW-406**

Client Sample ID: **PW-406**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919001
Lab Project ID: 1186919

Collection Date: 12/07/18 14:07
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 11:54
Container ID: 1186919001-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Ammonia-N	0.292	0.100	0.0310	mg/L	1		12/12/18 16:00

Batch Information

Analytical Batch: WDA4471	Prep Batch: WXX12655
Analytical Method: SM21 4500-NH3 G	Prep Method: METHOD
Analyst: DMM	Prep Date/Time: 12/12/18 14:50
Analytical Date/Time: 12/12/18 16:00	Prep Initial Wt./Vol.: 6 mL
Container ID: 1186919001-H	Prep Extract Vol: 6 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Nitrate/Nitrite-N	36.8 J	100	25.0	ug/L	2		12/14/18 13:14

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:14
Container ID: 1186919001-H

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Sulfide	50.0 U	100	31.0	ug/L	1		12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919001-G



Results of PW-406

Client Sample ID: **PW-406**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919001
Lab Project ID: 1186919

Collection Date: 12/07/18 14:07
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	481000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919001-A



Results of **PW-405**

Client Sample ID: **PW-405**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919002
Lab Project ID: 1186919

Collection Date: 12/08/18 10:43
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	69400	500	150	ug/L	1		12/13/18 14:39
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:39
Iron	1980	250	78.0	ug/L	1		12/13/18 14:39
Magnesium	10100	50.0	15.0	ug/L	1		12/13/18 14:39
Manganese	218	1.00	0.310	ug/L	1		12/13/18 14:39
Potassium	6370	500	150	ug/L	1		12/13/18 14:39
Sodium	57000	500	150	ug/L	1		12/13/18 14:39

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:39
Container ID: 1186919002-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	215000	5000	5000	ug/L	1		12/13/18 14:39

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:39
Container ID: 1186919002-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of **PW-405**

Client Sample ID: **PW-405**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919002
Lab Project ID: 1186919

Collection Date: 12/08/18 10:43
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Oil & Grease HEM	2000 J	4210	1050	ug/L	1		12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919002-E

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Chloride	74900	1000	250	ug/L	5		12/14/18 23:11
Fluoride	123 J	200	50.0	ug/L	1		12/14/18 19:43
Sulfate	12100	200	50.0	ug/L	1		12/14/18 19:43

Batch Information

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/14/18 19:43
Container ID: 1186919002-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/14/18 23:11
Container ID: 1186919002-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	2080	1000	400	ug/L	1		12/14/18 02:37

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 02:37
Container ID: 1186919002-C

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
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Results of PW-405

Client Sample ID: **PW-405**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919002
Lab Project ID: 1186919

Collection Date: 12/08/18 10:43
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	239000	10000	2500	ug/L	1		12/12/18 12:16

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:16
Container ID: 1186919002-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Conductivity	727	1.00	0.477	umhos/cm	1		12/12/18 12:16

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:16
Container ID: 1186919002-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Suspended Solids	4540	987	306	ug/L	1		12/13/18 15:02

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/13/18 15:02
Container ID: 1186919002-D

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
pH	7.6	0.100	0.100	pH units	1		12/12/18 12:16



Results of **PW-405**

Client Sample ID: **PW-405**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919002
Lab Project ID: 1186919

Collection Date: 12/08/18 10:43
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:16
Container ID: 1186919002-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Ammonia-N	0.0958 J	0.100	0.0310	mg/L	1		12/12/18 16:02

Batch Information

Analytical Batch: WDA4471	Prep Batch: WXX12655
Analytical Method: SM21 4500-NH3 G	Prep Method: METHOD
Analyst: DMM	Prep Date/Time: 12/12/18 14:50
Analytical Date/Time: 12/12/18 16:02	Prep Initial Wt./Vol.: 6 mL
Container ID: 1186919002-H	Prep Extract Vol: 6 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Nitrate/Nitrite-N	50.0 U	100	25.0	ug/L	2		12/14/18 13:16

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:16
Container ID: 1186919002-H

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Sulfide	50.0 U	100	31.0	ug/L	1		12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919002-G



Results of PW-405

Client Sample ID: **PW-405**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919002
Lab Project ID: 1186919

Collection Date: 12/08/18 10:43
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	384000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919002-A



Results of **PW-505**

Client Sample ID: **PW-505**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919003
Lab Project ID: 1186919

Collection Date: 12/08/18 10:33
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	71500	500	150	ug/L	1		12/13/18 14:42
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:42
Iron	2120	250	78.0	ug/L	1		12/13/18 14:42
Magnesium	10100	50.0	15.0	ug/L	1		12/13/18 14:42
Manganese	230	1.00	0.310	ug/L	1		12/13/18 14:42
Potassium	6670	500	150	ug/L	1		12/13/18 14:42
Sodium	57300	500	150	ug/L	1		12/13/18 14:42

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:42
Container ID: 1186919003-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	220000	5000	5000	ug/L	1		12/13/18 14:42

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:42
Container ID: 1186919003-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of **PW-505**

Client Sample ID: **PW-505**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919003
Lab Project ID: 1186919

Collection Date: 12/08/18 10:33
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Oil & Grease HEM	2500 J	4170	1040	ug/L	1		12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919003-E

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Chloride	74500	1000	250	ug/L	5		12/14/18 23:30
Fluoride	122 J	200	50.0	ug/L	1		12/14/18 20:02
Sulfate	12100	200	50.0	ug/L	1		12/14/18 20:02

Batch Information

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/14/18 20:02
Container ID: 1186919003-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/14/18 23:30
Container ID: 1186919003-A

Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	2270	1000	400	ug/L	1		12/14/18 02:59

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 02:59
Container ID: 1186919003-C

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
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Print Date: 12/27/2018 1:32:24PM

J flagging is activated



Results of **PW-505**

Client Sample ID: **PW-505**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919003
Lab Project ID: 1186919

Collection Date: 12/08/18 10:33
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	233000	10000	2500	ug/L	1		12/12/18 12:26

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:26
Container ID: 1186919003-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Conductivity	726	1.00	0.477	umhos/cm	1		12/12/18 12:26

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:26
Container ID: 1186919003-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Suspended Solids	5760	1090	337	ug/L	1		12/13/18 15:02

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/13/18 15:02
Container ID: 1186919003-D

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
pH	7.6	0.100	0.100	pH units	1		12/12/18 12:26



Results of **PW-505**

Client Sample ID: **PW-505**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919003
Lab Project ID: 1186919

Collection Date: 12/08/18 10:33
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:26
Container ID: 1186919003-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Ammonia-N	0.0452 J	0.100	0.0310	mg/L	1		12/12/18 16:04

Batch Information

Analytical Batch: WDA4471	Prep Batch: WXX12655
Analytical Method: SM21 4500-NH3 G	Prep Method: METHOD
Analyst: DMM	Prep Date/Time: 12/12/18 14:50
Analytical Date/Time: 12/12/18 16:04	Prep Initial Wt./Vol.: 6 mL
Container ID: 1186919003-H	Prep Extract Vol: 6 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Nitrate/Nitrite-N	68.8 J	100	25.0	ug/L	2		12/14/18 13:21

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:21
Container ID: 1186919003-H

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Sulfide	50.0 U	100	31.0	ug/L	1		12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919003-G



Results of PW-505

Client Sample ID: **PW-505**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919003
Lab Project ID: 1186919

Collection Date: 12/08/18 10:33
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	393000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919003-A



Results of **PW-202**

Client Sample ID: **PW-202**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919004
Lab Project ID: 1186919

Collection Date: 12/08/18 15:10
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	96000	500	150	ug/L	1		12/13/18 14:45
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:45
Iron	6020	250	78.0	ug/L	1		12/13/18 14:45
Magnesium	5870	50.0	15.0	ug/L	1		12/13/18 14:45
Manganese	146	1.00	0.310	ug/L	1		12/13/18 14:45
Potassium	1660	500	150	ug/L	1		12/13/18 14:45
Sodium	8890	500	150	ug/L	1		12/13/18 14:45

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:45
Container ID: 1186919004-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	264000	5000	5000	ug/L	1		12/13/18 14:45

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:45
Container ID: 1186919004-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of **PW-202**

Client Sample ID: **PW-202**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919004
Lab Project ID: 1186919

Collection Date: 12/08/18 15:10
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Oil & Grease HEM	2710 J	4170	1040	ug/L	1		12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919004-E

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Chloride	15800	200	50.0	ug/L	1		12/14/18 20:21
Fluoride	84.0 J	200	50.0	ug/L	1		12/14/18 20:21
Sulfate	19000	200	50.0	ug/L	1		12/14/18 20:21

Batch Information

Analytical Batch: WIC5857	Prep Batch: WXX12657
Analytical Method: EPA 300.0	Prep Method: METHOD
Analyst: DMM	Prep Date/Time: 12/14/18 16:30
Analytical Date/Time: 12/14/18 20:21	Prep Initial Wt./Vol.: 10 mL
Container ID: 1186919004-A	Prep Extract Vol: 10 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Organic Carbon	2750	1000	400	ug/L	1		12/14/18 03:19

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 03:19
Container ID: 1186919004-C

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	257000	10000	2500	ug/L	1		12/12/18 12:36



Results of PW-202

Client Sample ID: PW-202
Client Project ID: 101543-001 Gustavus PFAS
Lab Sample ID: 1186919004
Lab Project ID: 1186919

Collection Date: 12/08/18 15:10
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:36
Container ID: 1186919004-A

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Conductivity	592	1.00	0.477	umhos/cm	1		12/12/18 12:36

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:36
Container ID: 1186919004-A

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Suspended Solids	13200	1010	312	ug/L	1		12/13/18 15:02

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/13/18 15:02
Container ID: 1186919004-D

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
pH	7.6	0.100	0.100	pH units	1		12/12/18 12:36

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:36
Container ID: 1186919004-A

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
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Results of PW-202

Client Sample ID: **PW-202**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919004
Lab Project ID: 1186919

Collection Date: 12/08/18 15:10
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Ammonia-N	0.135	0.100	0.0310	mg/L	1		12/12/18 16:06

Batch Information

Analytical Batch: WDA4471
Analytical Method: SM21 4500-NH3 G
Analyst: DMM
Analytical Date/Time: 12/12/18 16:06
Container ID: 1186919004-H

Prep Batch: WXX12655
Prep Method: METHOD
Prep Date/Time: 12/12/18 14:50
Prep Initial Wt./Vol.: 6 mL
Prep Extract Vol: 6 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Nitrate/Nitrite-N	65.0 J	100	25.0	ug/L	2		12/14/18 13:23

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:23
Container ID: 1186919004-H

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Sulfide	50.0 U	100	31.0	ug/L	1		12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919004-G



Results of PW-202

Client Sample ID: **PW-202**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919004
Lab Project ID: 1186919

Collection Date: 12/08/18 15:10
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	317000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919004-A



Results of **PW-408**

Client Sample ID: **PW-408**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919005
Lab Project ID: 1186919

Collection Date: 12/08/18 17:06
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	65800	500	150	ug/L	1		12/13/18 14:48
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:48
Iron	4190	250	78.0	ug/L	1		12/13/18 14:48
Magnesium	13500	50.0	15.0	ug/L	1		12/13/18 14:48
Manganese	225	1.00	0.310	ug/L	1		12/13/18 14:48
Potassium	7050	500	150	ug/L	1		12/13/18 14:48
Sodium	78100	500	150	ug/L	1		12/13/18 14:48

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:48
Container ID: 1186919005-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	220000	5000	5000	ug/L	1		12/13/18 14:48

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:48
Container ID: 1186919005-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of PW-408

Client Sample ID: PW-408
Client Project ID: 101543-001 Gustavus PFAS
Lab Sample ID: 1186919005
Lab Project ID: 1186919

Collection Date: 12/08/18 17:06
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Oil & Grease HEM, 2580 J, 4120, 1030, ug/L, 1, 12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919005-E

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows: Chloride, Fluoride, Sulfate

Batch Information

Analytical Batch: WIC5858
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/18/18 14:52
Container ID: 1186919005-A
Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Total Organic Carbon, 2530, 1000, 400, ug/L, 1, 12/14/18 04:16

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 04:16
Container ID: 1186919005-C

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed

Print Date: 12/27/2018 1:32:24PM

J flagging is activated



Results of **PW-408**

Client Sample ID: **PW-408**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919005
Lab Project ID: 1186919

Collection Date: 12/08/18 17:06
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	217000	10000	2500	ug/L	1		12/12/18 12:57

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:57
Container ID: 1186919005-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Conductivity	845	1.00	0.477	umhos/cm	1		12/12/18 12:57

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:57
Container ID: 1186919005-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Suspended Solids	13800	2220	689	ug/L	1		12/13/18 15:02

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/13/18 15:02
Container ID: 1186919005-D

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
pH	7.6	0.100	0.100	pH units	1		12/12/18 12:57



Results of **PW-408**

Client Sample ID: **PW-408**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919005
Lab Project ID: 1186919

Collection Date: 12/08/18 17:06
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 12:57
Container ID: 1186919005-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Ammonia-N	0.274	0.100	0.0310	mg/L	1		12/12/18 15:42

Batch Information

Analytical Batch: WDA4471	Prep Batch: WXX12655
Analytical Method: SM21 4500-NH3 G	Prep Method: METHOD
Analyst: DMM	Prep Date/Time: 12/12/18 14:50
Analytical Date/Time: 12/12/18 15:42	Prep Initial Wt./Vol.: 6 mL
Container ID: 1186919005-H	Prep Extract Vol: 6 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Nitrate/Nitrite-N	50.0 U	100	25.0	ug/L	2		12/14/18 13:25

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:25
Container ID: 1186919005-H

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Sulfide	50.0 U	100	31.0	ug/L	1		12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919005-G



Results of PW-408

Client Sample ID: **PW-408**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919005
Lab Project ID: 1186919

Collection Date: 12/08/18 17:06
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	455000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919005-A



Results of **PW-200**

Client Sample ID: **PW-200**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919006
Lab Project ID: 1186919

Collection Date: 12/09/18 11:01
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Metals by ICP/MS**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Calcium	64900	500	150	ug/L	1		12/13/18 14:51
Chromium	1.00 U	2.00	0.780	ug/L	1		12/13/18 14:51
Iron	2440	250	78.0	ug/L	1		12/13/18 14:51
Magnesium	9700	50.0	15.0	ug/L	1		12/13/18 14:51
Manganese	339	1.00	0.310	ug/L	1		12/13/18 14:51
Potassium	6110	500	150	ug/L	1		12/13/18 14:51
Sodium	51300	500	150	ug/L	1		12/13/18 14:51

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Analyst: DSH
Analytical Date/Time: 12/13/18 14:51
Container ID: 1186919006-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Hardness as CaCO3	202000	5000	5000	ug/L	1		12/13/18 14:51

Batch Information

Analytical Batch: MMS10392
Analytical Method: SM21 2340B
Analyst: DSH
Analytical Date/Time: 12/13/18 14:51
Container ID: 1186919006-I

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/18 11:20
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL



Results of PW-200

Client Sample ID: PW-200
Client Project ID: 101543-001 Gustavus PFAS
Lab Sample ID: 1186919006
Lab Project ID: 1186919

Collection Date: 12/09/18 11:01
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Oil & Grease HEM, 2980 J, 4260, 1060, ug/L, 1, 12/13/18 09:18

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Analyst: EWW
Analytical Date/Time: 12/13/18 09:18
Container ID: 1186919006-E

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows: Chloride (68200), Fluoride (126 J), Sulfate (9050)

Batch Information

Analytical Batch: WIC5857
Analytical Method: EPA 300.0
Analyst: DMM
Analytical Date/Time: 12/15/18 00:27
Container ID: 1186919006-A
Prep Batch: WXX12657
Prep Method: METHOD
Prep Date/Time: 12/14/18 16:30
Prep Initial Wt./Vol.: 10 mL
Prep Extract Vol: 10 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Total Organic Carbon, 2200, 1000, 400, ug/L, 1, 12/14/18 04:37

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Analyst: VDL
Analytical Date/Time: 12/14/18 04:37
Container ID: 1186919006-C

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed

Print Date: 12/27/2018 1:32:24PM

J flagging is activated



Results of **PW-200**

Client Sample ID: **PW-200**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919006
Lab Project ID: 1186919

Collection Date: 12/09/18 11:01
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Waters Department**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Alkalinity	232000	10000	2500	ug/L	1		12/12/18 13:08

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Analyst: DMM
Analytical Date/Time: 12/12/18 13:08
Container ID: 1186919006-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Conductivity	689	1.00	0.477	umhos/cm	1		12/12/18 13:08

Batch Information

Analytical Batch: WTI5078
Analytical Method: SM21 2510B
Analyst: DMM
Analytical Date/Time: 12/12/18 13:08
Container ID: 1186919006-A

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Suspended Solids	5630	971	301	ug/L	1		12/13/18 15:02

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Analyst: DMM
Analytical Date/Time: 12/13/18 15:02
Container ID: 1186919006-D

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
pH	7.6	0.100	0.100	pH units	1		12/12/18 13:08



Results of PW-200

Client Sample ID: PW-200
Client Project ID: 101543-001 Gustavus PFAS
Lab Sample ID: 1186919006
Lab Project ID: 1186919

Collection Date: 12/09/18 11:01
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department

Batch Information

Analytical Batch: WTI5076
Analytical Method: SM21 4500-H B
Analyst: DMM
Analytical Date/Time: 12/12/18 13:08
Container ID: 1186919006-A

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Ammonia-N, 0.120, 0.100, 0.0310, mg/L, 1, 12/12/18 16:07

Batch Information

Analytical Batch: WDA4471
Analytical Method: SM21 4500-NH3 G
Analyst: DMM
Analytical Date/Time: 12/12/18 16:07
Container ID: 1186919006-H
Prep Batch: WXX12655
Prep Method: METHOD
Prep Date/Time: 12/12/18 14:50
Prep Initial Wt./Vol.: 6 mL
Prep Extract Vol: 6 mL

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Total Nitrate/Nitrite-N, 31.6 J, 100, 25.0, ug/L, 2, 12/14/18 13:26

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Analyst: EWW
Analytical Date/Time: 12/14/18 13:26
Container ID: 1186919006-H

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Sulfide, 50.0 U, 100, 31.0, ug/L, 1, 12/13/18 15:59

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Analyst: EWW
Analytical Date/Time: 12/13/18 15:59
Container ID: 1186919006-G



Results of PW-200

Client Sample ID: **PW-200**
Client Project ID: **101543-001 Gustavus PFAS**
Lab Sample ID: 1186919006
Lab Project ID: 1186919

Collection Date: 12/09/18 11:01
Received Date: 12/10/18 16:50
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Waters Department (Provisional Cert for TDS)

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Total Dissolved Solids	379000	10000	3100	ug/L	1		12/13/18 15:20

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Analyst: DMM
Analytical Date/Time: 12/13/18 15:20
Container ID: 1186919006-A



Method Blank

Blank ID: MB for HBN 1789682 [MXX/32143]
Blank Lab ID: 1491043

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EP200.8

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Calcium	250U	500	150	ug/L
Chromium	1.00U	2.00	0.780	ug/L
Iron	125U	250	78.0	ug/L
Magnesium	25.0U	50.0	15.0	ug/L
Manganese	0.500U	1.00	0.310	ug/L
Potassium	250U	500	150	ug/L
Sodium	250U	500	150	ug/L

Batch Information

Analytical Batch: MMS10392
Analytical Method: EP200.8
Instrument: Perkin Elmer Nexlon P5
Analyst: DSH
Analytical Date/Time: 12/13/2018 12:54:32PM

Prep Batch: MXX32143
Prep Method: E200.2
Prep Date/Time: 12/12/2018 11:20:30AM
Prep Initial Wt./Vol.: 20 mL
Prep Extract Vol: 50 mL

Print Date: 12/27/2018 1:32:28PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [MXX32143]

Blank Spike Lab ID: 1491044

Date Analyzed: 12/13/2018 13:00

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EP200.8

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Calcium	10000	9750	98	(85-115)
Chromium	400	403	101	(85-115)
Iron	5000	4820	96	(85-115)
Magnesium	10000	10000	100	(85-115)
Manganese	500	503	101	(85-115)
Potassium	10000	9810	98	(85-115)
Sodium	10000	10200	102	(85-115)

Batch Information

Analytical Batch: **MMS10392**

Analytical Method: **EP200.8**

Instrument: **Perkin Elmer Nexlon P5**

Analyst: **DSH**

Prep Batch: **MXX32143**

Prep Method: **E200.2**

Prep Date/Time: **12/12/2018 11:20**

Spike Init Wt./Vol.: 10000 ug/L Extract Vol: 50 mL

Dupe Init Wt./Vol.: Extract Vol:

Matrix Spike Summary

Original Sample ID: 1491047
 MS Sample ID: 1491048 MS
 MSD Sample ID:

Analysis Date: 12/13/2018 13:51
 Analysis Date: 12/13/2018 13:54
 Analysis Date:
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EP200.8

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Calcium	219J	10000	9650	94				70-130		
Chromium	1.00U	400	408	102				70-130		
Iron	93.1J	5000	5010	98				70-130		
Magnesium	77.0	10000	10200	101				70-130		
Manganese	2.25	500	503	100				70-130		
Potassium	179J	10000	10100	100				70-130		
Sodium	120000	10000	130000	99				70-130		

Batch Information

Analytical Batch: MMS10392
 Analytical Method: EP200.8
 Instrument: Perkin Elmer Nexlon P5
 Analyst: DSH
 Analytical Date/Time: 12/13/2018 1:54:24PM

Prep Batch: MX32143
 Prep Method: DW Digest for Metals on ICP-MS
 Prep Date/Time: 12/12/2018 11:20:30AM
 Prep Initial Wt./Vol.: 20.00mL
 Prep Extract Vol: 50.00mL



Method Blank

Blank ID: MB for HBN 1789703 [STS/6108]

Blank Lab ID: 1491110

QC for Samples:

1186919001

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2540D

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Suspended Solids	500U	1000	310	ug/L

Batch Information

Analytical Batch: STS6108

Analytical Method: SM21 2540D

Instrument:

Analyst: DMM

Analytical Date/Time: 12/12/2018 5:11:12PM

Print Date: 12/27/2018 1:32:33PM

Duplicate Sample Summary

Original Sample ID: 1186919001

Duplicate Sample ID: 1491113

QC for Samples:

1186919001

Analysis Date: 12/12/2018 17:11

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2540D

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Suspended Solids	14000	13778	ug/L	1.60	(< 5)

Batch Information

Analytical Batch: STS6108

Analytical Method: SM21 2540D

Instrument:

Analyst: DMM

Print Date: 12/27/2018 1:32:33PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [STS6108]
 Blank Spike Lab ID: 1491111
 Date Analyzed: 12/12/2018 17:11

Spike Duplicate ID: LCSD for HBN 1186919 [STS6108]
 Spike Duplicate Lab ID: 1491112
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001

Results by SM21 2540D

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Suspended Solids	25000	24100	96	25000	24900	100	(75-125)	3.30	(< 5)

Batch Information

Analytical Batch: **STS6108**
 Analytical Method: **SM21 2540D**
 Instrument:
 Analyst: **DMM**

Method Blank

Blank ID: MB for HBN 1789743 [STS/6110]

Blank Lab ID: 1491311

QC for Samples:

1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2540D

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Suspended Solids	500U	1000	310	ug/L

Batch Information

Analytical Batch: STS6110

Analytical Method: SM21 2540D

Instrument:

Analyst: DMM

Analytical Date/Time: 12/13/2018 3:02:37PM

Duplicate Sample Summary

Original Sample ID: 1186919005

Duplicate Sample ID: 1491314

QC for Samples:

1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Analysis Date: 12/13/2018 15:02

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2540D

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Suspended Solids	13800	12889	ug/L	6.70*	(< 5)

Batch Information

Analytical Batch: STS6110

Analytical Method: SM21 2540D

Instrument:

Analyst: DMM

Print Date: 12/27/2018 1:32:36PM

Duplicate Sample Summary

Original Sample ID: 1186953007

Duplicate Sample ID: 1491315

QC for Samples:

1186919006

Analysis Date: 12/13/2018 15:02

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2540D

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Suspended Solids	34000	40000	ug/L	16.20*	(< 5)

Batch Information

Analytical Batch: STS6110

Analytical Method: SM21 2540D

Instrument:

Analyst: DMM

Print Date: 12/27/2018 1:32:36PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [STS6110]
Blank Spike Lab ID: 1491312
Date Analyzed: 12/13/2018 15:02

Spike Duplicate ID: LCSD for HBN 1186919 [STS6110]
Spike Duplicate Lab ID: 1491313
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2540D

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Suspended Solids	25000	24800	99	25000	25600	102	(75-125)	3.20	(< 5)

Batch Information

Analytical Batch: STS6110
Analytical Method: SM21 2540D
Instrument:
Analyst: DMM

Print Date: 12/27/2018 1:32:37PM

Method Blank

Blank ID: MB for HBN 1789752 [STS/6111]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491349

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2540C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Dissolved Solids	5000U	10000	3100	ug/L

Batch Information

Analytical Batch: STS6111

Analytical Method: SM21 2540C

Instrument:

Analyst: DMM

Analytical Date/Time: 12/13/2018 3:20:54PM

Duplicate Sample Summary

Original Sample ID: 1186953001

Analysis Date: 12/13/2018 15:20

Duplicate Sample ID: 1491352

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2540C

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Dissolved Solids	132000	137000	ug/L	3.70	(< 5)

Batch Information

Analytical Batch: STS6111

Analytical Method: SM21 2540C

Instrument:

Analyst: DMM

Print Date: 12/27/2018 1:32:39PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [STS6111]
Blank Spike Lab ID: 1491350
Date Analyzed: 12/13/2018 15:20

Spike Duplicate ID: LCSD for HBN 1186919 [STS6111]
Spike Duplicate Lab ID: 1491351
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2540C

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Dissolved Solids	330000	270000	82	330000	264000	80	(75-125)	2.20	(< 5)

Batch Information

Analytical Batch: STS6111
Analytical Method: SM21 2540C
Instrument:
Analyst: DMM

Print Date: 12/27/2018 1:32:40PM

Method Blank

Blank ID: MB for HBN 1789717 [THOG/1253]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491183

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 1664B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Oil & Grease HEM	1900J	4000	1000	ug/L

Batch Information

Analytical Batch: THOG1253

Analytical Method: EPA 1664B

Instrument:

Analyst: EWW

Analytical Date/Time: 12/13/2018 9:18:43AM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [THOG1253]
Blank Spike Lab ID: 1491184
Date Analyzed: 12/13/2018 09:18

Spike Duplicate ID: LCSD for HBN 1186919 [THOG1253]
Spike Duplicate Lab ID: 1491185
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 1664B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Oil & Grease HEM	40000	34100	85	40000	36400	91	(78-114)	6.50	(< 18)

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Instrument:
Analyst: EWW

Print Date: 12/27/2018 1:32:41PM



Matrix Spike Summary

Original Sample ID: 1491191
MS Sample ID: 1491192 MS
MSD Sample ID:

Analysis Date: 12/13/2018 9:18
Analysis Date: 12/13/2018 9:18
Analysis Date:
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 1664B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Oil & Grease HEM	2150J	42100	40000	90				78-114		

Batch Information

Analytical Batch: THOG1253
Analytical Method: EPA 1664B
Instrument:
Analyst: EWW
Analytical Date/Time: 12/13/2018 9:18:43AM

Print Date: 12/27/2018 1:32:42PM

Method Blank

Blank ID: MB for HBN 1789756 [WAT/11299]
Blank Lab ID: 1491371

Matrix: Drinking Water

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM23 4500S D

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Sulfide	50.0U	100	31.0	ug/L

Batch Information

Analytical Batch: WAT11299
Analytical Method: SM23 4500S D
Instrument:
Analyst: EWW
Analytical Date/Time: 12/13/2018 3:59:00PM

Print Date: 12/27/2018 1:32:43PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WAT11299]

Blank Spike Lab ID: 1491372

Date Analyzed: 12/13/2018 15:59

Matrix: Drinking Water

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM23 4500S D

Parameter	Blank Spike (ug/L)			CL (75-125)
	Spike	Result	Rec (%)	
Sulfide	499	550	110	

Batch Information

Analytical Batch: WAT11299

Analytical Method: SM23 4500S D

Instrument:

Analyst: EWW

Print Date: 12/27/2018 1:32:44PM

Matrix Spike Summary

Original Sample ID: 1186919003
 MS Sample ID: 1491373 MS
 MSD Sample ID: 1491374 MSD

Analysis Date: 12/13/2018 15:59
 Analysis Date: 12/13/2018 15:59
 Analysis Date: 12/13/2018 15:59
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM23 4500S D

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Sulfide	50.0U	499	530	106	499	530	106	75-125	0.00	(< 25)

Batch Information

Analytical Batch: WAT11299
 Analytical Method: SM23 4500S D
 Instrument:
 Analyst: EWW
 Analytical Date/Time: 12/13/2018 3:59:00PM



Method Blank

Blank ID: MB for HBN 1789818 (WFI/2779)
Blank Lab ID: 1491667

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Nitrate-N	50.0U	100	25.0	ug/L
Nitrite-N	75.4J	100	25.0	ug/L
Total Nitrate/Nitrite-N	33.8J	100	25.0	ug/L

Batch Information

Analytical Batch: WFI2779
Analytical Method: SM21 4500NO3-F
Instrument: Astoria segmented flow
Analyst: EWW
Analytical Date/Time: 12/14/2018 12:17:25PM

Print Date: 12/27/2018 1:32:46PM

Method Blank

Blank ID: MB for HBN 1789818 (WFI/2779)

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491669

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Nitrate-N	50.0U	100	25.0	ug/L
Nitrite-N	50.0U	100	25.0	ug/L
Total Nitrate/Nitrite-N	50.0U	100	25.0	ug/L

Batch Information

Analytical Batch: WFI2779

Analytical Method: SM21 4500NO3-F

Instrument: Astoria segmented flow

Analyst: EWW

Analytical Date/Time: 12/14/2018 2:40:25PM

Print Date: 12/27/2018 1:32:46PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WFI2779]

Blank Spike Lab ID: 1491653

Date Analyzed: 12/14/2018 12:15

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Nitrate-N	2500	4880	195 *	(70-130)
Nitrite-N	2500	0	0 *	(90-110)
Total Nitrate/Nitrite-N	5000	4880	98	(90-110)

Batch Information

Analytical Batch: **WFI2779**

Analytical Method: **SM21 4500NO3-F**

Instrument: **Astoria segmented flow**

Analyst: **EWV**

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WFI2779]

Blank Spike Lab ID: 1491668

Date Analyzed: 12/14/2018 14:38

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Nitrate-N	2500	4530	181 *	(70-130)
Nitrite-N	2500		0 *	(90-110)
Total Nitrate/Nitrite-N	5000	4530	91	(90-110)

Batch Information

Analytical Batch: **WFI2779**

Analytical Method: **SM21 4500NO3-F**

Instrument: **Astoria segmented flow**

Analyst: **EWV**

Matrix Spike Summary

Original Sample ID: 1186919002
 MS Sample ID: 1491649 MS
 MSD Sample ID: 1491650 MSD

Analysis Date: 12/14/2018 13:16
 Analysis Date: 12/14/2018 13:18
 Analysis Date: 12/14/2018 13:19
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Nitrate/Nitrite-N	50.0U	5000	5470	109	5000	5550	111 *	90-110	1.40	(< 25)

Batch Information

Analytical Batch: WFI2779
 Analytical Method: SM21 4500NO3-F
 Instrument: Astoria segmented flow
 Analyst: EWW
 Analytical Date/Time: 12/14/2018 1:18:10PM

Matrix Spike Summary

Original Sample ID: 1186953009
 MS Sample ID: 1491651 MS
 MSD Sample ID: 1491652 MSD

Analysis Date: 12/14/2018 14:43
 Analysis Date: 12/14/2018 14:45
 Analysis Date: 12/14/2018 14:47
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500NO3-F

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Nitrate/Nitrite-N	87.6J	5000	5070	100	5000	4880	96	90-110	3.90	(< 25)

Batch Information

Analytical Batch: WFI2779
 Analytical Method: SM21 4500NO3-F
 Instrument: Astoria segmented flow
 Analyst: EWW
 Analytical Date/Time: 12/14/2018 2:45:40PM

Method Blank

Blank ID: MB for HBN 1789782 [WTC/2879]
Blank Lab ID: 1491514

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM 5310B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Organic Carbon	500U	1000	400	ug/L

Batch Information

Analytical Batch: WTC2879
Analytical Method: SM 5310B
Instrument: TOC Analyzer
Analyst: VDL
Analytical Date/Time: 12/13/2018 11:53:46PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTC2879]

Blank Spike Lab ID: 1491512

Date Analyzed: 12/13/2018 23:38

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM 5310B

Parameter	Blank Spike (ug/L)			CL (80-120)
	Spike	Result	Rec (%)	
Total Organic Carbon	75000	66800	89	

Batch Information

Analytical Batch: **WTC2879**

Analytical Method: **SM 5310B**

Instrument: **TOC Analyzer**

Analyst: **VDL**

Matrix Spike Summary

Original Sample ID: 1186953019
 MS Sample ID: 1491507 MS
 MSD Sample ID: 1491508 MSD

Analysis Date: 12/14/2018 0:13
 Analysis Date: 12/14/2018 0:32
 Analysis Date: 12/14/2018 0:57
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM 5310B

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Total Organic Carbon	1020	10000	10300	93	10000	10300	93	75-125	0.29	(< 25)

Batch Information

Analytical Batch: WTC2879
 Analytical Method: SM 5310B
 Instrument: TOC Analyzer
 Analyst: VDL
 Analytical Date/Time: 12/14/2018 12:32:36AM

Duplicate Sample Summary

Original Sample ID: 1186919001

Analysis Date: 12/12/2018 12:06

Duplicate Sample ID: 1491213

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500-H B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
pH	7.6	7.60	pH units	0.00	(< 5)

Batch Information

Analytical Batch: WTI5076

Analytical Method: SM21 4500-H B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:51PM

Duplicate Sample Summary

Original Sample ID: 1186919004

Duplicate Sample ID: 1491214

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Analysis Date: 12/12/2018 12:47

Matrix: Water (Surface, Eff., Ground)

Results by SM21 4500-H B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
pH	7.6	7.60	pH units	0.00	(< 5)

Batch Information

Analytical Batch: WTI5076

Analytical Method: SM21 4500-H B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:51PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTI5076]

Blank Spike Lab ID: 1491210

Date Analyzed: 12/12/2018 10:16

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500-H B

Parameter	Blank Spike (pH units)			CL
	Spike	Result	Rec (%)	
pH	7	7.04	101	(99-101)

Batch Information

Analytical Batch: **WTI5076**

Analytical Method: **SM21 4500-H B**

Instrument: **Titration**

Analyst: **DMM**



Method Blank

Blank ID: MB for HBN 1789726 [WTI/5077]
Blank Lab ID: 1491242

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2320B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Alkalinity	2840J	10000	2500	ug/L

Batch Information

Analytical Batch: WTI5077
Analytical Method: SM21 2320B
Instrument: Titration
Analyst: DMM
Analytical Date/Time: 12/12/2018 11:29:00AM

Method Blank

Blank ID: MB for HBN 1789726 [WTI/5077]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491247

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2320B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Alkalinity	5000U	10000	2500	ug/L

Batch Information

Analytical Batch: WTI5077

Analytical Method: SM21 2320B

Instrument: Titration

Analyst: DMM

Analytical Date/Time: 12/12/2018 2:57:18PM

Duplicate Sample Summary

Original Sample ID: 1186919001

Duplicate Sample ID: 1491245

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004

Analysis Date: 12/12/2018 12:06

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2320B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Alkalinity	224000	219430	ug/L	1.90	(< 25)

Batch Information

Analytical Batch: WTI5077

Analytical Method: SM21 2320B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:55PM

Duplicate Sample Summary

Original Sample ID: 1186919004

Duplicate Sample ID: 1491246

QC for Samples:

1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Analysis Date: 12/12/2018 12:47

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2320B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Alkalinity	257000	269400	ug/L	4.70	(< 25)

Batch Information

Analytical Batch: WTI5077

Analytical Method: SM21 2320B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:55PM

Duplicate Sample Summary

Original Sample ID: 1186953001

Duplicate Sample ID: 1491249

QC for Samples:

1186919005, 1186919006

Analysis Date: 12/12/2018 15:24

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2320B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Alkalinity	81400	80360	ug/L	1.20	(< 25)

Batch Information

Analytical Batch: WTI5077

Analytical Method: SM21 2320B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:55PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTI5077]

Blank Spike Lab ID: 1491243

Date Analyzed: 12/12/2018 11:21

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2320B

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Alkalinity	250000	217000	87	(85-115)

Batch Information

Analytical Batch: **WTI5077**

Analytical Method: **SM21 2320B**

Instrument: **Titration**

Analyst: **DMM**

Print Date: 12/27/2018 1:32:55PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTI5077]

Blank Spike Lab ID: 1491248

Date Analyzed: 12/12/2018 15:06

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2320B

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Alkalinity	250000	216000	86	(85-115)

Batch Information

Analytical Batch: **WTI5077**

Analytical Method: **SM21 2320B**

Instrument: **Titration**

Analyst: **DMM**

Print Date: 12/27/2018 1:32:55PM

Method Blank

Blank ID: MB for HBN 1789728 [WTI/5078]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491254

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2510B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Conductivity	2.30*	1.00	0.477	umhos/cm

Batch Information

Analytical Batch: WTI5078

Analytical Method: SM21 2510B

Instrument: Titration

Analyst: DMM

Analytical Date/Time: 12/12/2018 11:29:00AM

Method Blank

Blank ID: MB for HBN 1789728 [WTI/5078]

Matrix: Water (Surface, Eff., Ground)

Blank Lab ID: 1491259

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2510B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Conductivity	0.800J	1.00	0.477	umhos/cm

Batch Information

Analytical Batch: WTI5078

Analytical Method: SM21 2510B

Instrument: Titration

Analyst: DMM

Analytical Date/Time: 12/12/2018 2:57:18PM

Print Date: 12/27/2018 1:32:57PM

Duplicate Sample Summary

Original Sample ID: 1186919001

Duplicate Sample ID: 1491257

QC for Samples:

1186919001, 1186919002, 1186919003, 1186919004

Analysis Date: 12/12/2018 12:06

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2510B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Conductivity	882	882	umhos/cm	0.03	(< 20)

Batch Information

Analytical Batch: WTI5078

Analytical Method: SM21 2510B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:57PM

Duplicate Sample Summary

Original Sample ID: 1186919004

Duplicate Sample ID: 1491258

QC for Samples:

1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Analysis Date: 12/12/2018 12:47

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2510B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Conductivity	592	591	umhos/cm	0.14	(< 20)

Batch Information

Analytical Batch: WTI5078

Analytical Method: SM21 2510B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:57PM

Duplicate Sample Summary

Original Sample ID: 1186953001

Duplicate Sample ID: 1491262

QC for Samples:

1186919005, 1186919006

Analysis Date: 12/12/2018 15:24

Matrix: Water (Surface, Eff., Ground)

Results by SM21 2510B

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Conductivity	234	233	umhos/cm	0.09	(< 20)

Batch Information

Analytical Batch: WTI5078

Analytical Method: SM21 2510B

Instrument: Titration

Analyst: DMM

Print Date: 12/27/2018 1:32:57PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTI5078]

Blank Spike Lab ID: 1491255

Date Analyzed: 12/12/2018 10:48

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2510B

Parameter	Blank Spike (umhos/cm)			CL
	Spike	Result	Rec (%)	
Conductivity	9.83	9.50	97	(90-110)

Batch Information

Analytical Batch: **WTI5078**

Analytical Method: **SM21 2510B**

Instrument: **Titration**

Analyst: **DMM**

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WTI5078]

Blank Spike Lab ID: 1491260

Date Analyzed: 12/12/2018 14:33

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 2510B

Parameter	Blank Spike (umhos/cm)			CL
	Spike	Result	Rec (%)	
Conductivity	9.83	9.60	98	(90-110)

Batch Information

Analytical Batch: **WTI5078**

Analytical Method: **SM21 2510B**

Instrument: **Titration**

Analyst: **DMM**

Method Blank

Blank ID: MB for HBN 1789772 [WXX/12655]
Blank Lab ID: 1491431

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500-NH3 G

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Ammonia-N	0.0500U	0.100	0.0310	mg/L

Batch Information

Analytical Batch: WDA4471
Analytical Method: SM21 4500-NH3 G
Instrument: Discrete Analyzer 2
Analyst: DMM
Analytical Date/Time: 12/12/2018 3:37:32PM

Prep Batch: WXX12655
Prep Method: METHOD
Prep Date/Time: 12/12/2018 2:50:00PM
Prep Initial Wt./Vol.: 6 mL
Prep Extract Vol: 6 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WXX12655]
 Blank Spike Lab ID: 1491432
 Date Analyzed: 12/12/2018 15:39

Spike Duplicate ID: LCSD for HBN 1186919 [WXX12655]
 Spike Duplicate Lab ID: 1491433
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500-NH3 G

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Ammonia-N	1	1.01	101	1	0.905	91	(75-125)	10.80	(< 25)

Batch Information

Analytical Batch: WDA4471
 Analytical Method: SM21 4500-NH3 G
 Instrument: Discrete Analyzer 2
 Analyst: DMM

Prep Batch: WXX12655
 Prep Method: METHOD
 Prep Date/Time: 12/12/2018 14:50
 Spike Init Wt./Vol.: 1 mg/L Extract Vol: 6 mL
 Dupe Init Wt./Vol.: 1 mg/L Extract Vol: 6 mL

Matrix Spike Summary

Original Sample ID: 1186919005
 MS Sample ID: 1491434 MS
 MSD Sample ID: 1491435 MSD

Analysis Date: 12/12/2018 15:42
 Analysis Date: 12/12/2018 15:44
 Analysis Date: 12/12/2018 15:45
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by SM21 4500-NH3 G

Parameter	Sample	Matrix Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Ammonia-N	0.274	1.00	.993	72 *	1.00	1.18	91	75-125	17.50	(< 25)

Batch Information

Analytical Batch: WDA4471
 Analytical Method: SM21 4500-NH3 G
 Instrument: Discrete Analyzer 2
 Analyst: DMM
 Analytical Date/Time: 12/12/2018 3:44:15PM

Prep Batch: WXX12655
 Prep Method: Ammonia by SM21 4500F prep (W)
 Prep Date/Time: 12/12/2018 2:50:00PM
 Prep Initial Wt./Vol.: 6.00mL
 Prep Extract Vol: 6.00mL

Method Blank

Blank ID: MB for HBN 1789819 [WXX/12657]
 Blank Lab ID: 1491670

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 300.0

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Chloride	100U	200	50.0	ug/L
Fluoride	100U	200	50.0	ug/L
Sulfate	100U	200	50.0	ug/L

Batch Information

Analytical Batch: WIC5857
 Analytical Method: EPA 300.0
 Instrument: 930 Metrohm compact IC flex
 Analyst: DMM
 Analytical Date/Time: 12/14/2018 5:50:05PM

Prep Batch: WXX12657
 Prep Method: METHOD
 Prep Date/Time: 12/14/2018 4:30:00PM
 Prep Initial Wt./Vol.: 10 mL
 Prep Extract Vol: 10 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1186919 [WXX12657]
 Blank Spike Lab ID: 1491671
 Date Analyzed: 12/14/2018 18:09

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 300.0

Parameter	Blank Spike (ug/L)			CL
	Spike	Result	Rec (%)	
Chloride	5000	4890	98	(90-110)
Fluoride	5000	5000	100	(90-110)
Sulfate	5000	4980	100	(90-110)

Batch Information

Analytical Batch: **WIC5857**
 Analytical Method: **EPA 300.0**
 Instrument: **930 Metrohm compact IC flex**
 Analyst: **DMM**

Prep Batch: **WXX12657**
 Prep Method: **METHOD**
 Prep Date/Time: **12/14/2018 16:30**
 Spike Init Wt./Vol.: 5000 ug/L Extract Vol: 10 mL
 Dupe Init Wt./Vol.: Extract Vol:

Matrix Spike Summary

Original Sample ID: 1186950001
 MS Sample ID: 1491672 MS
 MSD Sample ID: 1491673 MSD

Analysis Date: 12/14/2018 18:27
 Analysis Date: 12/14/2018 18:46
 Analysis Date: 12/14/2018 19:05
 Matrix: Drinking Water

QC for Samples: 1186919001, 1186919002, 1186919003, 1186919004, 1186919005, 1186919006

Results by EPA 300.0

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chloride	2480	5000	7160	94	5000	7260	96	90-110	1.30	(< 15)
Fluoride	205	5000	4980	96	5000	5040	97	90-110	1.20	(< 15)
Sulfate	4930	5000	9430	90 *	5000	9530	92	90-110	1.10	(< 15)

Batch Information

Analytical Batch: WIC5857
 Analytical Method: EPA 300.0
 Instrument: 930 Metrohm compact IC flex
 Analyst: DMM
 Analytical Date/Time: 12/14/2018 6:46:54PM

Prep Batch: WXX12657
 Prep Method: EPA 300.0 Extraction Waters/Liquids
 Prep Date/Time: 12/14/2018 4:30:00PM
 Prep Initial Wt./Vol.: 10.00mL
 Prep Extract Vol: 10.00mL

Parameter	Units
Per- and Polyfluoroalkyl Substances	
4:2 Fluorotelomer sulfonate (4:2 FTS)	ng/l
6:2 Fluorotelomer sulfonate (6:2 FTS)	ng/l
8:2 Fluorotelomer sulfonate (8:2 FTS)	ng/l
n-Ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l
n-Methyl perfluorooctanesulfonamidoacetic acid (MeFOSAA)	ng/l
Perfluorobutane sulfonate (PFBS)	ng/l
Perfluorobutanoic acid (PFBA)	ng/l
Perfluorodecane sulfonate (PFDS)	ng/l
Perfluorodecanoic acid (PFDA)	ng/l
Perfluorododecanoic acid (PFDoA / PFDoDA)	ng/l
Perfluoroheptane sulfonate (PFHpS)	ng/l
Perfluoroheptanoic acid (PFHpA)	ng/l
Perfluorohexane sulfonate (PFHxS)	ng/l
Perfluorohexanoic acid (PFHxA)	ng/l
Perfluorononanesulfonate (PFNS)	ng/l
Perfluorononanoic acid (PFNA)	ng/l
Perfluorooctanesulfonamide (PFOSA / FOSA)	ng/l
Perfluorooctanesulfonate (PFOS)	ng/l
Perfluorooctanoic acid (PFOA)	ng/l
Perfluoropentanoic acid (PFPeA)	ng/l
Perfluoropentansulfonate (PFPeS)	ng/l
Perfluorotetradecanoic acid (PFTA / PFTeDA / PFTeA)	ng/l
Perfluorotridecanoic acid (PFTrDA / PFTriA)	ng/l
Perfluoroundecanoic acid (PFUnA / PFUnDA)	ng/l
General Parameters	
Alkalinity, total, as CaCO ₃	mg/l
Carbon, total organic	mg/l
Chloride	mg/l
Fluoride	mg/l
Hardness, as CaCO ₃	ug/l
Nitrogen, nitrate + nitrite, as N	mg/l
Nitrogen, ammonia, as N	mg/l
pH	units
Solids, total dissolved	mg/l
Solids, total suspended	mg/l
Specific conductance @ 25 °C	umhos/cm
Oil and Grease	mg/l
Sulfide	mg/L
Sulfate, as SO ₄	mg/l
Total Metals	
Arsenate	ug/l
Arsenite	ug/l
Calcium	ug/l
Chromium	ug/l
Iron	ug/l
Magnesium	ug/l
Manganese	ug/l
Potassium	ug/l
Sodium	ug/l

027 JNU 3575 4294

027-3575 4294

COOK

Shipper's Name and Address Shannon and Wilson Inc 2355 Hill Rd Fairbanks, AK 99712 USA Tel: 907-479-0600		Shipper's Account Number 27400200733 Customer's ID Number 10926		Not Negotiable Air Waybill Issued By <div style="text-align: right;">  Alaska. AIR CARGO P.O. BOX 68900 SEATTLE, WA 98168 800-225-2752 ALASKACARGO.COM </div>																														
Consignee's Name and Address SGS CT and ENVIRONM 200 W Potter Drive Anchorage, AK 99518 USA Tel: 907-562-2343		Consignee's Account Number 27400215947		Also notify Tel:																														
Issuing Carrier's Agent and City Agent's IATA Code Account No.		Accounting Information Shannon and Wilson Inc 2355 Hill Rd Fairbanks, AK 99712 USA SRN/101543 GoldStreak				10926																												
Airport of Departure (Addr. of First Carrier) and Requested Routing Juneau		Airport of Destination Anchorage		Flight/Date AS 065/10		Amount of Insurance XXX																												
To By First Carrier ANC Alaska Airlines		To / By To / By		Currency USD PX		Declared Value For Carriage NVD																												
Declared Value For Customs NCV		W/T/V/L X		Other X		Declared Value For Customs NCV																												
Handling Information		SCI																																
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>No of Pieces</th> <th>Gross Weight</th> <th>kg</th> <th>lb</th> <th>Commodity Item No.</th> <th>Chargeable Weight</th> <th>Rate / Charge</th> <th>Total</th> <th>Nature and Quantity of Goods (Incl. Dimensions or Volume)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">168.0</td> <td></td> <td style="text-align: center;">L</td> <td></td> <td style="text-align: center;">168.0</td> <td></td> <td style="text-align: center;">AS AGREED</td> <td style="text-align: center;">WATER SAMPLES Dims: 24 x 13 x14 x 3 11 x 11 x9 x 1 GSX</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">168.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">AS AGREED</td> <td style="text-align: center;">Volume: 8.214</td> </tr> </tbody> </table>								No of Pieces	Gross Weight	kg	lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)	4	168.0		L		168.0		AS AGREED	WATER SAMPLES Dims: 24 x 13 x14 x 3 11 x 11 x9 x 1 GSX	4	168.0						AS AGREED	Volume: 8.214
No of Pieces	Gross Weight	kg	lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)																										
4	168.0		L		168.0		AS AGREED	WATER SAMPLES Dims: 24 x 13 x14 x 3 11 x 11 x9 x 1 GSX																										
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Prepaid AS AGREED		Weight Charge Collect		Other Charges XBC 0.00																														
Valuation Charge		Tax		Total Other Charges Due Agent																														
Total Other Charges Due Carrier		Total Prepaid AS AGREED		Total Collect																														
Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. I consent to the inspection of this cargo.		For: Shannon and Wilson Inc		Signature of Shipper or his Agent 																														
<input checked="" type="checkbox"/> THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS		<input type="checkbox"/> THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS		Executed On (Date) 10 Dec 2018 09:28																														
at (Place) Juneau		Signature of Issuing Carrier or its Agent Alaska Airlines		027-3575 4294																														



e-Sample Receipt Form

SGS Workorder #:

1186919



1 1 8 6 9 1 9

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements		
Were Custody Seals intact? Note # & location	Yes	2-F Coolers 1-2, 4, 1-F cooler 3
COC accompanied samples?	Yes	
<input type="checkbox"/> N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	Yes	Cooler ID: 1 @ 3.3 °C Therm. ID: D11
	Yes	Cooler ID: 2 @ 3.6 °C Therm. ID: D25
	Yes	Cooler ID: 3 @ 4.6 °C Therm. ID: D11
	Yes	Cooler ID: 4 @ 1.4 °C Therm. ID: D25
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
<p>If samples received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".</p> <p>Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.</p>		
Holding Time / Documentation / Sample Condition Requirements		
Note: Refer to form F-083 "Sample Guide" for specific holding times.		
Were samples received within holding time?	Yes	
Do samples match COC ** (i.e., sample IDs, dates/times collected)?	Yes	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	Yes	
Were proper containers (type/mass/volume/preservative***) used?	Yes	<input type="checkbox"/> N/A ***Exemption permitted for metals (e.g.200.8/6020A).
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	N/A	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	N/A	
Were all soil VOAs field extracted with MeOH+BFB?	N/A	
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		



Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1186919001-A	No Preservative Required	OK	1186919005-C	HCL to pH < 2	OK
1186919001-B	No Preservative Required	OK	1186919005-D	No Preservative Required	OK
1186919001-C	HCL to pH < 2	OK	1186919005-E	HCL to pH < 2	OK
1186919001-D	No Preservative Required	OK	1186919005-F	HCL to pH < 2	OK
1186919001-E	HCL to pH < 2	OK	1186919005-G	Zn Acetate,NaOH to pH > 9	OK
1186919001-F	HCL to pH < 2	OK	1186919005-H	H2SO4 to pH < 2	OK
1186919001-G	Zn Acetate,NaOH to pH > 9	OK	1186919005-I	HNO3 to pH < 2	OK
1186919001-H	H2SO4 to pH < 2	OK	1186919005-J	EDA	OK
1186919001-I	HNO3 to pH < 2	OK	1186919005-K	No Preservative Required	OK
1186919001-J	EDA	OK	1186919005-L	No Preservative Required	OK
1186919001-K	No Preservative Required	OK	1186919006-A	No Preservative Required	OK
1186919001-L	No Preservative Required	OK	1186919006-B	No Preservative Required	OK
1186919002-A	No Preservative Required	OK	1186919006-C	HCL to pH < 2	OK
1186919002-B	No Preservative Required	OK	1186919006-D	No Preservative Required	OK
1186919002-C	HCL to pH < 2	OK	1186919006-E	HCL to pH < 2	OK
1186919002-D	No Preservative Required	OK	1186919006-F	HCL to pH < 2	OK
1186919002-E	HCL to pH < 2	OK	1186919006-G	Zn Acetate,NaOH to pH > 9	OK
1186919002-F	HCL to pH < 2	OK	1186919006-H	H2SO4 to pH < 2	OK
1186919002-G	Zn Acetate,NaOH to pH > 9	OK	1186919006-I	HNO3 to pH < 2	OK
1186919002-H	H2SO4 to pH < 2	OK	1186919006-J	EDA	OK
1186919002-I	HNO3 to pH < 2	OK	1186919006-K	No Preservative Required	OK
1186919002-J	EDA	OK	1186919006-L	No Preservative Required	OK
1186919002-K	No Preservative Required	OK			
1186919002-L	No Preservative Required	OK			
1186919003-A	No Preservative Required	OK			
1186919003-B	No Preservative Required	OK			
1186919003-C	HCL to pH < 2	OK			
1186919003-D	No Preservative Required	OK			
1186919003-E	HCL to pH < 2	OK			
1186919003-F	HCL to pH < 2	OK			
1186919003-G	Zn Acetate,NaOH to pH > 9	OK			
1186919003-H	H2SO4 to pH < 2	OK			
1186919003-I	HNO3 to pH < 2	OK			
1186919003-J	EDA	OK			
1186919003-K	No Preservative Required	OK			
1186919003-L	No Preservative Required	OK			
1186919004-A	No Preservative Required	OK			
1186919004-B	No Preservative Required	OK			
1186919004-C	HCL to pH < 2	OK			
1186919004-D	No Preservative Required	OK			
1186919004-E	HCL to pH < 2	OK			
1186919004-F	HCL to pH < 2	OK			
1186919004-G	Zn Acetate,NaOH to pH > 9	OK			
1186919004-H	H2SO4 to pH < 2	OK			
1186919004-I	HNO3 to pH < 2	OK			
1186919004-J	EDA	OK			
1186919004-K	No Preservative Required	OK			
1186919004-L	No Preservative Required	OK			
1186919005-A	No Preservative Required	OK			
1186919005-B	No Preservative Required	OK			

Container Id

Preservative

Container
Condition

Container Id

Preservative

Container
Condition

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM - The container was received damaged.

FR - The container was received frozen and not usable for Bacteria or BOD analyses.

IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.



18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

December 20, 2018

SGS Environmental
ATTN: Julie Shumway
200 West Potter Drive
Anchorage AK 99518
julie.shumway@sgs.com

RE: Project SGS-AN1803

Client Project ID: 1186919

Dear Julie Shumway,

On December 13, 2018, Brooks Applied Labs (BAL) received six (6) water samples in a sealed cooler. The samples were logged-in for dissolved arsenite [$As(III)$], arsenate [$As(V)$], monomethylarsonic acid [MMAs], and dimethylarsinic acid [DMAs]. The samples were filtered in the field by the client. All samples were received, prepared, analyzed, and stored according to BAL SOPs and EPA methodology.

Arsenic speciation was performed using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Arsenic species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS)

If the native sample result and/or the DUP result is not detected (ND) above the MDL, then the associated RPD is not calculated (N/C).

All data was reported without qualification (aside from concentration qualifiers) and all associated quality control sample results met the acceptance criteria. BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page in your report.

It should be noted that all Brooks Applied Labs, LLC methods, standard operating procedures, inventions, ideas, processes, improvements, designs and techniques included or referred to therein, must be considered and treated as Proprietary Information, protected by the Washington State Trade Secret Act, RCW 19.108 et seq., and other laws. All Proprietary Information, written or implied, will not be distributed, copied, or altered in any fashion without prior written consent from Brooks Applied Labs, LLC. All Proprietary Information (including originals, copies, summaries or other reproductions thereof) shall remain the property of Brooks Applied Labs, LLC at all times and must be returned upon demand. Furthermore, products presented in this document may be protected by Federal Patent laws and infringement will be subject to prosecution in accordance with Title 35 US Code 271.

Sincerely,

A handwritten signature in black ink that reads "ARoyal".

Amanda Royal
Senior Project Manager
amanda@brooksapplied.com



Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	MS	matrix spike
BAL	Brooks Applied Labs	MSD	matrix spike duplicate
BLK	method blank	ND	non-detect
BS	blank spike	NR	non-reportable
CAL	calibration standard	N/C	not calculated
CCB	continuing calibration blank	PS	post preparation spike
CCV	continuing calibration verification	REC	percent recovery
COC	chain of custody record	RPD	relative percent difference
D	dissolved fraction	SCV	secondary calibration verification
DUP	duplicate	SOP	standard operating procedure
IBL	instrument blank	SRM	standard reference material
ICV	initial calibration verification	T	total fraction
MDL	method detection limit	TR	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 9/23/09)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.



Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
<i>PW-406</i>	1850041-01	Water	Sample	12/07/2018	12/13/2018
<i>PW-405</i>	1850041-02	Water	Sample	12/08/2018	12/13/2018
<i>PW-505</i>	1850041-03	Water	Sample	12/08/2018	12/13/2018
<i>PW-202</i>	1850041-04	Water	Sample	12/08/2018	12/13/2018
<i>PW-408</i>	1850041-05	Water	Sample	12/08/2018	12/13/2018
<i>PW-200</i>	1850041-06	Water	Sample	12/09/2018	12/13/2018

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
As(III)	Water	SOP BAL-4100	12/14/2018	12/15/2018	B183424	1801706
As(V)	Water	SOP BAL-4100	12/14/2018	12/15/2018	B183424	1801706
DMAs	Water	SOP BAL-4100	12/14/2018	12/15/2018	B183424	1801706
MMAs	Water	SOP BAL-4100	12/14/2018	12/15/2018	B183424	1801706



Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
PW-406										
1850041-01	As(III)	Water	D	19.6		0.043	0.216	µg/L	B183424	1801706
1850041-01	As(V)	Water	D	2.29		0.043	0.216	µg/L	B183424	1801706
1850041-01	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-01	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706
PW-405										
1850041-02	As(III)	Water	D	10.8		0.043	0.216	µg/L	B183424	1801706
1850041-02	As(V)	Water	D	0.945		0.043	0.216	µg/L	B183424	1801706
1850041-02	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-02	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706
PW-505										
1850041-03	As(III)	Water	D	10.9		0.043	0.216	µg/L	B183424	1801706
1850041-03	As(V)	Water	D	0.949		0.043	0.216	µg/L	B183424	1801706
1850041-03	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-03	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706
PW-202										
1850041-04	As(III)	Water	D	3.85		0.043	0.216	µg/L	B183424	1801706
1850041-04	As(V)	Water	D	0.642		0.043	0.216	µg/L	B183424	1801706
1850041-04	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-04	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706
PW-408										
1850041-05	As(III)	Water	D	18.5		0.043	0.216	µg/L	B183424	1801706
1850041-05	As(V)	Water	D	1.65		0.043	0.216	µg/L	B183424	1801706
1850041-05	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-05	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706
PW-200										
1850041-06	As(III)	Water	D	9.70		0.043	0.216	µg/L	B183424	1801706
1850041-06	As(V)	Water	D	1.31		0.043	0.216	µg/L	B183424	1801706
1850041-06	DMAs	Water	D	≤ 0.054	U	0.054	0.227	µg/L	B183424	1801706
1850041-06	MMAs	Water	D	≤ 0.097	U	0.097	0.248	µg/L	B183424	1801706



Accuracy & Precision Summary

Batch: B183424
 Lab Matrix: Water
 Method: SOP BAL-4100

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B183424-BS1	Blank Spike, (1833019)						
	As(III)		5.010	5.047	µg/L	101% 75-125	
	As(V)		5.000	5.142	µg/L	103% 75-125	
	DMAs		3.198	3.215	µg/L	101% 75-125	
B183424-BS2	Blank Spike, (1833021)						
	MMA		4.700	4.933	µg/L	105% 75-125	
B183424-DUP1	Duplicate, (1850041-06)						
	As(III)	9.701		9.522	µg/L		2% 25
	As(V)	1.312		1.305	µg/L		0.5% 25
	DMAs	ND		ND	µg/L		N/C 25
	MMA	ND		ND	µg/L		N/C 25
B183424-MS1	Matrix Spike, (1850041-06)						
	As(III)	9.701	11.12	20.65	µg/L	98% 75-125	
	As(V)	1.312	11.23	12.46	µg/L	99% 75-125	
	DMAs	ND	11.02	11.13	µg/L	101% 75-125	
	MMA	ND	10.80	10.80	µg/L	100% 75-125	
B183424-MSD1	Matrix Spike Duplicate, (1850041-06)						
	As(III)	9.701	11.12	20.60	µg/L	98% 75-125	0.2% 25
	As(V)	1.312	11.23	12.55	µg/L	100% 75-125	0.7% 25
	DMAs	ND	11.02	11.19	µg/L	102% 75-125	0.6% 25
	MMA	ND	10.80	10.62	µg/L	98% 75-125	2% 25



Method Blanks & Reporting Limits

Batch: B183424
Matrix: Water
Method: SOP BAL-4100
Analyte: As(III)

Sample	Result	Units	
B183424-BLK1	0.00	µg/L	
B183424-BLK2	0.00	µg/L	
B183424-BLK3	0.00	µg/L	
B183424-BLK4	0.00	µg/L	
Average:	0.000		MDL: 0.004
Limit:	0.020		MRL: 0.020

Analyte: As(V)

Sample	Result	Units	
B183424-BLK1	0.004	µg/L	
B183424-BLK2	0.002	µg/L	
B183424-BLK3	0.003	µg/L	
B183424-BLK4	0.004	µg/L	
Average:	0.003		MDL: 0.004
Limit:	0.020		MRL: 0.020

Analyte: DMA_s

Sample	Result	Units	
B183424-BLK1	0.00	µg/L	
B183424-BLK2	0.00	µg/L	
B183424-BLK3	0.00	µg/L	
B183424-BLK4	0.00	µg/L	
Average:	0.000		MDL: 0.005
Limit:	0.021		MRL: 0.021



Method Blanks & Reporting Limits

Analyte: MMAs

Sample	Result	Units	
B183424-BLK1	0.00	µg/L	
B183424-BLK2	0.00	µg/L	
B183424-BLK3	0.00	µg/L	
B183424-BLK4	0.00	µg/L	
Average:	0.000		MDL: 0.009
Limit:	0.023		MRL: 0.023



Sample Containers

Lab ID: 1850041-01		Report Matrix: Water		Collected: 12/07/2018			
Sample: PW-406		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041
Lab ID: 1850041-02		Report Matrix: Water		Collected: 12/08/2018			
Sample: PW-405		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041
Lab ID: 1850041-03		Report Matrix: Water		Collected: 12/08/2018			
Sample: PW-505		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041
Lab ID: 1850041-04		Report Matrix: Water		Collected: 12/08/2018			
Sample: PW-202		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041
Lab ID: 1850041-05		Report Matrix: Water		Collected: 12/08/2018			
Sample: PW-408		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041
Lab ID: 1850041-06		Report Matrix: Water		Collected: 12/09/2018			
Sample: PW-200		Sample Type: Sample		Received: 12/13/2018			
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle HDPE As-SP	125 mL	18-0119	10 mL EDTA (PP)	1849005	5	Styro Cooler - 1850041

Project ID: SGS-AN1803
PM: Amanda Royal



BAL Report 1850041
Client PM: Julie Shumway
Client Project: 1186919

Shipping Containers

Styro Cooler - 1850041

Received: December 13, 2018 12:30
Tracking No: 1ZA8619W0166007635 via UPS
Coolant Type: Blue Ice
Temperature: 1.1 °C

Description: Styro Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#18

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes



SGS North America Inc.
CHAIN OF CUSTODY RECORD



1 1 8 6 9 1 9

BAL Report 1850041

Locations Nationwide

Alaska Florida
New Jersey Colorado
Texas North Carolina
Virginia Louisiana

www.us.sgs.com

CLIENT: SGS North America Inc. - Alaska Division					SGS Reference: Brooks Rand					Page 1 of 1			
CONTACT: Julie Shumway PHONE NO: (907) 562-2343					Additional Comments: All soils report out in dry weight unless otherwise requested.								
PROJECT NAME: 1186919		PWSID#:			C O N T A I N E R S	Preservative Used:	EDTA	TYPE C = COMP G = GRAB Multi Incremental Soils	Speciated Arsenic (Arsenate, Arsenite)	MS	MSD	SGS lab #	Location ID
REPORTS TO:		E-MAIL: Julie.Shumway@sgs.com											
INVOICE TO: SGS - Alaska		QUOTE #: P.O. #: 1186919											
RESERVED for lab use		SAMPLE IDENTIFICATION											
		DATE mm/dd/yy	TIME HHMM	MATRIX/MATRIX	#								
	PW-406	12/7/2018	14:07	Water	1	G	X					1186919001	
	PW-405	12/8/2018	10:43	Water	1	G	X					1186919002	
	PW-505	12/8/2018	10:33	Water	1	G	X					1186919003	
	PW-202	12/8/2018	15:10	Water	1	G	X					1186919004	
	PW-408	12/8/2018	17:06	Water	1	G	X					1186919005	
	PW-200	12/9/2018	11:01	Water	1	G	X					1186919006	
Relinquished By: (1)		Date	Time	Received By:		DOD Project? NO		Report to DL (J Flags)? YES		Report as DL/LOD/LOQ? YES		Data Deliverable Requirements:	
<i>Julie Shumway</i>		12/12/18	08:32									Level 2 w/SGS EDD	
Relinquished By: (2)		Date	Time	Received By:		Cooler ID:		Requested Turnaround Time and-or Special Instructions:					
								RUSH Due 12/19/2018, Report in ug/L.					
Relinquished By: (3)		Date	Time	Received By:		Temp Blank °C:		Chain of Custody Seal: (Circle)					
				<i>Shumway</i>		or Ambient []		<input checked="" type="radio"/> INTACT <input type="radio"/> BROKEN <input type="radio"/> ABSENT					
Relinquished By: (4)		Date	Time	Received For Laboratory By:									
				<i>12/13/18 12:33</i>									

[X] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
 [] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

http://www.sgs.com/terms_and_conditions.htm

REVIEWED NSW

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

SGS North America, Inc

1186919

SGS Job Number: FA60120

Sampling Dates: 12/07/18 - 12/09/18

Report to:

**SGS North America, Inc
200 W Potter Dr
Anchorage, AK 99518
julie.shumway@sgs.com**

ATTN: Julie Shumway

Total number of pages in report: 40



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

A handwritten signature in black ink that reads "Caitlin Brice".

**Caitlin Brice, M.S.
General Manager**

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), IL(200063), NC(573), NJ(FLO02), NY(12022), SC(96038001)
DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177),
AK, AR, IA, KY, MA, MS, ND, NH, NV, OK, OR, UT, WA, WV

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Test results relate only to samples analyzed.

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Sample Summary

SGS North America, Inc
1186919

Job No: FA60120

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
FA60120-1	12/07/18	14:07 JS	12/13/18	AQ	Water	PW-406
FA60120-2	12/08/18	10:43 JS	12/13/18	AQ	Water	PW-405
FA60120-3	12/08/18	10:33 JS	12/13/18	AQ	Water	PW-505
FA60120-4	12/08/18	15:10 JS	12/13/18	AQ	Water	PW-202
FA60120-5	12/08/18	17:06 JS	12/13/18	AQ	Water	PW-408
FA60120-6	12/09/18	11:01 JS	12/13/18	AQ	Water	PW-200



SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: SGS North America, Inc

Job No FA60120

Site: 1186919

Report Date 12/27/2018 2:06:26

2

6 Samples were collected between 12/07/2018 and 12/09/2018 and were received at SGS North America Inc - Orlando on 12/13/2018 properly preserved, at 4 Deg. C and intact. These samples received an SGS Orlando job number of FA60120. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section. Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

MS Semi-Volatiles By Method EPA 537M BY ID

Matrix: AQ

Batch ID: OP73097

All samples were extracted within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

Sample(s) FA60120-4MS, FA60120-6DUP were used as the QC samples indicated.

All method blanks for this batch meet method specific criteria.

Sample(s) FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6 have compound(s) reported with a "B" qualifier, indicating analyte is found in the associated method blank.

RPD(s) for Duplicate for Perfluorobutanoic acid, Perfluoroheptanoic acid, Perfluorohexanoic acid, Perfluorooctanoic acid, Perfluoropentanoic acid are outside control limits for sample OP73097-DUP. Probable cause is due to sample non-homogeneity.

Matrix: AQ

Batch ID: OP73163

All samples were extracted within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

OP73163-BS: Insufficient sample for MS/MSD.

SGS Orlando certifies that this report meets the project requirements for analytical data produced for the samples as received at SGS Orlando and as stated on the COC. SGS Orlando certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the SGS Orlando Quality Manual except as noted above. This report is to be used in its entirety. SGS Orlando is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

Ariel Hartney, Client Services (*Signature on File*)

Summary of Hits

Job Number: FA60120
Account: SGS North America, Inc
Project: 1186919
Collected: 12/07/18 thru 12/09/18



Lab Sample ID	Client Sample ID	Result/ Qual	LOQ	LOD	Units	Method
---------------	------------------	-----------------	-----	-----	-------	--------

FA60120-1 PW-406

Perfluorobutanoic acid	0.00520 J	0.015	0.0077	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0143	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.0121 B	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00544 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0134 B	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00198 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.00299 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.0238	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.00230 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.113	0.0077	0.0038	ug/l	EPA 537M BY ID

FA60120-2 PW-405

Perfluorobutanoic acid	0.00470 J	0.015	0.0077	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0115	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.00930 B	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00424 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0168 B	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00201 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.00305 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.0266	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.00266 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.106	0.0077	0.0038	ug/l	EPA 537M BY ID

FA60120-3 PW-505

Perfluorobutanoic acid	0.00492 J	0.016	0.0080	ug/l	EPA 537M BY ID
Perfluoropentanoic acid	0.0116	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.00995 B	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00457 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.0107 B	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid	0.00219 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid	0.00351 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid	0.0288	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid	0.00323 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid	0.114	0.0080	0.0040	ug/l	EPA 537M BY ID

FA60120-4 PW-202

Perfluoropentanoic acid	0.00515 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorohexanoic acid	0.00542 JB	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid	0.00233 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorooctanoic acid	0.00822 B	0.0080	0.0040	ug/l	EPA 537M BY ID

Summary of Hits

Job Number: FA60120
Account: SGS North America, Inc
Project: 1186919
Collected: 12/07/18 thru 12/09/18



Lab Sample ID	Client Sample ID	Result/Qual	LOQ	LOD	Units	Method
---------------	------------------	-------------	-----	-----	-------	--------

Perfluorobutanesulfonic acid		0.00251 J	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.00877	0.0080	0.0040	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0200	0.0080	0.0040	ug/l	EPA 537M BY ID

FA60120-5 PW-408

Perfluoropentanoic acid		0.0131	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00867	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00320 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00264 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00234 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0211	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.115	0.0077	0.0038	ug/l	EPA 537M BY ID

FA60120-6 PW-200

Perfluoropentanoic acid		0.00847	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanoic acid		0.00626 JB	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanoic acid		0.00280 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanoic acid		0.00285 JB	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorobutanesulfonic acid		0.00218 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoropentanesulfonic acid		0.00333 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorohexanesulfonic acid		0.0230	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluoroheptanesulfonic acid		0.00213 J	0.0077	0.0038	ug/l	EPA 537M BY ID
Perfluorooctanesulfonic acid		0.0977	0.0077	0.0038	ug/l	EPA 537M BY ID

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: PW-406		Date Sampled: 12/07/18
Lab Sample ID: FA60120-1		Date Received: 12/13/18
Matrix: AQ - Water		Percent Solids: n/a
Method: EPA 537M BY ID EPA 537 MOD		
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25362.D	1	12/21/18 06:49	NAF	12/19/18 09:00	OP73097	S2Q393
Run #2							

	Initial Volume	Final Volume
Run #1	130 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.00520	0.015	0.0077	0.0038	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0143	0.0077	0.0038	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.0121	0.0077	0.0038	0.0019	ug/l	B
375-85-9	Perfluoroheptanoic acid	0.00544	0.0077	0.0038	0.0019	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0134	0.0077	0.0038	0.0019	ug/l	B
375-95-1	Perfluorononanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	0.0038 U	0.0077	0.0038	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.00198	0.0077	0.0038	0.0019	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00299	0.0077	0.0038	0.0019	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0238	0.0077	0.0038	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00230	0.0077	0.0038	0.0019	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.113	0.0077	0.0038	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDES							
754-91-6	PFOSA	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
2991-50-6	EtFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.1
4

Report of Analysis

Client Sample ID: PW-406	
Lab Sample ID: FA60120-1	Date Sampled: 12/07/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	94%		30-140%
	13C5-PFPeA	99%		40-140%
	13C5-PFHxA	102%		50-150%
	13C4-PFHpA	103%		50-150%
	13C8-PFOA	114%		50-150%
	13C9-PFNA	112%		50-150%
	13C6-PFDA	113%		50-150%
	13C7-PFUnDA	97%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	83%		40-150%
	13C3-PFBS	94%		50-150%
	13C3-PFHxS	97%		50-150%
	13C8-PFOS	95%		50-150%
	13C8-FOSA	109%		30-140%
	d3-MeFOSAA	89%		50-150%
	13C2-4:2FTS	97%		50-150%
	13C2-6:2FTS	105%		50-150%
	13C2-8:2FTS	109%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.1
4

Report of Analysis

Client Sample ID: PW-405		
Lab Sample ID: FA60120-2		Date Sampled: 12/08/18
Matrix: AQ - Water		Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25363.D	1	12/21/18 07:05	NAF	12/19/18 09:00	OP73097	S2Q393
Run #2							

	Initial Volume	Final Volume
Run #1	130 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.00470	0.015	0.0077	0.0038	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0115	0.0077	0.0038	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.00930	0.0077	0.0038	0.0019	ug/l	B
375-85-9	Perfluoroheptanoic acid	0.00424	0.0077	0.0038	0.0019	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0168	0.0077	0.0038	0.0019	ug/l	B
375-95-1	Perfluorononanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	0.0038 U	0.0077	0.0038	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.00201	0.0077	0.0038	0.0019	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00305	0.0077	0.0038	0.0019	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0266	0.0077	0.0038	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00266	0.0077	0.0038	0.0019	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.106	0.0077	0.0038	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDES							
754-91-6	PFOSA	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
2991-50-6	EtFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.2
4

Report of Analysis

Client Sample ID: PW-405	
Lab Sample ID: FA60120-2	Date Sampled: 12/08/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	103%		30-140%
	13C5-PFPeA	106%		40-140%
	13C5-PFHxA	108%		50-150%
	13C4-PFHpA	110%		50-150%
	13C8-PFOA	120%		50-150%
	13C9-PFNA	101%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	101%		50-150%
	13C2-PFDoDA	64%		50-150%
	13C2-PFTeDA	72%		40-150%
	13C3-PFBS	103%		50-150%
	13C3-PFHxS	96%		50-150%
	13C8-PFOS	78%		50-150%
	13C8-FOSA	99%		30-140%
	d3-MeFOSAA	75%		50-150%
	13C2-4:2FTS	104%		50-150%
	13C2-6:2FTS	115%		50-150%
	13C2-8:2FTS	85%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.2
4

Report of Analysis

Client Sample ID: PW-505		
Lab Sample ID: FA60120-3		Date Sampled: 12/08/18
Matrix: AQ - Water		Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25364.D	1	12/21/18 07:21	NAF	12/19/18 09:00	OP73097	S2Q393
Run #2							

	Initial Volume	Final Volume
Run #1	125 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.00492	0.016	0.0080	0.0040	ug/l	J
2706-90-3	Perfluoropentanoic acid	0.0116	0.0080	0.0040	0.0030	ug/l	
307-24-4	Perfluorohexanoic acid	0.00995	0.0080	0.0040	0.0020	ug/l	B
375-85-9	Perfluoroheptanoic acid	0.00457	0.0080	0.0040	0.0020	ug/l	J
335-67-1	Perfluorooctanoic acid	0.0107	0.0080	0.0040	0.0020	ug/l	B
375-95-1	Perfluorononanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
307-55-1	Perfluorododecanoic acid	0.0040 U	0.0080	0.0040	0.0030	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.00219	0.0080	0.0040	0.0020	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00351	0.0080	0.0040	0.0020	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0288	0.0080	0.0040	0.0020	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00323	0.0080	0.0040	0.0020	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.114	0.0080	0.0040	0.0030	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROOCCTANESULFONAMIDES							
754-91-6	PFOSA	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.016 U	0.040	0.016	0.0080	ug/l	
2991-50-6	EtFOSAA	0.016 U	0.040	0.016	0.0080	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.3
4

Report of Analysis

Client Sample ID: PW-505	
Lab Sample ID: FA60120-3	Date Sampled: 12/08/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	97%		30-140%
	13C5-PFPeA	100%		40-140%
	13C5-PFHxA	104%		50-150%
	13C4-PFHpA	101%		50-150%
	13C8-PFOA	114%		50-150%
	13C9-PFNA	96%		50-150%
	13C6-PFDA	92%		50-150%
	13C7-PFUnDA	97%		50-150%
	13C2-PFDoDA	69%		50-150%
	13C2-PFTeDA	73%		40-150%
	13C3-PFBS	97%		50-150%
	13C3-PFHxS	88%		50-150%
	13C8-PFOS	73%		50-150%
	13C8-FOSA	87%		30-140%
	d3-MeFOSAA	74%		50-150%
	13C2-4:2FTS	98%		50-150%
	13C2-6:2FTS	109%		50-150%
	13C2-8:2FTS	82%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PW-202		
Lab Sample ID: FA60120-4		Date Sampled: 12/08/18
Matrix: AQ - Water		Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25365.D	1	12/21/18 07:36	NAF	12/19/18 09:00	OP73097	S2Q393
Run #2							

	Initial Volume	Final Volume
Run #1	125 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.0080 U	0.016	0.0080	0.0040	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00515	0.0080	0.0040	0.0030	ug/l	J
307-24-4	Perfluorohexanoic acid	0.00542	0.0080	0.0040	0.0020	ug/l	JB
375-85-9	Perfluoroheptanoic acid	0.00233	0.0080	0.0040	0.0020	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00822	0.0080	0.0040	0.0020	ug/l	B
375-95-1	Perfluorononanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
335-76-2	Perfluorodecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
307-55-1	Perfluorododecanoic acid	0.0040 U	0.0080	0.0040	0.0030	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.00251	0.0080	0.0040	0.0020	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
355-46-4	Perfluorohexanesulfonic acid	0.00877	0.0080	0.0040	0.0020	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.0200	0.0080	0.0040	0.0030	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROOCETANESULFONAMIDES							
754-91-6	PFOSA	0.0040 U	0.0080	0.0040	0.0020	ug/l	
PERFLUOROOCETANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.016 U	0.040	0.016	0.0080	ug/l	
2991-50-6	EtFOSAA	0.016 U	0.040	0.016	0.0080	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.4
4

Report of Analysis

Client Sample ID: PW-202	
Lab Sample ID: FA60120-4	Date Sampled: 12/08/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0080 U	0.016	0.0080	0.0040	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	101%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	107%		50-150%
	13C4-PFHpA	107%		50-150%
	13C8-PFOA	113%		50-150%
	13C9-PFNA	96%		50-150%
	13C6-PFDA	97%		50-150%
	13C7-PFUnDA	99%		50-150%
	13C2-PFDoDA	69%		50-150%
	13C2-PFTeDA	78%		40-150%
	13C3-PFBS	101%		50-150%
	13C3-PFHxS	90%		50-150%
	13C8-PFOS	77%		50-150%
	13C8-FOSA	97%		30-140%
	d3-MeFOSAA	77%		50-150%
	13C2-4:2FTS	101%		50-150%
	13C2-6:2FTS	108%		50-150%
	13C2-8:2FTS	86%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PW-408		
Lab Sample ID: FA60120-5		Date Sampled: 12/08/18
Matrix: AQ - Water		Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25531.D	1	12/24/18 23:08	NAF	12/22/18 08:30	OP73163	S2Q395
Run #2							

	Initial Volume	Final Volume
Run #1	130 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.0077 U	0.015	0.0077	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	0.0131	0.0077	0.0038	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.00867	0.0077	0.0038	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	0.00320	0.0077	0.0038	0.0019	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00264	0.0077	0.0038	0.0019	ug/l	J
375-95-1	Perfluorononanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	0.0038 U	0.0077	0.0038	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	0.00234	0.0077	0.0038	0.0019	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0211	0.0077	0.0038	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	0.115	0.0077	0.0038	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDES							
754-91-6	PFOSA	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
2991-50-6	EtFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.5
4

Report of Analysis

Client Sample ID: PW-408	
Lab Sample ID: FA60120-5	Date Sampled: 12/08/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	105%		30-140%
	13C5-PFPeA	112%		40-140%
	13C5-PFHxA	115%		50-150%
	13C4-PFHpA	113%		50-150%
	13C8-PFOA	129%		50-150%
	13C9-PFNA	111%		50-150%
	13C6-PFDA	93%		50-150%
	13C7-PFUnDA	86%		50-150%
	13C2-PFDoDA	71%		50-150%
	13C2-PFTeDA	79%		40-150%
	13C3-PFBS	106%		50-150%
	13C3-PFHxS	105%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	101%		30-140%
	d3-MeFOSAA	80%		50-150%
	13C2-4:2FTS	107%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	85%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PW-200		
Lab Sample ID: FA60120-6		Date Sampled: 12/09/18
Matrix: AQ - Water		Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD		Percent Solids: n/a
Project: 1186919		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2Q25368.D	1	12/21/18 08:23	NAF	12/19/18 09:00	OP73097	S2Q393
Run #2							

	Initial Volume	Final Volume
Run #1	130 ml	1.0 ml
Run #2		

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
PERFLUOROALKYLCARBOXYLIC ACIDS							
375-22-4	Perfluorobutanoic acid	0.0077 U	0.015	0.0077	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	0.00847	0.0077	0.0038	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.00626	0.0077	0.0038	0.0019	ug/l	JB
375-85-9	Perfluoroheptanoic acid	0.00280	0.0077	0.0038	0.0019	ug/l	J
335-67-1	Perfluorooctanoic acid	0.00285	0.0077	0.0038	0.0019	ug/l	JB
375-95-1	Perfluorononanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	0.0038 U	0.0077	0.0038	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROALKYLSULFONATES							
375-73-5	Perfluorobutanesulfonic acid	0.00218	0.0077	0.0038	0.0019	ug/l	J
2706-91-4	Perfluoropentanesulfonic acid	0.00333	0.0077	0.0038	0.0019	ug/l	J
355-46-4	Perfluorohexanesulfonic acid	0.0230	0.0077	0.0038	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	0.00213	0.0077	0.0038	0.0019	ug/l	J
1763-23-1	Perfluorooctanesulfonic acid	0.0977	0.0077	0.0038	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDES							
754-91-6	PFOSA	0.0038 U	0.0077	0.0038	0.0019	ug/l	
PERFLUOROOCCTANESULFONAMIDOACETIC ACIDS							
2355-31-9	MeFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
2991-50-6	EtFOSAA	0.015 U	0.038	0.015	0.0077	ug/l	
FLUOROTELOMER SULFONATES							
757124-72-4	4:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound



4.6
4

Report of Analysis

Client Sample ID: PW-200	
Lab Sample ID: FA60120-6	Date Sampled: 12/09/18
Matrix: AQ - Water	Date Received: 12/13/18
Method: EPA 537M BY ID EPA 537 MOD	Percent Solids: n/a
Project: 1186919	

PFAS List

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
39108-34-4	8:2 Fluorotelomer sulfonate	0.0077 U	0.015	0.0077	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Run# 1	Run# 2	Limits
	13C4-PFBA	100%		30-140%
	13C5-PFPeA	104%		40-140%
	13C5-PFHxA	105%		50-150%
	13C4-PFHpA	105%		50-150%
	13C8-PFOA	124%		50-150%
	13C9-PFNA	104%		50-150%
	13C6-PFDA	100%		50-150%
	13C7-PFUnDA	109%		50-150%
	13C2-PFDoDA	79%		50-150%
	13C2-PFTeDA	83%		40-150%
	13C3-PFBS	100%		50-150%
	13C3-PFHxS	99%		50-150%
	13C8-PFOS	84%		50-150%
	13C8-FOSA	98%		30-140%
	d3-MeFOSAA	83%		50-150%
	13C2-4:2FTS	101%		50-150%
	13C2-6:2FTS	117%		50-150%
	13C2-8:2FTS	91%		50-150%

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
 LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Parameter	Units
Per- and Polyfluoroalkyl Substances	
4:2 Fluorotelomer sulfonate (4:2 FTS)	ng/l
6:2 Fluorotelomer sulfonate (6:2 FTS)	ng/l
8:2 Fluorotelomer sulfonate (8:2 FTS)	ng/l
n-Ethyl perfluorooctanesulfonamideacetic acid (N-EFOSAA)	ng/l
n-Methyl perfluorooctanesulfonamideacetic acid (MeFOSAA)	ng/l
Perfluorobutane sulfonate (PFBS)	ng/l
Perfluorobutanoic acid (PFBA)	ng/l
Perfluorodecane sulfonate (PFDS)	ng/l
Perfluorodecanoic acid (PFDA)	ng/l
Perfluorodecanoic acid (PFDAa / PFDAc / PFDAoDA)	ng/l
Perfluorohexane sulfonate (PFHxS)	ng/l
Perfluorohexanoic acid (PFHxA)	ng/l
Perfluorohexane sulfonate (PFHxS)	ng/l
Perfluorohexanoic acid (PFHxA)	ng/l
Perfluorononane sulfonate (PFNS)	ng/l
Perfluorononanoic acid (PFNA)	ng/l
Perfluorooctanesulfonamide (PFOSA / FOSA)	ng/l
Perfluorooctanesulfonate (PFOS)	ng/l
Perfluorooctanoic acid (PFOA)	ng/l
Perfluoropentanoic acid (PFPPeA)	ng/l
Perfluoropentanesulfonate (PFPPeS)	ng/l
Perfluorotetradecanoic acid (PFTTA / PFTTcDA / PFTTcA)	ng/l
Perfluorotridecanoic acid (PFTDA / PFTTcA)	ng/l
Perfluoroundecanoic acid (PFUnA / PFUnDA)	ng/l
General Parameters	
Alkalinity, total, as CaCO3	mg/l
Carbon, total organic	mg/l
Chloride	mg/l
Fluoride	mg/l
Hardness, as CaCO3	ug/l
Nitrogen, nitrate + nitrite, as N	ng/l
Nitrogen, ammonia, as N	ng/l
pH	units
Solids, total dissolved	mg/l
Solids, total suspended	mg/l
Specific conductance @ 25 °C	umhoes/cm
Oil and Grease	mg/l
Sulfide	mg/l
Sulfate, as SO4	mg/l
Total Metals	
Arsenate	ug/l
Arsenite	ug/l
Calcium	ug/l
Chromium	ug/l
Iron	ug/l
Magnesium	ug/l
Manganese	ug/l
Potassium	ug/l
Sodium	ug/l

SGS Sample Receipt Summary

Job Number: FA60120

Client: SGS

Project: 1186919

Date / Time Received: 12/13/2018 10:00:00 AM

Delivery Method: UPS

Airbill #s: 1za8619w0167055242

Therm ID: IR 1;

Therm CF: -0.2;

of Coolers: 1

Cooler Temps (Raw Measured) °C: Cooler 1: (4.2);

Cooler Temps (Corrected) °C: Cooler 1: (4.0);

Cooler Information

	Y	or	N
1. Custody Seals Present	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Temp criteria achieved	<input checked="" type="checkbox"/>		<input type="checkbox"/>
4. Cooler temp verification	IR Gun		
5. Cooler media	Ice (Bag)		

Sample Information

	Y	or	N	N/A
1. Sample labels present on bottles	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Samples preserved properly	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
3. Sufficient volume/containers recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Condition of sample	Intact			
5. Sample recvd within HT	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
6. Dates/Times/IDs on COC match Sample Label	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
7. VOCs have headspace	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
9. Compositing instructions clear	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Voa Soil Kits/Jars received past 48hrs?	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. % Solids Jar received?	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Residual Chlorine Present?	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Trip Blank Information

	Y	or	N	N/A
1. Trip Blank present / cooler	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Trip Blank listed on COC	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	W	or	S	N/A
3. Type Of TB Received	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Misc. Information

Number of Encores: 25-Gram _____ 5-Gram _____ Number of 5035 Field Kits: _____ Number of Lab Filtered Metals: _____
 Test Strip Lot #s: pH 0-3 _____ 230315 _____ pH 10-12 _____ 219813A _____ Other: (Specify) _____
 Residual Chlorine Test Strip Lot #: _____

Comments

SM001
Rev. Date 05/24/17

Technician: SHAYLAP

Date: 12/13/2018 10:00:00

Reviewer: BK

Date: 12/13/2018

FA60120: Chain of Custody

Page 3 of 3

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA60120
Account: SGS/KA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-MB	2Q25361.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	0.00231	0.0077	0.0019	ug/l	J
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	0.00391	0.0077	0.0019	ug/l	J
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	92% 30-140%
	13C5-PFPeA	92% 40-140%
	13C5-PFHxA	95% 50-150%
	13C4-PFHpA	94% 50-150%
	13C8-PFOA	101% 50-150%
	13C9-PFNA	100% 50-150%
	13C6-PFDA	96% 50-150%
	13C7-PFUnDA	104% 50-150%

Method Blank Summary

Job Number: FA60120
Account: SGS/SAK North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-MB	2Q25361.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	76% 50-150%
	13C2-PFTeDA	79% 40-150%
	13C3-PFBS	90% 50-150%
	13C3-PFHxS	90% 50-150%
	13C8-PFOS	91% 50-150%
	13C8-FOSA	97% 30-140%
	d3-MeFOSAA	85% 50-150%
	13C2-4:2FTS	91% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	88% 50-150%

Method Blank Summary

Job Number: FA60120
Account: SGS/SAK/SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73163-MB	2Q25529.D	1	12/24/18	NAF	12/22/18	OP73163	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-5

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.0077	0.0029	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	101% 30-140%
	13C5-PFPeA	106% 40-140%
	13C5-PFHxA	110% 50-150%
	13C4-PFHpA	109% 50-150%
	13C8-PFOA	115% 50-150%
	13C9-PFNA	112% 50-150%
	13C6-PFDA	107% 50-150%
	13C7-PFUnDA	102% 50-150%

Method Blank Summary

Job Number: FA60120
Account: SGS/SAK North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73163-MB	2Q25529.D	1	12/24/18	NAF	12/22/18	OP73163	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-5

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	87% 50-150%
	13C2-PFTeDA	89% 40-150%
	13C3-PFBS	104% 50-150%
	13C3-PFHxS	105% 50-150%
	13C8-PFOS	106% 50-150%
	13C8-FOSA	110% 30-140%
	d3-MeFOSAA	97% 50-150%
	13C2-4:2FTS	102% 50-150%
	13C2-6:2FTS	106% 50-150%
	13C2-8:2FTS	98% 50-150%

6.1.2
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Instrument Blank

Job Number: FA60120
Account: SGS/SAK/SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q393-IBLK	2Q25298.D	1	12/20/18	NAF	n/a	n/a	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.017	0.0042	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0083	0.0031	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0083	0.0021	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0083	0.0021	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0083	0.0021	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0083	0.0021	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0083	0.0021	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0083	0.0021	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0083	0.0031	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0083	0.0021	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0083	0.0021	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0083	0.0021	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0083	0.0021	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0083	0.0021	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0083	0.0021	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.017	0.0042	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0083	0.0021	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0083	0.0021	ug/l	
754-91-6	PFOSA	ND	0.0083	0.0021	ug/l	
2355-31-9	MeFOSAA	ND	0.042	0.0083	ug/l	
2991-50-6	EtFOSAA	ND	0.042	0.0083	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.017	0.0042	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	97% 50-150%
	13C5-PFPeA	97% 50-150%
	13C5-PFHxA	101% 50-150%
	13C4-PFHpA	100% 50-150%
	13C8-PFOA	101% 50-150%
	13C9-PFNA	104% 50-150%
	13C6-PFDA	106% 50-150%
	13C7-PFUnDA	102% 50-150%

Instrument Blank

Job Number: FA60120
Account: SGS/SAK North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q393-IBLK	2Q25298.D	1	12/20/18	NAF	n/a	n/a	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	103% 50-150%
	13C2-PFTeDA	99% 50-150%
	13C3-PFBS	98% 50-150%
	13C3-PFHxS	99% 50-150%
	13C8-PFOS	99% 50-150%
	13C8-FOSA	105% 50-150%
	d3-MeFOSAA	101% 50-150%
	13C2-4:2FTS	92% 50-150%
	13C2-6:2FTS	97% 50-150%
	13C2-8:2FTS	96% 50-150%

Instrument Blank

Job Number: FA60120
Account: SGS/SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60120-5

CAS No.	Compound	Result	RL	MDL	Units	Q
375-22-4	Perfluorobutanoic acid	ND	0.015	0.0038	ug/l	
2706-90-3	Perfluoropentanoic acid	ND	0.0077	0.0029	ug/l	
307-24-4	Perfluorohexanoic acid	ND	0.0077	0.0019	ug/l	
375-85-9	Perfluoroheptanoic acid	ND	0.0077	0.0019	ug/l	
335-67-1	Perfluorooctanoic acid	ND	0.0077	0.0019	ug/l	
375-95-1	Perfluorononanoic acid	ND	0.0077	0.0019	ug/l	
335-76-2	Perfluorodecanoic acid	ND	0.0077	0.0019	ug/l	
2058-94-8	Perfluoroundecanoic acid	ND	0.0077	0.0019	ug/l	
307-55-1	Perfluorododecanoic acid	ND	0.0077	0.0029	ug/l	
72629-94-8	Perfluorotridecanoic acid	ND	0.0077	0.0019	ug/l	
376-06-7	Perfluorotetradecanoic acid	ND	0.0077	0.0019	ug/l	
375-73-5	Perfluorobutanesulfonic acid	ND	0.0077	0.0019	ug/l	
2706-91-4	Perfluoropentanesulfonic acid	ND	0.0077	0.0019	ug/l	
355-46-4	Perfluorohexanesulfonic acid	ND	0.0077	0.0019	ug/l	
375-92-8	Perfluoroheptanesulfonic acid	ND	0.0077	0.0019	ug/l	
1763-23-1	Perfluorooctanesulfonic acid	ND	0.015	0.0038	ug/l	
68259-12-1	Perfluorononanesulfonic acid	ND	0.0077	0.0019	ug/l	
335-77-3	Perfluorodecanesulfonic acid	ND	0.0077	0.0019	ug/l	
754-91-6	PFOSA	ND	0.0077	0.0019	ug/l	
2355-31-9	MeFOSAA	ND	0.038	0.0077	ug/l	
2991-50-6	EtFOSAA	ND	0.038	0.0077	ug/l	
757124-72-44:2	Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
27619-97-2	6:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	
39108-34-4	8:2 Fluorotelomer sulfonate	ND	0.015	0.0038	ug/l	

CAS No.	ID Standard Recoveries	Limits
	13C4-PFBA	98% 50-150%
	13C5-PFPeA	99% 50-150%
	13C5-PFHxA	102% 50-150%
	13C4-PFHpA	102% 50-150%
	13C8-PFOA	102% 50-150%
	13C9-PFNA	100% 50-150%
	13C6-PFDA	109% 50-150%
	13C7-PFUnDA	105% 50-150%

Instrument Blank

Job Number: FA60120
Account: SGS/SAK North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
S2Q395-IBLK	2Q25509.D	1	12/24/18	NAF	n/a	n/a	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M QSM5.1 B-15

FA60120-5

CAS No.	ID Standard Recoveries	Limits
	13C2-PFDoDA	102% 50-150%
	13C2-PFTeDA	100% 50-150%
	13C3-PFBS	99% 50-150%
	13C3-PFHxS	100% 50-150%
	13C8-PFOS	99% 50-150%
	13C8-FOSA	108% 50-150%
	d3-MeFOSAA	99% 50-150%
	13C2-4:2FTS	93% 50-150%
	13C2-6:2FTS	95% 50-150%
	13C2-8:2FTS	97% 50-150%

6.1.4
6

Blank Spike Summary

Job Number: FA60120
Account: SGS/SAK/SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-BS	2Q25360.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.154	0.146	95	70-130
2706-90-3	Perfluoropentanoic acid	0.154	0.145	94	70-130
307-24-4	Perfluorohexanoic acid	0.154	0.130	84	70-130
375-85-9	Perfluoroheptanoic acid	0.154	0.144	94	71-130
335-67-1	Perfluorooctanoic acid	0.154	0.149	97	74-130
375-95-1	Perfluorononanoic acid	0.154	0.123	80	76-130
335-76-2	Perfluorodecanoic acid	0.154	0.121	79	70-130
2058-94-8	Perfluoroundecanoic acid	0.154	0.146	95	70-130
307-55-1	Perfluorododecanoic acid	0.154	0.149	97	70-130
72629-94-8	Perfluorotridecanoic acid	0.154	0.165	107	70-139
376-06-7	Perfluorotetradecanoic acid	0.154	0.132	86	70-130
375-73-5	Perfluorobutanesulfonic acid	0.136	0.123	90	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.145	0.132	91	70-130
355-46-4	Perfluorohexanesulfonic acid	0.14	0.122	87	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.146	0.144	99	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.142	0.141	99	70-130
68259-12-1	Perfluorononanesulfonic acid	0.148	0.129	87	70-130
335-77-3	Perfluorodecanesulfonic acid	0.148	0.121	82	70-130
754-91-6	PFOSA	0.154	0.145	94	70-131
2355-31-9	MeFOSAA	0.154	0.146	95	70-130
2991-50-6	EtFOSAA	0.154	0.158	103	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.144	0.138	96	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.146	0.143	98	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.148	0.140	95	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	103%	30-140%
	13C5-PFPeA	102%	40-140%
	13C5-PFHxA	104%	50-150%
	13C4-PFHpA	103%	50-150%
	13C8-PFOA	106%	50-150%
	13C9-PFNA	107%	50-150%
	13C6-PFDA	107%	50-150%
	13C7-PFUnDA	113%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60120
Account: SGS/SAKA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-BS	2Q25360.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	91%	50-150%
	13C2-PFTeDA	90%	40-150%
	13C3-PFBS	101%	50-150%
	13C3-PFHxS	100%	50-150%
	13C8-PFOS	97%	50-150%
	13C8-FOSA	104%	30-140%
	d3-MeFOSAA	93%	50-150%
	13C2-4:2FTS	105%	50-150%
	13C2-6:2FTS	108%	50-150%
	13C2-8:2FTS	101%	50-150%

* = Outside of Control Limits.



Blank Spike Summary

Job Number: FA60120
Account: SGS/SAK/SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73163-BS ^a	2Q25530.D	1	12/24/18	NAF	12/22/18	OP73163	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
375-22-4	Perfluorobutanoic acid	0.154	0.143	93	70-130
2706-90-3	Perfluoropentanoic acid	0.154	0.140	91	70-130
307-24-4	Perfluorohexanoic acid	0.154	0.127	83	70-130
375-85-9	Perfluoroheptanoic acid	0.154	0.144	94	71-130
335-67-1	Perfluorooctanoic acid	0.154	0.148	96	74-130
375-95-1	Perfluorononanoic acid	0.154	0.120	78	76-130
335-76-2	Perfluorodecanoic acid	0.154	0.130	84	70-130
2058-94-8	Perfluoroundecanoic acid	0.154	0.150	97	70-130
307-55-1	Perfluorododecanoic acid	0.154	0.152	99	70-130
72629-94-8	Perfluorotridecanoic acid	0.154	0.157	102	70-139
376-06-7	Perfluorotetradecanoic acid	0.154	0.134	87	70-130
375-73-5	Perfluorobutanesulfonic acid	0.136	0.123	90	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.145	0.133	92	70-130
355-46-4	Perfluorohexanesulfonic acid	0.14	0.120	86	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.146	0.140	96	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.142	0.139	98	70-130
68259-12-1	Perfluorononanesulfonic acid	0.148	0.125	85	70-130
335-77-3	Perfluorodecanesulfonic acid	0.148	0.109	73	70-130
754-91-6	PFOSA	0.154	0.145	94	70-131
2355-31-9	MeFOSAA	0.154	0.144	94	70-130
2991-50-6	EtFOSAA	0.154	0.139	90	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.144	0.136	95	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.146	0.137	94	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.148	0.133	90	70-130

CAS No.	ID Standard Recoveries	BSP	Limits
	13C4-PFBA	105%	30-140%
	13C5-PFPeA	109%	40-140%
	13C5-PFHxA	110%	50-150%
	13C4-PFHpA	110%	50-150%
	13C8-PFOA	108%	50-150%
	13C9-PFNA	114%	50-150%
	13C6-PFDA	107%	50-150%
	13C7-PFUnDA	113%	50-150%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA60120
Account: SGS/KA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73163-BS ^a	2Q25530.D	1	12/24/18	NAF	12/22/18	OP73163	S2Q395

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-5

CAS No.	ID Standard Recoveries	BSP	Limits
	13C2-PFDoDA	92%	50-150%
	13C2-PFTeDA	96%	40-150%
	13C3-PFBS	106%	50-150%
	13C3-PFHxS	107%	50-150%
	13C8-PFOS	107%	50-150%
	13C8-FOSA	109%	30-140%
	d3-MeFOSAA	99%	50-150%
	13C2-4:2FTS	109%	50-150%
	13C2-6:2FTS	108%	50-150%
	13C2-8:2FTS	104%	50-150%

(a) Insufficient sample for MS/MSD.

* = Outside of Control Limits.



Matrix Spike Summary

Job Number: FA60120
Account: SGS/KA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-MS	2Q25366.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393
FA60120-4	2Q25365.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	Compound	FA60120-4 ug/l	Spike Q	ug/l	MS ug/l	MS %	Limits
375-22-4	Perfluorobutanoic acid	0.016 U		0.154	0.135	88	70-130
2706-90-3	Perfluoropentanoic acid	0.00515 J		0.154	0.136	85	70-130
307-24-4	Perfluoroheptanoic acid	0.00542 JB		0.154	0.121	75	70-130
375-85-9	Perfluoroheptanoic acid	0.00233 J		0.154	0.132	84	71-130
335-67-1	Perfluorooctanoic acid	0.00822 B		0.154	0.135	82	74-130
375-95-1	Perfluorononanoic acid	0.0080 U		0.154	0.122	79	76-130
335-76-2	Perfluorodecanoic acid	0.0080 U		0.154	0.129	84	70-130
2058-94-8	Perfluoroundecanoic acid	0.0080 U		0.154	0.147	96	70-130
307-55-1	Perfluorododecanoic acid	0.0080 U		0.154	0.161	105	70-130
72629-94-8	Perfluorotridecanoic acid	0.0080 U		0.154	0.160	104	70-139
376-06-7	Perfluorotetradecanoic acid	0.0080 U		0.154	0.142	92	70-130
375-73-5	Perfluorobutanesulfonic acid	0.00251 J		0.136	0.116	83	73-130
2706-91-4	Perfluoropentanesulfonic acid	0.0080 U		0.145	0.124	86	70-130
355-46-4	Perfluorohexanesulfonic acid	0.00877		0.14	0.122	81	74-130
375-92-8	Perfluoroheptanesulfonic acid	0.0080 U		0.146	0.131	90	74-130
1763-23-1	Perfluorooctanesulfonic acid	0.0200		0.142	0.162	100	70-130
68259-12-1	Perfluorononanesulfonic acid	0.0080 U		0.148	0.121	82	70-130
335-77-3	Perfluorodecanesulfonic acid	0.0080 U		0.148	0.107	72	70-130
754-91-6	PFOSA	0.0080 U		0.154	0.140	91	70-131
2355-31-9	MeFOSAA	0.040 U		0.154	0.149	97	70-130
2991-50-6	EtFOSAA	0.040 U		0.154	0.160	104	70-130
757124-72-44:2	Fluorotelomer sulfonate	0.016 U		0.144	0.127	88	70-130
27619-97-2	6:2 Fluorotelomer sulfonate	0.016 U		0.146	0.131	90	70-133
39108-34-4	8:2 Fluorotelomer sulfonate	0.016 U		0.148	0.135	91	70-130

CAS No.	ID Standard Recoveries	MS	FA60120-4	Limits
	13C4-PFBA	103%	101%	30-140%
	13C5-PFPeA	107%	104%	40-140%
	13C5-PFHxA	109%	107%	50-150%
	13C4-PFHpA	107%	107%	50-150%
	13C8-PFOA	116%	113%	50-150%
	13C9-PFNA	103%	96%	50-150%
	13C6-PFDA	97%	97%	50-150%
	13C7-PFUnDA	92%	99%	50-150%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: FA60120
Account: SGS/SAK North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-MS	2Q25366.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393
FA60120-4	2Q25365.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	ID Standard Recoveries	MS	FA60120-4	Limits
	13C2-PFDoDA	67%	69%	50-150%
	13C2-PFTeDA	75%	78%	40-150%
	13C3-PFBS	103%	101%	50-150%
	13C3-PFHxS	102%	90%	50-150%
	13C8-PFOS	85%	77%	50-150%
	13C8-FOSA	99%	97%	30-140%
	d3-MeFOSAA	78%	77%	50-150%
	13C2-4:2FTS	109%	101%	50-150%
	13C2-6:2FTS	116%	108%	50-150%
	13C2-8:2FTS	97%	86%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA60120
Account: SGS/KA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-DUP	2Q25369.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393
FA60120-6	2Q25368.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	Compound	FA60120-6		Q	RPD	Limits
		ug/l	DUP ug/l			
375-22-4	Perfluorobutanoic acid	0.015 U	0.00521 J	J	200*	30
2706-90-3	Perfluoropentanoic acid	0.00847	0.0119		34*	30
307-24-4	Perfluorohexanoic acid	0.00626 JB	0.00998		46*	30
375-85-9	Perfluoroheptanoic acid	0.00280 J	0.00471 J	J	51*	30
335-67-1	Perfluorooctanoic acid	0.00285 JB	0.0135		130*	30
375-95-1	Perfluorononanoic acid	0.0077 U	ND		nc	30
335-76-2	Perfluorodecanoic acid	0.0077 U	ND		nc	30
2058-94-8	Perfluoroundecanoic acid	0.0077 U	ND		nc	30
307-55-1	Perfluorododecanoic acid	0.0077 U	ND		nc	30
72629-94-8	Perfluorotridecanoic acid	0.0077 U	ND		nc	30
376-06-7	Perfluorotetradecanoic acid	0.0077 U	ND		nc	30
375-73-5	Perfluorobutanesulfonic acid	0.00218 J	0.00195 J	J	11	30
2706-91-4	Perfluoropentanesulfonic acid	0.00333 J	0.00331 J	J	1	30
355-46-4	Perfluorohexanesulfonic acid	0.0230	0.0237		3	30
375-92-8	Perfluoroheptanesulfonic acid	0.00213 J	0.00223 J	J	5	30
1763-23-1	Perfluorooctanesulfonic acid	0.0977	0.108		10	30
68259-12-1	Perfluorononanesulfonic acid	0.0077 U	ND		nc	30
335-77-3	Perfluorodecanesulfonic acid	0.0077 U	ND		nc	30
754-91-6	PFOSA	0.0077 U	ND		nc	30
2355-31-9	MeFOSAA	0.038 U	ND		nc	30
2991-50-6	EtFOSAA	0.038 U	ND		nc	30
757124-72-44:2	Fluorotelomer sulfonate	0.015 U	ND		nc	30
27619-97-2	6:2 Fluorotelomer sulfonate	0.015 U	ND		nc	30
39108-34-4	8:2 Fluorotelomer sulfonate	0.015 U	ND		nc	30

CAS No.	ID Standard Recoveries	DUP	FA60120-6	Limits
	13C4-PFBA	102%	100%	30-140%
	13C5-PFPeA	105%	104%	40-140%
	13C5-PFHxA	106%	105%	50-150%
	13C4-PFHpA	108%	105%	50-150%
	13C8-PFOA	121%	124%	50-150%
	13C9-PFNA	102%	104%	50-150%
	13C6-PFDA	96%	100%	50-150%
	13C7-PFUnDA	105%	109%	50-150%

* = Outside of Control Limits.

Duplicate Summary

Job Number: FA60120
Account: SGS/SAKKA SGS North America, Inc
Project: 1186919

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP73097-DUP	2Q25369.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393
FA60120-6	2Q25368.D	1	12/21/18	NAF	12/19/18	OP73097	S2Q393

The QC reported here applies to the following samples:

Method: EPA 537M BY ID

FA60120-1, FA60120-2, FA60120-3, FA60120-4, FA60120-6

CAS No.	ID Standard Recoveries	DUP	FA60120-6	Limits
	13C2-PFDoDA	70%	79%	50-150%
	13C2-PFTeDA	78%	83%	40-150%
	13C3-PFBS	101%	100%	50-150%
	13C3-PFHxS	95%	99%	50-150%
	13C8-PFOS	78%	84%	50-150%
	13C8-FOSA	104%	98%	30-140%
	d3-MeFOSAA	77%	83%	50-150%
	13C2-4:2FTS	102%	101%	50-150%
	13C2-6:2FTS	116%	117%	50-150%
	13C2-8:2FTS	87%	91%	50-150%

* = Outside of Control Limits.



Laboratory Data Review Checklist

Completed By:

Craig Beebe

Title:

Geologist

Date:

January 2, 2019

CS Report Name:

101543-001 Gustavus PFAS

Report Date:

December 27, 2018

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS North America Inc.

Laboratory Report Number:

1186919

ADEC File Number:

1507.38.017

Hazard Identification Number:

26904

1. Laboratory

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

 Yes No

Comments:

- 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:

The analyses of perfluoroalkyl substances (PFASs) were performed by an SGS network laboratory in Orlando, FL.

The analysis of speciated arsenic was sub-contracted to Brooks Applied Labs in Bothell, WA.

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:

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

 Yes No

Comments:

The sample receipt forms note that the samples were received in good condition and properly persevered by each of the three laboratories.

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 noted in the sample receipt documentation for the three laboratories.

e. Data quality or usability affected?

Comments:

The data quality and usability are not affected; 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:

*******SGS Anchorage Case Narrative*******

The case narrative notes the conductivity of the 2510B method blank, associated with preparation batch WTI/5078, was greater than the limit of quantitation (LOQ). The laboratory notes that the conductivity of the associated project samples were ten times greater than that of the method blank.

The case narrative notes that the relative precision demonstrated by the total suspended solids (TSS) result of the laboratory duplicate sample 1491314 DUP was outside of control limits. The laboratory notes that the difference between the primary and duplicate results is less than the LOQ.

The case narrative notes that the recovery of ammonia was outside of laboratory control limits in the matrix spike (MS) sample 1491314 MS associated with preparation batch WXX12655.

The case narrative notes that the recovery of nitrate/nitrite was outside of laboratory control limits in the MS duplicate (MSD) sample 1491650 MSD associated with analytical batch WF12779.

*******SGS Orlando Case Narrative*******

The case narrative notes that the samples *PW-406*, *PW-405*, *PW-505*, *PW-202*, and *PW-200* have compound(s) reported with a 'B' qualifier. This qualifier indicates that the qualified compound was detected in the associated method blank.

The case narrative notes that the relative precision demonstrated by the laboratory duplicate sample OP73097-DUP was outside of control limits for the PFAS compounds perfluorobutanoic acid, perfluoroheptanoic acid, perfluorohexanoic acid, perfluorooctanoic acid, and perfluoropentanoic acid. The laboratory attributes these precision failures to sample non-homogeneity.

The case narrative notes that there was insufficient sample volume available to perform MS/MSD samples associated with batch OP73163.

*******Brooks Applied Labs Case Narrative*******

The cover letter notes that all data was reported without qualification (aside from concentration qualifiers) and that all associated quality control sample results met the method acceptance criteria.

c. Were all corrective actions documented?

Yes No

Comments:

There were no corrective actions documented in the case narratives.

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

Comments:

The case narrative did not specify an effect on the data quality and 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:

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:

e. Data quality or usability affected?

 Yes No

Comments:

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:

Oil & grease HEM was detected at an estimated concentration in the EPA 1664B method blank sample associated with preparation batch THOG/1253.

Nitrite-N and total nitrate/nitrite-N were detected at estimated concentrations in the SM21 4500NO3-F method blank sample associated with preparation batch WFI/2779.

Alkalinity was detected at an estimated concentration in the SM21 2320B method blank sample associated with preparation batch WTI/5077.

Conductivity was measurable above the LOQ in the SM21 2510B method blank sample 1491254 associated with preparation batch WTI/5078. The method blank sample 1491259, associated with the same preparation batch, had conductivity measurable below the LOQ.

As(V) was detected in the BAL-4100 method blank samples associated with batch B183424.

Perfluorohexanoic and Perfluorooctanoic acids were detected at estimated concentrations in the EPA 537 (MOD) method blank sample associated with preparation batch OP73097.

iii. If above LOQ, what samples are affected?

Comments:

The samples *PW-200*, *PW-202*, *PW-405*, *PW-406*, *PW-408* and *PW-505* were affected by the oil & grease detection in the method blank associated with preparation batch THOG/1253.

The samples *PW-200*, *PW-202*, *PW-406*, and *PW-505* were affected by the total nitrate/nitrite-N detection in the method blank associated with preparation batch WFI/2779.

The samples were not affected by the detection of alkalinity in the method blank sample because the sample concentrations exceeded ten times that of the method blank concentration.

The samples were not affected by the elevated conductivity measurements of the method blank samples. The conductivities measured in the associated project samples exceeded ten times that of the method blank conductivities.

The samples were not affected by the detections of As(V) in the method blank samples because the sample concentrations exceeded ten times that of the method blank concentrations.

The samples *PW-200*, *PW-202*, *PW-405*, *PW-406*, and *PW-505* contained perfluorohexanoic acid and perfluorooctanoic acid at concentrations within five times that of the concentrations detected in the method blank, with one exception. Perfluorohexanoic acid was detected at a concentration within ten times that of the method blank concentration in the sample *PW-406*.

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

Yes No

Comments:

The estimated oil & grease results of the samples *PW-200*, *PW-202*, *PW-405*, *PW-406*, *PW-408* and *PW-505* are considered false positives attributed to laboratory contamination. These results are flagged 'UB' at their respective LOQs.

The estimated total nitrate/nitrite-N results of the samples *PW-200*, *PW-202*, *PW-406*, and *PW-505* are considered false positives attributed to laboratory contamination. These results are flagged 'UB' at their respective LOQs.

The Perfluorooctanoic acid results of the samples *PW-200*, *PW-202*, *PW-405*, *PW-406*, and *PW-505* are considered false positives attributed to laboratory contamination and are flagged 'UB' at the sample concentration or LOQ (whichever is greater).

The perfluorohexanoic acid results of the samples *PW-200*, *PW-202*, *PW-405*, and *PW-505* are considered false positives attributed to laboratory contamination and are flagged 'UB' at the sample concentration or LOQ (whichever is greater). The perfluorohexanoic acid result of the sample *PW-406* is considered estimated with a high analytical bias. This result is flagged 'JH' for reporting purposes.

v. Data quality or usability affected?

Comments:

The data quality and usability were 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:

LCS/LCSD and MS samples were reported for oil & grease HEM analysis

LCS and MS/MSD samples were reported for total organic carbon (TOC) analysis.

LCS/LCSD and MS/MSD samples were reported for ammonia-N analysis.

LCS, MS, and laboratory duplicate samples were reported for PFAS analysis.

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

Yes No

Comments:

LCS and MS samples were reported for metals analysis by EPA 200.8. No measure of analytical precision was provided for this method.

LCS/LCSD and laboratory duplicate samples were reported for TSS and total dissolved solids (TDS) analyses.

LCS and MS/MSD samples were reported for sulfide, nitrate/nitrite-N, chloride, fluoride, and sulfate analyses.

LCS and laboratory duplicate samples were reported for pH, alkalinity, and conductivity analyses.

LCS, MS/MSD, and laboratory duplicate samples were reported for speciated arsenic analysis.

- 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 recoveries of nitrate-N and nitrite-N were outside of laboratory control limits for the LCSs 1491653 and 1491668 and the MSD 1491650 associated with preparation batch WFI/2779.

The recovery of ammonia-N was below the lower control limit in the MS sample 1491434 associated with preparation batch WXX12655.

The recovery of sulfate was recorded at the lower control limit for the MS sample 1491672 associated with preparation batch WXX12657. The laboratory flagged this value, indicating that the result was below the lower control limit but rounded up.

- 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 relative precision demonstrated by the laboratory duplicate sample 1491314, did not meet acceptance criteria for TSS.

The relative precision demonstrated by the laboratory duplicate sample 1491315, did not meet acceptance criteria for TSS.

The relative precision demonstrated by the laboratory duplicate sample OP73097-DUP, did not meet acceptance criteria for the PFAS analytes perfluorobutanoic acid, perfluoropentanoic acid, perfluorohexanoic acid, perfluorooctanoic acid and perfluoroheptanoic acid.

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

Comments:

The laboratory duplicate sample 1491314 was performed using *PW-408* as the parent sample. The parent sample TSS result is considered affected by the analytical precision failure demonstrated by the laboratory duplicate sample.

The laboratory duplicate sample 1491315 was performed using a sample that was not included with this work order. The sample TSS results are considered unaffected by this precision failure.

The total nitrate/nitrite-N results of the project samples associated with this work order are considered to be affected by the recovery failures demonstrated by the LCS and MSD samples associated with preparation batch WFI/2779.

The MS sample 1491434 was performed using *PW-408* as the parent sample. The parent sample ammonia-N result is considered affected by the recovery failure demonstrated by the MS sample.

The MS sample 1491672 was performed using a sample that was not included with this work order. The sample sulfate results are considered unaffected by this recovery failure.

The laboratory duplicate sample OP73097-DUP was performed using *PW-200* as the parent sample. The parent sample perfluorobutanoic acid, perfluoropentanoic acid, perfluorohexonic acid, perfluorooctanoic acid and perfluoroheptanoic acid results are considered affected by the analytical precision failures demonstrated by the laboratory duplicate sample.

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

Yes No

Comments:

The TSS result of the sample *PW-408* is considered estimated due to the analytical precision failure in the laboratory duplicate sample. This result is flagged 'J' for reporting purposes.

The total nitrate/nitrite-N results of the project samples are considered estimated due to the conflicting biases in the recoveries of the individual nitrate-N and nitrite-N analytes in the LCS samples. However, the total nitrate/nitrite-N results of the samples *PW-200*, *PW-202*, *PW-406*, and *PW-505* were previously qualified for a method blank detection. Additional qualification of these samples is not required. The non-detect total nitrate/nitrite-N results of the samples *PW-405* and *PW-408* are considered estimated and flagged 'UJ' for reporting purposes.

The ammonia-N result of the sample *PW-408* is considered estimated with a low analytical bias due to the MS recovery failure. This result is flagged 'JL' for reporting purposes.

The perfluorobutanoic acid, perfluoropentanoic acid, perfluorohexonic acid, perfluorooctanoic acid and perfluoroheptanoic acid results of the sample *PW-200* are considered estimated due to the analytical precision failures in the laboratory duplicate sample. These results are flagged 'J' for reporting purposes, unless qualified elsewhere.

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

Comments:

The data quality and usability are 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:

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; there were no surrogate recovery failures associated with this work order.

iv. Data quality or usability affected?

Comments:

The data quality and usability are not 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:

N/A; volatile analyses were not requested in this work order.

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:

A trip blank was not submitted with this work order.

iii. All results less than LOQ?

Yes No

Comments:

Trip blanks are not required for this project.

iv. If above LOQ, what samples are affected?

Comments:

None; volatile analyses were not requested.

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 *PW-405 / PW-505* 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 relative precision demonstrated between the results of the field duplicate samples was within the recommended DQO of 30% for all analytes, where calculable, except ammonia-N.

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

Comments:

The ammonia-N results of the field duplicate samples *PW-405* and *PW-505* are considered estimated and flagged 'J' for reporting purposes; unless already qualified.

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

Yes No Not Applicable

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

- i. All results less than LOQ?

Yes No

Comments:

An equipment blank was not submitted with this work order.

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

Comments:

None; an equipment blank was not required for this project.

- iii. Data quality or usability affected?

Comments:

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

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

- a. Defined and appropriate?

Yes No

Comments:

There were no other flags or qualifiers required.

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

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 that 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

IMPORTANT INFORMATION