Naval Facilities Engineering Systems Command Washington
Washington, D.C.

Final

Preliminary Assessment for Per- and Polyfluoroalkyl Substances

Naval Research Laboratory-Chesapeake Bay Detachment
Chesapeake Beach, Maryland

September 2023

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Prepared for NAVFAC Washington
by CH2M HILL, Inc.
Herndon, VA
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Acronyms and Abbreviations

°F	degree(s) Fahrenheit
AFFF	aqueous film-forming foam
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH2M	CH2M HILL, Inc.
DASN	Deputy Assistant Secretary of the Navy
DoD	Department of Defense
EDR	Environmental Data Resources, Inc.
ER,N	Environmental Restoration, Navy
HFPO-DA	hexafluoropropylene oxide dimer acid
IAS	Initial Assessment Study
IPaC	Information for Planning and Consultation
MD 261	Maryland State Route 261
MDE	Maryland Department of the Environment
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
NDAA	National Defense Authorization Act
NDW	Naval District Washington
NRL-CBD	Naval Research Laboratory-Chesapeake Bay Detachment
NRL DC	Naval Research Laboratory Washington D.C.
PA	Preliminary Assessment
PAL	project action limit
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
ppt	part(s) per trillion
PWS	public water system
RI	remedial investigation
SI	Site Inspection
SL	screening level
SNUR	Significant New Use Rule
UCMR 3	third Unregulated Contaminant Monitoring Rule
UCMR 4	fourth Unregulated Contaminant Monitoring Rule
UCMR 5	fifth Unregulated Contaminant Monitoring Rule
USEPA	United States Environmental Protection Agency
WWTP	wastewater treatment plant

SECTION 1

Introduction

This Preliminary Assessment (PA) Report of potential releases of per- and polyfluoroalkyl substances (PFAS) at Naval Research Laboratory – Chesapeake Bay Detachment (NRL-CBD), Chesapeake Beach, Maryland, was prepared by CH2M HILL, Inc. (CH2M), a wholly owned subsidiary of Jacobs, under Naval Facilities Engineering Systems Command (NAVFAC) Atlantic's Comprehensive Long-term Environmental—Navy (CLEAN) Program, Contract N62470-16-D-9000, Contract Task Order 4758, for NAVFAC Washington. This PA was performed in accordance with the United States Environmental Protection Agency's (USEPA's) Guidance for Performing Preliminary Assessments under CERCLA (PA Guidance) (USEPA, 1991), USEPA's *Federal Facilities Remedial Preliminary Assessment Summary Guide (USEPA, 2005),* with additional guidance from the Department of the Navy's (Navy's) Interim Per- and Polyfluoroalkyl Substances (PFAS) Site Guidance for NAVFAC Remedial Project Managers (RPMs)/November 2020 (Navy PFAS Guidance) (Navy, 2020).

As discussed in Section 2.4, investigations related to historical releases of PFAS at the fire testing area on NRL-CBD (Site 10) have been ongoing since 2017, and documented releases of PFAS at Site 10 will be further investigated through completion of a Remedial Investigation (RI). This sitewide PA was conducted to evaluate if additional sources of PFAS other than Site 10 potentially exist at NRL-CBD.

1.1 Preliminary Assessment Objectives

This installation-specific PA for PFAS is part of a Navy-wide installations assessment of potential historical sources and use of PFAS. The objectives of this PFAS PA for NRL-CBD are to:

- Identify and catalog all potential or actual PFAS releases (see list below)
- Eliminate from further consideration those areas where there is no evidence of a PFAS release or suspected release, and document the rationale for elimination.
- Identify areas requiring further PFAS investigation.
- Identify receptors and migration pathways (both on- and off-installation).
- Determine whether an expedited response is warranted because of current complete exposure pathways (for example, on-installation or off-installation drinking water source within 1 mile downgradient of a potential PFAS release area).

To accomplish these objectives, the following activities were completed:

- A review of existing information to identify and characterize potential PFAS releases
- A review of existing information to identify potential off-installation receptors within 1 mile of the installation boundary
- Interviews with relevant site personnel to validate and verify data collected during the data review, and to provide supplemental information, such as emergency responses and spill records that include the use or release of AFFF
- A site reconnaissance of the installation to identify any evidence of PFAS releases and potential receptors and migration pathways, to identify all areas of concern, and to fill data gaps identified in the data review and interviews
- Identification of any need for initiation of an expedited response for drinking water investigation in accordance with Navy policy (DASN, June 20, 2016).

1.2 PFAS Background

PFAS have been identified by the Department of Defense (DoD) as "emerging chemicals."[1] PFAS are of environmental concern because of persistence in the environment and in organisms, their migration potential in aqueous systems (for example, groundwater), their historically widespread use in commercial products, and their possible health effects at low levels of exposure. PFAS are anthropogenic compounds with multiple strong carbon-fluorine bonds.

1.2.1 General Uses of PFAS

The chemical properties of PFAS make them useful for many commercial products because the compounds are heat-resistant and can repel oil, grease, and water. PFAS have been manufactured for use in a wide variety of products including firefighting foam, nonstick cookware, fiber and fabric stain protection, food packaging, and personal care products. The pervasive use of PFAS in commercial and industrial products has led to the discovery of PFAS in soil, air, and groundwater worldwide.

1.2.2 Key PFAS Sources at Naval Installations

PFAS have been used in a variety of military applications, including as a component of certain types of aqueous film-forming foam (AFFF), which was routinely used at firefighting training areas and firefighting equipment test areas. In addition, current and historical AFFF storage and transfer areas are of potential concern for releases to the environment. As such, identification of areas where AFFF was released to the environment, either as repeated small releases or as a significant one-time release, is key to determining potential PFAS sources to environmental media.

PFAS from AFFF used in firefighting, firefighting training, and fire suppression systems are considered to have the greatest potential for release of PFAS to the environment in terms of mass and concentration at Navy installations. Other potential sources of PFAS to the environment include operations wastes (for example, from chrome electroplating), historical on-installation land disposal areas and landfills that received PFAS-containing materials, wastewater treatment sludges and effluents, etc. Areas of interest for this PFAS PA include those where AFFF may have been applied, released, or stored. These include current and former firefighting training areas, equipment test and cleanout areas, buildings with firefighting infrastructure (for example, hangars, AFFF storage and handling areas, and pump houses), unplanned release areas (for example, crash sites), and fire suppression systems located at fuel storage area(s). For these operational and waste areas, it is important to develop a conceptual site model (CSM) that considers the following to determine if a reasonable basis exists for PFAS use, and if there is potential for the PFAS to be released into the environment:

- Type of operations
- Timeline of operational activity
- Material/product development and usage
- Material storage and management practices
- Quantities of material used
- Historical information/data from similar operations in the assessment

[1] The most current version of DoD Instruction 4715.18 (September 4, 2019) defines emerging chemicals as, "Chemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways."

1.2.2.1 Aqueous Film-forming Foam in Firefighting Training and Fire Suppression

AFFF containing PFAS was developed in the 1960s for use on Class B fires (that is, fires in flammable liquids or vapors) and was put into routine use by the early 1970s. In November 1969, a military specification (MILSPEC) was issued that described characteristics that AFFF needed to demonstrate in order to be used by the military, including a requirement for formulations containing PFAS. Most AFFF used at military installations after the 1970s likely included some combination of PFAS.

Typically, AFFF concentrate was proportionally mixed into water lines using in-line eductors or other proportioning devices to create the necessary foam solution ranging from 3 to 6 percent of the concentrate. Class A firefighting foams were used to extinguish wood and grass fires and do not contain PFAS. Therefore, Class A firefighting foams are not a concern for this PA.

1.2.2.2 Electroplating

Electroplating, specifically hard chromium plating, is an industrial activity where PFAS-containing mist suppressants may have been used. Electroplating consists of creating an electrolytic cell that enables a thin layer of metal to be deposited onto an electrically conductive metal surface. PFAS were sometimes used during the chromium electroplating process as a surfactant in chromic acid baths. As a surfactant, PFAS lowered the surface tension (adhesion of materials) by creating a thin, foamy layer on the surface of the chrome bath for mist-suppression. This mist-suppressant reduced the formation of airborne chromium aerosols during the plating process, which are known to be carcinogenic and allergenic. Areas where non-chromium electroplating operations were carried out would not be expected to have used PFAS-containing mist suppressants. Additionally, fluorinated surfactants were introduced to certain chromium plating operations in the 1980s; therefore, operations that ceased before this time would not have include PFAS materials in plating wastes (USEPA, 1998, 2021b).

1.2.2.3 Landfill Operations, Waste Disposal Areas, and Wastewater Treatment Plants

Historically, landfills received wastes generated from military installations, including waste streams from operational areas (such as machine shops and electroplating operations), housing areas, etc. These waste streams may contain industrial and/or consumer products that were either manufactured with PFAS or contain PFAS constituents. Additionally, biosolids, sludge, and other waste material generated by wastewater treatment plants (WWTPs) that received materials containing PFAS, can contain PFAS.

1.2.2.4 Other Potential Sources

Because of the widespread use of PFAS, there may be activities other than those previously mentioned where PFAS were used. PFAS have been included in some anti-fouling and stain-resistant paint formulations. It is possible that in significant amounts, these could also be sources of PFAS to the environment.

1.2.3 PFAS in the Environment

PFAS are a class of anthropogenic compounds characterized by carbon chains of varying lengths containing carbon-fluorine bonds. The strong electronegative force of the carbon-fluorine bond requires a large amount of energy to break, which makes PFAS extremely resistant to biodegradation, photo-oxidation, direct photolysis, and hydrolysis. In addition to environmental persistence, PFAS are readily soluble in aqueous solution and therefore have potential for migration to groundwater from soil and with groundwater flow to off-site locations. Due to their persistence and mobility, releases of PFAS to the environment present a unique set of challenges and concerns.

1.2.4 Potential Health Effects

Exposure to perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) appears to be global. Studies have found both compounds in the blood samples of the general population. Studies on exposed populations indicate that PFOA and/or PFOS may have caused elevated cholesterol levels and possibly low infant birth weight. In studies conducted using laboratory animals, effects on developmental, neurological, immune, thyroid, and liver function were observed.

Understanding the health effects from exposure to low levels of PFAS continues to develop as studies are continuing. Blood tests are available to measure these chemicals, but they are not routinely done because the results can be inconclusive and test results do not predict health effects. Long-term exposure effects are still being investigated by USEPA and other researchers.

1.3 Regulatory Background and History

1.3.1 PFOA Stewardship Program

In 2006, USEPA initiated the 2010/2015 PFOA Stewardship Program in which eight major companies in the United States committed to reduce facility emissions and product contents of PFOA and related chemicals on a global basis by 95 percent no later than 2010, and to work toward eliminating emissions and product content of these chemicals by 2015. All companies have met the program goals. To meet the program goals, most companies stopped the manufacture and import of long-chained PFAS, and then transitioned to alternative chemicals.

1.3.2 Toxic Substances Control Act

On January 21, 2015, USEPA proposed a Significant New Use Rule (SNUR) under the Toxics Substances Control Act, to require manufacturers (including importers) of PFOA- and PFOA-related chemicals to notify USEPA at least 90 days before starting or resuming new uses of these chemicals in any process. The effective date of the final SNUR was September 25, 2020. On June 3, 2021, USEPA published a final rule (effective January 1, 2021) to incorporate three additional PFAS into the Toxic Release Inventory. On June 10, 2021, USEPA withdrew some SNUR guidance and issued a proposed rule for new reporting requirements for manufacturers of PFAS.

1.3.3 Safe Drinking Water Act

The Safe Drinking Water Act authorizes USEPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made chemicals that may be found in drinking water.

1.3.3.1 Unregulated Contaminant Monitoring Rule

The USEPA issued the third Unregulated Contaminant Monitoring Rule (UCMR 3)[2] in May 2012. The UCMR 3 required monitoring, between 2013 and 2015, for 30 substances in all large public water systems (PWSs) serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people. Six PFAS were included in the UCMR 3 contaminant list. Of these six PFAS, USEPA issued health advisory levels for only two, PFOA and PFOS. The UCMR 3 results found these two chemicals were each present above the health advisory in less than 1 percent of the nearly 5,000 PWSs that were sampled under UCMR 3 (USEPA, 2017).

In December 2016, USEPA issued the fourth UCMR (UCMR 4). UCMR 4 required all large PWSs serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people to sample for 30 chemicals between 2018 and 2020. No PFAS were included on the UCMR 4 list of chemicals.

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2 The 1996 Safe Drinking Water Act amendments require that once every 5 years USEPA issue a new list of no more than 30 unregulated contaminants to be monitored by PWSs.

The fifth UCMR (UCMR 5) went into effect on January 26, 2022. UCMR 5 required all PWSs serving more than 3,300 and a representative sample of 800 systems serving 3,300 or fewer people to sample for 30 chemicals (29 PFAS and lithium) between 2023 and 2025 (86 Federal Register 73131).

1.3.3.2 United States Environmental Protection Agency Lifetime Health Advisories

In May 2016, USEPA's Office of Water issued lifetime drinking water health advisories of 70 parts per trillion (ppt) for PFOA and PFOS, individually or combined. On June 15, 2022, USEPA released interim updated drinking water health advisories for PFOA (0.004 ppt) and PFOS (0.02 ppt). They also established final lifetime drinking water health advisories for hexafluoropropylene oxide dimer acid (HFPO-DA) (10 ppt) and perfluorobutane sulfonic acid (PFBS) (2,000 ppt). These health advisories are not enforceable, regulatory levels; rather, they are levels that would provide Americans, including sensitive populations, with a margin of protection from a lifetime of exposure to PFOA,PFOS, HFPO-DA, and PFBS from drinking water. The Navy is currently evaluating how to address USEPA's new health advisories. The Navy is coordinating with DoD to develop a consistent approach to include proactive engagement with communities and the appropriate Congressional delegations.

1.3.3.3 Regulatory Determination

In March 2021, USEPA published the Fourth Regulatory Determinations, including a final determination to regulate PFOA and PFOS in drinking water. The Proposed National Primary Drinking Water Regulation for PFOA and PFOS in drinking water is expected in fall 2022 and the final rule expected in fall 2023 (USEPA, 2021d).

1.3.3.4 Strategic Planning

In February 2019, USEPA issued an Action Plan outlining the steps the agency is taking to address PFAS and to protect public health (USEPA, 2019). The action plan identifies USEPA-led short-term actions, longer-term research, and potential regulatory approaches designed to reduce the risks associated with PFAS in the environment. Other steps include further research into improving analytical methods, understanding remediation options, and obtaining more information about the potential toxicity of a broader set of PFAS, along with numerous additional actions. An update to the Action Plan was issued by USEPA in February 2020 (USEPA, 2020).

In October 2021, USEPA announced a new PFAS Strategic Roadmap describing ongoing and future agency actions, many of which were included in USEPA's 2019 PFAS action plan. The Roadmap provides information regarding the expected timing of regulatory actions from 2021 to 2024 (USEPA, 2021c).

1.3.4 United States Environmental Protection Agency Groundwater Guidance, December 19, 2019

On December 19, 2019, the USEPA issued Interim Recommendations for Addressing Groundwater Contaminated with PFOA and PFOS under federal cleanup programs. The guidance recommends using a screening level of 40 ppt to determine if PFOA and/or PFOS is present at a site and may warrant further attention. The guidance also recommends using USEPA's PFOA and PFOS Lifetime Drinking Water Health Advisory level of 70 ppt as the preliminary remediation goal for contaminated groundwater that is a current or potential source of drinking water, where no state or tribal maximum contaminant level or other applicable or relevant and appropriate requirements are available or sufficiently protective.

1.3.5 State-specific Action Levels

In November 2021, Maryland Department of Health, issued a health advisory for perfluorohexanesulfonic acid (PFHxS) in drinking water at concentrations at or above 140 ppt (MDH, 2021). This health advisory for PFHxS is based on the minimal risk level recommendations from the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) for children. Minimum risk levels are not enforceable standards, but are recommended to be used as a screening value below which unacceptable risks are not expected through a lifetime drinking water exposure.

In April 2022, the Maryland legislation passed Senate Bill 273, banning the use, manufacture, sale, or distribution of PFAS containing Class B fire-fighting foams with certain exceptions. The Naval Research Laboratory's mission at NRL-CBD to support fire research on behalf of the Department of Defense requires the use of PFAS containing fire-fighting foam. NRL-CBD's mission meets the definition of the exception clause provided in the Maryland law provided that NRL-CBD meets certain stipulations of use as outlined in the law.

1.4 Department of the Navy Policy

1.4.1 October 21, 2014 Policy

The Navy issued a policy requiring on-installation drinking water sampling for PFOA and PFOS for installations where groundwater was used as drinking water, and PFAS could have been released nearby in the past. Installations that were not required to sample finished drinking water under UCMR 3, but that produce drinking water from on-installation groundwater sources and have an identified or suspected PFAS release within approximately 1 mile upgradient to the drinking water source, were also required to sample finished drinking water by December 2015.

1.4.2 September 14, 2015 Policy

Similar to the October 2014 DASN (E) policy, this policy is related to testing on-base drinking water. However, this policy also specified that if levels of PFOS and/or PFOA in drinking water exceeded the current-at-the-time USEPA health advisory (that is, the 2009 provisional short-term health advisories), then alternative drinking water must be supplied until the PFOA and/or PFOS levels were reduced to below the USEPA health advisory.

1.4.3 June 14, 2016 Policy

This policy expanded the sampling for PFOA and PFOS at all Navy installations, where such sampling was not previously completed under USEPA's UCMR 3 or the Navy's October 2014 policy. This policy also specified that for instances where drinking water from an installation is purchased from a PWS, but was not tested under UCMR 3, that the installation must sample the finished drinking water to comply with this policy. Additionally, this policy included reporting requirements to the DASN (E) office for all PFOA and/or PFOS drinking water results.

Samples were collected from the NRL-CBD on-Base drinking water source in September 2016 in accordance with this policy and analyzed for PFOA and PFOS; there were no detections of either PFOA or PFOS (Chesapeake Environmental Laboratory, Inc., 2016).

1.4.4 June 17, 2016 Policy

This policy defines the Navy's intention to remove, dispose, and replace legacy AFFF that contains PFOS and/or PFOA once environmentally suitable substitutes are identified and certified to meet MILSPEC requirements. This policy directs the following actions be taken until suitable replacements are certified:

- Immediately cease the uncontrolled environmental release of AFFF for shoreside installations, with the exception of emergency responses.
- Update and implement Navy and Marine Corps firefighting system requirements, as needed, to ensure fire and emergency service vehicles and equipment at Navy installations and facilities are tested and certified in a manner that does not allow the release of AFFF to the environment.

- By the end of Fiscal Year (FY)2017, remove and dispose of uninstalled PFOS-containing AFFF in drums and cans from local stored supplies for shore installations and ships to prevent future environmental releases.

1.4.5 June 20, 2016 Policy

This policy required the Navy to identify and prioritize sites for investigation if drinking water resources, on- or off-installation, are thought to be vulnerable to PFAS contamination from past Navy and Marine Corps PFAS releases. Areas with drinking water sources within 1 mile downgradient of known or potential releases of PFAS were assigned the highest priority. This policy directed the sampling of off-installation drinking water at these high-priority (Priority 1) sites in Fiscal Year 2017.

The primary mechanism to identify potential PFAS release sites and areas of concern was review of Environmental Restoration, Navy (ER,N) records. To ensure that all potential PFAS release mechanisms were identified, installations were directed to identify areas that are not already part of the ER,N program. The Navy has completed the sampling for all off-installation potentially impacted drinking water sources that were identified as a result of this policy and currently known exposure sites have been addressed.

In 2016, a records review was conducted as a part of the Navy's evaluation to identify and prioritize sites for investigation of drinking water resources, on-Base or off-Base, that were thought to be vulnerable to past Navy releases of PFAS. This records review identified the residential areas near NRL-CBD using private wells for drinking water supply. Additionally, it was identified that these private drinking water wells are on average 300 feet deep and screened within the Piney Point aquifer. The identification of drinking water resources near NRL-CBD led to a Priority 1 ranking and initiated the preliminary Site Inspection (SI) investigation.

1.4.6 March 6, 2018 Policy

This policy outlined additional requirements for the removal, replacement, and disposal of legacy AFFF, specifically:

- Identify AFFF in installed systems where PFOA and/or PFOS exceed the maximum permissible levels in the September 2017 MILSPEC for AFFF.
- By the end of FY20, remove, dispose, and replace AFFF that does not meet the requirements of the September 2017 MILSPEC, to include triple-rinsing of systems.
- Dispose of AFFF-containing water in accordance with this policy.

1.5 Department of Defense Policy

1.5.1 July 23, 2019 Memorandum

This memorandum established a PFAS task force to ensure a coordinated, aggressive, and holistic approach to DoD-wide efforts to proactively address PFAS. The goals of the task force are mitigating and eliminating the use of the current AFFF, understanding the impacts of PFAS on human health, and fulfilling cleanup responsibility related to PFAS. The task force is coordinating and collaborating with other federal agencies to achieve these goals.

1.5.2 October 23, 2019 Memorandum

This memorandum revised quarterly progress reporting requirements for installations with known or suspected PFAS releases.

1.5.3 November 22, 2019 Memorandum

This memorandum established requirements for installation commanders to conduct community engagement with respect to PFAS issues, report on their progress in so doing, and to provide feedback on community questions and concerns.

1.5.4 November 22, 2019 Memorandum

This memorandum established a consistent methodology for analysis of PFAS in media other than drinking water and requires DoD Components to use analytical methods meeting the DoD/Department of Energy Quality Systems Manual for Environmental Laboratories, Appendix B, Table B-15.

1.5.5 January 13, 2020 Memorandum

This memorandum established annual reporting requirements for AFFF usage or spills (not associated with use) at all DoD installations.

1.5.6 March 2, 2020 Policy

This policy identifies requirements for PFAS drinking water sampling on DoD installations where DoD is the drinking water purveyor. The requirements include initial and routine monitoring, actions necessary if results exceed the May 2016 lifetime health advisory, laboratory analysis and record keeping requirements, and notification of results.

Samples were collected from the on-Base water source at NRL-CBD in November 2020 as part of routine monitoring required by this memorandum and analyzed for 18 PFAS; there were no detections of PFAS (**Appendix A**).

1.5.7 July 23, 2020 Policy

This memorandum identifies requirements for drinking water testing for PFAS on DoD installations where DoD is not the drinking water purveyor. The requirements include coordination with the non-DoD drinking water purveyor, actions necessary if results exceed the May 2016 lifetime health advisory, and notification of results.

1.5.8 September 18, 2020 Memorandum

This memorandum provides guidance for sharing drinking water monitoring data related to PFAS and other emerging contaminants between the DoD installations and municipalities or drinking water utilities that are 1 mile downgradient of a release from a military installation where the release may migrate and impact the drinking water utility or municipality.

1.5.9 December 7, 2021 Memorandum

This memorandum updates the November 22, 2019 guidance memorandum by requiring the use of the 2nd Draft EPA Method 1633[3], "Analysis of PFAS in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS," for analysis of PFAS in matrices other than drinking water for all new contracts and task orders issued after December 31, 2021. Existing projects are encouraged to use this method when Environmental Laboratory Accreditation Program-accredited laboratories become available.

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[3] [Compliant with Department of Defense Quality Systems Manual version 5.4 Table B-24 (DoD/DOE, 2021)].

1.5.10 December 22, 2021 Memorandum

This memorandum provides clarifying guidance on what triggers the need for removal actions under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and how DoD should address properly promulgated State PFAS drinking water standards as part of a CERCLA removal action.

1.5.11 April 7, 2022 Policy

This policy prohibits testing and training with AFFF on all DoD installations, ensures consistent response actions in the event of an AFFF spill, and includes reporting requirements. This policy replaces and rescinds the September 18, 2020 policy.

1.5.12 April 26, 2022 Memorandum

This memo prohibits incineration of any PFAS-containing material recovered during DoD's cleanup processes, as required by Section 343 of the FY2022 National Defense Authorization Act (NDAA). This prohibition will be rescinded upon issuance of incineration guidance that complies with Section 343 of the FY2022 NDAA.

1.5.13 April 26, 2022 Policy

This policy establishes notification requirements for off-base drinking water sampling at all DoD installations, in accordance with Section 345 of the FY2022 NDAA.

1.5.14 July 6, 2022 Memorandum

This memorandum supersedes and cancels the September 15, 2021 ASD guidance memorandum and addresses the May 2022 USEPA updates to the regional screening levels for PFOS, PFOA, perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and HFPO-DA. The PFBS screening level remains unchanged from USEPA's May 2021 update. Consistent with the CERCLA process, the regional screening levels in the May 2022 update should be used to determine if further investigation is warranted in the RI or if no further action is required.

1.6 Report Organization

The PFAS PA Report for NRL-CBD is organized into the following sections:

1. Introduction
2. Installation Description and Environmental Setting
3. Assessment Methodology
4. Findings and Recommendations
5. Conclusions
6. References

The following appendices are included:

A PFAS Potable Water Sampling Results for NRL-CBD
B United States Fish and Wildlife Service Species Report – Project Area
C Summary of Records Reviewed
D Interview Record

SECTION 2

Installation Description and Environmental Setting

NRL-CBD is located at 5813 Bayside Road in Calvert County, Maryland, south of the town of Chesapeake Beach, Maryland. NRL-CBD is located approximately 40 miles southeast of Washington, D.C. (**Figure 2-1**). Installation information relevant to this PA, including Base background, regional and local environmental setting, and contaminant migration pathways and potential receptors pertinent to this PA, is presented in the following subsections.

2.1 Installation Description and Background

NRL-CBD occupies approximately 160 acres of land along the western shoreline of the Chesapeake Bay (**Figure 2-1**). The mission of NRL-CBD is to provide and maintain facilities for use by the research divisions of the Naval Research Laboratory – Washington, D.C., for the testing, development, and evaluation of radar, radio, optical, and fire control equipment, along with other research projects requiring a maritime environment or open skies, but with land-based support facilities (NEESA, 1984).

The original acquisition of land for NRL-CBD was made in 1941, and construction progressed rapidly during World War II. Major expansion occurred in 1953 and 1954 with construction of a large laboratory building, shop facilities, and complete utility systems (NEESA, 1984). Over the years, the size and mission of CBD expanded to include operation and maintenance of facilities and support services for NRL focused on research in radar, electronic warfare, optical devices, materials, communications, and fire suppression research.

Currently, personnel from various NRL Washington divisions conduct a wide range of technical research at CBD, including condensed matter and radiation sciences, radar tactical electronic warfare, chemistry, optical sciences, and work related to the Center for Advanced Space Sensing. NRL-CBD hosts facilities for the Navy Technology Center for Safety and Survivability, which conducts fire suppression research on simulated carrier, surface, and submarine platforms (Malcolm Pirnie, 2006). Fire suppressant testing, including the testing of AFFF, has been ongoing since 1968 (CH2M, 2009).

2.2 Environmental Setting

NRL-CBD is bounded by the Chesapeake Bay to the east and offsite residential housing areas to the north, south, and west. The facility is separated into an eastern and western portion, separated by Bayside Road (Maryland State Route 261 [MD 261]). The main facility includes both developed and forested land. The administrative area and several research buildings and structures are located east of MD 261. Research buildings and structures, as well as most of the forested area, are located west of MD 261.

Natural resources at NRL-CBD include upland forests, wetlands, freshwater streams and ponds, and the Chesapeake Bay. There are approximately 32 forested acres at NRL-CBD that provide wildlife habitat. Hardwoods located on steep terrain comprise most of these forested areas. Wetland communities along streams and freshwater ponds, as well as emergent wetlands along the Chesapeake Bay exist at NRL-CBD, composed of approximately 2 acres (Malcolm Pirnie, 2006).

According to the United States Census Bureau American Fact Finder, the total population of Calvert County, Maryland, was 92,783 at the time of the last census in 2020 (United States Census Bureau, 2020).

2.2.1 Climate

Calvert County lies within the humid subtropical climate zone, bounded on the east by the Chesapeake Bay and on the west by the Patuxent River (https://www.weather.gov/jetstream/climates); summers are hot and humid, and winters are mild to chilly. The monthly precipitation distribution is fairly uniform throughout the year (https://www.weather.gov/lwx/bwinme) and the average yearly precipitation is 43.1 inches (https://www.calvertcountymd.gov/825/Location-and-Climate). The average summer temperature it 74.4 degrees Fahrenheit with the warmest month typically July, and the average winter temperature is 36.4 degrees Fahrenheit with the coldest month typically January (https://www.calvertcountymd.gov/825/Location-and-Climate and https://www.weather.gov/lwx/bwinme). The average yearly snowfall is 19.4 inches and the average duration of freeze-free period is 200 days (https://www.calvertcountymd.gov/825/Location-and-Climate).

2.2.2 Geologic and Hydrogeologic Setting

NRL-CBD lies within the Atlantic Coastal Plain Physiographic Province. The sediments of the Coastal Plain are a thick sequence of unconsolidated sands, clays, and gravels and, at times, indurated lime or iron-cemented sands (NEESA, 1984). At NRL-CBD, deposits of the Miocene series of the Chesapeake group are evident at the surface and include the Choptank Formation, which ranges from 75 to 100 feet thick, and the underlying Calvert Formation, which is approximately 150 feet thick; both formations slope to the southeast (NEESA, 1984). The Choptank Formation is characterized by interbedded brown to yellow, very fine-grained to fine-grained sand, and gray to dark bluish-green argillaceous silt, calcareous sandstone, and prominent shell beds (Maryland Geological Survey, 1968). The Calvert Formation is separated into two members: the upper Plum Point Marls Member and the Fairhaven Member. Plum Point Marls Member consists of interbedded dark green to dark bluish-gray, fine-grained argillaceous sand and sandy clay with prominent shell beds, and locally silica-cemented sandstones. The Fairhaven Member consists of greenish-blue diatomaceous clay that weathers to pale gray, pale brown to white fine-grained argillaceous sand, and greenish-blue sandy clay (Maryland Geological Survey, 1968).

Deposits of the Eocene series of the Pamunkey Group underlie the Calvert Formation and include the Piney Point Formation and Nanjemoy Formation. The Piney Point Formation consists of light gray to yellowish, glauconitic, medium- to coarse-grained sand and interbedded shell beds 10 to possibly 280 feet thick. The Nanjemoy Formation consists of dark green to gray, argillaceous, glauconitic, fine- to medium-grained sand with minor gray to pale brown clay, with the Marlboro Clay Member at base. The Marlboro Clay Formation is a pink to gray, homogeneous plastic clay with local lenses of very fine-grained white sand and up to 30 feet thick; present only west of the Chesapeake Bay (Maryland Geological Survey, 1968). The Nanjemoy Formation slopes southeast and is approximately 200 feet thick in the vicinity of NRL-CBD (NEESA, 1984).

Major aquifers in the region include (from shallow to deep), the surficial, Piney Point/Nanjemoy, Aquia, Magothy, Upper Patapsco, and Lower Patapsco aquifers (Andreasen, et al., 2013). NRL-CBD is underlain by the surficial aquifer from ground surface to approximately 50 feet below ground surface (bgs). The surficial aquifer transitions into a thick green clay confining unit that extends to approximately 200 feet bgs. This confining unit is believed to be laterally continuous and fully confining. Below this confining unit is the Piney Point aquifer, the extent of which is unknown below the facility (CH2M, 2017). Beneath NRL-CBD, the Calvert and Nanjemoy/Marlboro confining units serve as a barrier to groundwater migration between the first water zones within the surficial units, which are not considered significant drinking water sources, and the deeper regional aquifers.

2.2.3 Hydrologic Setting

NRL-CBD is located within the 64,000 square mile watershed of the Chesapeake Bay. The Chesapeake Bay, the largest estuary in the United States, stretches for almost 200 miles (north to south) and has more than 150 tributary rivers and streams. At NRL-CBD, the bulkheaded shoreline along the Chesapeake Bay forms the facility's eastern boundary. Surface water runoff in the eastern portion of the installation flows directly into the bay. Surface drainage, as well as surficial groundwater flow at the facility, are controlled by topography and surface water features such as ponds, ravines, and the Chesapeake Bay (**Figure 2-2**). North of Navy Court, surface runoff and shallow groundwater flow are to the northeast and east, toward the stormwater pond and Chesapeake Bay, respectively. South of Navy Court, surface runoff and shallow groundwater flow are to the southeast toward a stream that discharges into the Chesapeake Bay. Groundwater flow within the Piney Point aquifer beneath NRL-CBD is to the northeast (CH2M, 2018).

2.3 Migration Pathways and Potential Receptors

This section discusses hypothetical exposure scenarios (that is, environment media, receptors, and exposure routes) if a PFAS release occurred.

2.3.1 Migration Pathways

Because of their chemical structure, PFAS are chemically and biologically stable and resist typical degradation processes. As a result, PFAS persist in the environment. PFAS are water-soluble and migrate readily from soil to groundwater, where they can be transported long distances (USEPA, 2014). Additionally, although PFAS are water-soluble and tend to be relatively mobile in groundwater, complex partitioning mechanisms influence fate and transport. For example, a tendency for some PFAS, particularly the sulfonates, to associate with organic carbon in soil and sediment can result in persistent concentrations in these media (Navy, 2017).

Potential migration pathways for PFAS at NRL-CBD include:

- Release of PFAS to surface and subsurface soil.
- Overland flow of PFAS in stormwater runoff to downgradient areas, including soil, drainage ditches, stormwater retention ponds, and unnamed streams and tributaries, which eventually discharge to the Chesapeake Bay.
- Direct release of PFAS to drainage ditches.
- Leaching of PFAS from soil to groundwater.
- Discharge of groundwater to surface water (drainage ditches, unnamed streams, the Chesapeake Bay).
- Transport via advection in groundwater to downgradient areas.
- Bioaccumulation in terrestrial and aquatic biota.

2.3.2 Human Receptors

Current receptors (including maintenance workers, industrial workers, and trespassers and visitors), as well as potential future receptors (residents, maintenance workers, industrial workers, trespassers and visitors, and construction workers) could be exposed to PFAS, if present in groundwater, soil, sediment, and surface water at NRL-CBD. Current and future recreational users could be exposed to PFAS, if present in sediment, surface water, and biota in the Chesapeake Bay.

A total of 165 parcels are located within 1 mile of the NRL-CBD installation boundary as identified by Calvert County, Maryland. A total of 106 listed private wells (including all water wells of various usage) were identified within 1 mile of NRL-CBD (**Figure 2-2**). No additional offsite receptors were identified within 1 mile of the boundary of the installation (EDR, 2022c).

2.3.2.1 Soil

Current and future maintenance workers, industrial workers, trespassers and visitors, and hypothetical future residents and construction workers could be exposed to PFAS, if present in soil, through incidental ingestion of soil, dermal contact with soil, and inhalation of particulate emissions from surface and subsurface soil. Screening levels are available for dermal contact with and ingestion of PFAS in soil. There are no screening levels or other criteria for inhalation of PFAS.

2.3.2.2 Sediment

Current and future maintenance workers, trespassers and visitors, and hypothetical future residents and construction workers could be exposed to PFAS, if present in sediment in surface water bodies and drainage ditches onsite, and current and future recreational users could be exposed to PFAS, if present in sediment in off-installation reaches of streams that originate on NRL-CBD and eventually discharge to the Chesapeake Bay, through incidental ingestion of and dermal contact with sediment. Screening levels are available for dermal contact with and ingestion of PFAS in sediment.

2.3.2.3 Surface Water

Surface water near NRL-CBD is not suitable for potable use. Current and future maintenance workers, trespassers and visitors, and hypothetical future residents and construction workers could be exposed to PFAS, if present in surface water in streams and drainage ditches onsite, and current and future recreational users could be exposed to PFAS, if present in surface water in streams beyond the installation boundary, through incidental ingestion of and dermal contact with surface water. Screening levels are available for ingestion of PFAS in water. Currently, there are no regulatory screening levels or other criteria for dermal contact with PFAS in surface water.

2.3.2.4 Groundwater

Groundwater is used as a drinking water source in Calvert County within and outside of the installation. The two aquifers mainly in use for drinking water supply in Calvert County are the Piney Point/Nanjemoy aquifer and the Aquia aquifer. Because the southern Maryland region is almost entirely dependent on groundwater for its drinking water supply, these aquifers are considered a valuable natural resource. Current and future on- and off-installation workers, residents, students, and visitors could be exposed to PFAS, if present in groundwater, through ingestion and dermal contact while bathing. In areas where groundwater is within the potential depth of construction activities (within about 10 to 15 feet bgs), construction workers could be exposed to PFAS if present, through dermal contact during excavation activities. Ingestion-based screening levels are available for groundwater exposure to some PFAS. The screening levels are discussed in **Section 1.5.10** and the May 2016 Lifetime Health Advisories in **Section 1.3.3.2**.

On-Installation Drinking Water Source

Drinking water at NRL-CBD is supplied by two on-Base production wells installed in 1953 at depths of 514 and 540 feet bgs, within the Aquia aquifer (Maryland Geological Survey, 1984). Samples were collected from the on-Base drinking water source in September 2016 in accordance with the June 14, 2016 Navy Policy Memorandum and analyzed only for PFOA and PFOS; there were no detections of either PFOA or PFOS (Chesapeake Environmental Laboratory, Inc., 2016). Samples were collected again in November 2020 in accordance with the March 2, 2020 Navy Policy Memorandum and analyzed for 18 PFAS; there were no detections of PFAS (**Appendix A**).

According to the Maryland Department of the Environment's (MDE's) 2022 PFAS Public Water System Study, PFAS sampling under UCMR 3 has not been conducted on NRL-CBD drinking water wells (MDE, 2022). MDE's earliest efforts to assess PFAS in drinking water were primarily started by federal initiatives, specifically the testing required by the USEPA under UCMR 3.

Off-Installation Municipal and Private Drinking Water Sources

The residential areas adjacent to and within 1 mile of NRL-CBD (**Figure 2-2**) generally use private wells for drinking water supply (Calvert County, 2015). The private drinking water wells average 300 feet deep and are believed to be screened in the Piney Point aquifer. As discussed in **Section 2.4**, Navy sampled 42 of the private drinking water wells located in the immediate vicinity of NRL-CBD in 2018. PFOS and PFOA were detected at only three locations and concentrations were below the lifetime health advisories of 70 ppt.

One neighborhood located upgradient to the north of the installation receives municipal water supplied by the Town of Chesapeake Beach. A municipal water supply well for the town of Chesapeake Beach is reportedly screened within the Piney Point aquifer and is located approximately 1 mile northwest and crossgradient of NRL-CBD. According to the Town of Chesapeake Beach 2022 Annual Drinking Water Quality report, the municipal water has been tested for PFAS and no PFOS or PFOA were detected (WTLMD, 2022). A transient community water supply well, which is screened within the Piney Point/Nanjemoy aquifer is also located approximately 1 mile west and hydraulically upgradient of the NRL-CBD (**Figure 2-2**). Additionally, at least one municipal drinking water well (currently out of use) was identified within 1 mile of NRL-CBD and screened in the surficial aquifer. Sampling of private wells in the vicinity of Site 10 at NRL-CBD is discussed in **Section 2.4**.

2.3.2.5 Biota

PFAS have the potential to bioaccumulate. PFAS, if present in fish and shellfish, may be ingested by human receptors that consume such biota. Additionally, humans may be exposed to PFAS through consumption of food produced (through farming) or hunted in the vicinity of the installation if these food sources contain PFAS due to root uptake, ingestion of PFAS-containing water, or ingestion of PFAS-containing plants and animals. Ingestion-based toxicity values are available for some PFAS.

2.3.3 Ecological Receptors

Given the environmental setting and the habitats present, a wide variety of terrestrial, and wetland and aquatic ecological receptors may reside within or use areas of NRL-CBD. In terrestrial habitats, these receptors include terrestrial plants, soil invertebrates, reptiles, birds, and mammals. In wetland and aquatic habitats, receptors include aquatic and wetland plants, aquatic and benthic invertebrates, reptiles, amphibians, fish, birds, and mammals.

A review of the United States Fish and Wildlife Service website provided a list of federally threatened and endangered species for NRL-CBD and within a 1-mile boundary of the installation. These species have the potential to inhabit NRL-CBD. Listed threatened species within NRL-CBD and 1 mile of the installation include the northern long-eared bat (*Myotis septentrionalis*). No endangered species within a 1-mile boundary of the installation were listed. The complete list of threatened and endangered species for NRL-CBD and within a 1-mile boundary if the installation is provided in Appendix B. Proposed and final designated critical habitat that may occur within NRL-CBD was evaluated on the United States Department of the Interior Fish and Wildlife Service Information for Planning and Consultation (IPaC) website (USFWS, 2022). Appendix B includes the IPaC Resource List for NRL-CBD. No critical habitats were identified within this installation or within 1 mile of the installation (USFWS, 2022).

Plant communities at NRL-CBD include upland forests, southern floodplain forests, open fields, coastal areas, and freshwater wetlands. Upland forest vegetation includes hickories, loblolly and Virginia pines, southern red oak, sweet gum, and tulip poplar. Common understory vegetation includes flowering dogwood, highbush blueberry, and paw-paw. The southern floodplain forests are dominated by black walnut, chestnut oak, green ash, loblolly pine, shagbark hickory, swamp chestnut oak, sweet gum, and willow oak. Common associated species include American elm, black gum, red maple, and river birch. Open fields are predominately covered with grasses. Shrub communities, which include cherry, hawthorn, and sumac, occur along the edges of the open fields. The coastal areas at NRL-CBD consist of bulkheaded shoreline. A narrow strip of vegetation, which includes black locust and persimmon, grows between the bulkhead and Randle Cliffs. Patches of poison ivy and Virginia creeper cover these steep cliffs. Freshwater wetlands are limited to streams and drainageways, pond margins, and emergent wetlands at the base of Randle Cliffs. Common wetland plants include cattails, common reed, primrose, rushes, and sedges. Shrubs include alder, buttonbush, and marsh-elder (Malcolm Pirnie, 2006).

Lower trophic-level terrestrial ecological receptors (such as terrestrial plants and soil invertebrates) could be exposed to PFAS released to surface soil through root uptake (plants), direct contact, and direct ingestion. Because there is some evidence that PFAS may bioaccumulate in terrestrial food items (such as plants and invertebrates), there is the potential that upper trophic-level receptors (such as birds and mammals) could be exposed to these compounds via the food chain, as well as through incidental ingestion of soil and direct ingestion of drinking water (if PFAS are released to water sources).

Lower trophic-level wetland and aquatic ecological receptors (such as wetland and aquatic plants, aquatic and benthic invertebrates, fish, reptiles, and amphibians) could be exposed to PFAS released to surface water and sediment (either directly, or indirectly via surface runoff from terrestrial areas or through groundwater discharge) through root uptake, direct contact, and direct ingestion. Because there is evidence that PFAS may bioaccumulate in aquatic food items (such as fish), there is the potential that upper trophic-level receptors (such as birds and mammals) could be exposed to these compounds via the food web, as well as through incidental ingestion of sediment and direct ingestion of drinking water.

Currently, no federal or State of Maryland regulatory-based ecological screening values are available for PFAS. However, some literature-based ecological screening values are available for some PFAS (such as PFOA, PFOS, and PFBS) for soil, sediment, and/or surface water exposures (USEPA, 2018). PFAS ecotoxicology is a very active field of research, and additional data are likely to become available in the future. Any PFAS data collected for a specific site at NRL-CBD will be evaluated using vetted toxicology information from USEPA for the ecological pathways appropriate for the particular site.

2.4 Other PFAS Investigations

Fire suppressant testing has been conducted at Site 10 – Fire Testing Area since 1968, resulting in the release of AFFF, which contains PFAS, to the environment (CH2M, 2009). In 2016, a records review was conducted as a part of the Navy's evaluation to identify and prioritize sites for investigation of drinking water resources, on- or off-Base, that were thought to be vulnerable to past Navy releases of AFFF. This records review identified the residential areas near NRL-CBD that rely on private wells for drinking water supply. However, uncertainty regarding the potential for historical releases of AFFF at NRL-CBD to impact nearby private water supply wells existed because groundwater flow in the vicinity of these neighborhoods was not well understood. Therefore, groundwater sampling for PFAS was completed in 2017 at the fire testing area (Site 10) on NRL-CBD to determine if PFAS are present in surficial and Piney Point aquifer groundwater, and if so, assess the potential for offsite migration and exposure to offsite residents through a drinking water exposure scenario (CH2M, 2018). Nine shallow monitoring wells were installed in the surficial aquifer and four deep monitoring wells were installed in the deeper Piney Point aquifer, which is separated from the surficial aquifer by a thick clay confining unit that is up to 150 feet thick. Groundwater samples were analyzed for PFOA, PFOS, and PFBS (CH2M, 2018). The results indicated the PFOS, PFOA, and PFBS were present in surficial groundwater but were not detected in groundwater from the deeper Piney Point aquifer (CH2M, 2018) beneath the NRL-CBD. The highest PFAS concentrations detected in surficial groundwater were from monitoring wells near the center of the historic and current fire testing facility (Site 10), and concentrations decreased with distance from Site 10. The assessment concluded that Site 10 was likely the source of a PFAS release to shallow groundwater beneath NRL-CBD.

Based on a review of available well construction documents, private drinking water wells in Chesapeake Beach are on average 300 feet deep and screened within the Piney Point aquifer, which is separated from the unconfined shallow aquifer by a thick clay confining layer. Therefore, based on available groundwater data and well completion reports, the transport pathway into downgradient private water supply wells near NRL-CBD did not appear to be complete and off-Base drinking water sampling was not recommended. However, additional monitoring well installation and soil and groundwater sampling were recommended at the site to verify there are no continuing soil sources and to define the extent of PFAS in groundwater (CH2M, 2018).

In 2018, new information was provided to the Navy by a community resident indicating that there could be private wells screened in the surficial aquifer. Based on this new information and the potential that not all drinking water well completion reports are available in the County record system, the Navy initiated off-Base sampling of private drinking water wells (CH2M, 2020b) in areas potentially downgradient of Site 10 at NRL-CBD (**Figure 2-2**). Eighty parcels were identified within the off-Base sampling areas, 25 of which were determined to be vacant based on property records obtained from Calvert County. Of the 55 parcels identified with a private residential well, samples were collected from 42 parcels and were analyzed for 14 PFAS listed in Method 537 revision 1.1 (USEPA, 2009). PFAS were detected in three of the 42 privately owned, off-Base drinking water supply wells; however, detections of PFOA and PFOS were below the lifetime health advisory of 70 ppt.

In October 2020, an SI was conducted at Site 10 and included collection of groundwater, surface water, and soil samples for PFAS analysis (CH2M, 2022). Because there was a potential for the two streams on NRL-CBD to receive AFFF-impacted stormwater from the installation's stormwater conveyance system and/or discharge of PFAS-impacted groundwater (previously identified at Site 10), the Site 10 SI included collection of surface water samples from the northern and southern streams for PFAS analysis (CH2M, 2020). PFAS, including PFOA, PFOS, and PFBS were detected in all surface water samples; however only PFOA and PFOS exceeded the surface water project action limits (PALs) of 400 µg/L (CH2M, 2022). PFOA and PFOS exceeded surface water PALs at most of the locations sampled in the northern stream and PFOS exceeded the surface water PAL at two locations in the southern stream that are distal from Site 10 but downgradient of the NRL-CBD WWTP, which receives sanitary flow from facilities at Site 10 and sewer lines that lie beneath Site 10.

In October 2021, a Supplemental SI was conducted at Site 10, which included the sampling and analysis of surface water to confirm the CSM for PFAS in the northern stream; address data gaps in the CSM regarding where PFAS were entering the southern stream; and measure concentrations of PFAS in the southern stream at the installation boundary, before entering the Chesapeake Bay (CH2M, 2022). Based on the results of the data collected, detections of PFAS, including PFHxS, PFNA, PFOA, PFOS, and PFBS, were present in most of the surface water samples collected in the northern and southern streams during the October 2021 event. The supplemental SI surface water data confirm the detections reported in the northern stream during the initial SI and indicate that the majority of the PFAS in the southern stream appears to be present downgradient of the WWTP. PFAS entering the WWTP are primarily reported in the western branch influent, which receives water from buildings at Site 10 and sanitary sewer lines that run beneath Site 10.

Based on the findings from the Site 10 SI and Supplemental SI sampling, it was recommended that Site 10 proceed to the RI phase (CH2M, 2022). Planning for the Site 10 RI is in process. In addition, the elevated concentrations of PFAS in the northern and southern streams that originate on the NRL-CBD are being addressed through a Time-Critical Removal Action to reduce the concentrations of PFAS in these two surface water bodies before leaving the installation.

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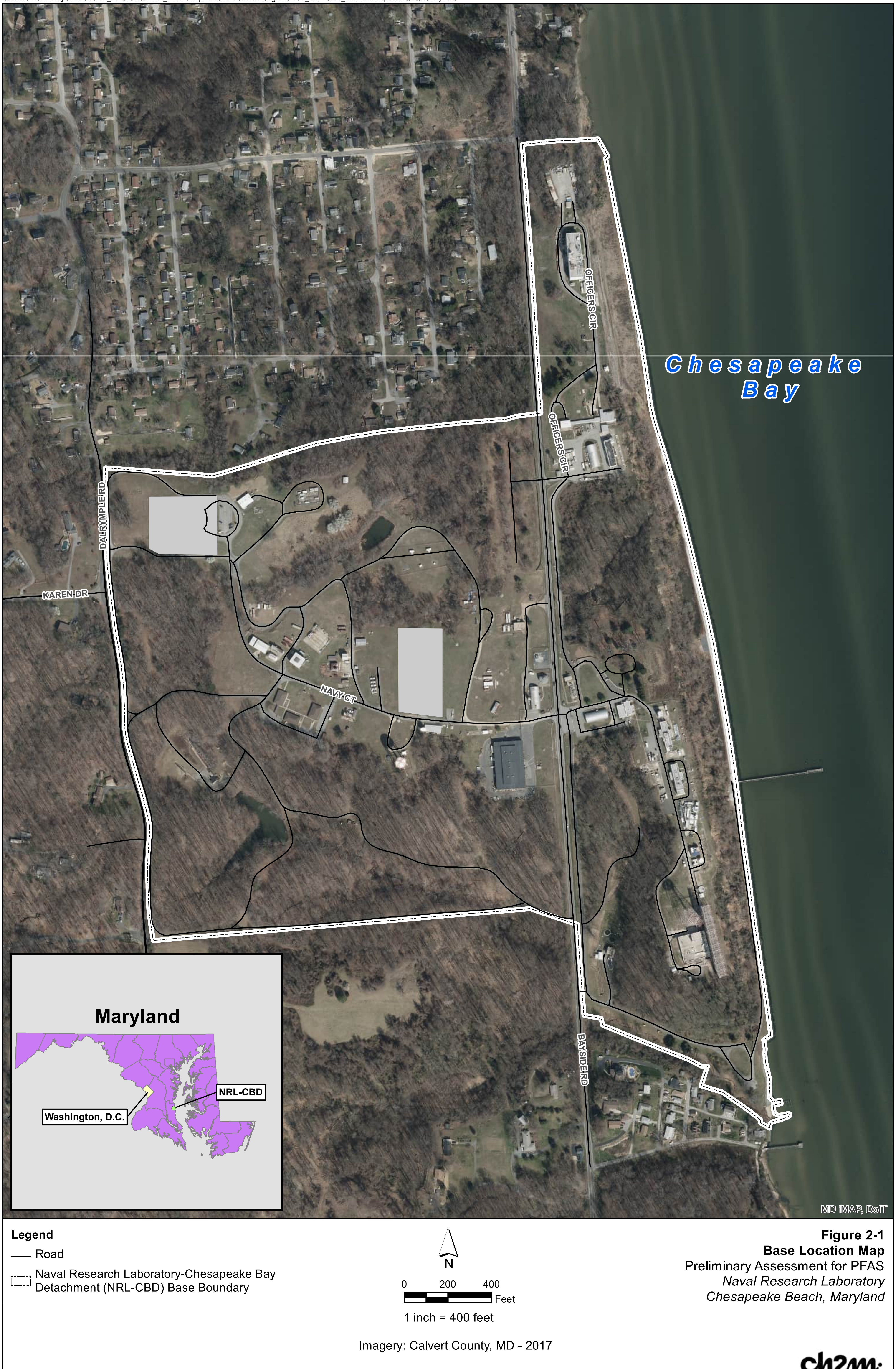

Figure 2-1
Base Location Map
Preliminary Assessment for PFAS
Naval Research Laboratory
Chesapeake Beach, Maryland

ch2m

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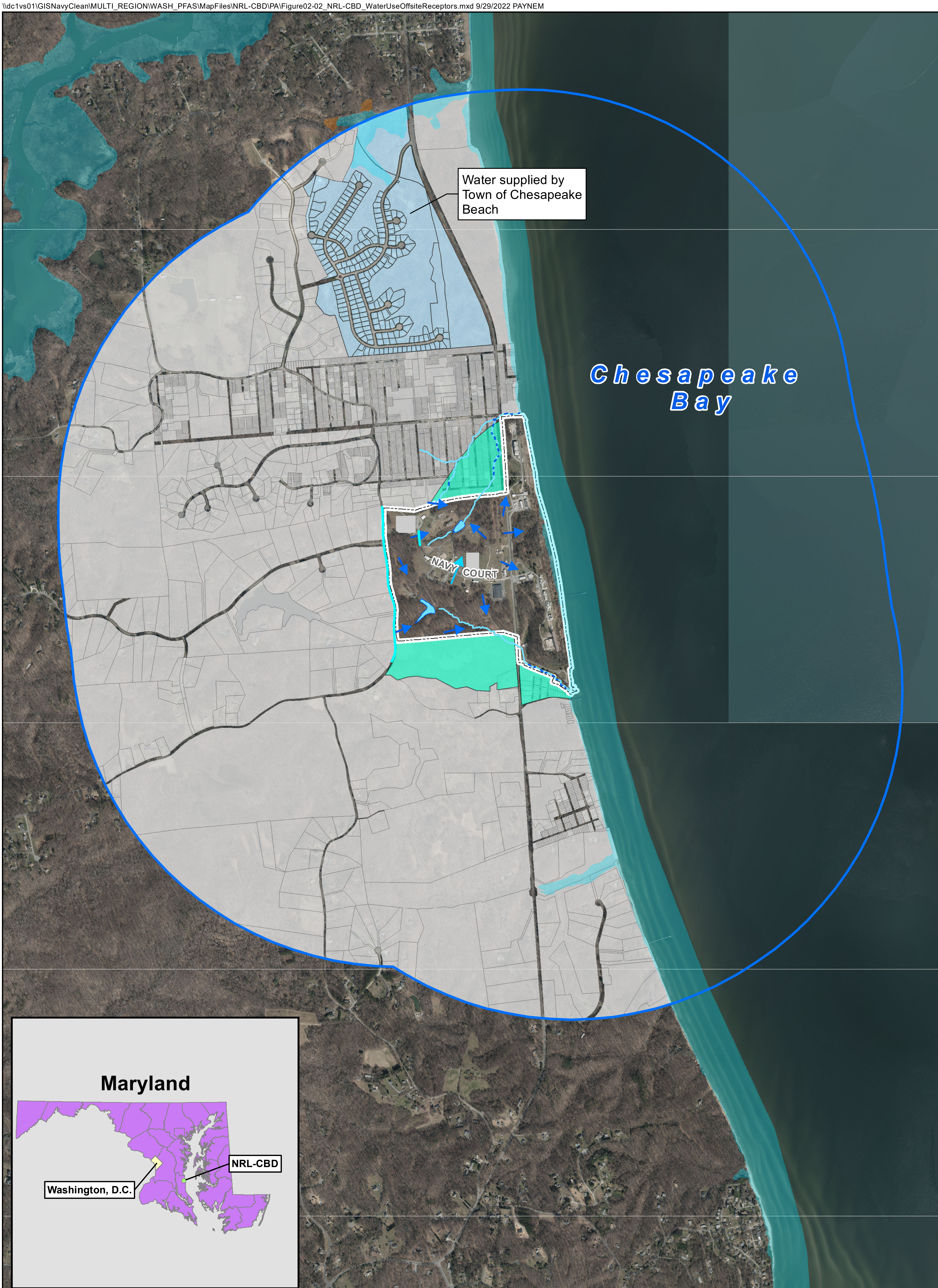

Legend

- General Groundwater Flow Direction (Piney Point Aquifer)
- General Groundwater Flow Direction (Surficial Aquifer)
- Stream
- Assumed Stream Channel
- Surface Water
- Private well sampling completed in 2018
- NRL CBD Facility - 1 Mile Buffer
- Naval Research Laboratory-Chesapeake Bay Detachment (NRL-CBD) Base Boundary

Parcels

- Parcels with municipal water service
- Parcels with no municipal water service. Probable private well location

Flood Hazard Zones

- 1% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard

N

0 750 1,500 Feet

1 inch = 1,500 feet

Imagery: Calvert County, MD 2017

Figure 2-2
Water Use and Offsite Receptors
Preliminary Assessment for PFAS
Naval Research Laboratory
Chesapeake Beach, Maryland

ch2m

SECTION 3

Assessment Methodology

The following activities were performed in support of this PFAS PA:

- Reviewed existing data to identify and characterize potential PFAS releases and to identify potential on and off-installation receptors
- Conducted interviews with relevant site personnel to validate and verify data collected during the data review and provide supplemental information
- Performed site reconnaissance of the installation to identify any evidence of PFAS releases, assess potential receptors and contaminant migration pathways, identify areas of concern, and to fill data gaps identified in the data review and interviews

Each activity is described in the following subsections.

3.1 Data Review

Existing information was gathered and reviewed to identify and characterize locations of potential PFAS use or disposal and focus the activities to be conducted during the site reconnaissance. A summary of information reviewed is provided as **Appendix C**. The following subsections specify document types that were evaluated during the preliminary review.

3.1.1 Environmental Restoration, Navy Program Records and Other Environmental Records

ER,N Program records from the administrative record, and the Naval Installation Restoration Solution database were reviewed to identify potential PFAS release areas, and to obtain information on physical investigations and identification of potential pathways and receptors at those areas. Relevant information about historical operations and potential PFAS storage, use, or disposal at NRL-CBD was identified and is included in **Section 4**.

3.1.2 Internet Records

Internet search engines were used to find supplemental records and historical information on crashes, fires, and use of AFFF, and spills at NRL-CBD. Search terms included: "NRL-CBD," "NRL-CBD," "Naval Research Laboratory Chesapeake Bay Detachment," "crash NRL-CBD," "firefighting foam NRL-CBD," and "AFFF NRL-CBD." There was no additional new evidence of PFAS material use or release at NRL-CBD as a result of the internet record search.

3.1.3 Department of the Navy Archives Records

The Navy Archives online catalog was reviewed using the search term "NRL-CBD" and "Naval Research Laboratory Chesapeake Bay Detachment." Search results led to a request of Command Operations Reports specific to NRL-CBD. Because information regarding NRL-CBD was included in Command Operations Reports generated for Naval Research Laboratory Washington D.C. (NRL DC), Command Operations Reports collected for NRL DC during a site visit to the Naval Heritage Center at the Washington Naval Yard in February 2019 were reviewed for information relevant to NRL-CBD from 1968 to present. No additional new evidence of PFAS material use or release at NRL-CBD was identified.

3.1.4 Environmental Data Resources Reports

The following Environmental Data Resources, LLC (EDR) reports were obtained and reviewed for NRL-CBD and the surrounding area:

- DataMap Well Search Report (EDR, 2022a)
- NEPASearch Map Report (EDR, 2022b)
- Offsite Receptor Report (EDR, 2022c)
- Historical Topographic Map Report (EDR, 2022d)
- Aerial Photograph Decade Package (EDR, 2022e)

Sensitive receptor, wetland, and wildlife area information was obtained from these reports and included in **Section 2**. No information relating to PFAS storage, use, or disposal at NRL-CBD was identified in these records.

3.1.5 Maps and Aerial Photographs

Aerial photographs of NRL-CBD between 1953 and 2017 were reviewed to identify potential PFAS use, release, or disposal areas. There was no evidence of burning, firefighting, landfilling, or spills of materials that potentially contained PFAS noted in the aerial photographs. Parcel and water service area information was obtained from Charles County. EDR reports provided maps with information on nearby public wells.

3.2 Interviews

Based on Navy guidance, interview questionnaires were sent to current installation personnel beginning in February 2022. Follow-up communication (in the form of interviews through emails and/or phone calls) extended through June 2022. The goal of the interviews was to validate and verify data collected during document and record reviews, and to identify other information related to PFAS not previously found in historical documents.

Completed questionnaires were received through email by the following personnel and are provided in **Appendix D**.

- Director of Fire Test Operations – NRL-CBD
- Environmental Protection Specialist – NRL-CBD
- Engineering Technician – NRL-CBD
- Fire Inspector – NDW Fire Department
- Fire Chief – NDW Fire Department

Completed in-person interview questionnaires are provided in **Appendix D**.

- Small Craft Operator – NRL-CBD
- Customer Liaison – NRL-CBD
- Wastewater Treatment Plant Operator – NRL-CBD

3.3 Site Reconnaissance

Site reconnaissance events were conducted at NRL-CBD on April 6, 2022. During the site reconnaissance, accessible areas were visited to identify any evidence of PFAS use, release, and disposal; fill data gaps identified in the document review and interviews; and document physical site characteristics (such as surface flow and drainage conditions) for areas with potential PFAS releases. Information gathered during the site reconnaissance is detailed in **Section 4**.

Findings and Recommendations

Table 4-1 provides a list of typical PFAS release areas at Navy facilities, summarizes whether those areas are present at NRL-CBD, and for those that are present, identifies whether evidence suggests the area is a potential PFAS release area. Areas evaluated during this PA are shown on **Figure 4-1**. Any area identified in **Table 4-1** as potential PFAS release areas are further evaluated in **Section 4.2**.

4.1 Drinking Water Exposure Assessment

An evaluation of drinking water on- and off-installation was conducted to determine whether NRL-CBD drinking water and/or off-facility drinking water could have been impacted by any potential PFAS release area. As discussed in **Sections 2.3.2 and 2.4**, groundwater is used as a drinking water source on- and off-installation.

The town of Chesapeake Beach has one municipal water well that is located within 1 mile of NRL-CBD. This municipal water supply is reportedly screened within the Piney Point aquifer and has been tested for PFAS; no PFOS or PFOA were detected (WTLMD, 2022). A transient community water supply well that is screened within the Piney Point/Nanjemoy aquifer is located approximately 1 mile west and hydraulically upgradient of the NRL-CBD. Additionally, at least one municipal drinking water well (currently out of use) was identified within 1 mile of NRL-CBD and screened in the surficial aquifer.

Generally, the residential areas adjacent to and within 1 mile of NRL-CBD (**Figure 2-2**) are not connected to municipal water and use private wells for drinking water supply (Calvert County Department of Community Planning & Building and Department of Public Works, 2015). As discussed in **Section 2.4**, the Navy sampled the private drinking water wells in the immediate vicinity of Site 10 and the areas of NRL-CBD evaluated during this PA in 2018 (CH2M, 2020b), and based on a review of the 2018 private well sampling results and the fact that most of the parcels with private drinking water wells within 1 mile of NRL-CBD are upgradient or sidegradient of NRL-CBD and Site 10, it is unlikely that off-Base drinking water in these areas would be impacted.

4.2 Potential PFAS Release Areas

Areas identified as potential PFAS release areas in **Table 4-1** were further evaluated, and the findings are presented in the following subsections. Area-specific information that includes migration pathways and exposure assessment is also provided. Detailed figures showing each area recommended for further investigation are presented in **Figure 4-2**.

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Table 4-1. Areas Evaluated for Potential PFAS Releases at NRL-CBD

Area	Potential PFAS Release Areas (Yes/No)	Rationale
Fire Stations and Firefighting Training Areas		
Building 50 – Former Firehouse	Yes	Building 50 – Former Firehouse is located near the center of the western area of NRL-CBD, along Bayside Road (**Figure 4-1**). Building 50 was constructed before the 1950s, according to historical aerials (EDR, 2022b). Building 50 historically acted as the firehouse for the Naval District Washington (NDW) Fire Department stationed at NRL-CBD (NDW Fire Inspector, pers. comm., 2022). The duration of the use of Building 50 as a firehouse is unknown, with operations beginning before 1984 and ending sometime after 2008 (NDW Fire Chief, pers. comm., 2022; NDW Fire Inspector, pers. comm., 2022). Fire trucks were stored and serviced at the firehouse during their use at NRL-CBD, including being washed both in Building 50 and in the asphalt parking lot in front of the building (NDW Fire Inspector, pers. comm., 2022). Firefighting apparatus were also washed inside and outside the firehouse (NDW Fire Chief, pers. comm., 2022). AFFF packaged in five gallon containers was stored by the fire department in the firehouse as well as a shack located immediately to the west of Building 50 (NDW Fire Inspector, pers. comm., 2022). The AFFF was routinely transferred at and around the firehouse as needed during firefighting operations. The NDW Fire Department ceased operations at NRL-CBD and removed the stored AFFF. Building 50 is now used as a general storage area, including the storage of generators. Due to the handling, transferring, and potential release of AFFF during firefighting operations and the washing of fire trucks and firefighting apparatus at Building 50 – Former Firehouse, this area is discussed in more detail in **Section 4.2** and further investigation is warranted.
Hangars and other structures with possible foam fire suppression systems		
None identified		
Foam Retention Lagoons		
None identified		
AFFF Test Spray Areas		
Site 10 – Fire Testing Area	Yes	Site 10 – Fire Testing Area, previously known as Area of Concern A, encompasses 3.408 acres and is located the center of NRL-CBD (**Figure 4-1**). Fire suppressant testing has been conducted at the site since 1968, resulting in the release of AFFF to the environment (CH2M, 2009). Because of the use of AFFF at Site 10, a groundwater investigation was conducted in 2017 that confirmed a release of PFAS to shallow groundwater at Site 10 (CH2M, 2018). The highest concentrations of PFAS were observed in the monitoring wells closest to Site 10, with concentrations in groundwater decreasing with distance from the site. It was determined that additional sampling was necessary to further characterize the nature of PFAS in shallow groundwater and soil and an SI was completed in June 2022. Due to the handling, use, and release of AFFF during fire suppressant testing at Site 10, further investigation was warranted and conducted during the Site 10 – Fire Testing Area SI (CH2M, 2022). This area is discussed in more detail in the SI and will not be further evaluated in this PA.
AFFF Storage Areas		
None identified		
Plane or Drone Crashes		
None identified		
Stormwater Drainage Ditches and Retention Basins where PFAS-containing Materials were Released		
None identified		
Crash Debris and Storage Areas		
None identified		
Aircraft Fuel Purge Stations		
None identified		

Table 4-1. Areas Evaluated for Potential PFAS Releases at NRL-CBD

Area	Potential PFAS Release Areas (Yes/No)	Rationale
Refueling Truck Ramp Area		
Fueling Stations C-431 and C-432	No	Fueling stations C-431 and C-432 are located west of Building 76 near the center of the western area of NRL-CBD (**Figure 4-1**). Fueling station C-431 contains gasoline and station C-432 contains diesel fuel (Navy, 2014). These are used to refuel vehicles at NRL-CBD. Both fuel tanks are double-walled. Spill kits are located in the vicinity. There have been no incidents regarding the use of these stations. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Bulk Fuel Storage Areas		
Building 76	No	Building 76 is located near the center of the western area of NRL-CBD, along Bayside Road (**Figure 4-1**). Building 76 is used by the Public Works Division for storage of vehicle, research, and facilities equipment (Navy, 2014). Carpentry operations at Building 76 uses small quantities of creosote, xylene, and varsol. A 300-gal underground storage tank is located next to the Building 76 structure and was used to hold used crankcase oils, spent gasoline, and paint thinner mixed with Number 6 fuel oil from the power plant. The tank was emptied by a contractor one to two times a year and hauled offsite (NEESA, 1984). Grounds maintenance equipment such as grass-cutting equipment and snow removal equipment is stored and maintained in Building 76. Reportedly, upon receiving a shipment of sealed containers of AFFF to the NRL-CBD facility, the sealed containers have occasionally been stored temporarily at Building 76 (NRL-CBD Customer Liason, pers. comm., 2022). The sealed containers are then picked up and moved to the Fire Testing Area. No transfer of AFFF between containers takes place at Building 76. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Site 6 Power Plant	No	Two 15,000 gallon above ground storage tanks were installed in 1954 and an additional two 15,000 gallon above ground storage tanks were installed in 1982. These four tanks are used to store either No. 6 or No. 4 heating oil to provide fuel to the central heting plant at NTL-CBD. There is no fire suppression system associated with these above ground tanks (NRL-CBD Customer Liaison, pers. comm., 2022). There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Refueler and Fire Truck Maintenance Ramps		
None identified		
Pesticide and Paint Storage/Usage/Release		
Building 15	No	Building 15 was located on the southeastern edge of NRL-CBD (**Figure 4-1**). Insecticides were historically stored at Building 15 since the late 1960s. The chemicals typically used for pest control at NRL-CBD are chlordane for termite control, diazinon and perythrom for roach control, malathion, seven, and 2,4-D. Building 15 also housed a mixing and wash area. Building 15 was demolished at an unknown date. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Sanitary Wastewater Treatment Plant/Industrial Water Treatment Plant and associated Drying Beds/Spray Fields/Sludge Lagoons		
Wastewater Treatment Plant	No	The WWTP is located in the southeastern portion of NRL-CBD (**Figure 4-1**). The WWTP receives sanitary waste from buildings at NRL-CBD, including buildings from the Site 10 – Fire Testing Area. The WWTP, constructed before the 1950s based on aerial photographs (EDR, 2022b), is the current WWTP for NRL-CBD. The WWTP operates under National Pollutant Discharge Elimination System Wastewater Discharge Permit Number MDR0000. Sludge is held in the digestor building of the WWTP, and is pumped roughly twice a month into a self-contained, concrete-lined drying bed. The sludge is allowed to dry in the drying bed and leachate is pumped back into the WWTP plant. Dried sludge is then hauled offsite (Wastewater Treatment Plant Operator, pers.comm., 2022). There is no evidence of any sludge applied directly to the ground surface at NRL-CBD for fertilizer or for use as landfill cover. There are no current or historical diversionary flow valves that would allow for waste to bypass the Installation's treatment plant. According to the WWTP Operator (Wastewater Treatment Plant Operator, pers. comm., 2022), there is no storage or use of PFAS materials at the WWTP. Because there is no evidence of releases of PFAS-containing materials at the WWTP aside from permitted discharges, additional evaluation of this area is not warranted at this time. If additional information becomes available, this area may be re-evaluated. It is noted that the WWTP appears to be receiving PFAS-containing water originating from Site 10 sanitary sewer lines. The elevated concentrations of PFAS detected in the WWTP influent and effluent is being addressed through implementation of a Time Critical Removal Action to reduce PFAS concentrations in WWTP effluent prior to discharge to the southern stream. In addition, the source of PFAS to the WWTP influent via sanitary sewer lines and the southern stream via groundwater discharge are being investigated as part of the RI at Site 10.

Table 4-1. Areas Evaluated for Potential PFAS Releases at NRL-CBD

Area	Potential PFAS Release Areas (Yes/No)	Rationale
Oil Water Separator		
None identified		
Car Washes and Auto Body Shops		
None identified		
Disposal Areas/ Landfills		
Site 2 – NRL-CBD Chemical Burial Site	No	Site 2, referred to as the CBD Chemical Burial Site, is located on the western portion of NRL-CBD, adjacent to Site 4 – Landfill No. 2 (**Figure 4-1**). Waste chemicals from NRL DC were burned and/or buried at CBD at this site by the Safety Department. Two instances of disposal in 1968 and 1969 were documented. In October 1968, 400 pounds of chemicals, including benzene, toluene, waste oil, ether, lithium hydride, acetone, alcohol, paint thinner, sulfuric acid, and nitric acid were sent to CBD. From May 1969 to October 1969, 1200 pounds of unspecified waste chemicals were taken to CBD for disposal, corresponding with the time period during which chemistry laboratories at NRL were consolidating and disposing of excess chemicals. The 1984 Initial Assessment Study (IAS) (NEESA, 1984) lists a table of typical materials shipped to CBD for disposal; this list did not include any PFAS-containing materials. Burning holes (4 feet deep and 6 feet square) were used to ignite most of the waste material after the containers were soaked with kerosene and gasoline. An unspecified amount of material was also buried. During the Base Wide SI, no evidence of waste material was encountered (CH2M, 2016). This finding supersedes the pre-SI understanding of the site in which burial and/or burn pits were thought to have been excavated at the site and served as a potential source area. The Base Wide SI concluded that no evidence of chemical burial and/or burning pits thought to be at the site was identified and these sources may not exist. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Site 3 – Landfill No. 1	No	Site 3, also referred to as Landfill No. 1 or "Old Junk Row," is located on the western portion of NRL-CBD (**Figure 4-1**). Site 3 was operational from 1942 through 1950 and reportedly consisted of four to six 25-foot by 25-foot by 20-foot-deep excavation pits occupying an area of 3,750 square feet. The landfill accepted three types of waste: municipal waste (such as household garbage and tree trimming refuse), shop wastes (such as wooden boxes, cardboard cartons, oily rags, absorbent materials, empty oil cans, lubricant cans, and paint sludges), and nontoxic laboratory waste (such as paper towels, cardboard boxes, and small quantities of waste solvents). Once the landfill was filled with refuse to within 4 feet of the ground surface, the remaining space was backfilled with excavated soil to ground surface (NEESA, 1984). After the landfill was closed, the area was designated "Old Junk Row" and the ground surface was used as open storage for broken-down and inoperative heavy equipment, demolition debris, and out-of-service laboratory equipment used in radar, sonar, and optics research. In the late 1980s, research buildings were constructed at the site in association with development of the Fire Testing Area. The area occupying Site 3 is currently used as maintained office space consisting of three research buildings (Buildings 301, 307, and 314) and a parking lot (NEESA, 1984). There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Site 4 – Landfill No. 2	No	Site 4, also referred to as Landfill No. 2, is located on the western portion of NRL-CBD (**Figure 4-1**). Landfill No. 2 operated from 1950 to 1958. Like Landfill No. 1, Landfill No. 2 reportedly consisted of four to six 25-foot by 25-foot by 20-foot-deep excavation pits occupying an area of 3,750 square feet. The landfill accepted three types of waste: municipal waste (such as household garbage and tree trimming refuse), shop wastes (such as wooden boxes, cardboard cartons, oily rags, absorbent materials, empty oil cans, lubricant cans, and paint sludges), and non-toxic laboratory waste (such as paper towels, cardboard boxes, and small quantities of waste solvents). Once the landfill was filled with refuse to within 4 feet of the ground surface, the remaining space was backfilled with excavated soil to ground surface. After the landfill was closed, the area was not reused. Currently, the site is a relatively flat, large, open, mowed grassy area (NEESA, 1984). There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.

Table 4-1. Areas Evaluated for Potential PFAS Releases at NRL-CBD

Area	Potential PFAS Release Areas (Yes/No)	Rationale
Site 5 – Landfill No. 3	No	Site 5, also referred to as Landfill No. 3, is located on the westernmost edge of the western half of CBD property (**Figure 4-1**). Landfill No. 3 operated from 1958 to 1968. Similar to Sites 3 and 4, the IAS stated that the site consisted of four to six pits (25 feet by 25 feet by 20 feet deep) and occupied an area of 3,750 square feet (NEESA, 1984). However, an aerial photograph dated May 1964 shows ground disturbance in an area that is 56,114 square feet in size. In addition to the landfill pits, the IAS states that two burn pits were located onsite as well. While the landfill was operational, it accepted municipal, shop, and nontoxic laboratory wastes from CBD. A small quantity of wastes consisted of empty paint cans, some of which may have contained small amounts of residues (CBD used approximately 200 to 300 gallons of paint per year), and 10 gallons of waste solvents per year. The bulk of the waste landfilled consisted of municipal-type wastes such as household garbage and waste paper products. Because fire suppressant testing began in 1968, it is likely the use of the landfill and burning activities pre-dated the use of AFFF at NRL-CBD. After the landfilling operations were complete, the site was designated as "New Junk Row" and was used for the open storage of assorted debris consisting of rusted laboratory equipment, heavy equipment, and missile packing crates. During a site visit conducted during the IAS, two empty drums with no labels were observed and areas where open burning took place were noted to have oil-stained soil patches and were devoid of grass cover (NEESA, 1984). Currently, the site is largely wooded with a grass clearing where the former access road used to be located and is relatively flat. It is likely the landfill activities at Site 5 pre-dated the use of AFFF at NRL-CBD and there is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
AOC C – Chemical Burial Site 2	No	AOC C, referred to as the CBD Chemical Burial Site 2, is located on the western portion of NRL-CBD, south of Site 5 and west of Site 2 (**Figure 4-1**). Very little is known about the history of AOC C, but It is possible that the site history for AOC C may be consistent with the practices that were used at Site 2 (that is, area used for chemical burial and/or burning). AOC C's site use is thought to be consistent with Site 2 since both Site 2 and AOC C are shown on the same facility drawing dated from January 1960 and are labeled similarly (CH2M, 2012). The extent of AOC C has been defined within an area of 8,925 square feet as identified on the 1960 facility drawing. In a 1963 facility drawing, AOC C is no longer identified and historical aerial photography from this time frame does not show any signs of land disturbance. Currently, AOC C is completely wooded and shows no signs of disturbance or historical site use. AOC C was evaluated during the 2016 Base Wide SI; no waste materials were encountered in any of the test pits or direct-push technology borings and a digital geophysical mapping survey did not identify any areas where waste material may have been placed (CH2M, 2016). The Base Wide SI suggested that the chemical burial and/or burning pits do not exist at this site. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Fires and Other Emergency Response		
None identified		
Government, Commercial, and Personal Vehicle Fires		
None identified		
Chrome Plating/Bath Mist Suppressant		
None identified		
Open Burn Areas/Burn Structures		
None identified		
Other		
Site 6: Power Plant Oil Spill	No	Site 6, also referred to as Power Plant Oil Spill, was a one-time release of No. 6 heating oil at the power plant located in the northern section of the facility at Building 79 (**Figure 4-1**). Reportedly, this release occurred in 1973, when an underground fuel-line, approximately six inches in diameter, six to twelve inches underground, which supplies No. 6 fuel oil from three outside storage tanks to the adjacent boiler room, ruptured during plant operations. The problem was identified by power plant personnel when the soil above the main became saturated with oil. No fire resulted from the oil spill. Reportedly, it was corrected by excavating the oil-soaked soil and removing the broken main. No sampling was done to determine the actual extent of contamination. The trench was then backfilled and a new aboveground main was constructed to feed oil from the storage tanks to the boilers (NEESA, 1984). There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.

Table 4-1. Areas Evaluated for Potential PFAS Releases at NRL-CBD

Area	Potential PFAS Release Areas (Yes/No)	Rationale
Site 7: Road Oil Application	No	Site 7, also referred to as Road Oil Application, includes the application of various liquid waste products along dirt roads at NRL-CBD as dust control measures (**Figure 4-1**). The application of waste oils to the road surfaces in the western portion of NRL-CBD (west of MD 261) was conducted from approximately 1940 to 1952. The oil used in this application was primarily spent crankcase oil and paint thinner. At times, other liquid waste products such as engine cleaner, steam cleaning waste, dishwashing soap, and gasoline were dumped in with the waste oil for application. It was reported but not confirmed that minimal (less than 10 pints per year) quantities of polychlorinated biphenyl (PCB)-contaminated liquids may also have been mixed with the waste oils (NEESA, 1984). There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Site 8: Well Mercury Contamination	No	Site 8, also referred to as Well Mercury Contamination, refers to an incident that occurred in March 1978 when it was discovered that a mercury-filled flow meter had discharged 7 to 14.5 pounds of mercury into the water supply at CBD (NEESA, 1984) (**Figure 4-1**). This occurred when mercury was siphoned from the flow meter into the line leading from the well inside Pumphouse No. 6. Cleanup of the spill was conducted in two steps. First, removal of contaminated water was accomplished by flushing the entire distribution system with water from the reservoir tower. The most highly contaminated part of the system was then cleaned using acetic and citric acids. The well at CBD was not recommended for further investigation because extensive efforts had been made to clean up the spill. Approximately 1,500 gallons of waste cleaning solution were collected during the well cleanup operation. This waste, which contained mercury in measured concentrations of 0.16 milligram per liter (NEESA, 1984), along with appreciable concentrations of iron and copper, was stored temporarily in a borrowed 3,000-gallon storage tank. The contents of the tank were then diluted to 3,000 gallons for safe transport to the NRL facility in D.C. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
Site 9: Photo-processing Waste Discharge	No	Site 9, also referred to as Photo-processing Waste Discharge, refers to the wastewaters generated from an intermittent photo processing operation in Building 43 which were discharged through a drainage pipe to the ground immediately outside the building (NEESA, 1984) (**Figure 4-1**). Reportedly, the operation was conducted for a 5-year period from the late 1950s to the early 1960s, and again for a 5- to 6-year period from the late 1960s to the mid-1970s. Photo-processing operations in this building were discontinued in 1975. During each year of operation, the photograph laboratory was used one to two times, generating 10 to 15 gallons of waste photographic solutions (for example, sodium thiosulfate, hydroquinone) per event. Visual inspection of this site showed no signs of stressed vegetation. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.
AOC D: Water Tower	No	AOC D, known as the water tower, is located on the western portion of NRL-CBD adjacent to Site 8 (**Figure 4-1**). The date of construction for the water tower is not available; however, the water tower is first shown in aerial photographs beginning in 1955 and currently remains onsite (CH2M, 2012). The water tower has a reported capacity of 400,000-gallons for use as part of the potable water supply for the Base. Although there are no documented releases from this area, it is assumed that the water tower likely was painted and recoated with lead-based paint several times during the time period when lead-based paint was readily available. There is no evidence PFAS-containing materials were used or released at this site; consequently, no additional evaluation of this area is warranted at this time. If additional information becomes available, this area may be re-evaluated.

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4.2.1 Building 50 – Former Firehouse

4.2.1.1 Description and Operational History

Building 50 – Former Firehouse is located on the western portion of NRL-CBD, adjacent to Bayside Road (**Figures 4-1** and **4-2**). Building 50 was constructed before 1950s, according to historical aerials (EDR, 2022b).

4.2.1.2 Potential for PFAS Use or Release

Building 50 historically acted as the firehouse for the NDW Fire Department stationed at NRL-CBD (NDW Fire Inspector, pers. comm., 2022). The duration of the use of Building 50 as a firehouse is unknown, with operations beginning before 1984 and ending sometime after 2008 (NDW Fire Chief, pers. comm., 2022; NDW Fire Inspector, pers. comm., 2022). Fire trucks were stored and serviced at the firehouse during their use at NRL-CBD, including being washed both in Building 50 and in the asphalt parking lot in front of the building (NDW Fire Inspector, pers. comm. 2022). Firefighting apparatus were also washed inside and outside the firehouse (NDW Fire Chief, pers. comm., 2022). AFFF packaged in 5-gallon containers was stored by the fire department in the firehouse and in a shack located immediately to the west of Building 50 (NDW Fire Inspector, pers. comm., 2022). The AFFF was routinely transferred at and around the firehouse as needed during firefighting operations. The NDW Fire Department ceased operations at NRL-CBD and removed the stored AFFF. Building 50 is now used as a general storage area, including the storage of generators.

4.2.1.3 Migration Pathway and Exposure Assessment

If released, AFFF containing PFAS could have migrated with surface runoff to the surrounding grassy area or infiltrated cracks in the pavement into soil. Stormwater from this area drains to the southeast toward stormwater catch basins that are connected to the facility stormwater conveyance system and/or drainage ditches to the southeast. Any PFAS that infiltrated the soil could potentially migrate to the underlying surficial aquifer. Groundwater flow from Building 50 is expected to flow to the southeast due to regional topography in the area. PFAS, if present in groundwater, could migrate via advection into nearby drainage ditches and/or partitioning to sediment. Ecological receptors, workers, or visitors are present within 1 mile of Building 50.

4.2.1.4 Recommendation

AFFF containing PFAS was potentially released at Building 50 – Former Firehouse during firefighting activities; therefore, an SI is recommended.

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Figure 4-1
Areas Evaluated
Preliminary Assessment for PFAS
Naval Research Laboratory
Chesapeake Beach, Maryland

ch2m

\\dc1vs01\GISNavyClean\MULTI_REGION\WASH_PFAS\MapFiles\NRL-CBD\PA\Figure04-02_Building50_FormerFirehouse_0705.mxd 8/16/2022 mcotterb

Legend

- Potential PFAS Release Area to be Further Evaluated in the PA
- Stormwater Inlet
- Stormwater Utility Line
- Anticipated Groundwater Flow Direction
- Anticipated Overland Flow Direction
- Installation Boundary

N

0 17.5 35 Feet

1 inch = 35 feet

Imagery: Calvert County, MD - 2017

Figure 4-2
Building 50 - Former Firehouse
Preliminary Assessment for PFAS
Naval Research Laboratory
Chesapeake Beach, Maryland

SECTION 5

Conclusions

This PA evaluated the potential for PFAS releases at NRL-CBD. **Table 4-1** includes the evaluation of potential PFAS release areas. No further action is recommended for 14 areas. An SI has already been completed for one area of known AFFF usage (Site 10), and based on the evaluation completed during this Basewide PA, an additional area is recommended to proceed to an SI as summarized in **Table 5-1.**

While groundwater beneath NRL-CBD is used as a source of drinking water on-installation, a drinking water exposure pathway to onsite workers does not exist, nor is one expected to develop in the future. PFAS have not been detected in the drinking water samples collected from the NRL-CBD water supply wells and because the on-installation drinking water wells are screened in the deeper confined aquifer with little to no potential for infiltration from the shallower unconfined aquifer, it is unlikely that a complete exposure pathway from potential PFAS source areas to the on-installation drinking water sources will develop in the future.

The residential areas adjacent to and within 1 mile of NRL-CBD use private wells for drinking water supply (Calvert County, 2015). These private wells average 300 feet deep and are reportedly screened in the deeper, confined Piney Point aquifer. However, at least one non-operational private well identified within 1 mile of NRL-CBD was screened in the surficial aquifer. Drinking water samples were collected from 42 private wells north and south of NRL-CBD and analyzed for 14 PFAS listed in Method 537 revision 1.1 (USEPA, 2009). PFAS were detected in three of the 42 privately owned, off-installation drinking water supply wells; however, detections of PFOA and PFOS were below the lifetime health advisory of 70 ppt, which was in place at that time. Also, a PFBS concentration of 8.46 J ppt was detected at one location but was below the screening level of 400,000 ppt, which was in place at that time. As such, no further action was warranted for the off-Base drinking water wells at that time (CH2M, 2020b).

Table 5-1. Areas Recommended for an SI

Area Assessed	Rationale for SI
Building 50 – Former Firehouse	Based on information obtained from the 2022 interviews, AFFF was stored and transferred within and in the vicinity of Building 50, including firefighting activities and the washing of fire trucks with no containment.

SECTION 6

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Appendix A
PFAS Potable Water Sampling Results

Inspection Experts Inc - PFAS Analysis
Project No 100144625
PFAS in drinking water

DW

Batch 20-1569

Package DP-20-1445

Submitted to:
Inspection Experts, Inc.
9250 Rumsey Road
Columbia, MD 21045 USA

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061

It can be done

Inspection Experts Inc - PFAS Analysis
Project No 100144625
PFAS in drinking water

DW

Batch 20-1569

Package DP-20-1445

Submitted to:
Inspection Experts, Inc.
9250 Rumsey Road
Columbia, MD 21045 USA

NELAP Accreditation Number: E87856 (Florida Department of Health)
DoD-ELAP Accreditation Number: 91667

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061

Analyst Approval: Digitally signed by Denise Schumitz
Date: 2020.12.28 09:38:49 -05'00'

QC Chemist Approval: Carla Devine Digitally signed by Carla Devine
Date: 2020.12.28 21:42:33 -05'00'

Project Manager Approval: Digitally signed by Jonathan Thorn
Date: 2020.12.29 07:24:01 -05'00'

BATTELLE
It can be done

Inspection Experts Inc - PFAS Analysis
Project No 100144625
PFAS in drinking water

DW

Batch 20-1569

Package DP-20-1445

BATTELLE

It can be done

BATTELLE

Master Signature Page

Name (Printed)	Signature	Initials	Date
Jonathan Thorn		JRT	1/9/2020
Robert Lizotte, Jr.		RL	1·9·2020
Ellyn M Fitch		EMF	1/9/2020
Carla Devine		CRD	1/9/2020
Denise Schumitz		DS	1/9/2020
Lauren Griffith		LMG	1·9·2020
Carole P McCarthy		CPM	1/9/2020
Rich Restucci		RR	1/9/2020
Sam Guimaraes		SAG	1/9/2020
Jordan Tower		JCT	1/9/2020
Christie Usher		CU	1/9/2020
Kevin McInerney		KM	1/14/2020
Matt Schumitz		MDS	1/14/2020
Weidong Li		W.L	1/14/2020
Kayla Lamarre		KAL	1/14/2020
MUNAZ MUNTASIR		MM	01/14/2020
Kristen Nichols		KN	01/14/2020
Kelsey Harnden		KH	01/30/2020
Kevin Bailey		KB	1/30/2020
Stephanie Schultz		SAS	1/30/2020

BATTELLE

Master Signature Page

Name (Printed)	Signature	Initials	Date
Chimieeo Brown	[illegible]	CB	01/30/20
Ryan Kelly	Ryan Kelly	RK	01/30/20
KAREN HYPPOLITE	[illegible]	K.H.	01/31/20
Gail DeRuzzo	[illegible]	GD	01/31/2020
Tracy Stenner	[illegible]	[illegible]	1/31/2020
Ashley Wellington	Ashley Wellington	AW	1/31/2020
Daniel Cooney	[illegible]	DAC	1/31/2020
Peter Demers	Peter Demers	PD	1/31/2020
Zachary Willenberg	[illegible]	ZW	2/3/2020

Sample Summary

Client: Inspection Experts Inc
SDG: 20-1569
Project/Site: PFAS Analysis
CTO: N/A

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Receipt Date
DB577PB-FS	Procedural Blank	WATER	12/8/2020	12/8/2020
DB578LCS-FS	Laboratory Control Sample	WATER	12/8/2020	12/8/2020
G3899-FS	CBD/DW01	DW	11/30/2020	12/1/2020
G3901-FS	Trip	DW	12/8/2020	12/1/2020

Work Plan

BATTELLE
It can be done

WORK/QUALITY ASSURANCE PROJECT PLAN

1.0 GENERAL PROJECT INFORMATION

Project Title:	Inspection Experts: PFAS Drinking Water
Project Number:	100144625
Client:	Inspection Experts, Inc. 9250 Rumsey Road Suite 106 Columbia, MD 21045 USA
Client Contact Information:	Kosala De Silva Program Manager (443) 741-8131(V) NA kosala@ieinc.net
Effective Date of QAPP:	11/23/2020
Version Number:	100144625(L)-01
Project Manager:	Thorn, Jonathan
Laboratory Task Manager:	Thorn, Jonathan
Deliverable Due Date:	12/17/2020

2.0 SCOPE OF WORK

Overview:	Analysis of drinking water samples for PFAS by EPA Method 537.1.
Matrix:	Water

2.1 TECHNICAL APPROACH

2.1.1 Sample Receipt, Storage, and Handling

The list of samples for this project plan are presented in Attachment 1.

Storage Directions:	Store refrigerated.
Sub_Sampling:	None
Procedures:	NA
Contact:	NA
Comment:	NA
Archiving:	Dispose of samples six months after final report has been delivered. Notifiy client prior to disposal of samples.
Disposal:	Dispose of samples in proper waste stream.

2.1.2 Sample Preparation

NA

Samples Expected:	Samples Per Batch:	Batches Expected:
50	20	3

Batch quality control samples are defined in Table 1.

Target samples are presented in Attachment 1.

Table 1: Quality Control Samples

Type:	*Description:*	*Count:*	*Rgt:*	*Reference:*	*Comment:*
PB	Laboratory control reagent blank.	1 per batch	--	NA	
LCS	Laboratory Control Sample	1 per batch	No	NA	
MS	Spiked field sample for determining method accuracy in the presence of matrix.	1 per batch	--	NA	MS/MSD defined on custody records
MSD	Spiked field sample for determining method accuracy and precision in the presence of matrix.	1 per batch	--	NA	MS/MSD defined on custody records

2.1.3 Extraction/Preparation

2.1.3.1 Extraction

SOP No.-Rev:	**5-371-05**
SOP Title:	*ANALYSIS OF POLY AND PERFLUOROALKYL SUBSTANCES IN DRINKING WATER SAMPLES BY LIQUID CHROMATOGRAPHY AND TANDEM MASS SPECTROMETRY (LC-MS/MS) FOLLOWING EPA METHOD 537.1*
Sample Size:	250 ml
SIS and LCS/MS Compounds:	Defined in Table 2.
Deviations:	None
Comments:	None

Table 2: SIS and LCS/MS Spiking Level

Standard Type	Standard Contents		Spike Amount (ng)	Volume (uL)	Comment
PFAS - 537.1 Surrogate Solution	LE06	SIS	~ 10.0 - 50 ng	25 uL	NA

Standard Type	Standard Contents	Spike Amount (ng)	Volume (uL)	Comment
PFAS - 537.1 Second Source LCS/MS Solution	LD34 LCS/MS	~ 9.0 - 10.0 ng	100 uL	NA

2.1.3.2 Cleanup

None.

RIS spiking levels are presented in Table 3.

Extract PIV (uL): 1000

Table 3: RIS Spiking Level

Standard Type	Standard Contents	Spike Amount (ng)	Volume (uL)	Comment
PFAS - 537.1 Internal Standard Solution	LE07 RIS	~ 10.0 - 50 ng	25 uL	NA

2.1.4 Instrumental Analysis

The list of analytes along with data quality criteria are presented in Attachment 2.

1) SOP_No-Rev: **5-371-05**

SOP_Title: *ANALYSIS OF POLY AND PERFLUOROALKYL SUBSTANCES IN DRINKING WATER SAMPLES BY LIQUID CHROMATOGRAPHY AND TANDEM MASS SPECTROMETRY (LC-MS/MS) FOLLOWING EPA METHOD 537.1*

Deviations: None

Comments: None

2.2. DELIVERABLES

Deliverables Due:	12/17/2020
LIMS Reports:	*No*
Histograms:	*No*
Excel Tables:	*No*
EICs:	*No*
Chromatograms:	*No*

EDDs:	*No*
Comments:	• Level II data package (public notice tables) • Level IV data package

3.0 QUALITY

The Method Quality Objectives are defined in Attachment 3.

4.0 ORGANIZATION AND COMMUNICATION

4.1 ORGANIZATION

The project team is defined in Table 4. Supervisors may make substitutions with Project Manager concurrence.

Table 4: Project Team and Roles

Staff Member	Role	Comment
Jonathan R. Thorn	Project Manager	NA
Brenton T. Murphy	Sample Preparation	NA
Stephanie A. Schultz	LC-MS/MS Analysis	NA
Matt D. Schumitz	Sample Custody	NA
Carla R. Devine	Quality Control Officer	NA
Zachary J. Willenberg	Quality Assurance Officer	NA

4.2 COMMUNICATION

A kick-off meeting will be held to discuss project scope and goals.

5.0 SCHEDULE

The project schedule is presented in Table 5.

Table 5. Schedule of Laboratory Activities

Activity:	Start Date:	End Date:	TAT (days):	Comment:
Sample Receipt	11/19/2020	11/19/2020	0	NA
Sample Preparation	11/19/2020	12/02/2020	13	NA
Instrument Analysis	12/02/2020	12/14/2020	12	NA
Quality Control Review	12/14/2020	12/16/2020	2	NA

Activity:	Start Date:	End Date:	TAT (days):	Comment:
Quality Assurance Review	12/16/2020	12/17/2020	1	NA

6.0 BUDGET

The labor budget for the analytical task is presented in Table 6.

Table 6. Labor Budget (Laboratory Analytical Task)

Labor Activity:	Hours/ Batch:	Batches:	Total Hours:	Comment:
Sample Receipt	3	3	9	hours per batch of 20 samples
Sample Preparation	9	3	27	NA
Instrument Analysis	9	3	27	NA
Quality Control Review	3	3	9	NA
Quality Assurance Review	1	3	3	NA

7.0 STAFF DEVELOPMENT

None anticipated.

Attachment 1: Target Samples

Shipment: **SHP-201119-01**

Status: Pending

Description: USNA

Range: G3517-G3520

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	G3517	#1	11/18/2020 8:35 am	WATER	R0119 (NA)			
2	G3518	#2	11/18/2020 8:35 am	WATER	R0119 (NA)			
3	G3519	FB1	11/18/2020 8:35 am	WATER	R0119 (NA)			
4	G3520	FB2	11/18/2020 8:35 am	WATER	R0119 (NA)			

Shipment: **SHP-201201-03**

Status: Pending

Description: ARC/CBD

Range: G3899-G3901

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	G3899	CBD/DW01	11/30/2020 10:20 am	DW	R0119 (NA)			
2	G3900	CBD/DW02	11/30/2020 10:20 am	DW	R0119 (NA)			
3	G3901	Trip		DW	R0119 (NA)			

Shipment: **SHP-201202-02**

Status: Pending

Description: PFAS DW Sampling

Range: G3912-G3919

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	G3912	DW-001	12/01/2020 11:16 am	L	R0119 (NA)			(POMONKEY)
2	G3913	DW-002	12/01/2020 11:16 am	L	R0119 (NA)			(POMONKEY)
3	G3914	DW-003	12/01/2020 11:16 am	L	R0119 (NA)			(POMONKEY)
4	G3915	DW-004	12/01/2020 11:16 am	L	R0119 (NA)			(POMONKEY)
5	G3916	DW-001	12/01/2020 10:09 am	L	R0119 (NA)			BLOSSOM POINT
6	G3917	DW-002	12/01/2020 10:09 am	L	R0119 (NA)			BLOSSOM POINT
7	G3918	DW-003	12/01/2020 10:09 am	L	R0119 (NA)			BLOSSOM POINT
8	G3919	DW-004	12/01/2020 10:09 am	L	R0119 (NA)			BLOSSOM POINT

Shipment: **SHP-201209-03**

Status: Pending

Description: NAVFAC Dahlgren

Range: G4317-G4326

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:

WORK/QUALITY ASSURANCE PROJECT PLAN

Shipment: **SHP-201209-03**

Status: Pending

Description: NAVFAC Dahlgren

Range: G4317-G4326

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	G4317	Entry Point 002 Bldg 1190 Caskey well	12/08/2020 8:30 am	DW	R0119 (NA)			
2	G4318	Entry Point 002 Bldg 1190 Caskey well Dup	12/08/2020 8:31 am	DW	R0119 (NA)			
3	G4319	Entry Point 002 Bldg 1190 Caskey well MS	12/08/2020 8:32 am	DW	R0119 (NA)			
4	G4320	Caskey Well Field Blank	12/08/2020 8:33 am	DW	R0119 (NA)			
5	G4321	Entry Point 003 Bldg 274A Res. Well	12/08/2020 8:05 am	DW	R0119 (NA)			
6	G4322	Entry Point 003 Bldg 274A Res. well Dup	12/08/2020 8:06 am	DW	R0119 (NA)			
7	G4323	Reservoir Well Field Blank	12/08/2020 8:07 am	DW	R0119 (NA)			
8	G4324	Entry Point 001 Bldg 9341 PMNK well	12/08/2020 9:26 am	DW	R0119 (NA)			
9	G4325	Entry Point 001 Bldg 9341 PMNK well DUP	12/08/2020 9:27 am	DW	R0119 (NA)			
10	G4326	Trip Blank (Lab Bottles Never Opened)	12/08/2020 9:28 am	DW	R0119 (NA)			

Shipment: **SHP-201221-01**

Status: Pending

Description: NSFIH - South Potomac Indian Head PFAS Sampling

Range: G4772-G4780

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	G4772	IH Well 1	12/16/2020 10:50 am	DW	R0118 (NA)			
2	G4773	IH Well 1 FRB	12/16/2020 10:50 am	DW	R0118 (NA)			
3	G4774	IH Well 1 MS	12/16/2020 10:50 am	DW	R0118 (NA)			
4	G4775	IH Well 15	12/16/2020 11:30 am	DW	R0118 (NA)			
5	G4776	IH Well 16	12/16/2020 11:41 am	DW	R0118 (NA)			
6	G4777	SN Well 43	12/16/2020 1:20 pm	DW	R0118 (NA)			
7	G4778	SN Well 43 FRB	12/16/2020 1:20 pm	DW	R0118 (NA)			
8	G4779	SN Well 43 MS	12/16/2020 1:20 pm	DW	R0118 (NA)			
9	G4780	SN Well 2012	12/16/2020 1:00 pm	DW	R0118 (NA)			

Attachment 2: Test Codes

Project Test Code Name:	Master_371.1
SOP Reference:	5-371 - ANALYSIS OF POLY AND PERFLUOROALKYL SUBSTANCES IN DRINKING WATER SAMPLES BY LIQUID CHROMATOGRAPHY AND TANDEM MASS SPECTROMETRY (LC-MS/MS) FOLLOWING EPA METHOD 537.1
Description:	PFAS in drinking water
Matrix:	L - Liquid Samples, like water or sea water, prepared and anlyzed under the same class of detection limits.
Detection Limit Study:	5-371
Instrument:	LC-MS/MS
MQO Criteria	Universal_LC
Standard Report:	Standard Result Report

Method Specific Reporting				Holding Times (days)		Data Flags	
Result Units:	ng/L	***Unit Conversion:***	(none)	***Sample:***	14	***DL_Flag:***	U
Weight Basis:	LIQUID	***Result Format:***	Fixed Digits	***Frozen:***	14	***RL_Flag:***	J
Standard Basis:	RIS	***# of Figures/Digits:***	2	***Extract:***	28	***PB_Flag:***	B
Oil Weight Basis:	No	***Oil Weight Source:***	Oil Weight			***DIL_Flag:***	D
U-Value Substition:	U-Flag=MD	***Histograms:***	No			***HT_Flag:***	T
ECD_Reporting:	No						

No:	Analyte:	Report Name:	Type	RIS	SIS	Hidden:	Graph:
1	Perfluoro-n-hexanoic acid	PFHxA	T	13C2-PFOA		No	No
2	Perfluoro-n-heptanoic Acid	PFHpA	T	13C2-PFOA		No	No
3	Perfluoro-n-octanoic Acid	PFOA	T	13C2-PFOA		No	No
4	Perfluorononanoic Acid	PFNA	T	13C2-PFOA		No	No
5	Perfluoro-n-decanoic Acid	PFDA	T	13C2-PFOA		No	No
6	Perfluoro-n-undecanoic acid	PFUnA	T	13C2-PFOA		No	No
7	Perfluoro-n-dodecanoic acid	PFDoA	T	13C2-PFOA		No	No
8	Perfluoro-n-tridecanoic acid	PFTrDA	T	13C2-PFOA		No	No
9	Perfluoro-n-tetradecanoic acid	PFTeDA	T	13C2-PFOA		No	No
10	N-methylperfluoro-1-octanesulfonamidoacetic acid	NMeFOSAA	T	d3-MeFOSAA		No	No
11	N-ethylperfluoro-octanesulfonamidoacetic acid	NEtFOSAA	T	d3-MeFOSAA		No	No
12	Perfluoro-1-butanesulfonate	PFBS	T	13C4-PFOS		No	No
13	Perfluoro-1-octanesulfonate	PFOS	T	13C4-PFOS		No	No
14	Perfluoro-1-hexanesulfonate	PFHxS	T	13C4-PFOS		No	No
15	Hexafluoropropylene oxide dimer acid	HFPO-DA	T	13C2-PFOA		No	No

Attachment 2: Test Codes

Project Test Code Name: Master_371.1

No:	Analyte:	Report Name:	Type	RIS	SIS	Hidden:	Graph:
16	Adona	Adona	T	13C2-PFOA		No	No
17	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	T	13C4-PFOS		No	No
18	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	T	13C4-PFOS		No	No
1	13C2-PFHxA	13C2-PFHxA	SIS	13C2-PFOA		No	No
2	13C2-PFDA	13C2-PFDA	SIS	13C2-PFOA		No	No
3	d5-EtFOSAA	d5-EtFOSAA	SIS	d3-MeFOSAA		No	No
4	13C3-HFPO-DA	13C3-HFPO-DA	SIS	13C2-PFOA		No	No

Total Analytes: 22

Subtract Peaks:

None

Sum Peaks:

None

Attachment 2: Test Codes

Project Test Code Name: Master_371.1

ICAL Acceptance Criteria:

Curve Fit:	Limit Mean(%):	Mean Qual:	Limit Ind.:	Ind. Qual:	Min Points:	Points Qual:	Comments:
Linear	NA	NA	0.995	N	5	N	NA
Average RF	15	N	25	N	5	N	NA
Linear (0,0)	NA	NA	0.995	N	5	N	NA
Quadratic	NA	NA	0.995	N	6	N	NA
Quadratic (0,0)	NA	NA	0.995	N	6	N	NA

Continuing Calibration Verification Criteria:

CCV Name: Standard

Frequency Hrs:		Mean PD(%):		Individual PD(%):		RIS/SIS RT Window (min):		Area Limit Low(%):	Area Limit High(%):		Comment:
12	(N)	20	(N)	25	(N)	0.07	(N)	-50	100	(N)	Lab Default Continuing Calibration Verfication Criteria

Independent Calibration Verification:

ICC Name: Standard

Mean PD Limit(%):		Ind. PD Limit(%):		RIS/SIS Window Limit (Secs):		Area Limit High(%):	Area Limit Low(%):		Comment:
15	(N)	20	(N)	0.07	(N)	-50	100	(N)	Standard laboratory criteria for ICCs

Mass Discrimination Criteria:

None

Degredation Check Criteria:

None

Attachment 3: Method Quality Objectives

MQO Application:	***Universal_LC***		
MQO:	**Acceptance Criteria:**	**Qual:**	**Corrective Action:**
Procedural Blank	Samples must be greater than five times the blank concentration (>5xPB).	B	Review with Project Manager; re-analyze or justify results in project records.
PB Measurement Quality Objective	Organic results in the Procedural Blank are less than 1/2 times the LOQ (<1/2xLOQ)	N	Review with Project Manager; re-analyze or justify results in project records.
Laboratory Control Sample	Recovery values 70-130%.	N	Review with project manager; re-analyze or justify reporting the results in project records.
Matrix Spike / Matrix Spike Duplicate Recovery	Organics 70-130%. Analyte concentration in MS/MSD must be greater than five times reported background concentration.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the Original	n	
Matrix Spike/Spike Duplicate Precision	Organics results less than 30% Relative Percent Difference (RPD). Analyte concentration in MS/MSD must be greater than five times reported background concentration.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the Original	n	
Standard Reference Material Accuracy	Organics Percent Difference less than 30% from a range of certified values on average. Analyte concentration must be greater than five times the Method Detection Limit (>5xMDL).	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the MDL	n	
Analytical Duplicate Precision	Organics results less than 30% Relative Percent Difference (RPD). Analyte concentration must be > 5x MDL.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Original is less than 5 times the MDL	n	

Attachment 3: Method Quality Objectives

MQO Application:	***Universal_LC***		
MQO:	**Acceptance Criteria:**	**Qual:**	**Corrective Action:**
Analytical Triplicate Precision	Organics results less than 30% Relative Standard Deviation (RSD). Analyte concentration must be > 5x MDL.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Original is less than 5 times the MDL	n	
Surrogate Compound Recovery	Recovery results between 50% and 150%.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
Control Oil	RPD < 30% for at least 90% of analytes	N	Results examined by project manager, task leader, or subcontractor lab manager. Reextraction, reanalysis, or justification documented.
Instrument Calibration	5-371-5: R-squared greater than or equal to 0.995 Mean RSD less than or equal to 15%, Individual RSD less than or equal to 25%	N	Results examined by project manager, task leader, or subcontractor lab manager. Reextraction, reanalysis, or justification documented.
Independent Calibration Check Solution	5-371-5: Individual PD less than or equal to 20%. Mean Percent Difference less than or equal to 15%.	N	Review with Project Manager; re-analyze or justify in project records.
Continuing Calibration Verification	5-371-5: Individual PD less than or equal to 25%. Mean Percent Difference less than or equal to 20%.	N	Review with Project Manager; re-analyze or justify in project records.

BATTELLE
It can be done

ShpNo SHP-201201-03

Battelle Project No: 100144625

Sample Receipt Form

Approved: ☐ Authorized ☐

Project Number:

Client: Inspection Experts

Received by: Schumitz, Matt

Date/Time Received: Tuesday, December 01, 2020 11:00 AM

No. of Shipping Containers: 1

SHIPMENT

Method of Delivery: Commercial Carrier

Tracking Number: Fed Ex

COC Forms: ☑ **Shipped with samples** ☐ **No Forms**

Cooler(s)/Box(es)

Cntr	Type	Tracking No.	Seal	Seal	Container	Therm.	Temp C	Smps
1 of 1	Cooler	7721 8966 7506	Custody Seals	Intact	Intact	Therm_1	2.7	3

Samples

Sample Labels:
☑ Sample labels agree with COC forms
☐ Discrepancies (see Sample Custody Corrective Action Form)

Container Seals:
☐ Tape ☐ Custody Seals ☐ Other Seals (See sample Log)
☑ Seals intact for each shipping container
☐ Seals broken (See sample log for impacted samples)

Condition of Samples:
☑ Sample containers intact
☐ Sample containers broken/leaking (See Custody Corrective Action Form)

Temperature upon receipt (°C): 2.7 Temperature Blank used ☑ Yes ☐ No
(Note: If temperature upon receipt differs from required conditions, see sample log comment field)

Samples Acidified: ☐ Yes ☐ No ☑ Unknown

Initial pH 5-9?: ☐ Yes ☐ No ☑ NA
If no, individual sample adjustments on the Auxiliary Sample Receipt Form

Total Residual Chlorine Present?: ☐ Yes ☐ No ☑ NA
If yes, individual sample adjustments on the Auxiliary Sample Receipt Form

Head Space <1% in samples for water VOC analysis: ☐ Yes ☐ No ☑ NA
Individual sample deviations noted on sample log

Samples Containers:
Samples returned in PC-grade jars: ☐ Yes ☐ No ☑ Unknown /Lot No.: Unknown

Storage Location: Custody: Refrigerator - R0119 (NA)

BDO IDs Assigned: G3899 - G3901

Samples logged in by: Schumitz, Matt

Date/Time: 12/01/2020 11:00 AM

Approved By:

Approved On:

Authorized By:

Authorized On:

BATTELLE
It can be done

ShpNo: SHP-201201-03

Battelle Project No: 100144625

Report Corrective Actions

Corrective Action No: 1 of 1

Authorized ☐ Approved: ☐

COC Client: Inspection Experts

COC Project: ARC/CBD

COC Date: 12/1/2020 11:50:

	Description of Problem:	Explanation:
Client Id	Either label or C-O-C cannot be verified	The two samples do not have ID's on them and cant be linked to the ID's on the COC.

Documentation of project manager notification

Sample Custodian	Schumitz, Matt	**Date:**	12/1/2020 1:44:00 PM
Laboratory Manager:	Thorn, Jonathan	**Date:**	12/2/2020 6:08:00 PM
Project Manager:	Thorn, Jonathan	**Date:**	12/2/2020 6:09:00 PM

Documentation of client notification (should be completed by project manager within 24 hrs):

On 01-Dec-20 **I contacted** De Silva, Kosala **at** Inspection Experts, Inc.

Results of communication with client (Describe any corrective action directed by the client):

See email

Date this form was received back to the custodian: ____________

Reference Number: ____________

Temp.
Trip
Trip.
Trizma Lot: SLBZ6597
1.26g
1.24g

From:	Kosala De Silva
To:	Schumitz, Matt D (US)
Cc:	Thorn, Jonathan R (US)
Subject:	Re: Shipment from today
Date:	Wednesday, December 02, 2020 1:52:28 PM

Yes. Sorry about that. The samples marked Trip were the FRBs. Lets PRIZMA bottles are the sample and duplicate. This is one location so only one sample need to be analyzed. Per the client " I don't think it will matter which one the lab labels DW01 or DW02. They were collected at the same location. One sample and one duplicate. ….and the two bottles labeled "trip' would be the FRBs per the Method 537.1 guidelines. "

Kosala De Silva, PE, CHMM
Vice President
Inspection Experts, Inc.
Cell: 301-655-6109
Office Direct: 443-741-8131
Fax: 614-386-1999
9250 Rumsey Road, Suite 106
Columbia, MD 21045

On Wed, Dec 2, 2020 at 1:48 PM Schumitz, Matt D (US) <SCHUMITZM@battelle.org> wrote:

> Hi Kosala,
>
> Were you able to get any more information on the samples sent?
>
> Pictures attached again
>
> ---
>
> **From:** Kosala De Silva <kosala@ieinc.net>
> **Sent:** Tuesday, December 01, 2020 4:02 PM
> **To:** Schumitz, Matt D (US) <SCHUMITZM@battelle.org>
> **Cc:** Thorn, Jonathan R (US) <thorn@battelle.org>
> **Subject:** Re: Shipment from today
>
> Message received from outside the Battelle network. Carefully examine it before you open any links or attachments.
>
> The TRIZMA bottles would be the sample and the FRB.

Kosala De Silva, PE, CHMM

Vice President

Inspection Experts, Inc.

Cell: 301-655-6109

Office Direct: 443-741-8131

Fax: 614-386-1999

9250 Rumsey Road, Suite 106

Columbia, MD 21045

On Tue, Dec 1, 2020 at 4:00 PM Schumitz, Matt D (US) <SCHUMITZM@battelle.org> wrote:

> So the two bottles with the Trizma labels on them are 1 sample and is the "Trip" the FRB?
>
> ---
>
> **From:** Kosala De Silva <kosala@ieinc.net>
> **Sent:** Tuesday, December 01, 2020 3:53 PM
> **To:** Schumitz, Matt D (US) <SCHUMITZM@battelle.org>
> **Cc:** Thorn, Jonathan R (US) <thorn@battelle.org>
> **Subject:** Re: Shipment from today
>
> Message received from outside the Battelle network. Carefully examine it before you open any links or attachments.
>
> Hi Matt,
>
> The samples were from the same location. One original and the other the FRB.
>
> **Kosala De Silva, PE, CHMM**

Vice President

Inspection Experts, Inc.

Cell: 301-655-6109

Office Direct: 443-741-8131

Fax: 614-386-1999

9250 Rumsey Road, Suite 106

Columbia, MD 21045

On Tue, Dec 1, 2020 at 2:15 PM Schumitz, Matt D (US) <SCHUMITZM@battelle.org> wrote:

> Good afternoon Kosala
>
> We received some samples today and I am having trouble verifying the ID's
>
> Attached is a picture of the 5 bottles that arrived and the shipment records.
>
> The problem I am having is that the bottles that I believe are the samples don't have any labels on them other than the ones that they were sent with.
>
> Can you verify if these are different samples or is it one sample collected in contingency?
>
> **Matthew Schumitz**
>
> *Technician Specialist / Sample Custodian*
>
> *Hazardous Waste Coordinator*
>
> Analytical Chemistry Services

BATTELLE

It can be done

ShpNo SHP-201201-03

Battelle Project No: 100144625

Sample Receipt Form Details

Approved: ☐ Authorized ☐

Project Number:

Client: Inspection Experts

Received by: Schumitz, Matt

Date/Time Received: Tuesday, December 01, 2020 11:00 AM

No. of Shipping Containers: 1

BDO Id:	Client Sample ID:	Collection Date:	Login Date:	Ctrs:	Matrix:	Temp:	pH:	TRC:	VOC:	Stored In:	Loc:	No:	Comments:
G3899	CBD/DW01	11/30/20 10:20	12/01/20 11:53	1	DW	2.7	NA	NA	NA	R0119 (NA)			
G3900	CBD/DW02	11/30/20 10:20	12/01/20 11:53	1	DW	2.7	NA	NA	NA	R0119 (NA)			
G3901	Trip		12/01/20 11:53	2	DW	2.7	NA	NA	NA	R0119 (NA)			

Total Samples: 3

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Chain-of-Custody

Client Contact Information	Project Manager: Sampler Information (print name): Mark Edes Phone: 410-257-4013 Email:	Sampling Site: Bldg 81	Site Information:
Project Name: ARL/CBD	Turnaround Time (TAT) Requested: Normal Priority RUSH	Preservative	COC #
Project No.:	Time Zone:	Analysis: PFAS	Page#

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	Total # of Cont	PFAS	COC #
CBD/D/W001	11-30-20	1020	G	D/W	1		G3899
CBD/D/W002	11-30-20	1020	G	D/W	1		G3900
Trip							G3901
Trip							G3901
Temp.							

Receipt Temperature:(°C)	Samples Intact: Yes - No	Samples on Ice: Yes - No	Receipt Comments:

Relinquished by (Print/Sign)	Company	Date/Time	Received by (Print/Sign)	Company	Date/Time
Mark Edes / [signature]	ARL/CBD	11-30-20	[signature]	BNO	12.1.20 1100

Comments:

ORIGIN ID:KEUA (410) 715-3939
GEORGE TSAMOUTALES
INSPECTION EXPERTS, INC
9250 RUMSEY RD
STE 106
COLUMBIA, MD 21045
UNITED STATES US

SHIP DATE: 25NOV20
ACTWGT: 7.00 LB
CAD: 110188502/INET4280
DIMS: 25x13x14 IN

BILL SENDER

TO **JONATHAN THORN**
BATTELLE
141 LONGWATER DR
SUITE 202
NORWELL MA 02061
(781) 681-5565 REF: SOUTH POTOMAC PFAS
INV
PO: 1511-0040-001-001 DEPT:

56BJ5/BAB9/B766

FedEx Express

E

J202020071401uv

FRI - 27 NOV 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7721 8966 7506**

02061
MA-US **BOS**

EM XPUA

Therm!
2.7°

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Data Tables

BATTELLE
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Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Client ID	CBD/DW01
Battelle ID	G3899-FS
Sample Type	SA
Collection Date	11/30/2020
Extraction Date	12/08/2020
Analytical Instrument	Sciex 6500+ (AE) LC/MS/MS
% Moisture	NA
Matrix	DW
Sample Size	0.295
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.204	J	G3899-FS(0)	1.000	12/23/2020	0.191	0.424	2.12
PFHpA	375-85-9	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.198	0.424	2.12
PFOA	335-67-1	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.168	0.424	2.12
PFNA	375-95-1	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.103	0.339	2.12
PFDA	335-76-2	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.0958	0.339	2.12
PFUnA	2058-94-8	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.0873	0.339	2.12
PFDoA	307-55-1	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.117	0.424	2.12
PFTrDA	72629-94-8	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.0813	0.339	2.12
PFTeDA	376-06-7	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.190	0.424	2.12
NMeFOSAA	2355-31-9	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.170	0.424	2.12
NEtFOSAA	2991-50-6	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.140	0.424	2.12
PFBS	375-73-5	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.101	0.339	2.12
PFHxS	355-46-4	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.100	0.339	2.12
PFOS	1763-23-1	0.424	U	G3899-FS(0)	1.000	12/23/2020	0.124	0.424	2.12
HFPO-DA	13252-13-6	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.0731	0.339	2.12
Adona	919005-14-4	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.102	0.339	2.12
11Cl-PF3OUdS	763051-92-9	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.100	0.339	2.12
9Cl-PF3ONS	756426-58-1	0.339	U	G3899-FS(0)	1.000	12/23/2020	0.0831	0.339	2.12

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C2-PFHxA	82	G3899-FS(0)	12/23/2020
13C2-PFDA	103	G3899-FS(0)	12/23/2020
d5-EtFOSAA	99	G3899-FS(0)	12/23/2020
13C3-HFPO-DA	85	G3899-FS(0)	12/23/2020

BATTELLE
It can be done

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Client ID	Trip
Battelle ID	G3901-FS
Sample Type	SA
Collection Date	12/08/2020
Extraction Date	12/08/2020
Analytical Instrument	Sciex 6500+ (AE) LC/MS/MS
% Moisture	NA
Matrix	DW
Sample Size	0.298
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.189	0.419	2.10
PFHpA	375-85-9	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.196	0.419	2.10
PFOA	335-67-1	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.166	0.419	2.10
PFNA	375-95-1	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.102	0.336	2.10
PFDA	335-76-2	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0948	0.336	2.10
PFUnA	2058-94-8	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0864	0.336	2.10
PFDoA	307-55-1	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.116	0.419	2.10
PFTrDA	72629-94-8	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0805	0.336	2.10
PFTeDA	376-06-7	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.188	0.419	2.10
NMeFOSAA	2355-31-9	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.169	0.419	2.10
NEtFOSAA	2991-50-6	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.138	0.419	2.10
PFBS	375-73-5	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0998	0.336	2.10
PFHxS	355-46-4	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0990	0.336	2.10
PFOS	1763-23-1	0.419	U	G3901-FS(0)	1.000	12/23/2020	0.122	0.419	2.10
HFPO-DA	13252-13-6	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0724	0.336	2.10
Adona	919005-14-4	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.101	0.336	2.10
11Cl-PF3OUdS	763051-92-9	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0990	0.336	2.10
9Cl-PF3ONS	756426-58-1	0.336	U	G3901-FS(0)	1.000	12/23/2020	0.0822	0.336	2.10

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C2-PFHxA	86	G3901-FS(0)	12/23/2020
13C2-PFDA	93	G3901-FS(0)	12/23/2020
d5-EtFOSAA	99	G3901-FS(0)	12/23/2020
13C3-HFPO-DA	89	G3901-FS(0)	12/23/2020

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Client ID	LE02 IB
Battelle ID	LE02 IB_12/22/2020
Sample Type	IB
Collection Date	NA
Extraction Date	NA
Analysis Date	12/22/2020
Analytical Instrument	Sciex 6500+ (AE) LC/MS/MS
% Moisture	NA
Matrix	Water
Sample Size	0.250
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)		DL	LOD	LOQ
PFHxA	307-24-4	0.500	U	0.225	0.500	2.50
PFHpA	375-85-9	0.500	U	0.234	0.500	2.50
PFOA	335-67-1	0.500	U	0.198	0.500	2.50
PFNA	375-95-1	0.400	U	0.121	0.400	2.50
PFDA	335-76-2	0.400	U	0.113	0.400	2.50
PFUnA	2058-94-8	0.400	U	0.103	0.400	2.50
PFDoA	307-55-1	0.500	U	0.138	0.500	2.50
PFTrDA	72629-94-8	0.400	U	0.0959	0.400	2.50
PFTeDA	376-06-7	0.500	U	0.224	0.500	2.50
NMeFOSAA	2355-31-9	0.500	U	0.201	0.500	2.50
NEtFOSAA	2991-50-6	0.182	J	0.165	0.500	2.50
PFBS	375-73-5	0.400	U	0.119	0.400	2.50
PFHxS	355-46-4	0.400	U	0.118	0.400	2.50
PFOS	1763-23-1	0.500	U	0.146	0.500	2.50
HFPO-DA	13252-13-6	0.400	U	0.0863	0.400	2.50
Adona	919005-14-4	0.400	U	0.120	0.400	2.50
11Cl-PF3OUdS	763051-92-9	0.400	U	0.118	0.400	2.50
9Cl-PF3ONS	756426-58-1	0.400	U	0.0980	0.400	2.50

Surrogate Recoveries (%)	
13C2-PFHxA	112
13C2-PFDA	107
d5-EtFOSAA	117
13C3-HFPO-DA	104

BATTELLE
It can be done

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Client ID		Procedural Blank
Battelle ID		DB577PB-FS
Sample Type		PB
Collection Date		12/08/2020
Extraction Date		12/08/2020
Analytical Instrument		Sciex 6500+ (AE) LC/MS/MS
% Moisture		NA
Matrix		WATER
Sample Size		0.250
Size Unit-Basis		L

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.259	J	DB577PB-FS(0)	1.000	12/23/2020	0.225	0.500	2.50
PFHpA	375-85-9	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.234	0.500	2.50
PFOA	335-67-1	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.198	0.500	2.50
PFNA	375-95-1	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.121	0.400	2.50
PFDA	335-76-2	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.113	0.400	2.50
PFUnA	2058-94-8	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.103	0.400	2.50
PFDoA	307-55-1	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.138	0.500	2.50
PFTrDA	72629-94-8	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.0959	0.400	2.50
PFTeDA	376-06-7	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.224	0.500	2.50
NMeFOSAA	2355-31-9	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.201	0.500	2.50
NEtFOSAA	2991-50-6	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.165	0.500	2.50
PFBS	375-73-5	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.119	0.400	2.50
PFHxS	355-46-4	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.118	0.400	2.50
PFOS	1763-23-1	0.500	U	DB577PB-FS(0)	1.000	12/23/2020	0.146	0.500	2.50
HFPO-DA	13252-13-6	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.0863	0.400	2.50
Adona	919005-14-4	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.120	0.400	2.50
11Cl-PF3OUdS	763051-92-9	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.118	0.400	2.50
9Cl-PF3ONS	756426-58-1	0.400	U	DB577PB-FS(0)	1.000	12/23/2020	0.0980	0.400	2.50

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C2-PFHxA	93	DB577PB-FS(0)	12/23/2020
13C2-PFDA	94	DB577PB-FS(0)	12/23/2020
d5-EtFOSAA	96	DB577PB-FS(0)	12/23/2020
13C3-HFPO-DA	81	DB577PB-FS(0)	12/23/2020

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Client ID	Laboratory Control Sample
Battelle ID	DB578LCS-FS
Sample Type	LCS
Collection Date	12/08/2020
Extraction Date	12/08/2020
Analytical Instrument	Sciex 6500+ (AE) LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.250
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	Target	Recovery	Qual	Control Limits Lower	Control Limits Upper
PFHxA	307-24-4	40.1	DB578LCS-FS(0)	1.000	12/23/2020	40.0	100		70	130
PFHpA	375-85-9	38.9	DB578LCS-FS(0)	1.000	12/23/2020	40.0	97		70	130
PFOA	335-67-1	37.7	DB578LCS-FS(0)	1.000	12/23/2020	40.0	94		70	130
PFNA	375-95-1	36.7	DB578LCS-FS(0)	1.000	12/23/2020	40.0	92		70	130
PFDA	335-76-2	37.4	DB578LCS-FS(0)	1.000	12/23/2020	40.0	94		70	130
PFUnA	2058-94-8	38.4	DB578LCS-FS(0)	1.000	12/23/2020	40.0	96		70	130
PFDoA	307-55-1	41.0	DB578LCS-FS(0)	1.000	12/23/2020	40.0	103		70	130
PFTrDA	72629-94-8	40.5	DB578LCS-FS(0)	1.000	12/23/2020	40.0	101		70	130
PFTeDA	376-06-7	37.5	DB578LCS-FS(0)	1.000	12/23/2020	40.0	94		70	130
NMeFOSAA	2355-31-9	39.9	DB578LCS-FS(0)	1.000	12/23/2020	40.0	100		70	130
NEtFOSAA	2991-50-6	39.6	DB578LCS-FS(0)	1.000	12/23/2020	40.0	99		70	130
PFBS	375-73-5	32.1	DB578LCS-FS(0)	1.000	12/23/2020	35.4	91		70	130
PFHxS	355-46-4	34.0	DB578LCS-FS(0)	1.000	12/23/2020	37.8	90		70	130
PFOS	1763-23-1	29.3	DB578LCS-FS(0)	1.000	12/23/2020	38.2	77		70	130
HFPO-DA	13252-13-6	35.0	DB578LCS-FS(0)	1.000	12/23/2020	40.0	88		70	130
Adona	919005-14-4	36.4	DB578LCS-FS(0)	1.000	12/23/2020	37.8	96		70	130
11Cl-PF3OUdS	763051-92-9	31.6	DB578LCS-FS(0)	1.000	12/23/2020	37.6	84		70	130
9Cl-PF3ONS	756426-58-1	32.8	DB578LCS-FS(0)	1.000	12/23/2020	37.2	88		70	130

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C2-PFHxA	97	DB578LCS-FS(0)	12/23/2020
13C2-PFDA	96	DB578LCS-FS(0)	12/23/2020
d5-EtFOSAA	92	DB578LCS-FS(0)	12/23/2020
13C3-HFPO-DA	88	DB578LCS-FS(0)	12/23/2020

Glossary of Data Qualifiers

Flag:	Application:
D	Dilution Run. Initial run outside the initial calibration range of the instrument
E	Estimate, result is greater than the highest concentration level in the calibration
J	Analyte detected below the Limit of Quantitation (LOQ)
MI	Significant Matrix Interference - value could not be determined.
N	Quality Control (QC) value is outside the accuracy or precision Data Quality Objective (DQO)
NA	Not Applicable
T	Holding Time (HT) exceeded
U	Analyte not detected or detected below the Detection Limit (DL) value, Limit of Detection (LOD) reported

Miscellaneous Documentation

QA/QC Summary
Batch 20-1569

Project:	Inspection Experts: PFAS analysis
Client Project Manager:	Kosala De Silva
Parameters:	PFAS
Laboratory:	Battelle, Norwell, MA
Matrix:	DW
Data Set:	DP-20-1445
Analytical SOP:	5-371
Method Reference:	USEPA 537.1 (November 2018)

Sample Custody		
Collection Date	Receipt Date	Temp (°C)
11/30/2020	12/1/2020	2.7

Corrective Actions	Two samples could not be matched to the COC, verified with client during login. Email from client and pictures of sample containers included in the custody records for clarification.
Sample Storage	The water samples were stored refrigerated until extraction.
Related samples	None.

	METHOD SUMMARIES
Sample Preparation	Water samples were spiked with surrogates in the original sample container from the field. The water was extracted using a solid phase extraction (SPE) cartridge and eluted from the SPE with methanol. Extracts were concentrated to dryness under nitrogen with a water bath set between 60 °C and 65 °C, reconstituted with 96:4 methanol/water (V/V) and fortified with internal standard. Extracts were transferred for LC-MS/MS analysis.
Prep comments	pH verified at 7 prior to extraction. Sample G3899-FS (CBD/DW01) contained particulates.
Analysis	PFAS were measured by liquid chromatography tandem mass spectrometry (LC-MS/MS) in the multiple reaction monitoring (MRM). An initial calibration consisting of representative target analytes, labelled analogs, and internal standards was analyzed prior to analysis to demonstrate the linear range of analysis. Calibration verification was performed at the beginning and end of 10 injections and at the end of each sequence. Target PFAS were quantified using the internal standard method. Samples are reported in ng/L concentrations to three (3) significant figures.
Analysis Comments	Samples analyzed on Sciex 6500+ (AE) LC-MS/MS. 11Cl-PF3OUdS in the level one for the secondary transition of the calibration curve was not used in the calibration curve. The secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data.

Holding Times	Extraction Date(s)	Analysis Date(s)
	12/8/2020	12/22 – 23/2020

QA/QC Summary
Batch 20-1569

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
≤ 1/3 the LOQ	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
70-130% of true value	No exceedances noted.
	No comments.

Matrix Spike (MS) / Duplicate (MSD)	A MS/MSD were prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy. The relative percent difference was calculated to measure precision.
70-130% of true value, RPD ≤ 30%	Project specific MS/MSD not included with this data set.
	No comments.

Surrogates Standard Analytes	Labelled surrogate compounds were added prior to extraction. The recoveries are calculated to measure extraction efficiency.
70-130% of true value	No exceedances noted.
	No comments.

Internal Standard Analytes	Labelled analog compounds were added prior to analysis.
ICAL high and low points RPD ≤20%, 50-150% of average area of the ICAL and 70-140% of most recent CCV	No exceedances noted.
	No comments.

Initial Calibration (ICAL)	The LC-MS/MS was calibrated with multi-level calibration curve for all compounds using linear or quadradic curve fitting.
R^2 >0.99 Target and SIS compounds +/-30% of true value, Low point 50-150% of true value	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
Target and SIS compounds +/-30% of true value	No exceedances noted.
	No comments.

QA/QC Summary
Batch 20-1569

Continuing Calibration Verification (CCV)	Continuing calibration standards were run at the beginning and end of 10 injections and at the end of the sequence to ensure that initial calibration is still valid.
Target and SIS compounds +/- 30% of true value Low point 50-150% of true value	No exceedances noted.
	No comments.

Instrument Blank (IB)	Immediately following the highest standard analyzed and daily prior to sample analysis.
≤ ½ the LOQ	No exceedances noted.
	No comments.

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project Number: 100144625
Preparation Batch: 20-1569
Data Set: DP-20-1445
Test Code: Master_371.1

QC Parameter:	Exceed:	Justification:
Procedural Blank	0	None
Laboratory Control Sample	0	None
Matrix Spike / Matrix Spike Duplicate Recovery	NA	None
Matrix Spike / Matrix Spike Duplicate Precision	NA	None
Extracted Internal Standard Analytes (Surrogates)	0	None
Instrument Calibration	0	None
Instrument Blank	0	None
Independent Calibration Check	0	None
Continuing Calibration Verification	0	None

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
MISCELLANEOUS DOCUMENTATION FORM

Project Title:	Inspection Experts Inc - PFAS Analysis	**Data Set Number:**	DP-20-1445
Project Number:	100144625	**Prep Batch Number:**	20-1569
Entered By:	Denise Schumitz	**Entered On:**	12/28/2020
Test Code (Matrix Type):	Master_371.1(L)		

Samples that were manually integrated are noted on the quant reports with the comment (TRUE).
DMS 12/28/2020

11Cl-PF3OUdS in the level one for the secondary transition of the calibration curve was not used in the calibration curve. The secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data.
DMS 12/28/2020

Task Leader Approval:

SupervisorApproval: Digitally signed by Jonathan Thorn
Date: 2020.12.28 12:31:26 -05'00'

PM Approval:

Example Calculation for PFAS

Calculation of final concentration from area:

$$Concentration = \left[\frac{PA - b}{m}\right] * C_{IS} * PIV * DF/S$$

Where:

PA = Area of target / area of internal standard
b = y intercept from calibration curve
CIS = concentration of internal standard (ng/L)
m = slope of calibration
DF = dilution factor
S = Sample Size
PIV = Pre-injection volume (L)

Sample ID:	DB578LCS-FS(0)
Client Sample ID:	Laboratory Control Sample
Sample Size:	0.25
Units:	L
Dilution Factor:	1.000
PIV (L):	0.001
Target Analyte:	HFPO-DA
MRM Transition:	285.0 / 169.0
Data file:	AE_12222020_5-371.wiff
Result table:	20-1569_DW
Area:	6,737,411.81
IS Name:	13C2-PFOA
IS Area:	9,139,773.95
IS Amount (ng/L):	10000
y-intercept:	0
slope:	0.8426

$$\text{Concentration} = \frac{[(6737411.81/9139773.95) - 0]}{0.8426} * 10000 * 0.001 * 1 / 0.25$$

ng/L = 35.0

*Final concentration may vary based on rounding.

BATTELLE
It can be done

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625
Preparation Batch: 20-1569
Data Set: DP-20-1445

		DB577PB-FS (Procedural Blank)	DB578LCS-FS (Laboratory Control Sample)	G3899-FS (CBD/DW01)	G3901-FS (Trip)
PFHxA	307-24-4	L	L	L	-
PFHpA	375-85-9	-	L	-	-
PFOA	335-67-1	-	L	-	-
PFNA	375-95-1	-	L	-	-
PFDA	335-76-2	-	L	-	-
PFUnA	2058-94-8	-	L	-	-
PFDoA	307-55-1	-	L	-	-
PFTrDA	72629-94-8	-	L	-	-
PFTeDA	376-06-7	-	L	-	-
NMeFOSAA	2355-31-9	-	L	-	-
NEtFOSAA	2991-50-6	-	L	-	-
PFBS	375-73-5	-	L	-	-
PFHxS	355-46-4	-	L	-	-
PFOS	1763-23-1	-	L	-	-
HFPO-DA	13252-13-6	-	L	-	-
Adona	919005-14-4	-	L	-	-
11Cl-PF3OUdS	763051-92-9	-	L	-	-
9Cl-PF3ONS	756426-58-1	-	L	-	-

"L" :Linear
"Br": branched
"L/Br": Linear/Branched
"-": Not detected

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Sample Name	Sample ID	Analysis Date	Analyte	Area	RPD (L1/L7)	
LD94	L1	12/22/20 19:23	13C4-PFOS	14,964,202.82	-	
LD95	L2	12/22/20 19:34	13C4-PFOS	14,255,088.01	-	
LD96	L3	12/22/20 19:44	13C4-PFOS	13,876,959.18	-	
LD97	L4	12/22/20 19:55	13C4-PFOS	14,338,277.87	-	
LD98	L5	12/22/20 20:06	13C4-PFOS	14,789,346.52	-	
LD99	L6	12/22/20 20:16	13C4-PFOS	13,663,883.08	-	
LE01	L7	12/22/20 20:27	13C4-PFOS	14,601,191.15	2.5	PASS

Average	Lower	Upper
14,355,564.09	7,177,782.05	21,533,346.14

Sample Name	Sample ID	Analysis Date	Analyte	Area	Lower	Upper	Qualifier	CCV Lower	CCV Upper	Qualifier
LD94	L1	12/22/20 19:23	13C4-PFOS	14,964,202.82	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD95	L2	12/22/20 19:34	13C4-PFOS	14,255,088.01	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD96	L3	12/22/20 19:44	13C4-PFOS	13,876,959.18	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD97	L4	12/22/20 19:55	13C4-PFOS	14,338,277.87	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD98	L5	12/22/20 20:06	13C4-PFOS	14,789,346.52	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD99	L6	12/22/20 20:16	13C4-PFOS	13,663,883.08	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LE01	L7	12/22/20 20:27	13C4-PFOS	14,601,191.15	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LE02 IB	Instrument Blank	12/22/20 20:37	13C4-PFOS	15,816,377.56	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LE03 ICC	ICC	12/22/20 20:48	13C4-PFOS	14,038,423.75	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
LD97 CCV	CCV	12/23/20 1:32	13C4-PFOS	15,719,969.22	7,177,782.05	21,533,346.14		10,036,794.51	20,073,589.02	
DB577PB-FS(0)	Procedural Blank	12/23/20 1:53	13C4-PFOS	16,844,124.58	7,177,782.05	21,533,346.14		11,003,978.45	22,007,956.91	
DB578LCS-FS(0)	Laboratory Control Sample	12/23/20 2:03	13C4-PFOS	15,969,145.02	7,177,782.05	21,533,346.14		11,003,978.45	22,007,956.91	
G3899-FS(0)	CBD DW01	12/23/20 2:14	13C4-PFOS	15,863,271.70	7,177,782.05	21,533,346.14		11,003,978.45	22,007,956.91	
G3901-FS(0)	Trip	12/23/20 2:24	13C4-PFOS	15,879,495.16	7,177,782.05	21,533,346.14		11,003,978.45	22,007,956.91	
LD98 CCV	CCV	12/23/20 2:46	13C4-PFOS	16,109,318.83	7,177,782.05	21,533,346.14		11,003,978.45	22,007,956.91	

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Sample Name	Sample ID	Analysis Date	Analyte	Area	RPD (L1/L7)	
LD94	L1	12/22/20 19:23	13C2-PFOA	9,428,290.65	-	
LD95	L2	12/22/20 19:34	13C2-PFOA	9,692,714.23	-	
LD96	L3	12/22/20 19:44	13C2-PFOA	8,510,802.56	-	
LD97	L4	12/22/20 19:55	13C2-PFOA	9,381,964.85	-	
LD98	L5	12/22/20 20:06	13C2-PFOA	9,524,633.60	-	
LD99	L6	12/22/20 20:16	13C2-PFOA	8,741,845.40	-	
LE01	L7	12/22/20 20:27	13C2-PFOA	8,922,014.30	5.5	PASS

Average	Lower	Upper
9,171,752.23	4,585,876.12	13,757,628.35

Sample Name	Sample ID	Analysis Date	Analyte	Area	Lower	Upper	Qualifier	CCV Lower	CCV Upper	Qualifier
LD94	L1	12/22/20 19:23	13C2-PFOA	9,428,290.65	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD95	L2	12/22/20 19:34	13C2-PFOA	9,692,714.23	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD96	L3	12/22/20 19:44	13C2-PFOA	8,510,802.56	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD97	L4	12/22/20 19:55	13C2-PFOA	9,381,964.85	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD98	L5	12/22/20 20:06	13C2-PFOA	9,524,633.60	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD99	L6	12/22/20 20:16	13C2-PFOA	8,741,845.40	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LE01	L7	12/22/20 20:27	13C2-PFOA	8,922,014.30	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LE02 IB	Instrument Blank	12/22/20 20:37	13C2-PFOA	8,909,464.48	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LE03 ICC	ICC	12/22/20 20:48	13C2-PFOA	8,839,517.91	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
LD97 CCV	CCV	12/23/20 1:32	13C2-PFOA	9,605,045.05	4,585,876.12	13,757,628.35		6,567,375.40	13,134,750.79	
DB577PB-FS(0)	Procedural Blank	12/23/20 1:53	13C2-PFOA	9,717,866.67	4,585,876.12	13,757,628.35		6,723,531.54	13,447,063.07	
DB578LCS-FS(0)	Laboratory Control Sample	12/23/20 2:03	13C2-PFOA	9,139,773.95	4,585,876.12	13,757,628.35		6,723,531.54	13,447,063.07	
G3899-FS(0)	CBD DW01	12/23/20 2:14	13C2-PFOA	8,625,071.02	4,585,876.12	13,757,628.35		6,723,531.54	13,447,063.07	
G3901-FS(0)	Trip	12/23/20 2:24	13C2-PFOA	9,357,725.61	4,585,876.12	13,757,628.35		6,723,531.54	13,447,063.07	
LD98 CCV	CCV	12/23/20 2:46	13C2-PFOA	9,326,935.42	4,585,876.12	13,757,628.35		6,723,531.54	13,447,063.07	

Project Client: Inspection Experts, Inc.
Project Name: Inspection Experts Inc - PFAS Analysis
Project No.: 100144625

Sample Name	Sample ID	Analysis Date	Analyte	Area	RPD (L1/L7)	
LD94	L1	12/22/20 19:23	d3-MeFOSAA	7,972,338.71	-	
LD95	L2	12/22/20 19:34	d3-MeFOSAA	8,036,604.21	-	
LD96	L3	12/22/20 19:44	d3-MeFOSAA	8,070,177.40	-	
LD97	L4	12/22/20 19:55	d3-MeFOSAA	8,373,794.29	-	
LD98	L5	12/22/20 20:06	d3-MeFOSAA	8,260,134.46	-	
LD99	L6	12/22/20 20:16	d3-MeFOSAA	7,245,963.70	-	
LE01	L7	12/22/20 20:27	d3-MeFOSAA	7,703,237.21	3.4	PASS

Average	Lower	Upper
7,951,750.00	3,975,875.00	11,927,625.00

Sample Name	Sample ID	Analysis Date	Analyte	Area	Lower	Upper	Qualifier	CCV Lower	CCV Upper	Qualifier
LD94	L1	12/22/20 19:23	d3-MeFOSAA	7,972,338.71	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD95	L2	12/22/20 19:34	d3-MeFOSAA	8,036,604.21	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD96	L3	12/22/20 19:44	d3-MeFOSAA	8,070,177.40	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD97	L4	12/22/20 19:55	d3-MeFOSAA	8,373,794.29	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD98	L5	12/22/20 20:06	d3-MeFOSAA	8,260,134.46	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD99	L6	12/22/20 20:16	d3-MeFOSAA	7,245,963.70	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LE01	L7	12/22/20 20:27	d3-MeFOSAA	7,703,237.21	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LE02 IB	Instrument Blank	12/22/20 20:37	d3-MeFOSAA	8,254,286.50	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LE03 ICC	ICC	12/22/20 20:48	d3-MeFOSAA	8,268,930.14	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
LD97 CCV	CCV	12/23/20 1:32	d3-MeFOSAA	8,554,372.91	3,975,875.00	11,927,625.00		5,861,656.00	11,723,312.01	
DB577PB-FS(0)	Procedural Blank	12/23/20 1:53	d3-MeFOSAA	8,841,605.99	3,975,875.00	11,927,625.00		5,988,061.04	11,976,122.07	
DB578LCS-FS(0)	Laboratory Control Sample	12/23/20 2:03	d3-MeFOSAA	8,261,601.34	3,975,875.00	11,927,625.00		5,988,061.04	11,976,122.07	
G3899-FS(0)	CBD DW01	12/23/20 2:14	d3-MeFOSAA	7,945,389.12	3,975,875.00	11,927,625.00		5,988,061.04	11,976,122.07	
G3901-FS(0)	Trip	12/23/20 2:24	d3-MeFOSAA	8,736,257.33	3,975,875.00	11,927,625.00		5,988,061.04	11,976,122.07	
LD98 CCV	CCV	12/23/20 2:46	d3-MeFOSAA	8,008,698.98	3,975,875.00	11,927,625.00		5,988,061.04	11,976,122.07	

Preparation Batch: 20-1569
Matrix: Drinking Water

			Passing criteria: 70% - 130%			
Sample Name	Sample ID	Analysis Date	13C3-HFPO-DA	13C2-PFHxA	13C2-PFDA	d5-EtFOSAA
DB577PB-FS(0)	Procedural Blank	12/23/20 1:53	81	93	94	96
DB578LCS-FS(0)	Laboratory Control Sample	12/23/20 2:03	88	97	96	92
G3899-FS(0)	CBD DW01	12/23/20 2:14	85	82	103	99
G3901-FS(0)	Trip	12/23/20 2:24	89	86	93	99

NQ - Not quantified (dilution run and not needed)

Sample Name	LD98	Injection Vial	6
Sample ID	L5	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:06:00 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Asymmetry Factor	Passing Range
PFBS_1	298.9 / 80.0	1.27	0.95	0.8 – 1.5
PFHxA_1	313.0 / 269.0	1.51	1.07	0.8 – 1.5

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Mass Spectral Acquisition Rate Report

Created with Analyst Reporter
Printed: 28/12/2020 9:41:17 AM

Sample Name	LD99	Injection Vial	7
Sample ID	L6	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:16:32 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Spectra Acquisition Rate	Passing Range
PFBS_1	298.9 / 80.0	1.28	50	>10
PFBS_2	298.9 / 99.0	1.28	41	>10
PFHxA_1	313.0 / 269.0	1.52	53	>10
PFHxA_2	313.0 / 119.0	1.52	50	>10
PFHpA_1	363.0 / 319.0	1.86	53	>10
PFHpA_2	363.0 / 169.0	1.85	25	>10
PFHxS_1	399.0 / 80.0	1.86	57	>10
PFHxS_2	399.0 / 99.0	1.86	44	>10
PFOA_1	413.0 / 369.0	2.22	51	>10
PFOA_2	413.0 / 169.0	2.22	30	>10
PFNA_1	463.0 / 419.0	2.59	51	>10
PFNA_2	463.0 / 219.0	2.59	60	>10
PFOS_1	499.0 / 80.0	2.59	54	>10
PFOS_2	499.0 / 99.0	2.59	57	>10
PFDA_1	513.0 / 469.0	2.95	42	>10
PFDA_2	513.0 / 219.0	2.95	34	>10
PFUnA_1	563.0 / 519.0	3.27	37	>10
PFUnA_2	563.0 / 269.0	3.27	31	>10
PFDoA_1	613.0 / 569.0	3.56	49	>10
PFDoA_2	613.0 / 319.0	3.56	37	>10
PFTrDA_1	663.0 / 619.0	3.82	62	>10
PFTrDA_2	663.0 / 169.0	3.82	41	>10
PFTeDA_1	713.0 / 669.0	4.04	55	>10
PFTeDA_2	713.0 / 169.0	4.04	37	>10
NMeFOSAA_1	570.0 / 419.0	3.10	55	>10
NMeFOSAA_2	570.0 / 512.0	3.10	51	>10
NEtFOSAA_1	584.0 / 419.0	3.27	48	>10
NEtFOSAA_2	584.0 / 483.0	3.26	43	>10
13C2-PFHxA	315.0 / 270.0	1.51	18	>10
13C2-PFDA	515.0 / 470.0	2.94	55	>10
d5-EtFOSAA	589.0 / 419.0	3.26	42	>10
HFPO-DA_1	285.0 / 169.0	1.62	42	>10
HFPO-DA_2	285.0 / 118.8	1.61	41	>10
ADONA_1	377.0 / 251.0	1.89	57	>10
ADONA_2	377.0 / 85.0	1.89	32	>10
13C3-HFPO-DA	287.0 / 169.0	1.61	46	>10
9Cl-PF3ONS_1	531.0 / 351.0	2.79	52	>10
9Cl-PF3ONS_2	531.0 / 83.0	2.79	37	>10
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	53	>10
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	24	>10

Precision and Bias at the LOQ for PFAS in Drinking Water

Analyte	CAS No.	Average (ng/L)	ST DEV	2 Sigma	n [1]
PFHxA	307-24-4	5.75	0.4674	0.93	7
PFHpA	375-85-9	5.83	0.4947	0.99	7
PFOA	335-67-1	5.81	0.1944	0.39	7
PFNA	375-95-1	5.45	0.5105	1.02	7
PFDA	335-76-2	5.44	0.5904	1.18	7
PFUnA	2058-94-8	5.39	0.4962	0.99	7
PFDoA	307-55-1	5.34	0.5823	1.16	7
PFTrDA	72629-94-8	5.26	0.6079	1.22	7
PFTeDA	376-06-7	6.02	0.3429	0.69	7
NMeFOSAA	2355-31-9	5.81	0.4849	0.97	7
NEtFOSAA	2991-50-6	5.71	0.5190	1.04	7
PFBS	375-73-5	4.84	0.2120	0.42	7
PFHxS	355-46-4	5.10	0.2380	0.48	7
PFOS	1763-23-1	4.77	0.1159	0.23	7
HFPO-DA	13252-13-6	5.16	0.5627	1.13	7
Adona	919005-14-4	5.26	0.3703	0.74	7
9Cl-PF3ONS	763051-92-9	4.65	0.3022	0.60	7
11Cl-PF3OUdS	756426-58-1	4.87	0.1825	0.37	7

[1] Minimum of 20 samples required per QAM for determination of uncertainty, results including less than 20 data points are estimated.

BATTELLE DETECTION LIMITS FOR PFAS IN DRINKING WATER

EPA Method 537.1

Analyte	CAS No.	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)	MRL (ng/L)
PFHxA	307-24-4	0.23	0.5	2.5	2.5
PFHpA	375-85-9	0.23	0.5	2.5	2.5
PFOA	335-67-1	0.20	0.5	2.5	2.5
PFNA	375-95-1	0.12	0.4	2.5	2.5
PFDA	335-76-2	0.11	0.4	2.5	2.5
PFUnA	2058-94-8	0.10	0.4	2.5	2.5
PFDoA	307-55-1	0.14	0.5	2.5	2.5
PFTrDA	72629-94-8	0.10	0.4	2.5	2.5
PFTeDA	376-06-7	0.22	0.5	2.5	2.5
NMeFOSAA	2355-31-9	0.20	0.5	2.5	2.5
NEtFOSAA	2991-50-6	0.17	0.5	2.5	2.5
PFBS	375-73-5	0.12	0.4	2.5	2.5
PFHxS	355-46-4	0.12	0.4	2.5	2.5
PFOS	1763-23-1	0.15	0.5	2.5	2.5
HFPO-DA	13252-13-6	0.09	0.4	2.5	2.5
Adona	919005-14-4	0.12	0.4	2.5	2.5
9Cl-PF3ONS	756426-58-1	0.12	0.4	2.5	2.5
11Cl-PF3OUdS	763051-92-9	0.10	0.4	2.5	2.5

Analytes on ELAP QSM 5.1 Scope of accreditation

800.201.2011 | solutions@battelle.org | www.battelle.org

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It can be done

ID 626 02/19

Analytical Transitions for PFAS in drinking water

SOP 5-371 (EPA 537.1 November 2019)

Analyte	CAS No.	Type	Primary Transition	Secondary Transition
PFHxA	307-24-4	Target	313.0 / 269.0	313.0 / 119.0
PFHpA	375-85-9	Target	363.0 / 319.0	363.0 / 169.0
PFOA	335-67-1	Target	413.0 / 369.0	413.0 / 169.0
PFNA	375-95-1	Target	463.0 / 419.0	463.0 / 219.0
PFDA	335-76-2	Target	513.0 / 469.0	513.0 / 219.0
PFUnA	2058-94-8	Target	563.0 / 519.0	563.0 / 269.0
PFDoA	307-55-1	Target	613.0 / 569.0	613.0 / 319.0
PFTrDA	72629-94-8	Target	663.0 / 619.0	663.0 / 169.0
PFTeDA	376-06-7	Target	713.0 / 669.0	713.0 / 169.0
NMeFOSAA	2355-31-9	Target	570.0 / 419.0	570.0 / 512.0
NEtFOSAA	2991-50-6	Target	584.0 / 419.0	584.0 / 483.0
PFBS	375-73-5	Target	299.0 / 80.0	299.0 / 99.0
PFHxS	355-46-4	Target	399.0 / 80.0	399.0 / 99.0
PFOS	1763-23-1	Target	499.0 / 80.0	499.0 / 99.0
HFPO-DA	13252-13-6	Target	285.0 /169.0	285.0 /118.8
Adona	919005-14-4	Target	377.0 / 251.0	377.0 / 85.0
9Cl-PF3ONS	756426-58-1	Target	531.0 / 351.0	531.0 / 83.0
11Cl-PF3OUdS	763051-92-9	Target	631.0 / 451.0	631.0 / 83.0
$^{13}C_2$-***PFHxA***	NA	SIS	315.0 / 270.0	NA
$^{13}C_2$-***PFDA***	NA	SIS	515.0 / 470.0	NA
d_5-***EtFOSAA***	NA	SIS	589.0 / 419.0	NA
$^{13}C_3$-***HFPO-DA***	NA	SIS	287.0 / 169.0	NA
$^{13}C_2$-***PFOA***	NA	IS	415.0 / 270.0	NA
$^{13}C_4$-***PFOS***	NA	IS	503.0 / 80.0	NA
d_3-***MeFOSAA***	NA	IS	573.0 / 419.0	NA

Drinking Water Calibration to Sample Equivalents

ICAL (ng/L)	PIV (mL)	DF[1]	Sample Size (L)	Sample Equivalent (ng/L)[2]
250	1	1	0.250	1.0
625	1	1	0.250	2.5
1,250	1	1	0.250	5.0
2,500	1	1	0.250	10.0
5,000	1	1	0.250	20.0
10,000	1	1	0.250	40.0
25,000	1	1	0.250	100.0

[1] - base level dilution as part of the extraction procedure

[2] - calculated equivalent of a sample based on the ICAL concentration

Triple Quad 6500+
Preventive Maintenance Checklist

Preventive Maintenance Date:	12AUG2020

Request ID:	
Company Name:	Battelle
Instrument ID:	AE
Instrument Model:	Triple Quad 6500 Plus
Instrument Serial Number:	CF22921705

☑ **PASS** ☐ **FAIL**

Any failure will lead to an automatic Service Call being open to investigate fault.

Preventive Maintenance is performed twice every year unless specified in the Service Contract. It is designed to help maintain optimum system performance and to help diagnose any system deficiencies.

Engineer is required the assigned Request ID for this PM otherwise making this job invalid.

Comments:____

Performed By: C. LAFLAMME **Date:** 12AUG2020

Approved By : K. McInerney **Date:** 13AUG2020

PRE-PM PPG PERFORMANCE EVALUATION:

☑ Consult the customer concerning the system overall performance.
☑ Check Logbook for services performed recently if available.
☑ Check Vacuum Pressure.

CAD Settings	Vacuum Reading (10^{-5} Torr)	Acceptance Criteria
☑ CAD 0	0.6e-5	0.4 to 1.1 x 10^{-5} Torr
☑ CAD 12	3.4e-5	2.4 to 4.1 x 10^{-5} Torr

☑ Check for Front end contamination symptoms. Run Q1 POS PPG using PPG 2e-7M for a few minutes and check for any TIC signal degradation or huge sensitivity drop where the sensitivity result can't pass specification.

☐ No degradation or Sensitivity drop

☑ Check for Q3 contamination symptoms. Run Q3 POS PPG using PPG 2e-7M for a few minutes and check for any TIC signal degradation or huge sensitivity drop where the sensitivity result can't pass specification.

☑ No degradation or Sensitivity drop

PPG Performance Test

(Make printouts showing all the peaks, intensities, peak widths, and mass shift values.)

Positive Mode: Masses for the peaks of interest are: 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134,1952.427.

High Mass Test

☑ Perform High Mass Q1 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Specs		
Q1 500.380	5.22 E7	Read Only	0.6820	Read Only
Q1 616.464	2.17 E7	Read Only	0.6839	Read Only
Q1 906.673	1.13 E8	Read Only	0.6695	Read Only
Q1 1952.427	6.59 E6	Read Only	0.7717	Read Only

☑ Perform High Mass Q3 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Specs		
Q3 500.380	5.87 E7	Read Only	0.6380	Read Only
Q3 616.464	6.01 E7	Read Only	0.6289	Read Only
Q3 906.673	1.11 E8	Read Only	0.6631	Read Only
Q3 1952.427	9.34 E6	Read Only	0.6453	Read Only

Low Mass Test

☑ Perform Low Mass Q1 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Specs		
Q1 175.133	7.25 E6	Read Only	0.6879	Read Only
Q1 500.380	8.56 E7	Read Only	0.7542	Read Only
Q1 616.464	3.35 E7	Read Only	0.7116	Read Only
Q1 906.673	1.05 E8	Read Only	0.6893	Read Only

☑ Perform Low Mass Q3 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Specs		
Q3 175.133	1.85 E7	Read Only	0.7276	Read Only
Q3 500.380	8.66 E7	Read Only	0.7226	Read Only
Q3 616.464	9.91 E7	Read Only	0.7191	Read Only
Q3 906.673	1.54 E8	Read Only	0.6927	Read Only

Preventive Maintenance Procedure

☑ Check cooling fans in mass spec if working. Replace them soon, if defective.
☑ Clean bench cooling fans if applicable. Replace them soon, if defective.

☑ Record AC input voltage while MS is OFF: ___230___ (200 to 240 Vac).
Notify customer if input voltage is out of range.

☑ After venting, clean Interface region:
- ☑ Curtain Plate
- ☑ Orifice Plate atmosphere side
- ☑ Orifice Plate vacuum side
- ☑ Ion Drive QJet and IQ0.

☑ Check Q0 for signs of arcing and clean with cleaning solvent.
☑ Replace Roughing Pump Oil.

☐ Clean oil exhaust Filter.
Replace if necessary. ☑ N/A

☑ Adjust Multiplier Voltage if necessary.
☑ Clean or replace Air Filters.
☑ Clean the turbo pump filter screen if applicable.

☑ Check Orifice resistances.
Replace it soon if out of resistance specifications. ☐ N/A

☑ Replace Electrode if necessary in Ion Drive Turbo V source.

☑ Check Turbo heaters resistances and their physical conditions in Ion Drive Turbo V source.
Replace the defective heaters if necessary. ☐ N/A

☐ Check the APCI heater resistance. Verify Temperature reaches setpoint
Replace the heater if necessary. ☑ N/A

☑ Turn on the mass spec and rough pumps for pumping down.
☑ Verify Temperature reaches setpoint in both TIS and APCI modes if applicable.

POST- PM PPG PERFORMANCE TESTS:

☑ Set-up PPG standard for infusion.
☑ Check spray and adjust sprayer's position of the Ion Drive Turbo V source.
☑ Check Vacuum Pressure:

CAD Settings	Vacuum Reading (10^{-5} Torr)	Acceptance Criteria
☑ CAD 0	0.6e-5	0.4 to 1.1 x 10^{-5} Torr
☑ CAD 12	3.4e-5	2.4 to 4.1 x 10^{-5} Torr

☑ Check for Front end contamination symptoms. Run Q1 POS PPG using PPG 2e-7M for a few minutes and check for any TIC signal degradation or huge sensitivity drop where the sensitivity result can't pass specification.

☑ No degradation or Sensitivity drop

☑ Check for Q3 contamination symptoms. Run Q3 POS PPG using PPG 2e-7M for a few minutes and check for any TIC signal degradation or huge sensitivity drop where the sensitivity result can't pass specification.

☑ No degradation or Sensitivity drop

PPG Performance Test

(Mass calibrate to less than 0.1 amu. Make printouts showing all the peaks, intensities, peak widths, and mass shift values.)

Positive Mode: Masses for the peaks of interest are: 59.050, 175.133, 500.380, 616.464, 906.673, 1254.925, 1545.134,1952.427.

Negative Mode: Masses for the peaks of interest are: 44.998, 411.259, 585.385, 933.636, 1223.845, 1572.097, 1863.306, 1979.389.

High Mass Test

☑ Perform High Mass Q1 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Specs		
Q1 500.380	6.71 E7	≥ 3.2 e7	0.6153	0.6 to 0.8
Q1 616.464	3.42 E7	≥ 2.0 e7	0.6455	0.6 to 0.8
Q1 906.673	1.84 E8	≥ 9.6 e7	0.7677	0.6 to 0.8
Q1 1952.427	3.33 E7	≥ 2.4 e6	0.7357	0.6 to 0.8

☑ Perform High Mass Q3 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Specs		
Q3 500.380	1.06 E8	≥ 3.2 e7	0.6956	0.6 to 0.8
Q3 616.464	5.54 E7	≥ 2.0 e7	0.6891	0.6 to 0.8
Q3 906.673	1.90 E8	≥ 9.6 e7	0.7131	0.6 to 0.8
Q3 1952.427	2.01 E7	≥ 2.4 e6	0.6267	0.6 to 0.8

☑ Perform MSMS POS in Product Ion scan with 907 parent and record daughter 175.1 using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	MSMS Intensity		MSMS Width Value	Width Specs
	Value	Spec		
MS/MS 175.1	3.13 E6	Read Only	0.7237	Read Only

☑ Perform Q1 NEG using NEG PPG 3 x 10-5 M (10:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Specs		
Q1 933.636	1.93 E7	≥ 1.8 e7	0.7252	0.6 to 0.8
Q1 1863.306	6.15 E6	≥ 1.0 e6	0.6011	0.6 to 0.8

☑ Perform Q3 NEG using NEG PPG 3 x 10-5 M (10:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Specs		
Q3 933.636	2.00 E7	≥ 1.8 e7	0.8000	0.6 to 0.8
Q3 1863.306	5.27 E6	≥ 1.0 e6	0.7424	0.6 to 0.8

Low Mass Test

☑ Perform Low Mass Q1 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Specs		
Q1 175.133	9.03 E6	≥ 8.0 ^{e}6	0.6000	0.6 to 0.8
Q1 500.380	8.01 E7	≥ 3.68 ^{e}7	0.7050	0.6 to 0.8
Q1 616.464	3.76 E7	≥ 2.4 ^{e}7	0.6496	0.6 to 0.8
Q1 906.673	1.63 E8	≥ 1.0 ^{e}8	0.7296	0.6 to 0.8

☑ Perform Low Mass Q3 POS using POS PPG 2e-7M (500:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Specs		
Q3 175.133	2.40 E7	≥ 8.0 ^{e}6	0.7595	0.6 to 0.8
Q3 500.380	1.17 E8	≥ 3.68 ^{e}7	0.7521	0.6 to 0.8
Q3 616.464	6.32 E7	≥ 2.4 ^{e}7	0.7503	0.6 to 0.8
Q3 906.673	2.15 E8	≥ 1.0 ^{e}8	0.7131	0.6 to 0.8

☑ Perform Q1 NEG using NEG PPG 3 x 10-5 M (10:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q1 Intensity		Q1 Width Value	Width Specs
	Value	Spec		
Q1 933.636	2.46 E7	≥ 1.8 ^{e}7	0.7775	0.6 to 0.8

☑ Perform Q3 NEG using NEG PPG 3 x 10-5 M (10:1). Scan Rate 10 Da/s. Record 10 MCA.

Mass	Q3 Intensity		Q3 Width Value	Width Specs
	Value	Spec		
Q3 933.636	2.20 E7	≥ 1.8 ^{e}7	0.7705	0.6 to 0.8

☑ Perform MSMS NEG in Product Ion scan with 933.6 parent and record daughter 45.0 using NEG PPG 3 x 10-5 M (10:1) at the scan rate of 10 Da/s for 10 MCA.

Mass	MSMS Intensity		MSMS Width Value	Width Specs
	Value	Spec		
MS/MS 45.0	2.18 E6	Read Only	0.7123	Read Only

REVIEW:

☑ Attach all printouts to this checklist.
☑ If any parameter setting access modes were changed during the PM, ensure that they are returned to their normal access mode and that their offsets are adjusted to match optimized values from the post-PM acquisition files.
☐ Empty tuning cache folder, if necessary. ☑ N/A
☑ Fill and replaced PM Label.

END OF PREVENTIVE MAINTENANCE PROCEDURE

Document history:

04 OCT 2016: Appendix ZEFPM003-1S: New SOP Appendix.

Standards, Intermediate Solutions, and Purchased Solutions used in this SDG

Battelle Standard ID	Description	Intermediate Solutions			Battelle Reagent ID (purchased solutions)
LE06	PFAS - 537.1 Surrogate Solution	LD92	LB54	-	200521-08
LE06	PFAS - 537.1 Surrogate Solution	LD92	LB54	-	200521-09
LE06	PFAS - 537.1 Surrogate Solution	LD92	LB54	-	200521-10
LE06	PFAS - 537.1 Surrogate Solution	LD92	-	-	200921-01
LD34	PFAS - 537.1 Second Source LCS/MS Solution	-	-	-	191011-01
LE07	PFAS - 537.1 Internal Standard Solution	LD93	LB56	-	200521-12
LE07	PFAS - 537.1 Internal Standard Solution	LD93	-	-	200921-02
LE07	PFAS - 537.1 Internal Standard Solution	LD93	-	-	200921-03
LD94	PFAS - 537.1 ICAL L1	LD92	LB54	-	200521-08
LD94	PFAS - 537.1 ICAL L1	LD92	LB54	-	200521-09
LD94	PFAS - 537.1 ICAL L1	LD92	LB54	-	200521-10
LD94	PFAS - 537.1 ICAL L1	LD92	-	-	200921-01
LD94	PFAS - 537.1 ICAL L1	LD93	LB56	-	200521-12
LD94	PFAS - 537.1 ICAL L1	LD93	-	-	200921-02
LD94	PFAS - 537.1 ICAL L1	LD93	-	-	200921-03
LD94	PFAS - 537.1 ICAL L1	LE05	LE04	-	200508-03
LD95	PFAS - 537.1 ICAL L2	LD92	LB54	-	200521-08
LD95	PFAS - 537.1 ICAL L2	LD92	LB54	-	200521-09
LD95	PFAS - 537.1 ICAL L2	LD92	LB54	-	200521-10
LD95	PFAS - 537.1 ICAL L2	LD92	-	-	200921-01
LD95	PFAS - 537.1 ICAL L2	LD93	LB56	-	200521-12
LD95	PFAS - 537.1 ICAL L2	LD93	-	-	200921-02
LD95	PFAS - 537.1 ICAL L2	LD93	-	-	200921-03
LD95	PFAS - 537.1 ICAL L2	LE05	LE04	-	200508-03
LD96	PFAS - 537.1 ICAL L3	LD92	LB54	-	200521-08
LD96	PFAS - 537.1 ICAL L3	LD92	LB54	-	200521-09
LD96	PFAS - 537.1 ICAL L3	LD92	LB54	-	200521-10
LD96	PFAS - 537.1 ICAL L3	LD92	-	-	200921-01
LD96	PFAS - 537.1 ICAL L3	LD93	LB56	-	200521-12
LD96	PFAS - 537.1 ICAL L3	LD93	-	-	200921-02
LD96	PFAS - 537.1 ICAL L3	LD93	-	-	200921-03
LD96	PFAS - 537.1 ICAL L3	LE04	-	-	200508-03
LD97	PFAS - 537.1 ICAL L4	LD92	LB54	-	200521-08
LD97	PFAS - 537.1 ICAL L4	LD92	LB54	-	200521-09
LD97	PFAS - 537.1 ICAL L4	LD92	LB54	-	200521-10
LD97	PFAS - 537.1 ICAL L4	LD92	-	-	200921-01
LD97	PFAS - 537.1 ICAL L4	LD93	LB56	-	200521-12
LD97	PFAS - 537.1 ICAL L4	LD93	-	-	200921-02
LD97	PFAS - 537.1 ICAL L4	LD93	-	-	200921-03
LD97	PFAS - 537.1 ICAL L4	LE04	-	-	200508-03
LD98	PFAS - 537.1 ICAL L5	LD92	LB54	-	200521-08
LD98	PFAS - 537.1 ICAL L5	LD92	LB54	-	200521-09
LD98	PFAS - 537.1 ICAL L5	LD92	LB54	-	200521-10
LD98	PFAS - 537.1 ICAL L5	LD92	-	-	200921-01
LD98	PFAS - 537.1 ICAL L5	LD93	LB56	-	200521-12
LD98	PFAS - 537.1 ICAL L5	LD93	-	-	200921-02
LD98	PFAS - 537.1 ICAL L5	LD93	-	-	200921-03
LD98	PFAS - 537.1 ICAL L5	LE04	-	-	200508-03
LD99	PFAS - 537.1 ICAL L6	LD92	LB54	-	200521-08

Standards, Intermediate Solutions, and Purchased Solutions used in this SDG

Battelle Standard ID	Description	Intermediate Solutions			Battelle Reagent ID (purchased solutions)
LD99	PFAS - 537.1 ICAL L6	LD92	LB54	-	200521-09
LD99	PFAS - 537.1 ICAL L6	LD92	LB54	-	200521-10
LD99	PFAS - 537.1 ICAL L6	LD92	-	-	200921-01
LD99	PFAS - 537.1 ICAL L6	LD93	LB56	-	200521-12
LD99	PFAS - 537.1 ICAL L6	LD93	-	-	200921-02
LD99	PFAS - 537.1 ICAL L6	LD93	-	-	200921-03
LD99	PFAS - 537.1 ICAL L6	LE04	-	-	200508-03
LE01	PFAS - 537.1 ICAL L7	LD92	LB54	-	200521-08
LE01	PFAS - 537.1 ICAL L7	LD92	LB54	-	200521-09
LE01	PFAS - 537.1 ICAL L7	LD92	LB54	-	200521-10
LE01	PFAS - 537.1 ICAL L7	LD92	-	-	200921-01
LE01	PFAS - 537.1 ICAL L7	LD93	LB56	-	200521-12
LE01	PFAS - 537.1 ICAL L7	LD93	-	-	200921-02
LE01	PFAS - 537.1 ICAL L7	LD93	-	-	200921-03
LE01	PFAS - 537.1 ICAL L7	LE04	-	-	200508-03
LE03	PFAS - 537.1 ICC	LD34	-	-	191011-01
LE03	PFAS - 537.1 ICC	LD92	LB54	-	200521-08
LE03	PFAS - 537.1 ICC	LD92	LB54	-	200521-09
LE03	PFAS - 537.1 ICC	LD92	LB54	-	200521-10
LE03	PFAS - 537.1 ICC	LD92	-	-	200921-01
LE03	PFAS - 537.1 ICC	LD93	LB56	-	200521-12
LE03	PFAS - 537.1 ICC	LD93	-	-	200921-02
LE03	PFAS - 537.1 ICC	LD93	-	-	200921-03

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LB54**

Description: PFAS - 537.1 SIS Stock 1

Stock Id: 200521-08

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	1000	50.00	1	100.000	1	10	5.00000

Stock Id: 200521-09

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFHxA	1000	50.00	1	100.000	1	10	5.00000

Stock Id: 200521-10

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C3-HFPO-DA	1000	50.00	1	100.000	1	10	5.00000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFDA	5.00000
13C2-PFHxA	5.00000
13C3-HFPO-DA	5.00000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
200521-08	Pipette	B820865811
200521-09	Pipette	B820865811
200521-10	Pipette	B820865811

Solution Prepared By: Schultz, Stephanie **Date Prepared:** 7/20/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q water (RP-200720-6)

Approved By: Schumitz, Denise **Date:** 7/21/2020 9:06:00 AM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LB56**

Description: PFAS - 537.1 RIS Stock 1

Stock Id: 200521-12

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	1000	50.00	1	100.000	1	10	5.00000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFOA	5.00000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
200521-12	Pipette	B820865811

Solution Prepared By: Schultz, Stephanie	**Date Prepared:** 7/20/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q water (RP-200720-6)

Approved By: Schumitz, Denise **Date:** 7/21/2020 9:06:00 AM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD34**

Description: PFAS - 537.1 Second Source LCS/MS Solution

Stock Id: 191011-01

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	1000	1.88	1	100.000	1	20	0.09400
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	1000	1.86	1	100.000	1	20	0.09300
Adona	1000	1.89	1	100.000	1	20	0.09450
Hexafluoropropylene oxide dimer acid	1000	2.00	1	100.000	1	20	0.10000
N-ethylperfluoro-octanesulfonamidoacetic acid	1000	2.00	1	100.000	1	20	0.10000
N-methylperfluoro-1-octanesulfonamidoacetic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-1-butanesulfonate	1000	1.77	1	100.000	1	20	0.08850
Perfluoro-1-hexanesulfonate	1000	1.89	1	100.000	1	20	0.09450
Perfluoro-1-octanesulfonate	1000	1.91	1	100.000	1	20	0.09550
Perfluoro-n-decanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-dodecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-heptanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-hexanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-octanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluorononanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-tetradecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-tridecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-undecanoic acid	1000	2.00	1	100.000	1	20	0.10000

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.09400
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.09300
Adona	.09450
Hexafluoropropylene oxide dimer acid	.10000
N-ethylperfluoro-octanesulfonamidoacetic acid	.10000
N-methylperfluoro-1-octanesulfonamidoacetic acid	.10000
Perfluoro-1-butanesulfonate	.08850
Perfluoro-1-hexanesulfonate	.09450
Perfluoro-1-octanesulfonate	.09550
Perfluoro-n-decanoic Acid	.10000
Perfluoro-n-dodecanoic acid	.10000
Perfluoro-n-heptanoic Acid	.10000
Perfluoro-n-hexanoic acid	.10000
Perfluoro-n-octanoic Acid	.10000
Perfluorononanoic Acid	.10000

Solution Prepared By: Bailey, Kevin **Date Prepared:** 9/28/2020 **Expiration Date:** 9/28/2021

Solution Volume 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q water (RP-200928-4)

Approved By: Thorn, Jonathan **Date:** 9/28/2020 1:59:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD34**

Description: PFAS - 537.1 Second Source LCS/MS Solution

Perfluoro-n-tetradecanoic acid	.10000
Perfluoro-n-tridecanoic acid	.10000
Perfluoro-n-undecanoic acid	.10000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
191011-01	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 9/28/2020	**Expiration Date:** 9/28/2021	
Solution Volume 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q water (RP-200928-4)

Approved By: Thorn, Jonathan **Date:** 9/28/2020 1:59:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD92**

Description: PFAS - 537.1 SIS Stock 2

Stock Id: 200921-01

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
d5-EtFOSAA	800	50.00	1	100.000	1	10	4.00000

Stock Id: LB54

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	2000	5.00	---	---	1	10	1.00000
13C2-PFHxA	2000	5.00	---	---	1	10	1.00000
13C3-HFPO-DA	2000	5.00	---	---	1	10	1.00000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFDA	1.00000
13C2-PFHxA	1.00000
13C3-HFPO-DA	1.00000
d5-EtFOSAA	4.00000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
200921-01	Pipette	B820865811
LB54	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:**	VOC Laboratory: Refrigerator - R0121	

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD93**

Description: PFAS - 537.1 RIS Stock 2

Stock Id: 200921-02

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C4-PFOS	600	47.90	1	100.000	1	10	2.87400

Stock Id: 200921-03

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
d3-MeFOSAA	800	50.00	1	100.000	1	10	4.00000

Stock Id: LB56

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	2000	5.00	---	---	1	10	1.00000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFOA	1.00000
13C4-PFOS	2.87400
d3-MeFOSAA	4.00000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
200921-02	Pipette	B820865811
200921-03	Pipette	B820865811
LB56	Pipette	B820865811

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD94**

Description: PFAS - 537.1 ICAL L1

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LE05

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	250	0.01	---	---	1	10	0.00024
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	250	0.01	---	---	1	10	0.00023
Adona	250	0.01	---	---	1	10	0.00024
Hexafluoropropylene oxide dimer acid	250	0.01	---	---	1	10	0.00025
N-ethylperfluoro-octanesulfonamidoacetic acid	250	0.01	---	---	1	10	0.00025
N-methylperfluoro-1-octanesulfonamidoacetic acid	250	0.01	---	---	1	10	0.00025
Perfluoro-1-butanesulfonate	250	0.01	---	---	1	10	0.00022
Perfluoro-1-hexanesulfonate	250	0.01	---	---	1	10	0.00023
Perfluoro-1-octanesulfonate	250	0.01	---	---	1	10	0.00023
Perfluoro-n-decanoic Acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-dodecanoic acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-heptanoic Acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-hexanoic acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-octanoic Acid	250	0.01	---	---	1	10	0.00025
Perfluorononanoic Acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-tetradecanoic acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-tridecanoic acid	250	0.01	---	---	1	10	0.00025
Perfluoro-n-undecanoic acid	250	0.01	---	---	1	10	0.00025

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00024

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD94**

Description: PFAS - 537.1 ICAL L1

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00023
Adona	.00024
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00025
N-ethylperfluoro-octanesulfonamidoacetic acid	.00025
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00025
Perfluoro-1-butanesulfonate	.00022
Perfluoro-1-hexanesulfonate	.00023
Perfluoro-1-octanesulfonate	.00023
Perfluoro-n-decanoic Acid	.00025
Perfluoro-n-dodecanoic acid	.00025
Perfluoro-n-heptanoic Acid	.00025
Perfluoro-n-hexanoic acid	.00025
Perfluoro-n-octanoic Acid	.00025
Perfluorononanoic Acid	.00025
Perfluoro-n-tetradecanoic acid	.00025
Perfluoro-n-tridecanoic acid	.00025
Perfluoro-n-undecanoic acid	.00025

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B814659662
LD93	Pipette	B814659662
LE05	Pipette	B909301860

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD95**

Description: PFAS - 537.1 ICAL L2

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LE05

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	625	0.01	---	---	1	10	0.00059
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	625	0.01	---	---	1	10	0.00058
Adona	625	0.01	---	---	1	10	0.00059
Hexafluoropropylene oxide dimer acid	625	0.01	---	---	1	10	0.00063
N-ethylperfluoro-octanesulfonamidoacetic acid	625	0.01	---	---	1	10	0.00063
N-methylperfluoro-1-octanesulfonamidoacetic acid	625	0.01	---	---	1	10	0.00063
Perfluoro-1-butanesulfonate	625	0.01	---	---	1	10	0.00055
Perfluoro-1-hexanesulfonate	625	0.01	---	---	1	10	0.00057
Perfluoro-1-octanesulfonate	625	0.01	---	---	1	10	0.00058
Perfluoro-n-decanoic Acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-dodecanoic acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-heptanoic Acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-hexanoic acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-octanoic Acid	625	0.01	---	---	1	10	0.00063
Perfluorononanoic Acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-tetradecanoic acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-tridecanoic acid	625	0.01	---	---	1	10	0.00063
Perfluoro-n-undecanoic acid	625	0.01	---	---	1	10	0.00063

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00059

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD95**

Description: PFAS - 537.1 ICAL L2

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00058
Adona	.00059
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00063
N-ethylperfluoro-octanesulfonamidoacetic acid	.00063
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00063
Perfluoro-1-butanesulfonate	.00055
Perfluoro-1-hexanesulfonate	.00057
Perfluoro-1-octanesulfonate	.00058
Perfluoro-n-decanoic Acid	.00063
Perfluoro-n-dodecanoic acid	.00063
Perfluoro-n-heptanoic Acid	.00063
Perfluoro-n-hexanoic acid	.00063
Perfluoro-n-octanoic Acid	.00063
Perfluorononanoic Acid	.00063
Perfluoro-n-tetradecanoic acid	.00063
Perfluoro-n-tridecanoic acid	.00063
Perfluoro-n-undecanoic acid	.00063

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B814659662
LD93	Pipette	B814659662
LE05	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD96**

Description: PFAS - 537.1 ICAL L3

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	125	0.09	---	---	1	10	0.00118
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	125	0.09	---	---	1	10	0.00116
Adona	125	0.09	---	---	1	10	0.00118
Hexafluoropropylene oxide dimer acid	125	0.10	---	---	1	10	0.00125
N-ethylperfluoro-octanesulfonamidoacetic acid	125	0.10	---	---	1	10	0.00125
N-methylperfluoro-1-octanesulfonamidoacetic acid	125	0.10	---	---	1	10	0.00125
Perfluoro-1-butanesulfonate	125	0.09	---	---	1	10	0.00111
Perfluoro-1-hexanesulfonate	125	0.09	---	---	1	10	0.00114
Perfluoro-1-octanesulfonate	125	0.09	---	---	1	10	0.00116
Perfluoro-n-decanoic Acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-dodecanoic acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-heptanoic Acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-hexanoic acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-octanoic Acid	125	0.10	---	---	1	10	0.00125
Perfluorononanoic Acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-tetradecanoic acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-tridecanoic acid	125	0.10	---	---	1	10	0.00125
Perfluoro-n-undecanoic acid	125	0.10	---	---	1	10	0.00125

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00118

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD96**

Description: PFAS - 537.1 ICAL L3

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00116
Adona	.00118
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00125
N-ethylperfluoro-octanesulfonamidoacetic acid	.00125
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00125
Perfluoro-1-butanesulfonate	.00111
Perfluoro-1-hexanesulfonate	.00114
Perfluoro-1-octanesulfonate	.00116
Perfluoro-n-decanoic Acid	.00125
Perfluoro-n-dodecanoic acid	.00125
Perfluoro-n-heptanoic Acid	.00125
Perfluoro-n-hexanoic acid	.00125
Perfluoro-n-octanoic Acid	.00125
Perfluorononanoic Acid	.00125
Perfluoro-n-tetradecanoic acid	.00125
Perfluoro-n-tridecanoic acid	.00125
Perfluoro-n-undecanoic acid	.00125

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B814659662
LD93	Pipette	B814659662
LE04	Pipette	B909301860

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: LD97

Description: PFAS - 537.1 ICAL L4

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	200	1.00	---	---	1	20	0.01000
13C2-PFHxA	200	1.00	---	---	1	20	0.01000
13C3-HFPO-DA	200	1.00	---	---	1	20	0.01000
d5-EtFOSAA	200	4.00	---	---	1	20	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	200	1.00	---	---	1	20	0.01000
13C4-PFOS	200	2.87	---	---	1	20	0.02874
d3-MeFOSAA	200	4.00	---	---	1	20	0.04000

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	500	0.09	---	---	1	20	0.00235
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	500	0.09	---	---	1	20	0.00232
Adona	500	0.09	---	---	1	20	0.00236
Hexafluoropropylene oxide dimer acid	500	0.10	---	---	1	20	0.00250
N-ethylperfluoro-octanesulfonamidoacetic acid	500	0.10	---	---	1	20	0.00250
N-methylperfluoro-1-octanesulfonamidoacetic acid	500	0.10	---	---	1	20	0.00250
Perfluoro-1-butanesulfonate	500	0.09	---	---	1	20	0.00221
Perfluoro-1-hexanesulfonate	500	0.09	---	---	1	20	0.00228
Perfluoro-1-octanesulfonate	500	0.09	---	---	1	20	0.00231
Perfluoro-n-decanoic Acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-dodecanoic acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-heptanoic Acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-hexanoic acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-octanoic Acid	500	0.10	---	---	1	20	0.00250
Perfluorononanoic Acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-tetradecanoic acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-tridecanoic acid	500	0.10	---	---	1	20	0.00250
Perfluoro-n-undecanoic acid	500	0.10	---	---	1	20	0.00250

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00235

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD97**

Description: PFAS - 537.1 ICAL L4

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00232
Adona	.00236
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00250
N-ethylperfluoro-octanesulfonamidoacetic acid	.00250
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00250
Perfluoro-1-butanesulfonate	.00221
Perfluoro-1-hexanesulfonate	.00228
Perfluoro-1-octanesulfonate	.00231
Perfluoro-n-decanoic Acid	.00250
Perfluoro-n-dodecanoic acid	.00250
Perfluoro-n-heptanoic Acid	.00250
Perfluoro-n-hexanoic acid	.00250
Perfluoro-n-octanoic Acid	.00250
Perfluorononanoic Acid	.00250
Perfluoro-n-tetradecanoic acid	.00250
Perfluoro-n-tridecanoic acid	.00250
Perfluoro-n-undecanoic acid	.00250

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B909301860
LD93	Pipette	B909301860
LE04	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD98**

Description: PFAS - 537.1 ICAL L5

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	200	1.00	---	---	1	20	0.01000
13C2-PFHxA	200	1.00	---	---	1	20	0.01000
13C3-HFPO-DA	200	1.00	---	---	1	20	0.01000
d5-EtFOSAA	200	4.00	---	---	1	20	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	200	1.00	---	---	1	20	0.01000
13C4-PFOS	200	2.87	---	---	1	20	0.02874
d3-MeFOSAA	200	4.00	---	---	1	20	0.04000

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	1000	0.09	---	---	1	20	0.00470
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	1000	0.09	---	---	1	20	0.00465
Adona	1000	0.09	---	---	1	20	0.00473
Hexafluoropropylene oxide dimer acid	1000	0.10	---	---	1	20	0.00500
N-ethylperfluoro-octanesulfonamidoacetic acid	1000	0.10	---	---	1	20	0.00500
N-methylperfluoro-1-octanesulfonamidoacetic acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-1-butanesulfonate	1000	0.09	---	---	1	20	0.00443
Perfluoro-1-hexanesulfonate	1000	0.09	---	---	1	20	0.00456
Perfluoro-1-octanesulfonate	1000	0.09	---	---	1	20	0.00463
Perfluoro-n-decanoic Acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-dodecanoic acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-heptanoic Acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-hexanoic acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-octanoic Acid	1000	0.10	---	---	1	20	0.00500
Perfluorononanoic Acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-tetradecanoic acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-tridecanoic acid	1000	0.10	---	---	1	20	0.00500
Perfluoro-n-undecanoic acid	1000	0.10	---	---	1	20	0.00500

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00470

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD98**

Description: PFAS - 537.1 ICAL L5

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00465
Adona	.00473
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00500
N-ethylperfluoro-octanesulfonamidoacetic acid	.00500
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00500
Perfluoro-1-butanesulfonate	.00443
Perfluoro-1-hexanesulfonate	.00456
Perfluoro-1-octanesulfonate	.00463
Perfluoro-n-decanoic Acid	.00500
Perfluoro-n-dodecanoic acid	.00500
Perfluoro-n-heptanoic Acid	.00500
Perfluoro-n-hexanoic acid	.00500
Perfluoro-n-octanoic Acid	.00500
Perfluorononanoic Acid	.00500
Perfluoro-n-tetradecanoic acid	.00500
Perfluoro-n-tridecanoic acid	.00500
Perfluoro-n-undecanoic acid	.00500

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B909301860
LD93	Pipette	B909301860
LE04	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:** 7/20/2021	
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:40:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: LD99

Description: PFAS - 537.1 ICAL L6

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	1000	0.09	---	---	1	10	0.00940
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	1000	0.09	---	---	1	10	0.00930
Adona	1000	0.09	---	---	1	10	0.00945
Hexafluoropropylene oxide dimer acid	1000	0.10	---	---	1	10	0.01000
N-ethylperfluoro-octanesulfonamidoacetic acid	1000	0.10	---	---	1	10	0.01000
N-methylperfluoro-1-octanesulfonamidoacetic acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-1-butanesulfonate	1000	0.09	---	---	1	10	0.00885
Perfluoro-1-hexanesulfonate	1000	0.09	---	---	1	10	0.00912
Perfluoro-1-octanesulfonate	1000	0.09	---	---	1	10	0.00925
Perfluoro-n-decanoic Acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-dodecanoic acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-heptanoic Acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-hexanoic acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-octanoic Acid	1000	0.10	---	---	1	10	0.01000
Perfluorononanoic Acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-tetradecanoic acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-tridecanoic acid	1000	0.10	---	---	1	10	0.01000
Perfluoro-n-undecanoic acid	1000	0.10	---	---	1	10	0.01000

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00940

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LD99**

Description: PFAS - 537.1 ICAL L6

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00930
Adona	.00945
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.01000
N-ethylperfluoro-octanesulfonamidoacetic acid	.01000
N-methylperfluoro-1-octanesulfonamidoacetic acid	.01000
Perfluoro-1-butanesulfonate	.00885
Perfluoro-1-hexanesulfonate	.00912
Perfluoro-1-octanesulfonate	.00925
Perfluoro-n-decanoic Acid	.01000
Perfluoro-n-dodecanoic acid	.01000
Perfluoro-n-heptanoic Acid	.01000
Perfluoro-n-hexanoic acid	.01000
Perfluoro-n-octanoic Acid	.01000
Perfluorononanoic Acid	.01000
Perfluoro-n-tetradecanoic acid	.01000
Perfluoro-n-tridecanoic acid	.01000
Perfluoro-n-undecanoic acid	.01000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B909301860
LD93	Pipette	B909301860
LE04	Pipette	B820865811

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE01**

Description: PFAS - 537.1 ICAL L7

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	2500	0.09	---	---	1	10	0.02350
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	2500	0.09	---	---	1	10	0.02325
Adona	2500	0.09	---	---	1	10	0.02363
Hexafluoropropylene oxide dimer acid	2500	0.10	---	---	1	10	0.02500
N-ethylperfluoro-octanesulfonamidoacetic acid	2500	0.10	---	---	1	10	0.02500
N-methylperfluoro-1-octanesulfonamidoacetic acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-1-butanesulfonate	2500	0.09	---	---	1	10	0.02213
Perfluoro-1-hexanesulfonate	2500	0.09	---	---	1	10	0.02280
Perfluoro-1-octanesulfonate	2500	0.09	---	---	1	10	0.02314
Perfluoro-n-decanoic Acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-dodecanoic acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-heptanoic Acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-hexanoic acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-octanoic Acid	2500	0.10	---	---	1	10	0.02500
Perfluorononanoic Acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-tetradecanoic acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-tridecanoic acid	2500	0.10	---	---	1	10	0.02500
Perfluoro-n-undecanoic acid	2500	0.10	---	---	1	10	0.02500

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.02350

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:** 7/20/2021	
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE01**

Description: PFAS - 537.1 ICAL L7

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.02325
Adona	.02363
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.02500
N-ethylperfluoro-octanesulfonamidoacetic acid	.02500
N-methylperfluoro-1-octanesulfonamidoacetic acid	.02500
Perfluoro-1-butanesulfonate	.02213
Perfluoro-1-hexanesulfonate	.02280
Perfluoro-1-octanesulfonate	.02314
Perfluoro-n-decanoic Acid	.02500
Perfluoro-n-dodecanoic acid	.02500
Perfluoro-n-heptanoic Acid	.02500
Perfluoro-n-hexanoic acid	.02500
Perfluoro-n-octanoic Acid	.02500
Perfluorononanoic Acid	.02500
Perfluoro-n-tetradecanoic acid	.02500
Perfluoro-n-tridecanoic acid	.02500
Perfluoro-n-undecanoic acid	.02500

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B909301860
LD93	Pipette	B909301860
LE04	Pipette	B820865811

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: LE03

Description: PFAS - 537.1 ICC

Stock Id: LD34

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	250	0.09	---	---	1	10	0.00235
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	250	0.09	---	---	1	10	0.00232
Adona	250	0.09	---	---	1	10	0.00236
Hexafluoropropylene oxide dimer acid	250	0.10	---	---	1	10	0.00250
N-ethylperfluoro-octanesulfonamidoacetic acid	250	0.10	---	---	1	10	0.00250
N-methylperfluoro-1-octanesulfonamidoacetic acid	250	0.10	---	---	1	10	0.00250
Perfluoro-1-butanesulfonate	250	0.09	---	---	1	10	0.00221
Perfluoro-1-hexanesulfonate	250	0.09	---	---	1	10	0.00236
Perfluoro-1-octanesulfonate	250	0.10	---	---	1	10	0.00239
Perfluoro-n-decanoic Acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-dodecanoic acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-heptanoic Acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-hexanoic acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-octanoic Acid	250	0.10	---	---	1	10	0.00250
Perfluorononanoic Acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-tetradecanoic acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-tridecanoic acid	250	0.10	---	---	1	10	0.00250
Perfluoro-n-undecanoic acid	250	0.10	---	---	1	10	0.00250

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	100	1.00	---	---	1	10	0.01000
13C2-PFHxA	100	1.00	---	---	1	10	0.01000
13C3-HFPO-DA	100	1.00	---	---	1	10	0.01000
d5-EtFOSAA	100	4.00	---	---	1	10	0.04000

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	100	1.00	---	---	1	10	0.01000
13C4-PFOS	100	2.87	---	---	1	10	0.02874
d3-MeFOSAA	100	4.00	---	---	1	10	0.04000

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00235

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE03**

Description: PFAS - 537.1 ICC

13C2-PFDA	.01000
13C2-PFHxA	.01000
13C2-PFOA	.01000
13C3-HFPO-DA	.01000
13C4-PFOS	.02874
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00232
Adona	.00236
d3-MeFOSAA	.04000
d5-EtFOSAA	.04000
Hexafluoropropylene oxide dimer acid	.00250
N-ethylperfluoro-octanesulfonamidoacetic acid	.00250
N-methylperfluoro-1-octanesulfonamidoacetic acid	.00250
Perfluoro-1-butanesulfonate	.00221
Perfluoro-1-hexanesulfonate	.00236
Perfluoro-1-octanesulfonate	.00239
Perfluoro-n-decanoic Acid	.00250
Perfluoro-n-dodecanoic acid	.00250
Perfluoro-n-heptanoic Acid	.00250
Perfluoro-n-hexanoic acid	.00250
Perfluoro-n-octanoic Acid	.00250
Perfluorononanoic Acid	.00250
Perfluoro-n-tetradecanoic acid	.00250
Perfluoro-n-tridecanoic acid	.00250
Perfluoro-n-undecanoic acid	.00250

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD34	Pipette	B909301860
LD92	Pipette	B909301860
LD93	Pipette	B909301860

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 7/20/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: LE04

Description: PFAS - 537.1 High ICAL Stock

Stock Id: 200508-03

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	1000	1.88	1	100.000	1	20	0.09400
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	1000	1.86	1	100.000	1	20	0.09300
Adona	1000	1.89	1	100.000	1	20	0.09450
Hexafluoropropylene oxide dimer acid	1000	2.00	1	100.000	1	20	0.10000
N-ethylperfluoro-octanesulfonamidoacetic acid	1000	2.00	1	100.000	1	20	0.10000
N-methylperfluoro-1-octanesulfonamidoacetic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-1-butanesulfonate	1000	1.77	1	100.000	1	20	0.08850
Perfluoro-1-hexanesulfonate	1000	1.82	1	100.000	1	20	0.09120
Perfluoro-1-octanesulfonate	1000	1.85	1	100.000	1	20	0.09255
Perfluoro-n-decanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-dodecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-heptanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-hexanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-octanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluorononanoic Acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-tetradecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-tridecanoic acid	1000	2.00	1	100.000	1	20	0.10000
Perfluoro-n-undecanoic acid	1000	2.00	1	100.000	1	20	0.10000

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.09400
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.09300
Adona	.09450
Hexafluoropropylene oxide dimer acid	.10000
N-ethylperfluoro-octanesulfonamidoacetic acid	.10000
N-methylperfluoro-1-octanesulfonamidoacetic acid	.10000
Perfluoro-1-butanesulfonate	.08850
Perfluoro-1-hexanesulfonate	.09120
Perfluoro-1-octanesulfonate	.09255
Perfluoro-n-decanoic Acid	.10000
Perfluoro-n-dodecanoic acid	.10000
Perfluoro-n-heptanoic Acid	.10000
Perfluoro-n-hexanoic acid	.10000
Perfluoro-n-octanoic Acid	.10000
Perfluorononanoic Acid	.10000

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:** 10/28/2021	
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:49:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE04**

Description: PFAS - 537.1 High ICAL Stock

Perfluoro-n-tetradecanoic acid	.10000
Perfluoro-n-tridecanoic acid	.10000
Perfluoro-n-undecanoic acid	.10000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
200508-03	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:** 10/28/2021	
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:49:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: LE05

Description: PFAS - 537.1 Low ICAL Stock

Stock Id: LE04

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic aci	500	0.09	---	---	1	5	0.00940
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic aci	500	0.09	---	---	1	5	0.00930
Adona	500	0.09	---	---	1	5	0.00945
Hexafluoropropylene oxide dimer acid	500	0.10	---	---	1	5	0.01000
N-ethylperfluoro-octanesulfonamidoacetic acid	500	0.10	---	---	1	5	0.01000
N-methylperfluoro-1-octanesulfonamidoacetic acid	500	0.10	---	---	1	5	0.01000
Perfluoro-1-butanesulfonate	500	0.09	---	---	1	5	0.00885
Perfluoro-1-hexanesulfonate	500	0.09	---	---	1	5	0.00912
Perfluoro-1-octanesulfonate	500	0.09	---	---	1	5	0.00925
Perfluoro-n-decanoic Acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-dodecanoic acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-heptanoic Acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-hexanoic acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-octanoic Acid	500	0.10	---	---	1	5	0.01000
Perfluorononanoic Acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-tetradecanoic acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-tridecanoic acid	500	0.10	---	---	1	5	0.01000
Perfluoro-n-undecanoic acid	500	0.10	---	---	1	5	0.01000

Final Concentrations:

Analyte:	Conc (ug/mL):
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	.00940
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	.00930
Adona	.00945
Hexafluoropropylene oxide dimer acid	.01000
N-ethylperfluoro-octanesulfonamidoacetic acid	.01000
N-methylperfluoro-1-octanesulfonamidoacetic acid	.01000
Perfluoro-1-butanesulfonate	.00885
Perfluoro-1-hexanesulfonate	.00912
Perfluoro-1-octanesulfonate	.00925
Perfluoro-n-decanoic Acid	.01000
Perfluoro-n-dodecanoic acid	.01000
Perfluoro-n-heptanoic Acid	.01000
Perfluoro-n-hexanoic acid	.01000
Perfluoro-n-octanoic Acid	.01000
Perfluorononanoic Acid	.01000

Solution Prepared By: Bailey, Kevin **Date Prepared:** 10/28/2020 **Expiration Date:** 10/28/2021

Solution Volume : 40 **mL X** 1 **Vials** **Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE

It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE05**

Description: PFAS - 537.1 Low ICAL Stock

Perfluoro-n-tetradecanoic acid	.01000
Perfluoro-n-tridecanoic acid	.01000
Perfluoro-n-undecanoic acid	.01000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LE04	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	10/28/2021
Solution Volume : 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Schumitz, Denise **Date:** 11/6/2020 3:41:00 PM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE06**

Description: PFAS - 537.1 Surrogate Solution

Stock Id: LD92

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFDA	8000	1.00	---	---	1	20	0.40000
13C2-PFHxA	8000	1.00	---	---	1	20	0.40000
13C3-HFPO-DA	8000	1.00	---	---	1	20	0.40000
d5-EtFOSAA	8000	4.00	---	---	1	20	1.60000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFDA	.40000
13C2-PFHxA	.40000
13C3-HFPO-DA	.40000
d5-EtFOSAA	1.60000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD92	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:**	7/20/2021
Solution Volume 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Thorn, Jonathan **Date:** 11/2/2020 9:23:00 AM

BATTELLE
It can be done

Standard Solution Concentrations

Approved: ☑

Standard Laboratory ID Number: **LE07**

Description: PFAS - 537.1 Internal Standard Solution

Stock Id: LD93

Chemical Name	Stock Amount uL	Initial Conc. (ug/mL)	Density (g/mL)	Purity	Conv. Factor	Final Vol mL	Concentration (ug/mL)
13C2-PFOA	8000	1.00	---	---	1	20	0.40000
13C4-PFOS	8000	2.87	---	---	1	20	1.14960
d3-MeFOSAA	8000	4.00	---	---	1	20	1.60000

Final Concentrations:

Analyte:	Conc (ug/mL):
13C2-PFOA	.40000
13C4-PFOS	1.14960
d3-MeFOSAA	1.60000

Syringes/Pipettes:

Stock ID:	Type:	Battelle ID:
LD93	Pipette	B820865811

Solution Prepared By: Bailey, Kevin	**Date Prepared:** 10/28/2020	**Expiration Date:** 7/20/2021	
Solution Volume 40 **mL X** 1 **Vials**	**Refrigerator/Freezer No:** VOC Laboratory: Refrigerator - R0121		

Comment: 96/4 methanol/milli-q (RP-201028-14)

Approved By: Thorn, Jonathan **Date:** 11/2/2020 9:23:00 AM

BATTELLE

It can be done

BDO Id: 191011-01

Reagent Receipt Report

Approved: ☐ Authorized: ☐

Name:	EPA-537PDSL-R1	Received:	10/11/2019
Vendor:	Wellington Laboratories	Custodian:	Schumitz, Matt
Catalogue No:	EPA-537PDSL-R1	Expires:	2/14/2022
Type:	Solution	Consumed:	
Lot No:	537PDSLR10119	Stored In:	VOC Laboratory - R0121
Quantity:	5 ea ml	% Moisture:	
Description:	EPA-537PDSL-R1		

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
11-chloroeicosafluoro-3-oxaundecan	763051-92-9	1.8800	100.00	--	--	☐			
9-chlorohexadecafluoro-3-oxanonane	756426-58-1	1.8600	100.00	--	--	☐			
Adona	919005-14-4	1.8900	100.00	--	--	☐			
Hexafluoropropylene oxide dimer aci	13252-13-6	2.0000	100.00	--	--	☐			
N-ethylperfluoro-octanesulfonamidoa	2991-50-6	2.0000	100.00	--	--	☐			
N-methylperfluoro-1-octanesulfonami	2355-31-9	2.0000	100.00	--	--	☐			
Perfluoro-1-butanesulfonate	375-73-5	1.7700	100.00	--	--	☐			
Perfluoro-1-hexanesulfonate	355-46-4	1.8900	100.00	--	--	☐			
Perfluoro-1-octanesulfonate	1763-23-1	1.9100	100.00	--	--	☐			
Perfluoro-n-decanoic Acid	335-76-2	2.0000	100.00	--	--	☐			
Perfluoro-n-dodecanoic acid	307-55-1	2.0000	100.00	--	--	☐			
Perfluoro-n-heptanoic Acid	375-85-9	2.0000	100.00	--	--	☐			
Perfluoro-n-hexanoic acid	307-24-4	2.0000	100.00	--	--	☐			
Perfluoro-n-octanoic Acid	335-67-1	2.0000	100.00	--	--	☐			
Perfluorononanoic Acid	375-95-1	2.0000	100.00	--	--	☐			
Perfluoro-n-tetradecanoic acid	376-06-7	2.0000	100.00	--	--	☐			
Perfluoro-n-tridecanoic acid	72629-94-8	2.0000	100.00	--	--	☐			
Perfluoro-n-undecanoic acid	2058-94-8	2.0000	100.00	--	--	☐			

Total Analytes: 18

Notes:

Approved by:		Approved on:	
Authorized by:		Authorized on:	

191011-01

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

EPA-537PDSL-R1

Native PFAS Linear Primary Dilution Standard Solution/Mixture

PRODUCT CODE:	EPA-537PDSL-R1
LOT NUMBER:	537PDSLR10119
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/30/2019
LAST TESTED: (mm/dd/yyyy)	02/14/2019
EXPIRY DATE: (mm/dd/yyyy)	02/14/2022
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

EPA-537PDSL-R1 is a solution/mixture of native linear perfluoroalkylcarboxylic acids (PFCAs; C_6-C_{14}), native linear perfluoroalkylsulfonates (PFSAs; C_4, C_6, and C_8), native linear N-substituted perfluorooctanesulfonamidoacetic acids (N-MeFOSAA and N-EtFOSAA), GenX (HFPO-DA), the main components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and the sodium salt of ADONA (NaDONA). The components and their concentrations are given in Table A.

The components of this solution all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Table A: EPA-537PDSL-R1; Components and Concentrations (ng/ml; ± 5% in Methanol / Water (<1%))

Compound	Abbreviation	Concentration * (ng/ml)		Peak Assignment in Figure 1
Perfluoro-n-hexanoic acid	PFHxA	2000		B
Perfluoro-n-heptanoic acid	PFHpA	2000		D
Perfluoro-n-octanoic acid	PFOA	2000		G
Perfluoro-n-nonanoic acid	PFNA	2000		H
Perfluoro-n-decanoic acid	PFDA	2000		K
Perfluoro-n-undecanoic acid	PFUdA	2000		N
Perfluoro-n-dodecanoic acid	PFDoA	2000		P
Perfluoro-n-tridecanoic acid	PFTrDA	2000		Q
Perfluoro-n-tetradecanoic acid	PFTeDA	2000		R
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000		C
N-methylperfluoro-1-octanesulfonamidoacetic acid	N-MeFOSAA	2000		L
N-ethylperfluoro-1-octanesulfonamidoacetic acid	N-EtFOSAA	2000		M
Compound	**Abbreviation**	**Concentration (ng/ml)**		**Peak Assignment in Figure 1**
		as the salt	**as the anion**	
Potassium perfluoro-1-butanesulfonate	L-PFBS	2000	1770	A
Sodium perfluoro-1-hexanesulfonate	L-PFHxS	2000	1890	F
Sodium perfluoro-1-octanesulfonate	L-PFOS	2000	1910	I
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	E
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1860	J
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1880	O

* Concentrations have been rounded to three significant figures.

Certified By: [signature] B.G. Chittim, General Manager

Date: 03/26/2019 (mm/dd/yyyy)

BATTELLE
It can be done

BDO Id: 200508-03

Reagent Receipt Report

Approved: ☐ Authorized ☐

Name:	EPA-537PDS-R1	**Received:**	5/8/2020
Vendor:	Wellington Laboratories	**Custodian:**	Schumitz, Matt
Catalogue No:	EPA-537PDS-R1	**Expires:**	11/25/2022
Type:	Solution	**Consumed:**	
Lot No:	537PDSR10119	**Stored In:**	VOC Laboratory - R0123
Quantity:	2 ea ml	**% Moisture:**	

Description: EPA-537PDS-R1

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
11-chloroeicosafluoro-3-oxaundecan	763051-92-9	1.8800	100.00	--	--	☐			
9-chlorohexadecafluoro-3-oxanonane	756426-58-1	1.8600	100.00	--	--	☐			
Adona	919005-14-4	1.8900	100.00	--	--	☐			
Hexafluoropropylene oxide dimer aci	13252-13-6	2.0000	100.00	--	--	☐			
N-ethylperfluoro-octanesulfonamidoa	2991-50-6	2.0000	100.00	--	--	☐			1
N-methylperfluoro-1-octanesulfonami	2355-31-9	2.0000	100.00	--	--	☐			2
Perfluoro-1-butanesulfonate	375-73-5	1.7700	100.00	--	--	☐			
Perfluoro-1-hexanesulfonate	355-46-4	1.8240	100.00	--	--	☐			3
Perfluoro-1-octanesulfonate	1763-23-1	1.8510	100.00	--	--	☐			4
Perfluoro-n-decanoic Acid	335-76-2	2.0000	100.00	--	--	☐			
Perfluoro-n-dodecanoic acid	307-55-1	2.0000	100.00	--	--	☐			
Perfluoro-n-heptanoic Acid	375-85-9	2.0000	100.00	--	--	☐			
Perfluoro-n-hexanoic acid	307-24-4	2.0000	100.00	--	--	☐			
Perfluoro-n-octanoic Acid	335-67-1	2.0000	100.00	--	--	☐			
Perfluorononanoic Acid	375-95-1	2.0000	100.00	--	--	☐			
Perfluoro-n-tetradecanoic acid	376-06-7	2.0000	100.00	--	--	☐			
Perfluoro-n-tridecanoic acid	72629-94-8	2.0000	100.00	--	--	☐			
Perfluoro-n-undecanoic acid	2058-94-8	2.0000	100.00	--	--	☐			

Total Analytes: 18

Notes:

	Analyte:	Comment:
1	N-ethylperfluoro-octanesulfonamidoacetic acid	Sum of branched and linear isomers
2	N-methylperfluoro-1-octanesulfonamidoacetic acid	Sum of branched and linear isomers
3	Perfluoro-1-hexanesulfonate	Sum of branched and linear isomers
4	Perfluoro-1-octanesulfonate	Sum of branched and linear isomers

Approved by:		**Approved on:**	
Authorized by:		**Authorized on:**	

200508-03

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

EPA-537PDS-R1

Native PFAS Primary Dilution Standard Solution/Mixture

PRODUCT CODE:	EPA-537PDS-R1
LOT NUMBER:	537PDSR10119
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	02/14/2019
LAST TESTED: (mm/dd/yyyy)	11/25/2019
EXPIRY DATE: (mm/dd/yyyy)	11/25/2022
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

EPA-537PDS-R1 is a solution/mixture of native linear perfluoroalkylcarboxylic acids (PFCAs; C_6-C_{14}), native perfluoroalkylsulfonates (PFSAs; C_4 linear; C_6 and C_8 linear and branched), native N-substituted perfluoro-octanesulfonamidoacetic acids (N-MeFOSAA and N-EtFOSAA; linear and branched), GenX (HFPO-DA), the main components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and the sodium salt of ADONA (NaDONA). The components and their concentrations are given in Table A.

The components of this solution/mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Table B: Isomeric Components and Percent Composition of N-MeFOSAA
Table C: Isomeric Components and Percent Composition of N-EtFOSAA
Table D: Isomeric Components and Percent Composition of PFHxSK
Table E: Isomeric Components and Percent Composition of PFOSK
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

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Table A: **EPA-537PDS-R1; Components and Concentrations (ng/ml; ± 5% in Methanol / Water (<1%))**

Compound	Abbreviation	Concentration * (ng/ml)	Peak Assignment in Figure 1
Perfluoro-n-hexanoic acid	PFHxA	2000	B
Perfluoro-n-heptanoic acid	PFHpA	2000	D
Perfluoro-n-octanoic acid	PFOA	2000	H
Perfluoro-n-nonanoic acid	PFNA	2000	I
Perfluoro-n-decanoic acid	PFDA	2000	M
Perfluoro-n-undecanoic acid	PFUdA	2000	R
Perfluoro-n-dodecanoic acid	PFDoA	2000	T
Perfluoro-n-tridecanoic acid	PFTrDA	2000	U
Perfluoro-n-tetradecanoic acid	PFTeDA	2000	V
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000	C
N-methylperfluorooctanesulfonamidoacetic acid [a]	N-MeFOSAA: linear isomer	1520	O
	N-MeFOSAA: ∑ branched isomers	480	N
N-ethylperfluorooctanesulfonamidoacetic acid [b]	N-EtFOSAA: linear isomer	1550	Q
	N-EtFOSAA: ∑ branched isomers	450	P

Compound	Abbreviation	Concentration * (ng/ml) as the salt	Concentration * (ng/ml) as the acid	Peak Assignment in Figure 1
Potassium perfluoro-1-butanesulfonate	L-PFBS	2000	1770	A
Potassium perfluorohexanesulfonate [c]	PFHxSK: linear isomer	1620	1480	G
	PFHxSK: ∑ branched isomers	378	345	F
Potassium perfluorooctanesulfonate [d]	PFOSK: linear isomer	1580	1460	K
	PFOSK: ∑ branched isomers	422	392	J
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	E
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	L
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	S

[a] See Table B for percent composition of linear and branched N-MeFOSAA isomers.
[b] See Table C for percent composition of linear and branched N-EtFOSAA isomers.
[c] See Table D for percent composition of linear and branched PFHxSK isomers.
[d] See Table E for percent composition of linear and branched PFOSK isomers.

* Concentrations have been rounded to three significant figures.

Table B: **N-MeFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	N-methylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2NCH_2CO_2H$ CH_3	76.0	76.0
2	N-methylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_2)_2SO_2NCH_2CO_2H$ CF_3 CH_3	0.7	24.0
3	N-methylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_2)_3SO_2NCH_2CO_2H$ CF_3 CH_3	2.0	
4	N-methylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_2)_4SO_2NCH_2CO_2H$ CF_3 CH_3	6.0	
5	N-methylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_2)_5SO_2NCH_2CO_2H$ CF_3 CH_3	14.0	
6	N-methylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	CF_3 $CF_3C(CF_2)_4SO_2NCH_2CO_2H$ CF_3 CH_3	0.2	
7	Other Unidentified Isomers		1.1	

* Percent of total N-methylperfluorooctanesulfonamidoacetic acid isomers only.

Table C: **N-EtFOSAA; Isomeric Components and Percent Composition (by [19]F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	N-ethylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2NCH_2CO_2H$ C_2H_5	77.5	77.5
2	N-ethylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_2)_2SO_2NCH_2CO_2H$ CF_3 C_2H_5	2.3	22.5
3	N-ethylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_2)_3SO_2NCH_2CO_2H$ CF_3 C_2H_5	2.2	
4	N-ethylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_2)_4SO_2NCH_2CO_2H$ CF_3 C_2H_5	5.4	
5	N-ethylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_2)_5SO_2NCH_2CO_2H$ CF_3 C_2H_5	10.4	
6	N-ethylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	CF_3 $CF_3C(CF_2)_4SO_2NCH_2CO_2H$ CF_3 C_2H_5	0.3	
7	N-ethylperfluoro-4,5-dimethylhexanesulfonamidoacetic acid	CF_3 $CF_3CFCF(CF_2)_3SO_2NCH_2CO_2H$ CF_3 C_2H_5	0.3	
8	N-ethylperfluoro-3,5-dimethylhexanesulfonamidoacetic acid	CF_3 $CF_3CFCF_2CF(CF_2)_2SO_2NCH_2CO_2H$ CF_3 C_2H_5	0.3	
9	Other Unidentified Isomers		1.3	

* Percent of total N-ethylperfluorooctanesulfonamidoacetic acid isomers only.

Table D: **PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2\underset{\mid \atop CF_3}{C}FSO_3^-K^+$	2.9	18.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2\underset{\mid \atop CF_3}{C}FCF_2SO_3^-K^+$	1.4	
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2\underset{\mid \atop CF_3}{C}FCF_2CF_2SO_3^-K^+$	5.0	
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3\underset{\mid \atop CF_3}{C}FCF_2CF_2CF_2SO_3^-K^+$	8.9	
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3\overset{CF_3 \atop \mid}{\underset{\mid \atop CF_3}{C}}CF_2CF_2SO_3^-K^+$	0.2	
7	Other Unidentified Isomers		0.5	

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

Table E: **PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CFSO_3^-K^+$ | CF_3	1.2	21.1
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CFCF_2SO_3^-K^+$ | CF_3	0.6	
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CFCF_2CF_2SO_3^-K^+$ | CF_3	1.9	
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CFCF_2CF_2CF_2SO_3^-K^+$ | CF_3	2.2	
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CFCF_2CF_2CF_2CF_2SO_3^-K^+$ | CF_3	4.5	
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CFCF_2CF_2CF_2CF_2CF_2SO_3^-K^+$ | CF_3	10.0	
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	CF_3 | $CF_3CCF_2CF_2CF_2CF_2SO_3^-K^+$ | CF_3	0.2	
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	CF_3 | $CF_3CF_2CCF_2CF_2CF_2SO_3^-K^+$ | CF_3	0.03	
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	CF_3 | $CF_3CFCFCF_2CF_2CF_2SO_3^-K^+$ | CF_3	0.4	
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	CF_3 | $CF_3CFCF_2CFCF_2CF_2SO_3^-K^+$ | CF_3	0.07	

* Percent of total perfluorooctanesulfonate isomers only.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: B.G. Chittim, General Manager **Date:** 12/20/2019 (mm/dd/yyyy)

BATTELLE

It can be done

BDO Id: 200521-08

Reagent Receipt Report

Approved: ☐ Authorized: ☐

Name:	MPFDA	**Received:**	5/21/2020
Vendor:	Wellington Laboratories	**Custodian:**	Schultz, Stephanie
Catalogue No:	MPFDA	**Expires:**	3/24/2025
Type:	Solution	**Consumed:**	
Lot No:	MPFDA0320	**Stored In:**	VOC Laboratory - R0123
Quantity:	1 ea mL	**% Moisture:**	
Description:	MPFDA		

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
13C2-PFDA	BDO-2110	50.0000	100.00	--	--	☐			

Total Analytes: 1

Notes:

Approved by: **Approved on:**

Authorized by: **Authorized on:**

200521-08

WELLINGTON LABORATORIES

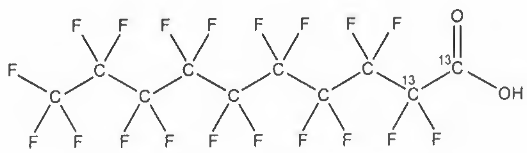
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: MPFDA

COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid

LOT NUMBER: MPFDA0320

STRUCTURE:



CAS #: Not available

MOLECULAR FORMULA: $^{13}C_2{}^{12}C_8HF_{19}O_2$

CONCENTRATION: 50.0 ± 2.5 µg/ml

MOLECULAR WEIGHT: 516.07

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 03/24/2020

EXPIRY DATE: (mm/dd/yyyy) 03/24/2025

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

ISOTOPIC PURITY: $\geq$99% ^{13}C (1,2-$^{13}C_2$)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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Certified By: [signature]
B.G. Chittim, General Manager

Date: 04/06/2020 (mm/dd/yyyy)

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BATTELLE

It can be done

BDO Id: 200521-09

Reagent Receipt Report

Approved: ☐ Authorized: ☐

Name:	MPFHxA	**Received:**	5/21/2020
Vendor:	Wellington Laboratories	**Custodian:**	Schultz, Stephanie
Catalogue No:	MPFHxA	**Expires:**	4/3/2025
Type:	Solution	**Consumed:**	
Lot No:	MPFHxA0320	**Stored In:**	VOC Laboratory - R0123
Quantity:	1 ea mL	**% Moisture:**	
Description:	MPFHxA		

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
13C2-PFHxA	BDO-2106	50.0000	100.00	--	--	☐			

Total Analytes: 1

Notes:

Approved by: ____________________ **Approved on:** ____________________

Authorized by: ____________________ **Authorized on:** ____________________

200521-09

WELLINGTON LABORATORIES

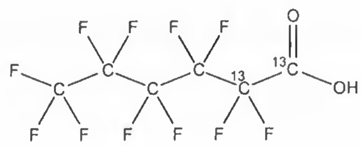
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: MPFHxA

COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid

LOT NUMBER: MPFHxA0320

STRUCTURE:



CAS #: Not available

MOLECULAR FORMULA: $^{13}C_2{}^{12}C_4HF_{11}O_2$

CONCENTRATION: 50 ± 2.5 μg/ml

MOLECULAR WEIGHT: 316.04

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 04/03/2020

EXPIRY DATE: (mm/dd/yyyy) 04/03/2025

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

ISOTOPIC PURITY: $\geq$99% ^{13}C (1,2-$^{13}C_2$)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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Certified By: ____________ B.G. Chittim, General Manager

Date: 04/03/2020 (mm/dd/yyyy)

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BATTELLE

It can be done

BDO Id: 200521-10

Reagent Receipt Report

Approved: ☐ Authorized: ☐

Name:	M3HFPO-DA	**Received:**	5/21/2020
Vendor:	Wellington Laboratories	**Custodian:**	Schultz, Stephanie
Catalogue No:	M3HFPO-DA	**Expires:**	1/8/2023
Type:	Solution	**Consumed:**	
Lot No:	M3HFPODA0120	**Stored In:**	VOC Laboratory - R0123
Quantity:	1 ea mL	**% Moisture:**	

Description: M3HFPO-DA

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
13C3-HFPO-DA	BDO-2276	50.0000	100.00	--	--	☐			

Total Analytes: 1

Notes:

Approved by: ______ **Approved on:** ______

Authorized by: ______ **Authorized on:** ______

200521-10

WELLINGTON LABORATORIES

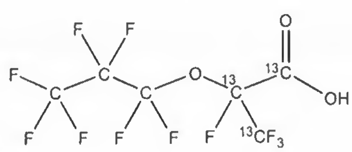
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: M3HFPO-DA

LOT NUMBER: M3HFPODA0120

COMPOUND: 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-$^{13}C_3$-propanoic acid

STRUCTURE:



CAS #: Not available

MOLECULAR FORMULA: $^{13}C_3{}^{12}C_3HF_{11}O_3$

CONCENTRATION: 50.0 ± 2.5 µg/ml

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 01/08/2020

EXPIRY DATE: (mm/dd/yyyy) 01/08/2023

RECOMMENDED STORAGE: Refrigerate ampoule

MOLECULAR WEIGHT: 333.03

SOLVENT(S): Methanol

ISOTOPIC PURITY: ≥99% ^{13}C ($^{13}C_3$)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 1.9% of the linear M3HFPO-DA isomer.
- Product is commercially known as GenX.

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Certified By: [signature]
B.G. Chittim, General Manager

Date: 01/13/2020 (mm/dd/yyyy)

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BATTELLE
It can be done

BDO Id: 200521-12

Reagent Receipt Report

Approved: ☐ Authorized: ☐

Name:	M2PFOA	Received:	5/21/2020
Vendor:	Wellington Laboratories	Custodian:	Schultz, Stephanie
Catalogue No:	M2PFOA	Expires:	1/8/2025
Type:	Solution	Consumed:	
Lot No:	M2PFOA0120	Stored In:	VOC Laboratory - R0123
Quantity:	1 ea mL	% Moisture:	
Description:	M2PFOA		

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
13C2-PFOA	BDO-2107	50.0000	100.00	--	--	☐			

Total Analytes: 1

Notes:

Approved by:		Approved on:	
Authorized by:		Authorized on:	

200521-12

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

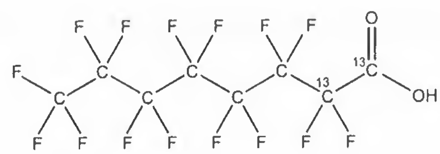
PRODUCT CODE: M2PFOA

LOT NUMBER: M2PFOA0120

COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]octanoic acid

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_2{}^{12}C_6HF_{15}O_2$

MOLECULAR WEIGHT: 416.05

CONCENTRATION: 50.0 ± 2.5 µg/ml

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

ISOTOPIC PURITY: $\geq$99% ^{13}C (1,2-$^{13}C_2$)

LAST TESTED: (mm/dd/yyyy) 01/08/2020

EXPIRY DATE: (mm/dd/yyyy) 01/08/2025

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of perfluoro-n-[$^{13}C_1$]heptanoic acid ($^{13}C_1$-PFHpA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim, General Manager

Date: 01/15/2020 (mm/dd/yyyy)

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BATTELLE
It can be done

BDO Id: 200921-01

Reagent Receipt Report

Approved: ☐ **Authorized** ☐

Name: d5-N-EtFOSAA

Vendor: Wellington Laboratories

Catalogue No: d5-N-EtFOSAA

Type: Solution

Lot No: d5NEtFOSAA0520

Quantity: 2 ea ml **% Moisture:**

Received: 9/21/2020

Custodian: Bailey, Kevin

Expires: 5/20/2025

Consumed:

Stored In: VOC Laboratory - R0123

Description: d5-N-EtFOSAA

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
d5-EtFOSAA	BDO-1839	50.0000	100.00	--	--	☐	47.5	-5	100

Total Analytes: 1

Notes:

Approved by: **Approved on:**

Authorized by: **Authorized on:**

200921-01

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

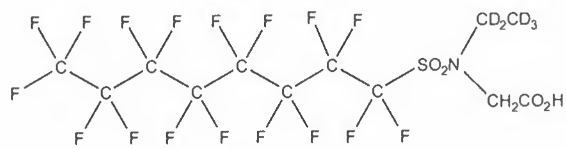
PRODUCT CODE: d5-N-EtFOSAA

LOT NUMBER: d5NEtFOSAA0520

COMPOUND: N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $C_{12}D_5H_3F_{17}NO_4S$

MOLECULAR WEIGHT: 590.26

CONCENTRATION: 50.0 ± 2.5 μg/ml

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

ISOTOPIC PURITY: ≥98% $^2H_5$

LAST TESTED: (mm/dd/yyyy) 05/20/2020

EXPIRY DATE: (mm/dd/yyyy) 05/20/2025

RECOMMENDED STORAGE: Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent the conversion of the acetic acid moiety to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: [signature]
B.G. Chittim, General Manager

Date: 05/22/2020 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

BATTELLE
It can be done

BDO Id: 200921-02

Reagent Receipt Report

Approved: ☐ Authorized ☐

Name: MPFOS
Received: 9/21/2020
Vendor: Wellington Laboratories
Custodian: Bailey, Kevin
Catalogue No: MPFOS
Expires: 4/15/2025
Type: Solution
Consumed:
Lot No: MPFOS0420
Stored In: VOC Laboratory - R0123
Quantity: 2 ea ml **% Moisture:**

Description: MPFOS

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
13C4-PFOS	BDO-2121	47.9000	100.00	--	--	☐		0	0

Total Analytes: 1

Notes:

Approved by: **Approved on:**

Authorized by: **Authorized on:**

200921-02

WELLINGTON LABORATORIES

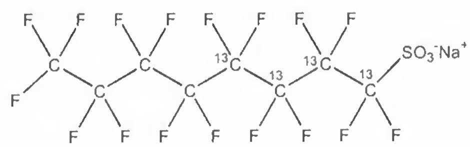
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: MPFOS

LOT NUMBER: MPFOS0420

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE:



CAS #: 960315-53-1

MOLECULAR FORMULA: $^{13}C_4{}^{12}C_4F_{17}SO_3Na$

CONCENTRATION: 50.0 ± 2.5 µg/ml (Na salt)
47.9 ± 2.4 µg/ml (MPFOS acid)
47.8 ± 2.4 µg/ml (MPFOS anion)

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 04/15/2020

EXPIRY DATE: (mm/dd/yyyy) 04/15/2025

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

MOLECULAR WEIGHT: 526.08

SOLVENT(S): Methanol

ISOTOPIC PURITY: $\geq$99% ^{13}C (1,2,3,4-$^{13}C_4$)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.3% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: [signature]
B.G. Chittim, General Manager

Date: 04/20/2020 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

BATTELLE

It can be done

BDO Id: 200921-03

Reagent Receipt Report

Approved: ☐ **Authorized** ☐

Name: d3-N-MeFOSAA

Vendor: Wellington Laboratories

Catalogue No: d3-N-MeFOSAA

Type: Solution

Lot No: d3NMeFOSAA1119

Quantity: 2 ea ml **% Moisture:**

Description: d3-N-MeFOSAA

Received: 9/21/2020

Custodian: Bailey, Kevin

Expires: 12/2/2024

Consumed:

Stored In: VOC Laboratory - R0123

Analyte:	CAS No:	Concentration (ug/mL):	Purity:	Density:	Density Units:	Cert	Cert Val:	Lower Limit:	Upper Limit:
d3-MeFOSAA	BDO-1838	50.0000	100.00	--	--	☐			

Total Analytes: 1

Notes:

Approved by: **Approved on:**

Authorized by: **Authorized on:**

200921-03

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

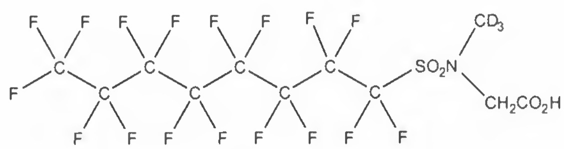
PRODUCT CODE: d3-N-MeFOSAA

LOT NUMBER: d3NMeFOSAA1119

COMPOUND: N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid

STRUCTURE:

CAS #: 1400690-70-1



MOLECULAR FORMULA: $C_{11}D_3H_3F_{17}NO_4S$

MOLECULAR WEIGHT: 574.23

CONCENTRATION: 50 ± 2.5 μg/ml

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

ISOTOPIC PURITY: $\geq$98% $^2H_3$

LAST TESTED: (mm/dd/yyyy) 12/02/2019

EXPIRY DATE: (mm/dd/yyyy) 12/02/2024

RECOMMENDED STORAGE: Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent the conversion of the acetic acid moiety to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: [signature]
B.G. Chittim, General Manager

Date: 12/04/2019
(mm/dd/yyyy)

ACCREDITATIONS

Accrediting Authority	Laboratory ID
U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)	91667
State of Florida Department of Health	E87856
State of New York Department of Health	12105
State of Washington Department of Ecology	C1050
State of California	3045
Commonwealth of Massachusetts	E87856
State of Maine	MA00056
State of Vermont	VT 87856
State of New Hampshire	2137
Commonwealth of Pennsylvania Department of Environmental Protection	68-05687
State of Alaska Department of Environmental Conservation	19-005
State of Rhode Island	E87856

Current certificates and lists of accredited parameters are available upon request.

Sample Preparation

BATTELLE

It can be done

BATTELLE - NORWELL OPERATIONS
SAMPLE PREPARATION RECORDS

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

SOP Numbers (see workplan for modifications)

VOASOP No. 5-371

This Batch Contains The Following Samples:
DB577PB-FS
DB578LCS-FS
G3899-FS
G3901-FS

Laboratory Preparation Records

COMPLETE AND VALIDATED

Prep Task Leader: Kevin Bailey

Approved By:	Date	Initials
Denise Schumitz	12/28/2020	DMS

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
SAMPLE IDENTIFICATION PAGE

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Sample ID	Description
DB577PB-FS	Procedural Blank
DB578LCS-FS	Laboratory Control Sample
G3899-FS	CBD/DW01
G3901-FS	Trip

Samples Assigned By: Matt Schumitz Date : December 2, 2020

Comments:

BATTELLE - NORWELL OPERATIONS
SAMPLE CUSTODY LOG

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Requested On/By: 12/08/2020 KB **Purpose:** Sample Preparation

Relinquished On/By: 12/08/2020 MDS **Last Activity:** Transfer

Accepted On/By: 12/08/2020 KH

Stored In Facility: Sample Preparation

Stored Until

Stored Comment: NA

Returned On/To:

Returned To Facility:

Returned Comment: NA

No.	BDO-ID:	Ctrs	*	Condition:	Custody Comment:
1	G3899	1	C	Consumed	NA
2	G3901	1	C	Consumed	NA

Total Samples 2 * "C" = Consumed Container

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
LIQUID SAMPLE ID FORM

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Sample ID	Description	Volume (mL)	Bottles	*	Date Initials
DB577PB-FS	Procedural Blank	250.0	NA	--	12/08/20 KH
DB578LCS-FS	Laboratory Control Sample	250.0	NA	--	12/08/20 KH
G3899-FS	CBD/DW01	295.0	1	C	12/14/20 BB
G3901-FS	Trip	298.0	1	C	12/14/20 BB

Comments:

Sample ID:	Comments:
DB577PB-FS	pre-weighed trizma bottle (lot number SLCD9647)
DB578LCS-FS	pre-weighed trizma bottle (lot number SLCD9647)

Samples Assigned By: Matt Schumitz Date : December 2, 2020

* - "C" = Sample is Consumed

BATTELLE - NORWELL OPERATIONS
SURROGATE SPIKE FORM

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Sample ID	Standard ID	Type	Vial No.	Vol Added (uL)	Date Spiked/ Spiked By	Witn'd By	Comment
DB577PB-FS	LE06	SIS	1	25	12/08/20 KH	BTM	NA
DB578LCS-FS	LD34	LCS/MS	1	100	12/08/20 KH	BTM	NA
DB578LCS-FS	LE06	SIS	1	25	12/08/20 KH	BTM	NA
G3899-FS	LE06	SIS	1	25	12/08/20 KH	BTM	NA
G3901-FS	LE06	SIS	1	25	12/08/20 KH	BTM	NA

Syringes/Pipettes Used:

Std ID	Type	Syr/Pip
LD34	Pipette	B814659662
LE06	Pipette	B814659662

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
SAMPLE EXTRACTION FORM

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Sample ID	1st Extraction	2nd Extraction	3rd Extraction	Conc. ID	Turbo °C	Turbo PSI	KD °C	Comment
DB577PB-FS	12/08/20 KH	NA	NA	NEVAP_3	NA	NA	NA	NA
DB578LCS-FS	12/08/20 KH	NA	NA	NEVAP_3	NA	NA	NA	NA
G3899-FS	12/08/20 KH	NA	NA	NEVAP_3	NA	NA	NA	NA
G3901-FS	12/08/20 KH	NA	NA	NEVAP_3	NA	NA	NA	NA

Solvents/Reagent Preparations:

Name	ID	Expires	Lot No	Procedure	Comments
Indicator Paper 4.5-10	201008-01	10/08/25	20D5091	NA	
Pre-packed SPE Column	RP-201208-14	12/08/20	S214-0107/S20-004455	Pre-packed SPE Column	

Solvents/Reagents:

Name	Lot No	Comments
Methanol, HPLC (201202-02)	204505	

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
INTERNAL STANDARD SPIKING FORM

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

(N/A Fraction)

Extract Id	Extr. Vol. (uL)	Added (uL)	Std. Id	Accm . (uL)	Vial No.	Pre Inj. Vol. (uL)^	Final Dilution *	Date Spiked/ Spiked By	Witn'd By
DB577PB-FS(0)	975	25	LE07	25	1	1000	1.000	12/22/20 RPK	AW
DB578LCS-FS(0)	975	25	LE07	25	1	1000	1.000	12/22/20 RPK	AW
G3899-FS(0)	975	25	LE07	25	1	1000	1.000	12/22/20 RPK	AW
G3901-FS(0)	975	25	LE07	25	1	1000	1.000	12/22/20 RPK	AW

Syringes/Pipettes Used:

Std ID	Type	Syr/Pip
LE07	Pipette	B814659662

* - Final Dilution is any HPLC, dilutions, or other manipulation

^ - Pre Injection Volume (PIV) includes any RIS spikes.

BATTELLE - NORWELL OPERATIONS
PREPARATION EXTRACT SPLIT FORM

Project Title(s)
Inspection Experts Inc - PFAS Analysis

Project No.(s)
100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Extract		*	Extract Date	Source		Initial Extract Vol (uL)	Extract Split	Extract Split	Total Dilution	Date/Initials
Name	#			Name	#					
DB577PB-FS	0	--	12/8/2020 11:53:00 AM	NA		NA	NA	1.000	1.000	12/08/20 KH
DB578LCS-FS	0	--	12/8/2020 11:53:00 AM	NA		NA	NA	1.000	1.000	12/08/20 KH
G3899-FS	0	--	12/8/2020 1:09:00 PM	NA		NA	NA	1.000	1.000	12/08/20 KH
G3901-FS	0	--	12/8/2020 1:09:00 PM	NA		NA	NA	1.000	1.000	12/08/20 KH

Total Oil = [Sample Volume (uL) / Aliquot Volume (uL)] * [Aliquot Weight (mg)]
Dilution Factor = [Sample Volume (uL) / Aliqot Volume (uL))] * Prior Dilution Factor
* - "C" = Extract is Consumed

BATTELLE - NORWELL OPERATIONS
EXTRACT - INSTRUMENT FACILITY CUSTODY PAGE

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Purpose:	LC-MS/MS TRANSFER	**Last Activity:**	Prep->Inst
Relinquished On/By:	Dec 22 2020 4:47PM RPK	**Received On/By:**	Dec 22 2020 4:47PM DMS
Relinquished From:	Sample Preparation: NA	**Received Location:**	LC Laboratory: NA
Relinquish Comment:	NA	**Received Comment:**	NA

No.	BDO-ID:	PIV:	DF:	Condition:	Custody Comment:
1	DB577PB-FS(0)	1000	1	Intact	NA
2	DB578LCS-FS(0)	1000	1	Intact	NA
3	G3899-FS(0)	1000	1	Intact	NA
4	G3901-FS(0)	1000	1	Intact	NA

Total Extracts: 4

BATTELLE - NORWELL OPERATIONS
SAMPLE SPECIFIC COMMENTS

Project Title(s)	**Project No.(s)**
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Sample ID:	Comment:	Date/Initials:
DB577PB-FS	Extraction began at 11:53 AM, manifold 8, ended at 12:17 PM.	12/08/20 KH
DB578LCS-FS	Extraction began at 11:53 AM, manifold 8, ended at 12:15 PM.	12/08/20 KH
G3899-FS	Extraction began at 1:09 PM, manifold 5, ended at 1:35 PM.	12/08/20 KH
G3899-FS	Sample contained particulates.	12/08/20 KH
G3901-FS	Extraction began at 1:09 PM, manifold 5, ended at 1:36 PM.	12/08/20 KH

BATTELLE
It can be done

BATTELLE - NORWELL OPERATIONS
MISCELLANEOUS DOCUMENTATION FORM

Project Title(s)	Project No.(s)
Inspection Experts Inc - PFAS Analysis	100144625

20-1569

Inspection Experts: PFAS Drinking Water

DW

Entered By: On:

Task Leader Approval: On:

SupervisorApproval: On:

PM Approval: On:

Analytical Calibrations

BATTELLE

Sequence Report

Created with Analyst Reporter
Printed: 28/12/2020 9:47:57 AM

Vial	Laboratory Sample ID	Client Sample ID	Acquisition Date	Acquisition Method	Data File	
2	LD94	L1	12/22/2020 7:23:57 PM	5-371.dam	AE_12222020_5-371.wiff	
3	LD95	L2	12/22/2020 7:34:27 PM	5-371.dam	AE_12222020_5-371.wiff	
4	LD96	L3	12/22/2020 7:44:58 PM	5-371.dam	AE_12222020_5-371.wiff	
5	LD97	L4	12/22/2020 7:55:29 PM	5-371.dam	AE_12222020_5-371.wiff	
6	LD98	L5	12/22/2020 8:06:00 PM	5-371.dam	AE_12222020_5-371.wiff	
7	LD99	L6	12/22/2020 8:16:32 PM	5-371.dam	AE_12222020_5-371.wiff	
8	LE01	L7	12/22/2020 8:27:03 PM	5-371.dam	AE_12222020_5-371.wiff	
9	LE02 IB	Instrument Blank	12/22/2020 8:37:36 PM	5-371.dam	AE_12222020_5-371.wiff	
10	LE03 ICC	ICC	12/22/2020 8:48:09 PM	5-371.dam	AE_12222020_5-371.wiff	
11	LF42 Branch	Branch Standard	12/22/2020 8:58:41 PM	5-371.dam	AE_12222020_5-371.wiff	
12	MeOH		12/22/2020 9:09:15 PM	5-371.dam	AE_12222020_5-371.wiff	
13	~~DB607PB-FS(0)~~		~~12/22/2020 9:19:47 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	1
~~14~~	~~DB608LCS-FS(0)~~		~~12/22/2020 9:30:20 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~15~~	~~G4144-FS(0)~~		~~12/22/2020 9:40:51 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~16~~	~~G4145-FS(0)~~		~~12/22/2020 9:51:22 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~17~~	~~G4146-FS(0)~~		~~12/22/2020 10:01:53 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~18~~	~~G4147-FS(0)~~		~~12/22/2020 10:12:24 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~19~~	~~G4148-FS(0)~~		~~12/22/2020 10:22:55 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~20~~	~~G4149-FS(0)~~		~~12/22/2020 10:33:26 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~21~~	~~G4150-FS(0)~~		~~12/22/2020 10:43:57 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~22~~	~~MeOH~~		~~12/22/2020 10:54:28 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~23~~	~~LD98 CCV~~		~~12/22/2020 11:04:59 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~24~~	~~G4151-FS(0)~~		~~12/22/2020 11:15:30 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~25~~	~~G4152-FS(0)~~		~~12/22/2020 11:26:00 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~26~~	~~G4153-FS(0)~~		~~12/22/2020 11:36:33 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~27~~	~~G4154-FS(0)~~		~~12/22/2020 11:47:06 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~28~~	~~MeOH~~		~~12/22/2020 11:57:39 PM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~29~~	~~LD97 CCV~~		~~12/23/2020 12:08:11 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~30~~	~~MeOH~~		~~12/23/2020 12:18:43 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~31~~	~~DB585PB-FS(0)~~		~~12/23/2020 12:29:14 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~32~~	~~DB586LCS-FS(0)~~		~~12/23/2020 12:39:45 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~33~~	~~G4073-FS(0)~~		~~12/23/2020 12:50:17 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~34~~	~~G4074-FS(0)~~		~~12/23/2020 1:00:48 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~35~~	~~G4075-FS(0)~~		~~12/23/2020 1:11:19 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
~~36~~	~~MeOH~~		~~12/23/2020 1:21:50 AM~~	~~5-371.dam~~	~~AE_12222020_5-371.wiff~~	
37	LD97 CCV	CCV	12/23/2020 1:32:20 AM	5-371.dam	AE_12222020_5-371.wiff	
36	MeOH		12/23/2020 1:42:52 AM	5-371.dam	AE_12222020_5-371.wiff	
38	DB577PB-FS(0)	Procedural Blank	12/23/2020 1:53:24 AM	5-371.dam	AE_12222020_5-371.wiff	
39	DB578LCS-FS(0)	Laboratory Control Sample	12/23/2020 2:03:55 AM	5-371.dam	AE_12222020_5-371.wiff	

1. Samples from another batch, not reported with this one. DMS 12/28/2020

Vial	Laboratory Sample ID	Client Sample ID	Acquisition Date	Acquisition Method	Data File
40	G3899-FS(0)	CBD/DW01	12/23/2020 2:14:26 AM	5-371.dam	AE_12222020_5-371.wiff
41	G3901-FS(0)	Trip	12/23/2020 2:24:57 AM	5-371.dam	AE_12222020_5-371.wiff
42	MeOH		12/23/2020 2:35:29 AM	5-371.dam	AE_12222020_5-371.wiff
43	LD98 CCV	CCV	12/23/2020 2:46:00 AM	5-371.dam	AE_12222020_5-371.wiff

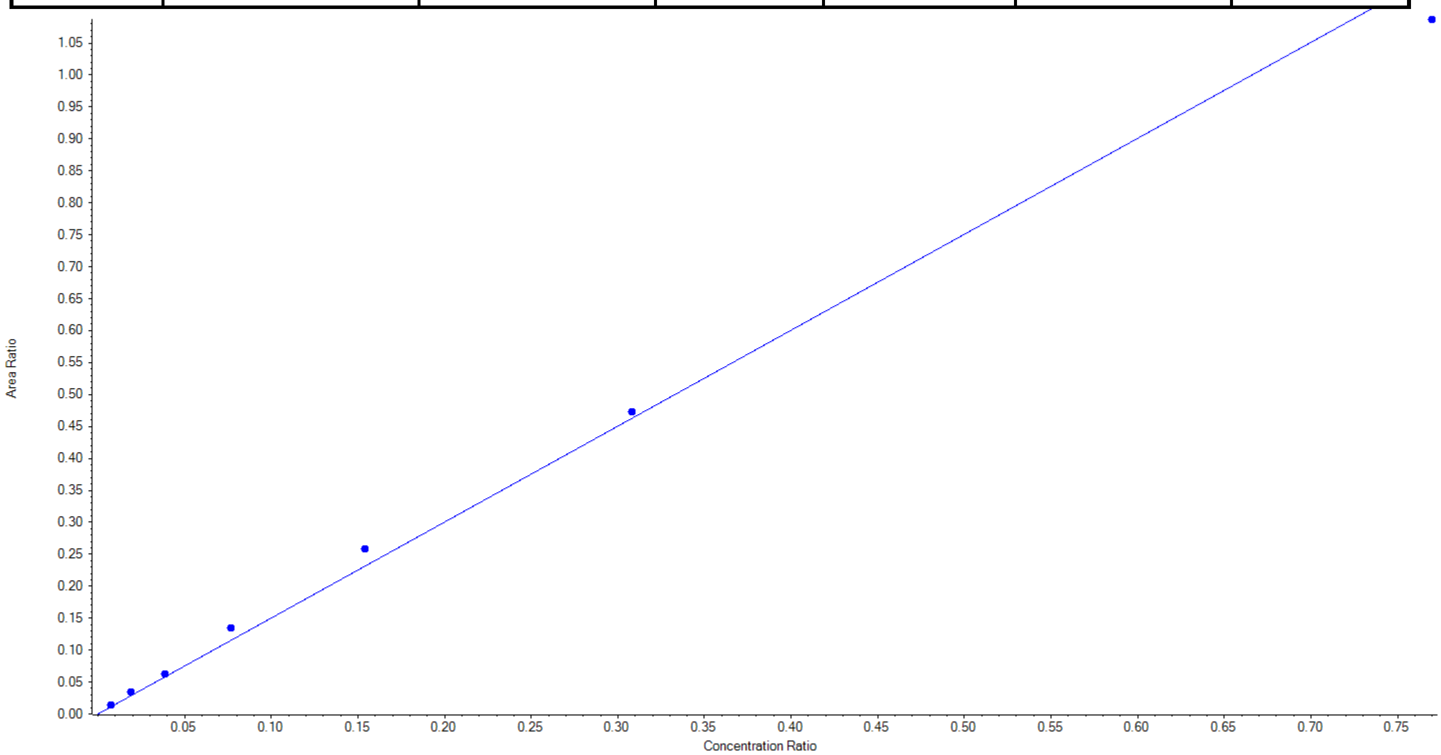
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFBS_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	298.9 / 80.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.50161 x (r = 0.99734) (weighting: 1 / x) r^2:0.9947

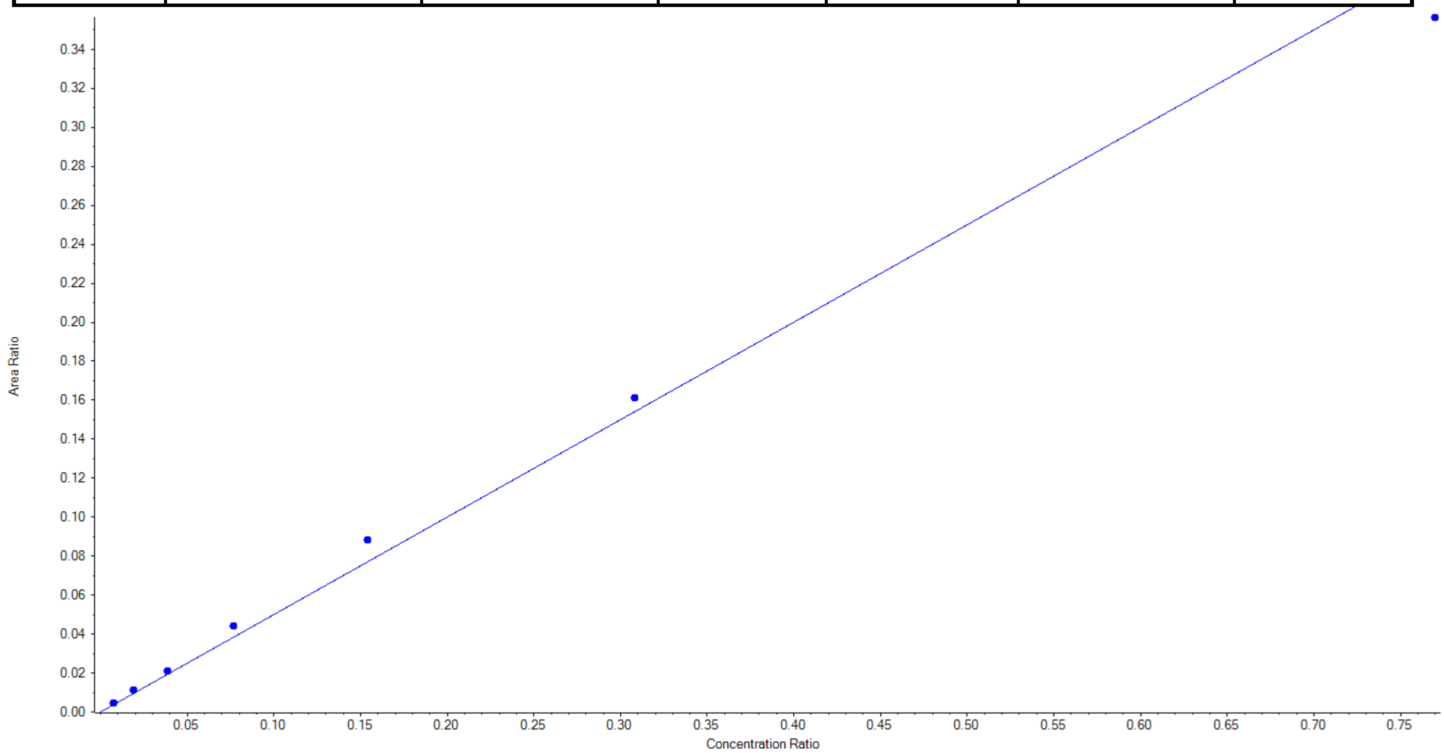
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	221.25	256.07	115.7
3	LD95	L2	True	553.13	652.66	118.0
4	LD96	L3	True	1106.25	1204.00	108.8
5	LD97	L4	True	2212.50	2571.88	116.2
6	LD98	L5	True	4425.00	4958.25	112.1
7	LD99	L6	True	8850.00	9048.76	102.3
8	LE01	L7	True	22125.00	20801.52	94.0



Analyte Name	PFBS_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	298.9 / 99.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.50006 x (r = 0.99625) (weighting: 1 / x) r^2:0.9925

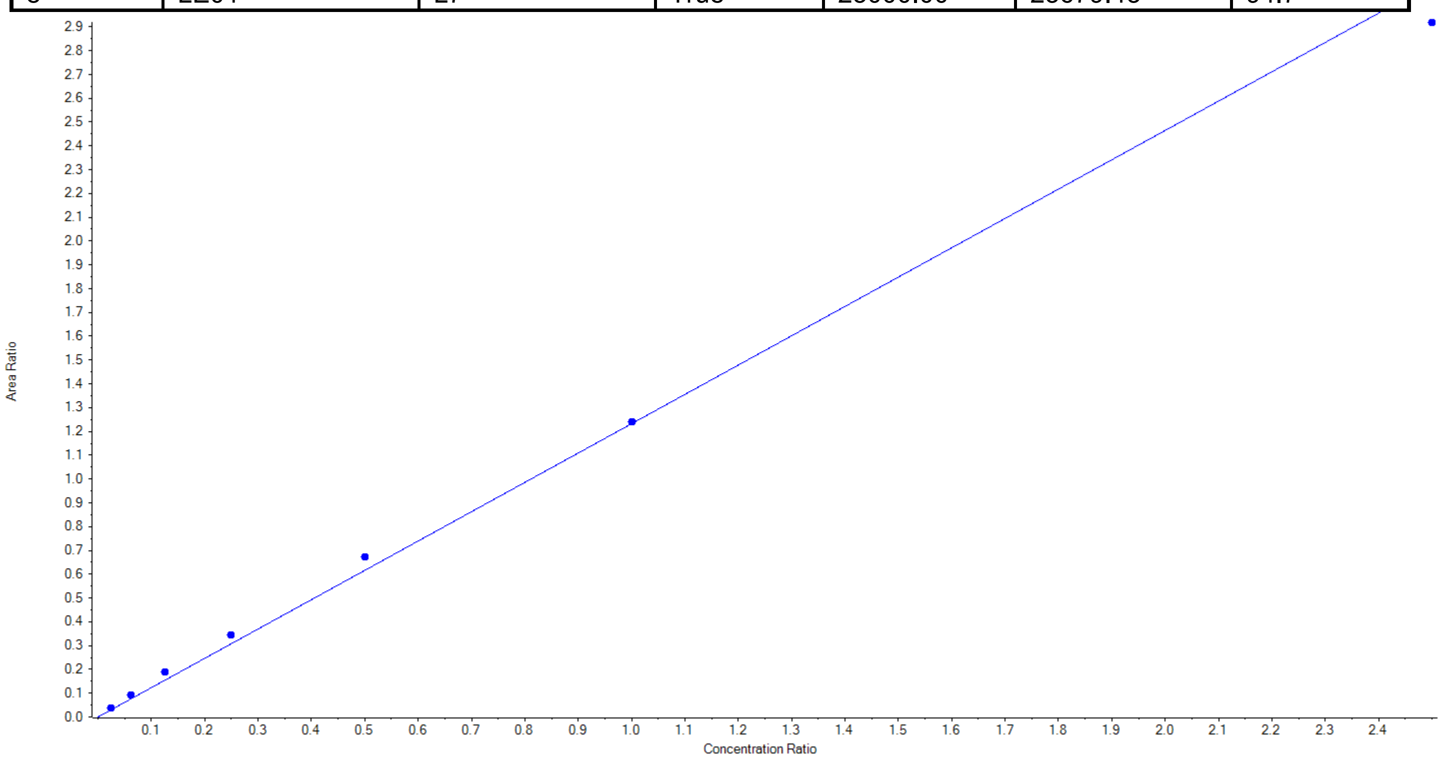
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	221.25	260.41	117.7
3	LD95	L2	True	553.13	658.20	119.0
4	LD96	L3	True	1106.25	1222.37	110.5
5	LD97	L4	True	2212.50	2538.50	114.7
6	LD98	L5	True	4425.00	5068.90	114.6
7	LD99	L6	True	8850.00	9262.54	104.7
8	LE01	L7	True	22125.00	20482.21	92.6



Analyte Name	PFHxA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	313.0 / 269.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.23235 x (r = 0.99820) (weighting: 1 / x) r^2:0.9964

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	320.15	128.1
3	LD95	L2	True	625.00	751.23	120.2
4	LD96	L3	True	1250.00	1525.06	122.0
5	LD97	L4	True	2500.00	2809.06	112.4
6	LD98	L5	True	5000.00	5460.13	109.2
7	LD99	L6	True	10000.00	10079.94	100.8
8	LE01	L7	True	25000.00	23679.43	94.7



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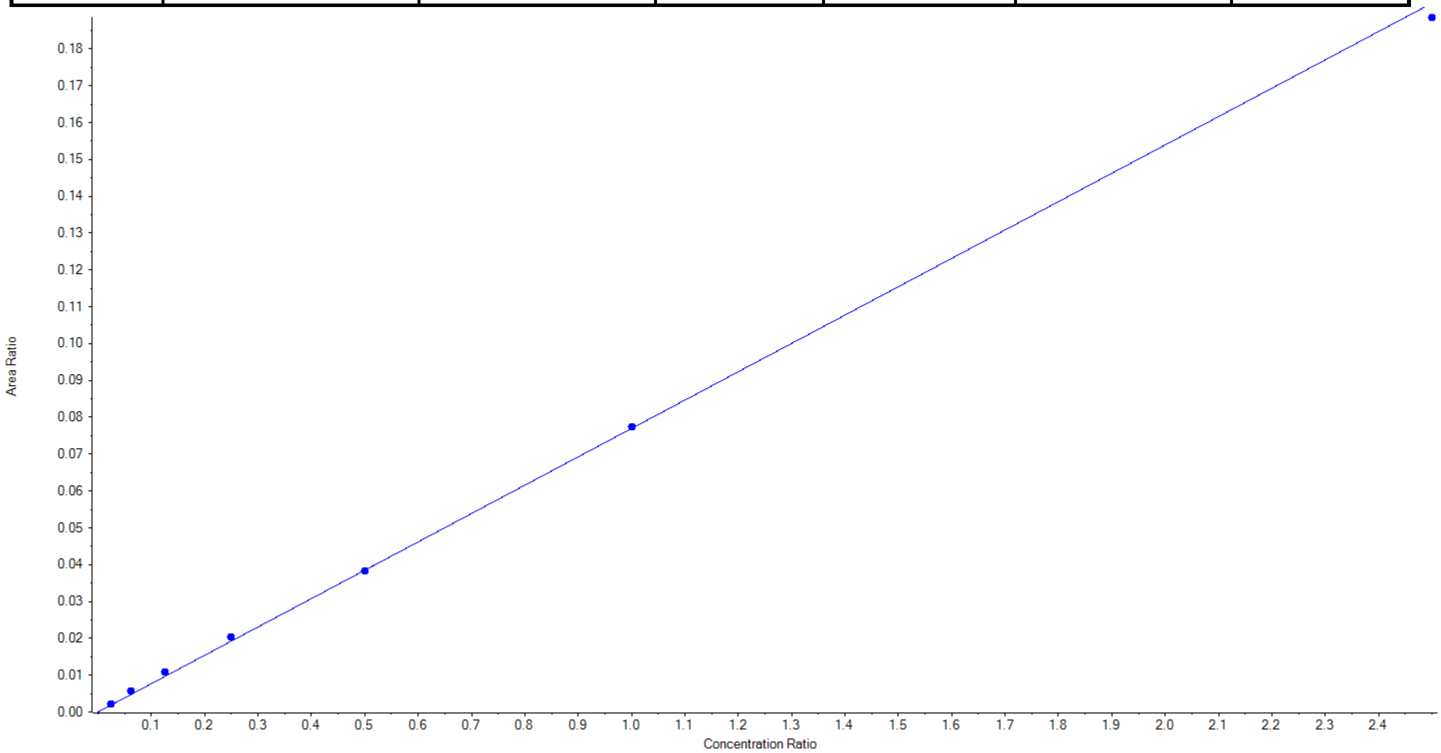
Analyte Name	PFHxA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	313.0 / 119.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.07696 x (r = 0.99968) (weighting: 1 / x) r^2:0.9994

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	290.33	116.1
3	LD95	L2	True	625.00	732.49	117.2
4	LD96	L3	True	1250.00	1410.24	112.8
5	LD97	L4	True	2500.00	2656.24	106.3
6	LD98	L5	True	5000.00	4976.42	99.5
7	LD99	L6	True	10000.00	10066.36	100.7
8	LE01	L7	True	25000.00	24492.93	98.0



Calibration Summary Report

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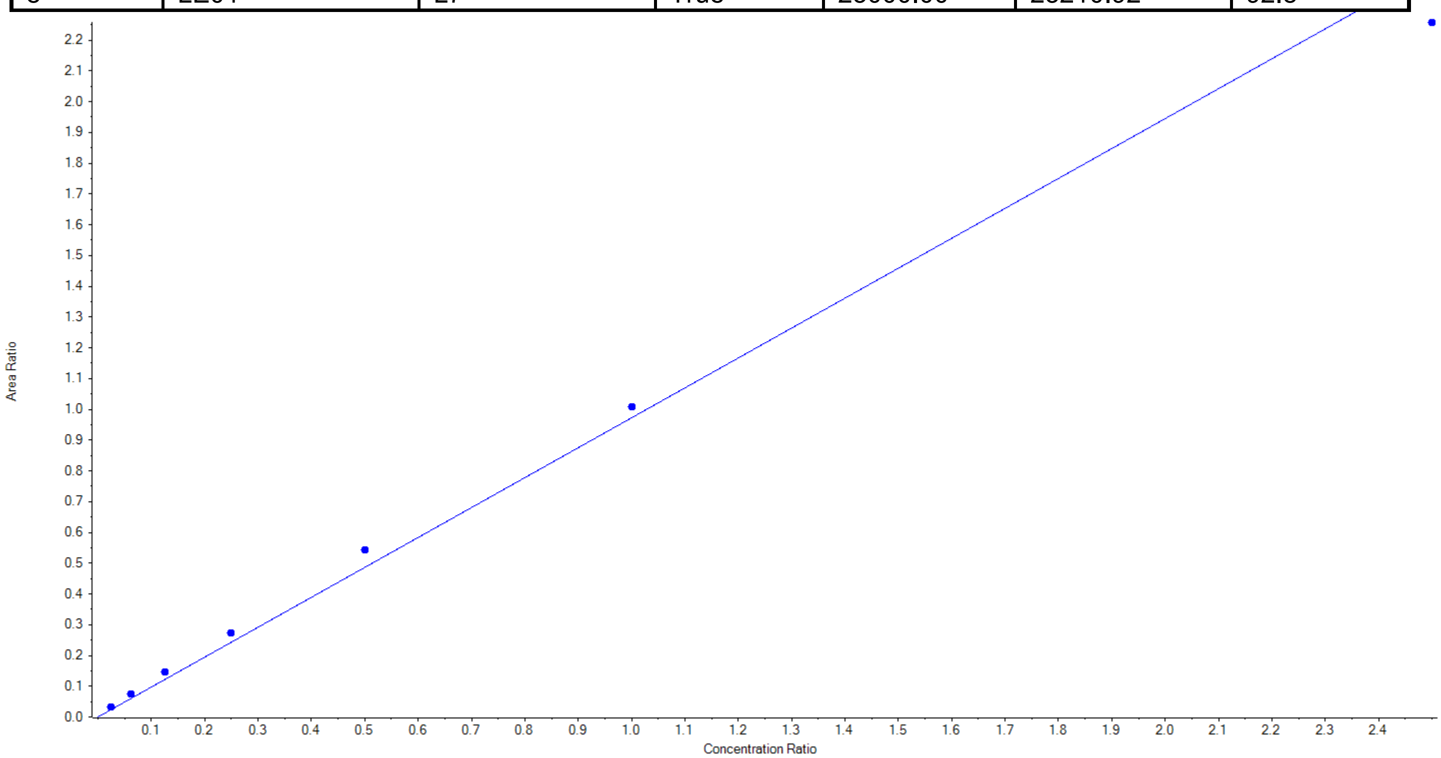
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFHpA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	363.0 / 319.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.97241 x (r = 0.99721) (weighting: 1 / x) r^2:0.9944

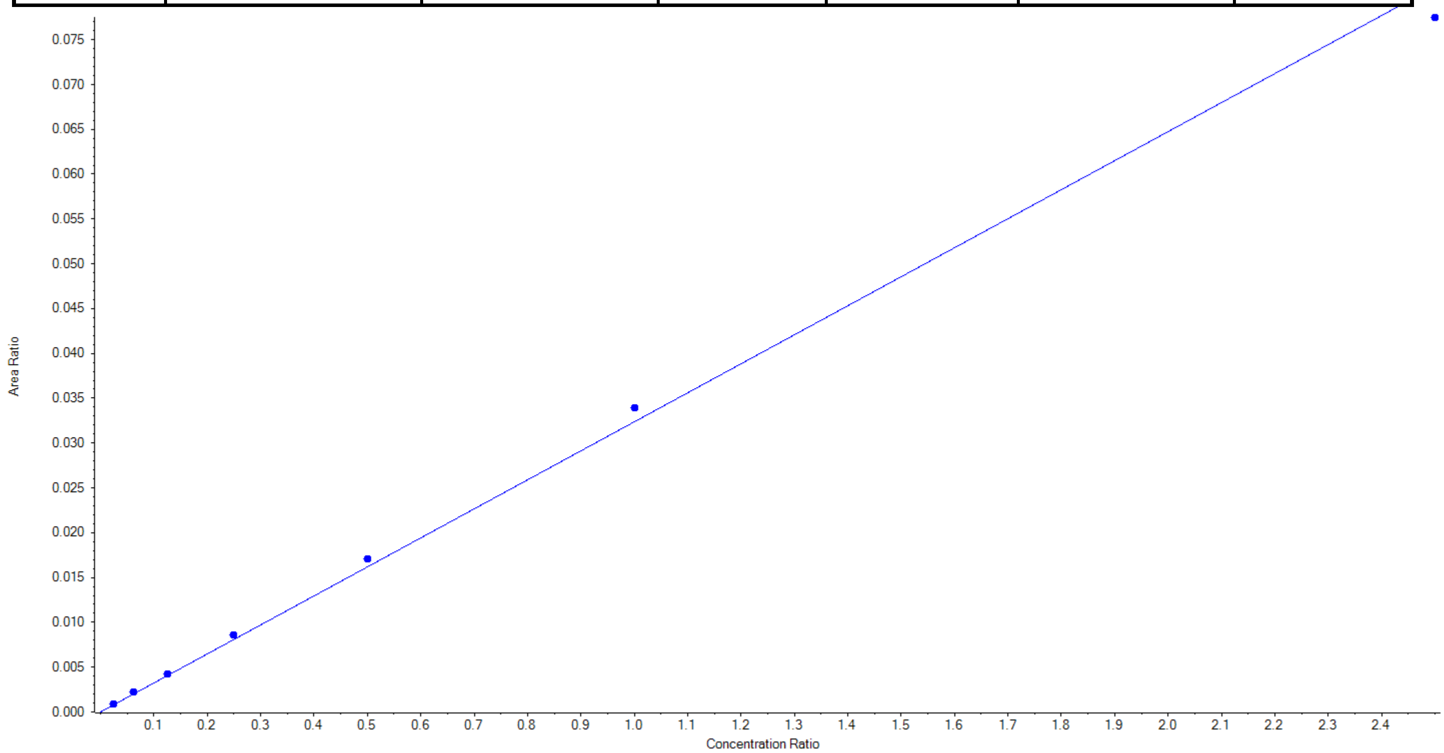
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	347.43	139.0
3	LD95	L2	True	625.00	760.76	121.7
4	LD96	L3	True	1250.00	1511.37	120.9
5	LD97	L4	True	2500.00	2817.74	112.7
6	LD98	L5	True	5000.00	5594.84	111.9
7	LD99	L6	True	10000.00	10381.94	103.8
8	LE01	L7	True	25000.00	23210.92	92.8



Analyte Name	PFHpA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	363.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.03237 x (r = 0.99898) (weighting: 1 / x) r^2:0.9980

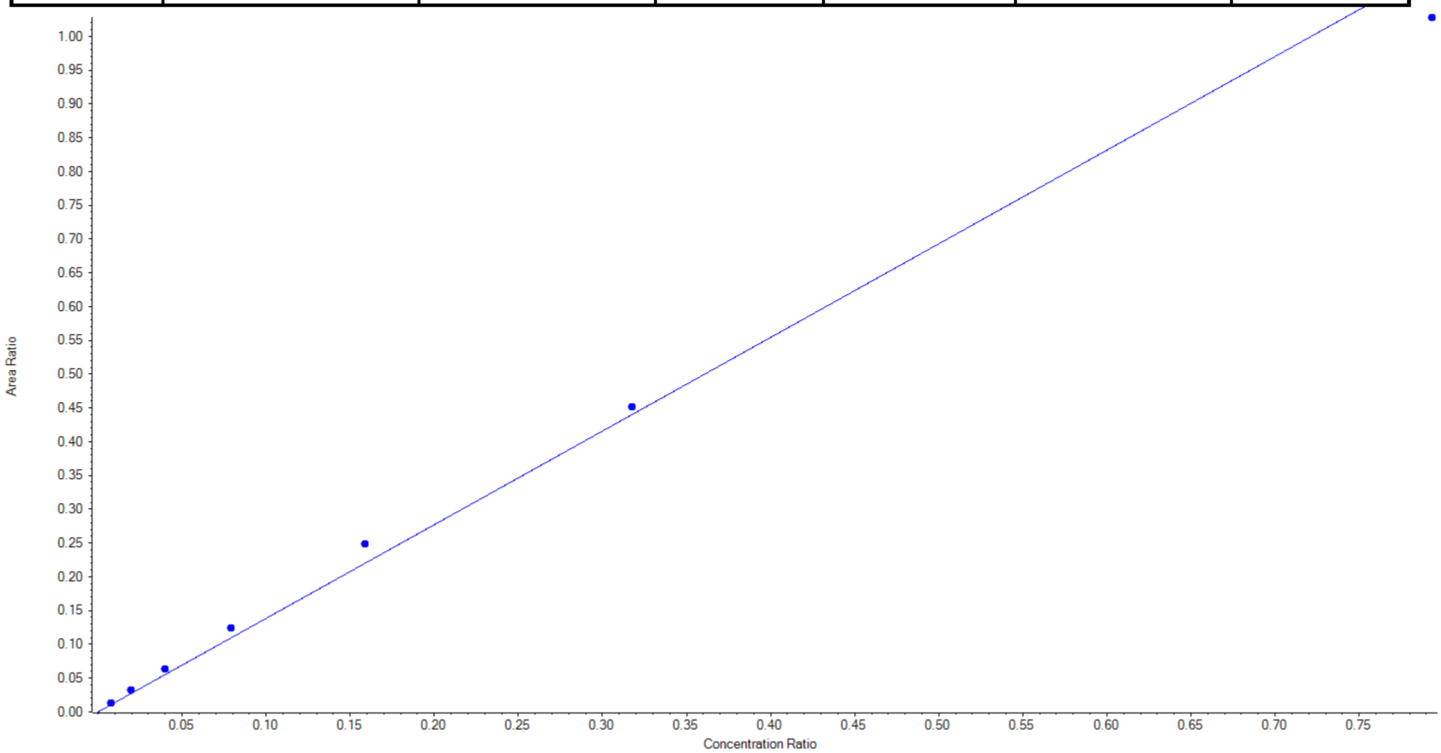
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	290.69	116.3
3	LD95	L2	True	625.00	702.34	112.4
4	LD96	L3	True	1250.00	1325.12	106.0
5	LD97	L4	True	2500.00	2644.82	105.8
6	LD98	L5	True	5000.00	5261.24	105.2
7	LD99	L6	True	10000.00	10469.10	104.7
8	LE01	L7	True	25000.00	23931.69	95.7



Analyte Name	PFHxS_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	399.0 / 80.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.38631 x (r = 0.99708) (weighting: 1 / x) r^2:0.9942

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	228.00	267.71	117.4
3	LD95	L2	True	570.00	689.61	121.0
4	LD96	L3	True	1140.00	1307.98	114.7
5	LD97	L4	True	2280.00	2587.79	113.5
6	LD98	L5	True	4560.00	5160.09	113.2
7	LD99	L6	True	9120.00	9370.93	102.8
8	LE01	L7	True	22800.00	21313.89	93.5



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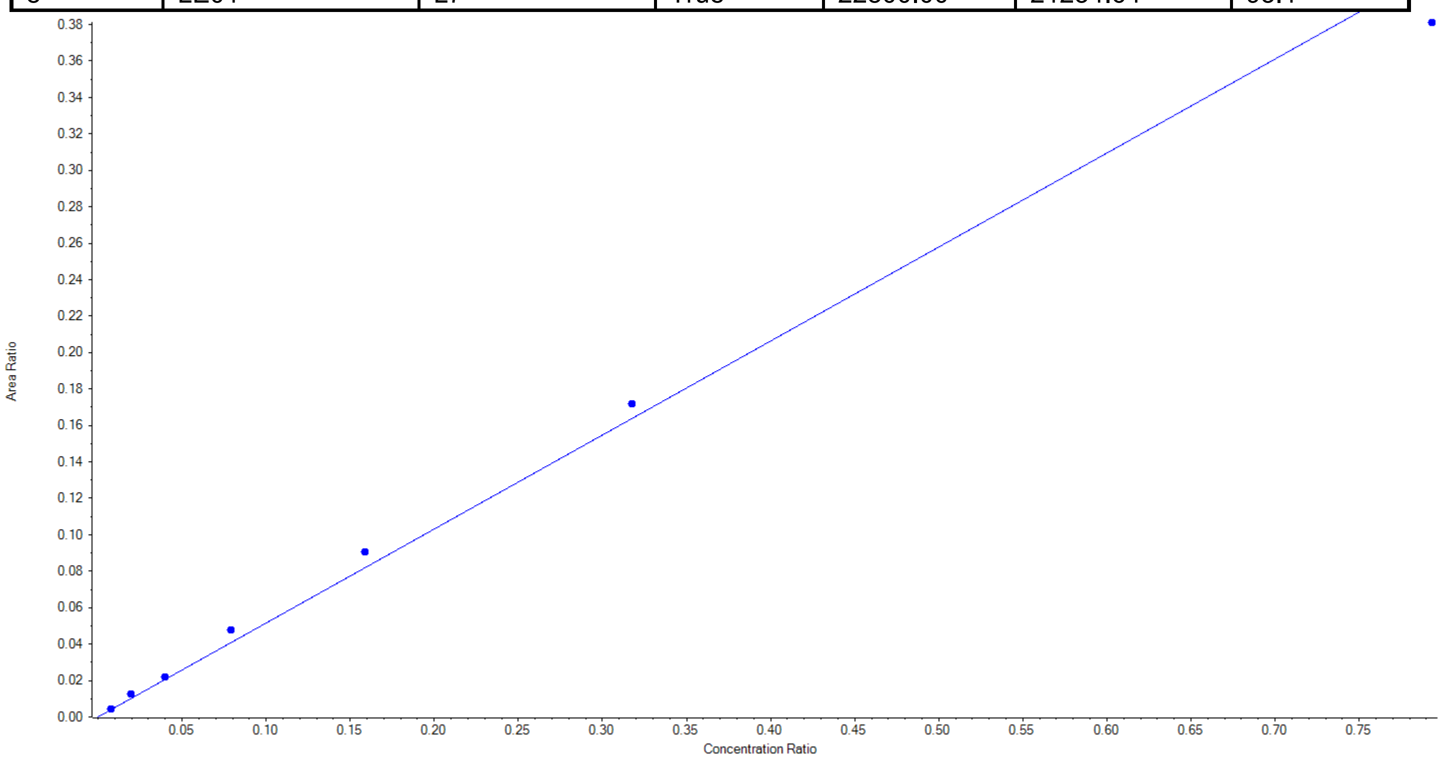
Analyte Name	PFHxS_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	399.0 / 99.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.51584 x (r = 0.99669) (weighting: 1 / x) r^2:0.9934

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	228.00	250.15	109.7
3	LD95	L2	True	570.00	693.86	121.7
4	LD96	L3	True	1140.00	1210.22	106.2
5	LD97	L4	True	2280.00	2654.15	116.4
6	LD98	L5	True	4560.00	5063.23	111.0
7	LD99	L6	True	9120.00	9591.74	105.2
8	LE01	L7	True	22800.00	21234.64	93.1



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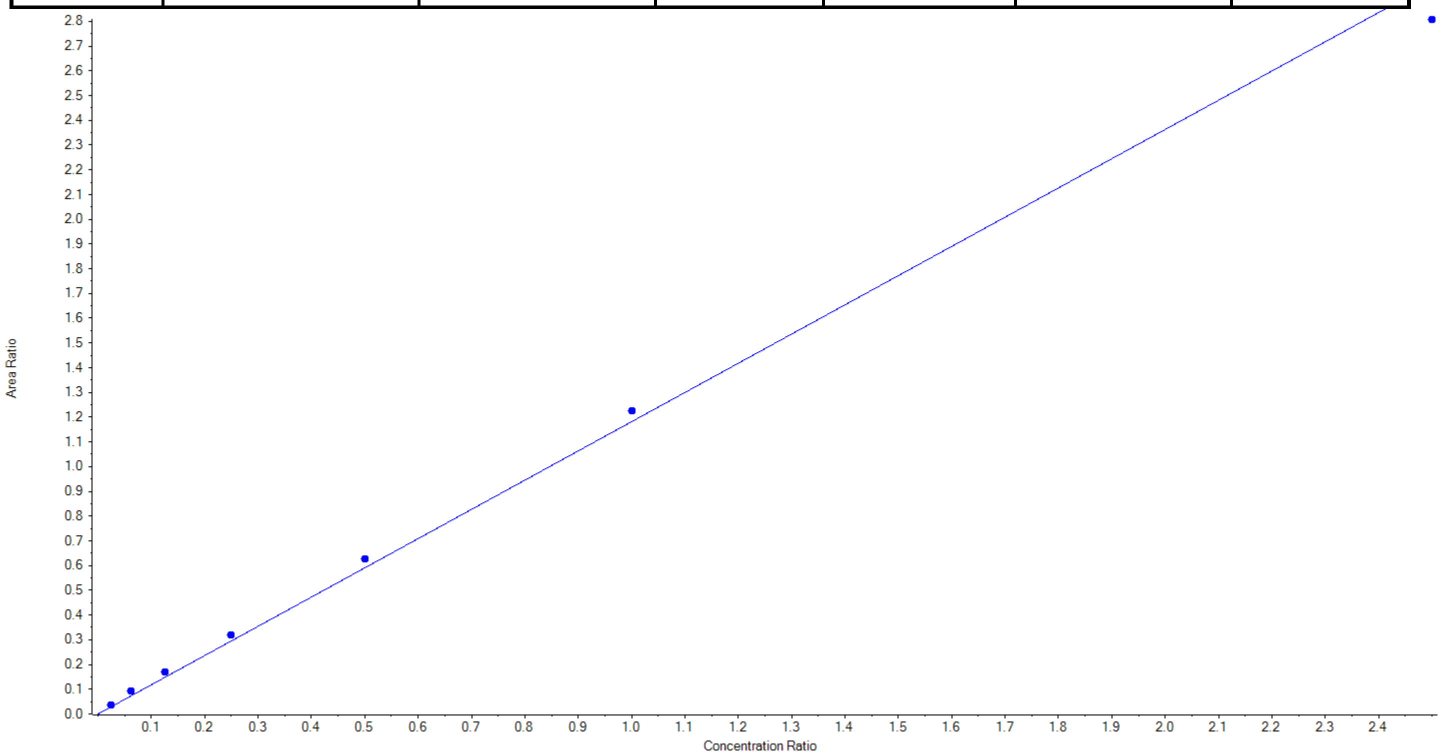
Analyte Name	PFOA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	413.0 / 369.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.18155 x (r = 0.99864) (weighting: 1 / x) r^2:0.9973

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	296.57	118.6
3	LD95	L2	True	625.00	781.76	125.1
4	LD96	L3	True	1250.00	1431.75	114.5
5	LD97	L4	True	2500.00	2690.65	107.6
6	LD98	L5	True	5000.00	5303.41	106.1
7	LD99	L6	True	10000.00	10359.51	103.6
8	LE01	L7	True	25000.00	23761.34	95.1



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Calibration Summary Report

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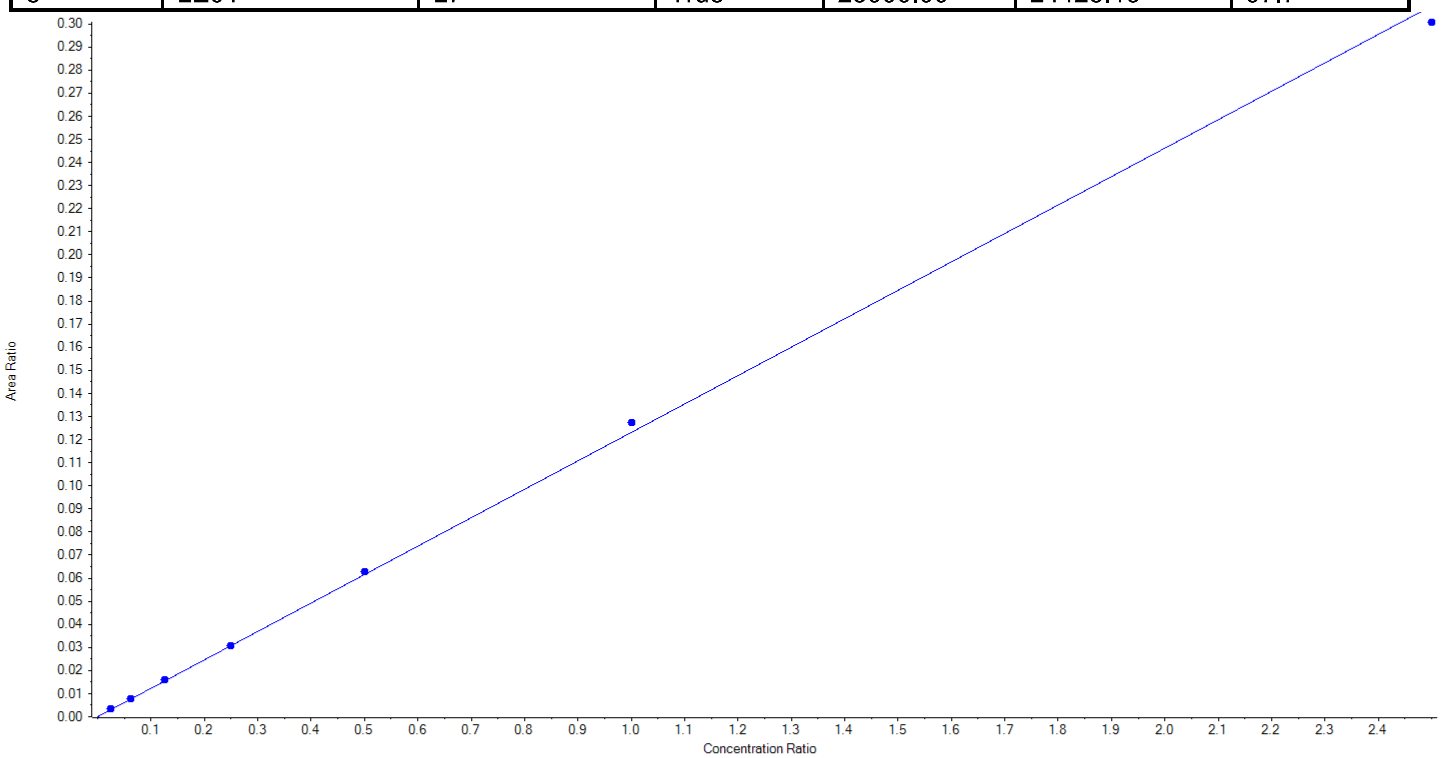
Analyte Name	PFOA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	413.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.12311 x (r = 0.99963) (weighting: 1 / x) r^2:0.9993

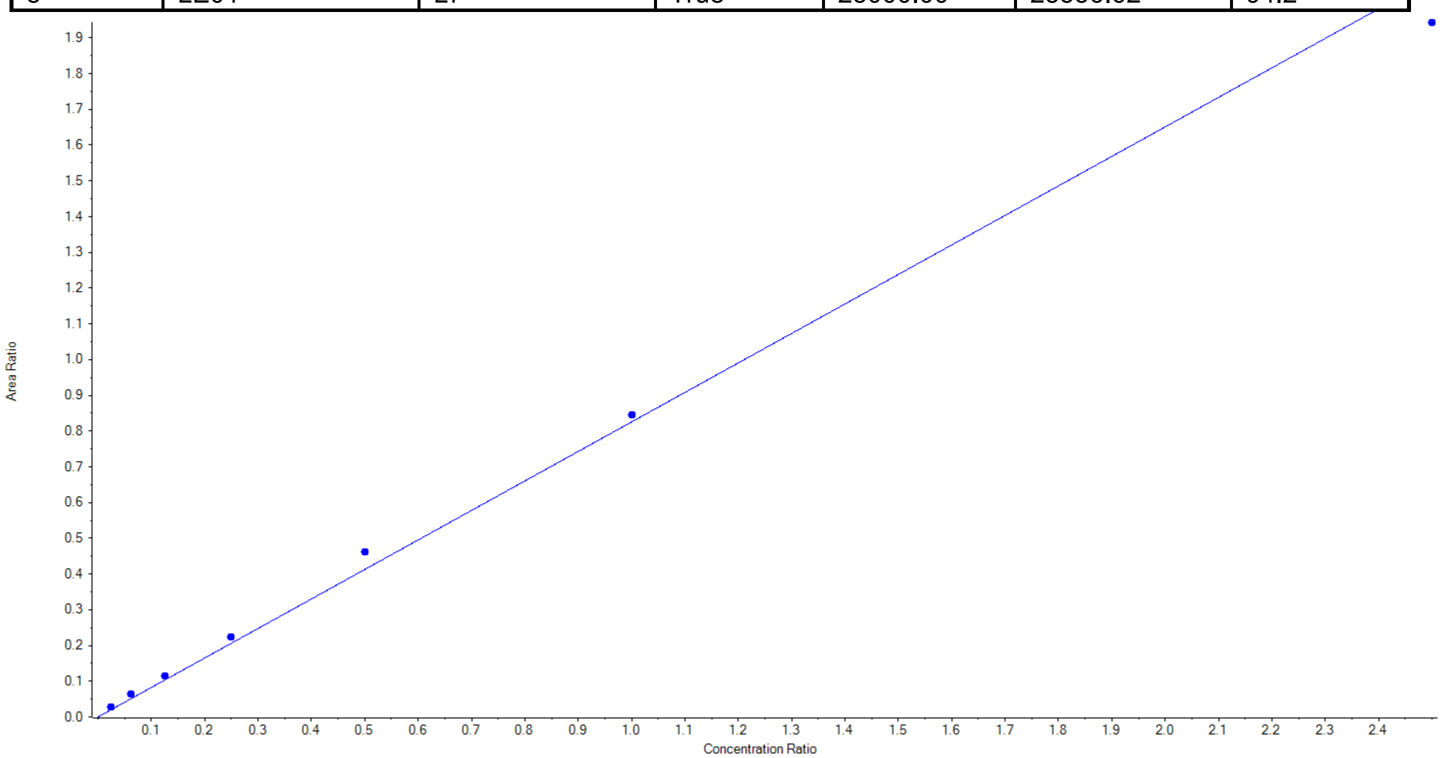
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	267.10	106.8
3	LD95	L2	True	625.00	635.05	101.6
4	LD96	L3	True	1250.00	1319.10	105.5
5	LD97	L4	True	2500.00	2515.88	100.6
6	LD98	L5	True	5000.00	5118.92	102.4
7	LD99	L6	True	10000.00	10343.76	103.4
8	LE01	L7	True	25000.00	24425.19	97.7



Analyte Name	PFNA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	463.0 / 419.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.82549 x (r = 0.99797) (weighting: 1 / x) r^2:0.9959

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	324.87	130.0
3	LD95	L2	True	625.00	793.14	126.9
4	LD96	L3	True	1250.00	1404.13	112.3
5	LD97	L4	True	2500.00	2724.35	109.0
6	LD98	L5	True	5000.00	5604.66	112.1
7	LD99	L6	True	10000.00	10237.23	102.4
8	LE01	L7	True	25000.00	23536.62	94.2



Calibration Summary Report

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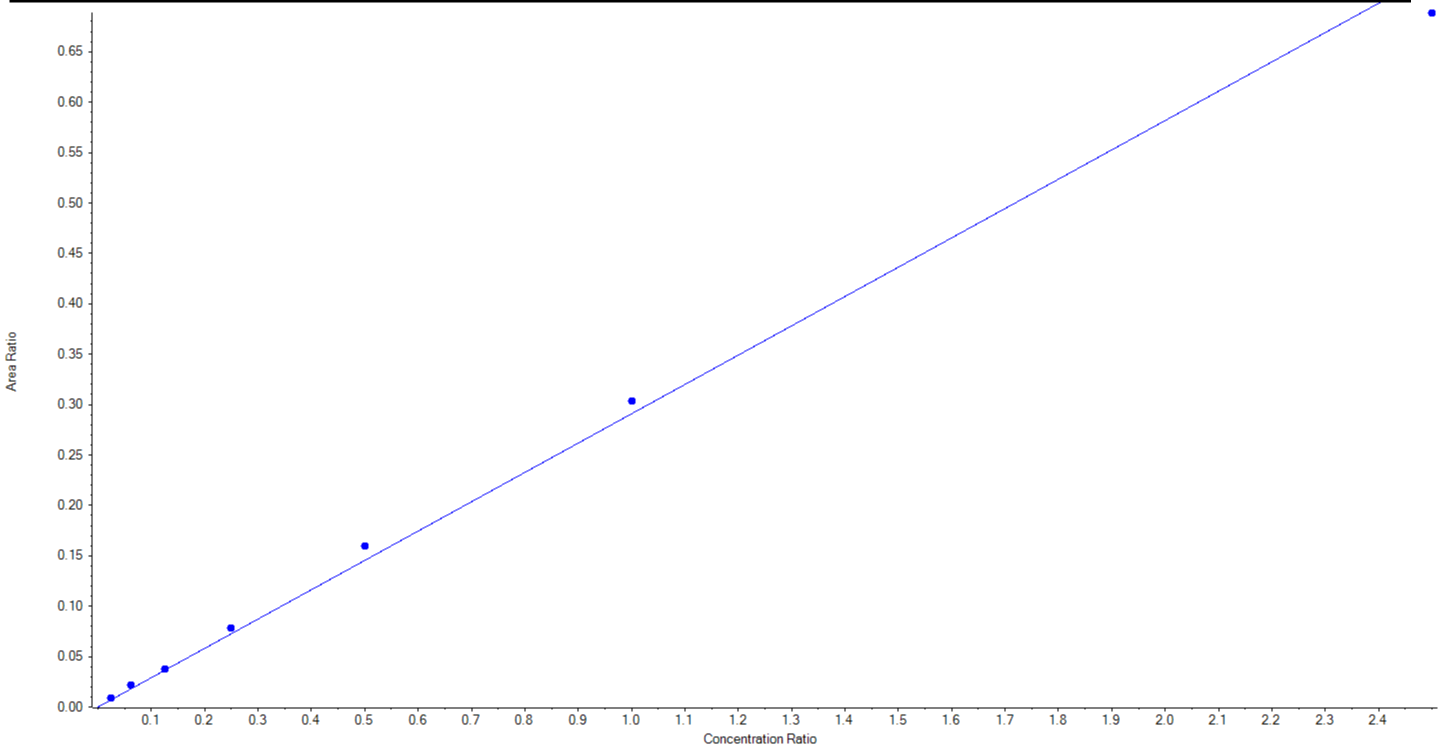
Analyte Name	PFNA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	463.0 / 219.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.29088\ x\ (r = 0.99830)$ (weighting: 1 / x) r^2:0.9966

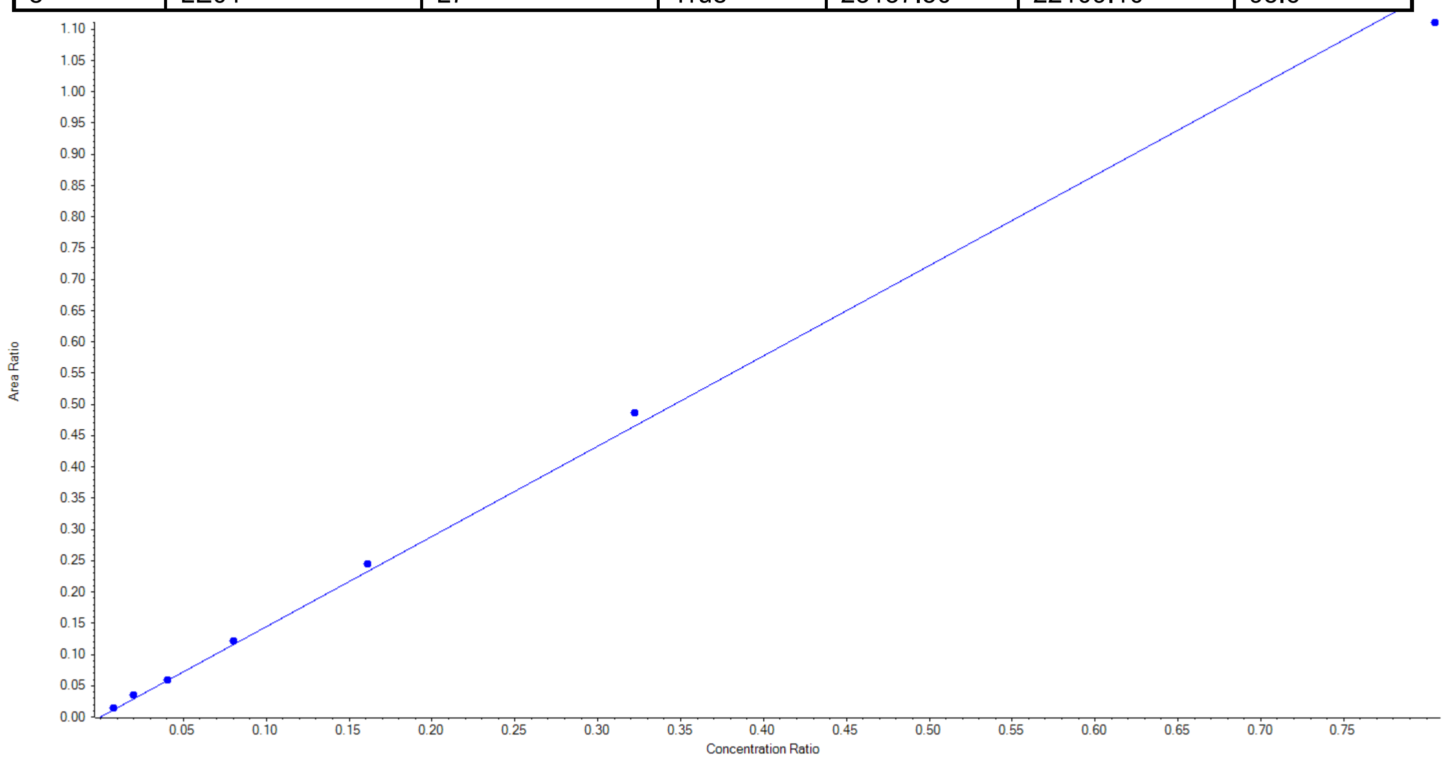
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	308.71	123.5
3	LD95	L2	True	625.00	746.71	119.5
4	LD96	L3	True	1250.00	1298.76	103.9
5	LD97	L4	True	2500.00	2695.23	107.8
6	LD98	L5	True	5000.00	5483.80	109.7
7	LD99	L6	True	10000.00	10425.57	104.3
8	LE01	L7	True	25000.00	23666.22	94.7



Analyte Name	PFOS_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	499.0 / 80.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.44393 x (r = 0.99887) (weighting: 1 / x) r^2:0.9977

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	231.25	281.71	121.8
3	LD95	L2	True	578.13	716.54	123.9
4	LD96	L3	True	1156.88	1192.42	103.1
5	LD97	L4	True	2313.75	2435.36	105.3
6	LD98	L5	True	4627.50	4876.20	105.4
7	LD99	L6	True	9255.00	9688.68	104.7
8	LE01	L7	True	23137.50	22109.10	95.6



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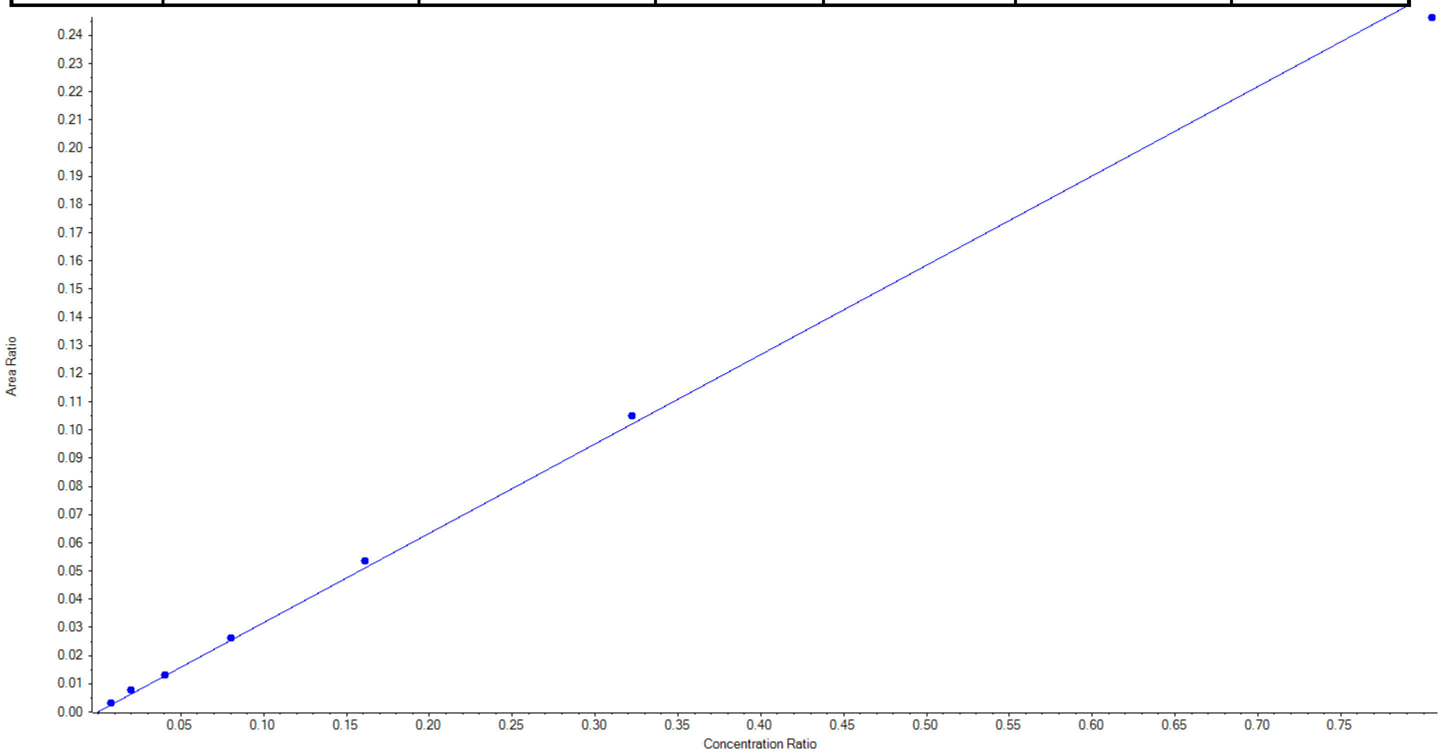
Analyte Name	PFOS_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	499.0 / 99.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.31689 x (r = 0.99933) (weighting: 1 / x) r^2:0.9987

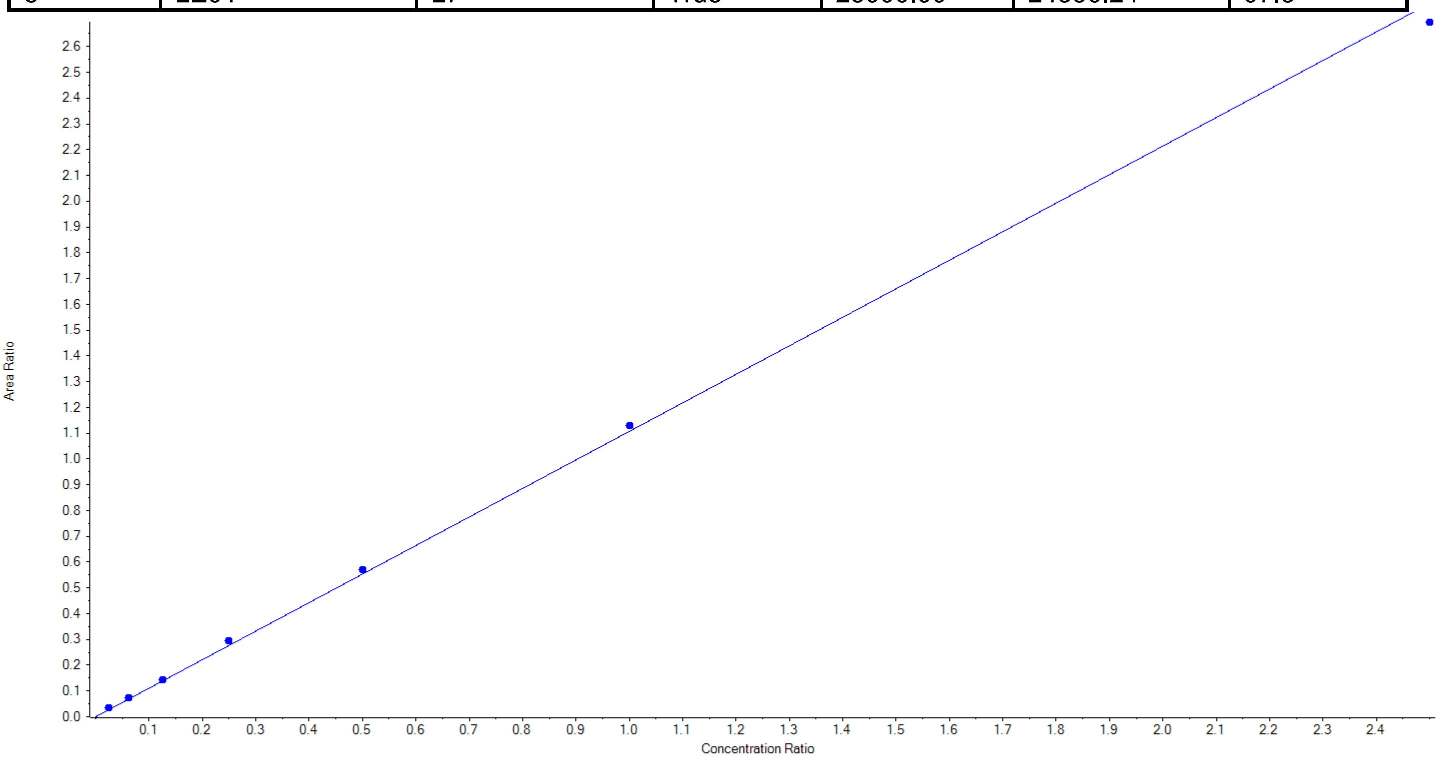
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	231.25	278.48	120.4
3	LD95	L2	True	578.13	712.12	123.2
4	LD96	L3	True	1156.88	1198.59	103.6
5	LD97	L4	True	2313.75	2383.58	103.0
6	LD98	L5	True	4627.50	4859.43	105.0
7	LD99	L6	True	9255.00	9529.64	103.0
8	LE01	L7	True	23137.50	22338.16	96.6



Analyte Name	PFDA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	513.0 / 469.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.10717 x (r = 0.99965) (weighting: 1 / x) r^2:0.9993

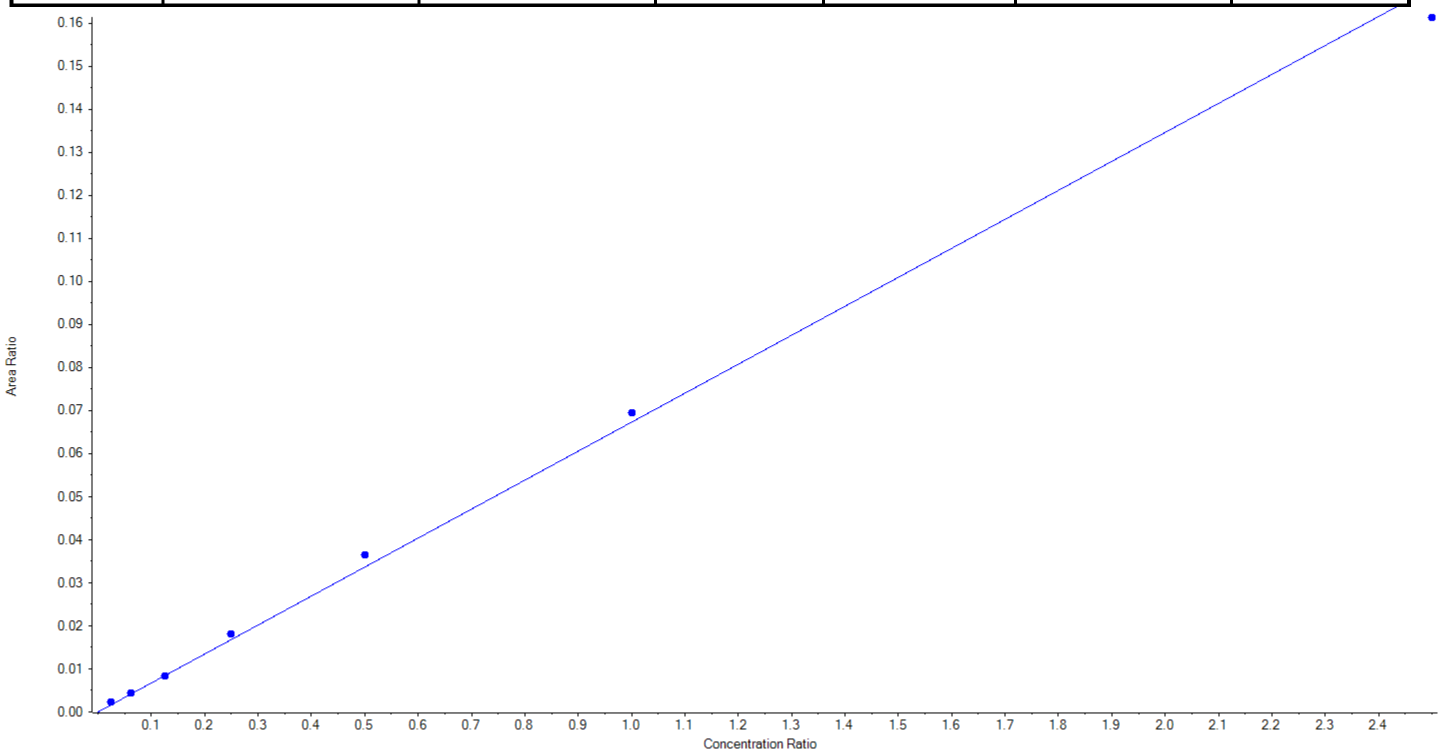
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	300.25	120.1
3	LD95	L2	True	625.00	661.02	105.8
4	LD96	L3	True	1250.00	1311.00	104.9
5	LD97	L4	True	2500.00	2654.00	106.2
6	LD98	L5	True	5000.00	5144.66	102.9
7	LD99	L6	True	10000.00	10217.84	102.2
8	LE01	L7	True	25000.00	24336.24	97.3



Analyte Name	PFDA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	513.0 / 219.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.06732 x (r = 0.99878) (weighting: 1 / x) r^2:0.9976

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	333.39	133.4
3	LD95	L2	True	625.00	638.86	102.2
4	LD96	L3	True	1250.00	1249.98	100.0
5	LD97	L4	True	2500.00	2689.57	107.6
6	LD98	L5	True	5000.00	5428.86	108.6
7	LD99	L6	True	10000.00	10320.49	103.2
8	LE01	L7	True	25000.00	23963.85	95.9



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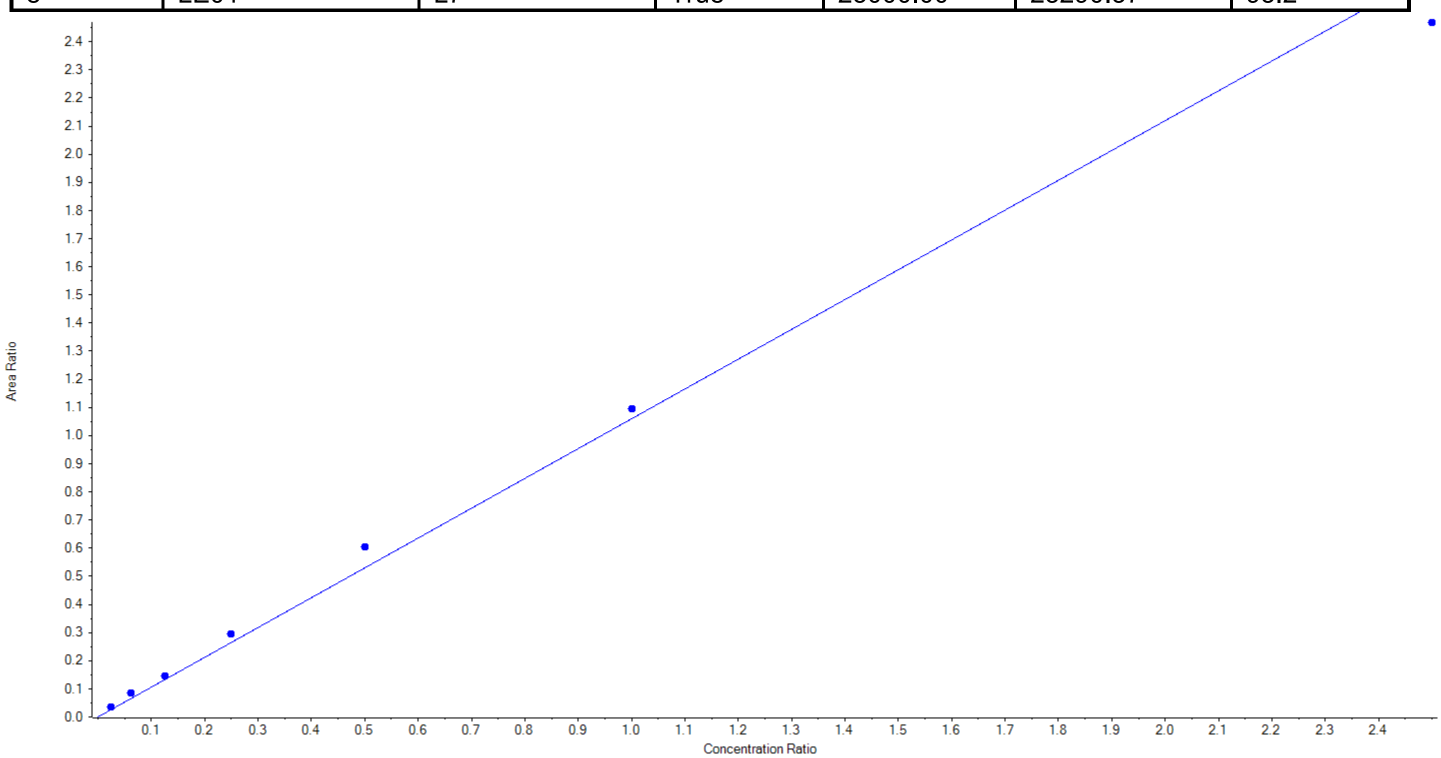
Analyte Name	PFUnA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	563.0 / 519.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.05983 x (r = 0.99710) (weighting: 1 / x) r^2:0.9942

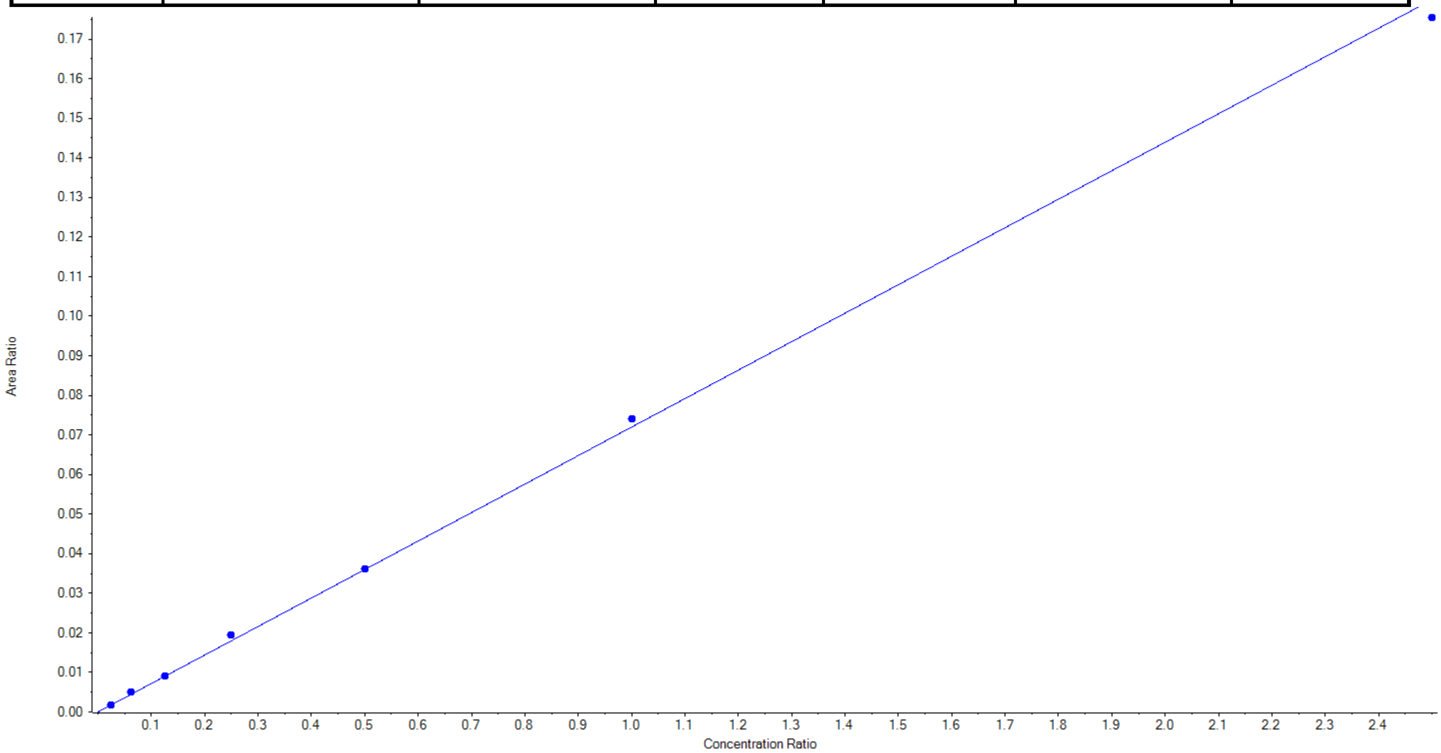
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	326.26	130.5
3	LD95	L2	True	625.00	799.48	127.9
4	LD96	L3	True	1250.00	1384.44	110.8
5	LD97	L4	True	2500.00	2798.51	111.9
6	LD98	L5	True	5000.00	5705.65	114.1
7	LD99	L6	True	10000.00	10320.30	103.2
8	LE01	L7	True	25000.00	23290.37	93.2



Analyte Name	PFUnA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	563.0 / 269.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.07197 x (r = 0.99945) (weighting: 1 / x) r^2:0.9989

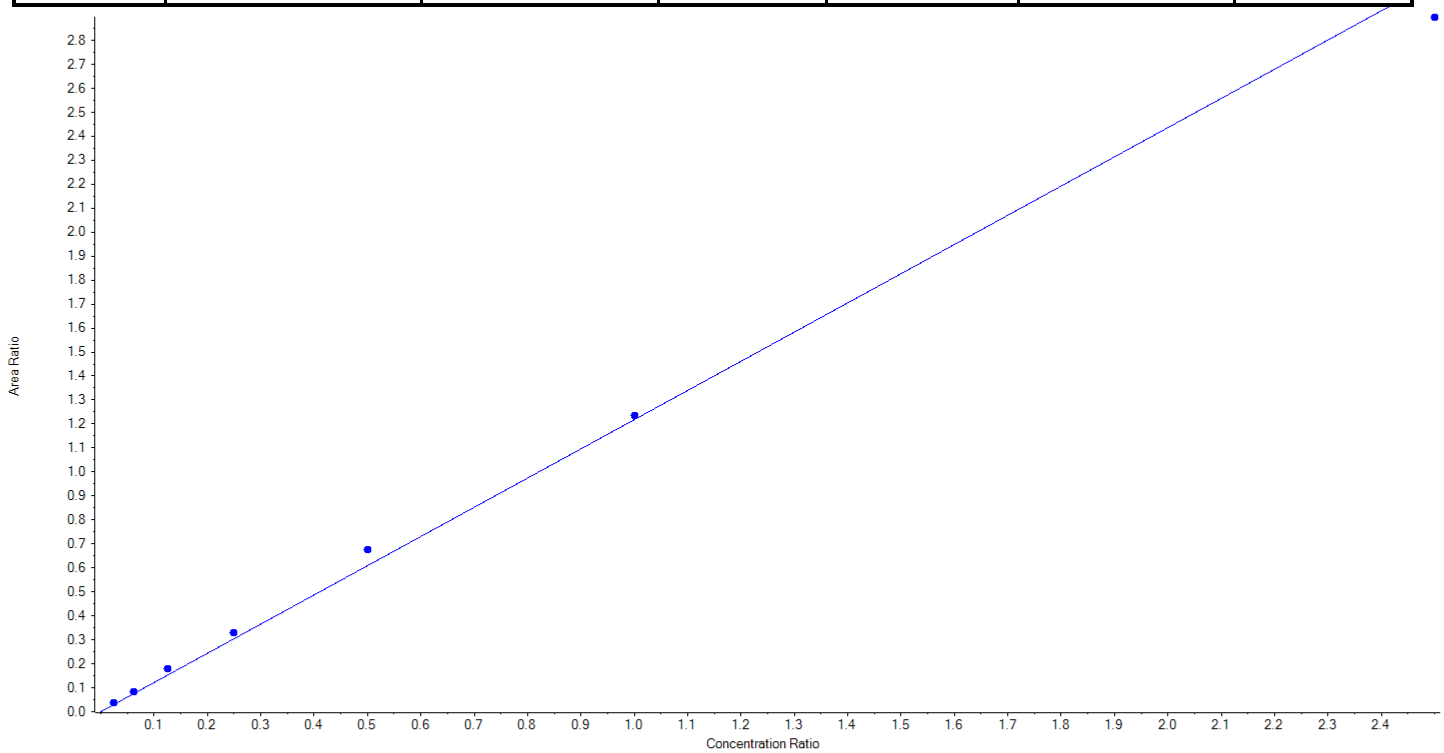
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	260.51	104.2
3	LD95	L2	True	625.00	694.04	111.1
4	LD96	L3	True	1250.00	1251.35	100.1
5	LD97	L4	True	2500.00	2721.62	108.9
6	LD98	L5	True	5000.00	5032.36	100.7
7	LD99	L6	True	10000.00	10287.85	102.9
8	LE01	L7	True	25000.00	24377.27	97.5



Analyte Name	PFDoA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	613.0 / 569.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 1.21799\ x$ ($r = 0.99837$) (weighting: $1 / x$) r^2:0.9967

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	310.98	124.4
3	LD95	L2	True	625.00	692.30	110.8
4	LD96	L3	True	1250.00	1456.44	116.5
5	LD97	L4	True	2500.00	2692.12	107.7
6	LD98	L5	True	5000.00	5546.65	110.9
7	LD99	L6	True	10000.00	10149.93	101.5
8	LE01	L7	True	25000.00	23776.58	95.1



Calibration Summary Report

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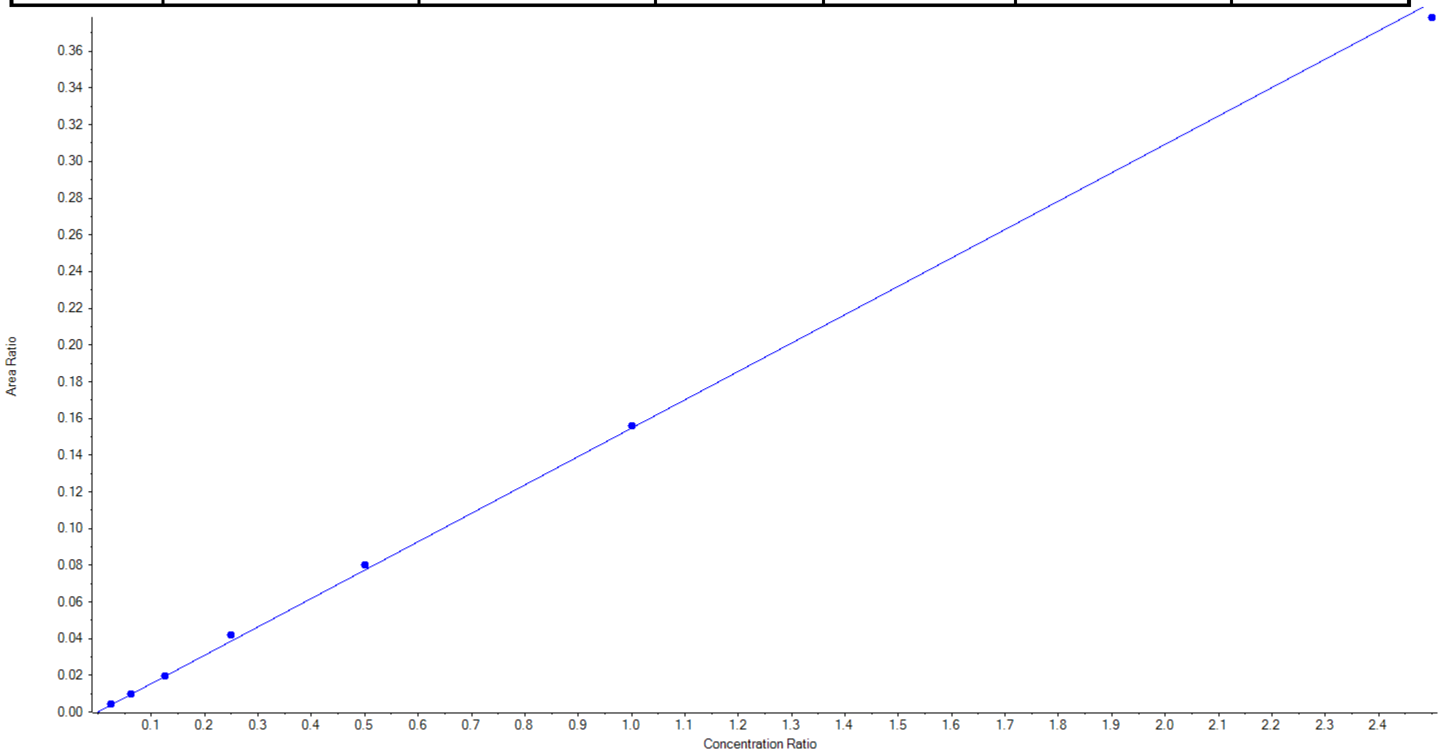
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFDoA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	613.0 / 319.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.15466\,x$ ($r = 0.99961$) (weighting: $1 / x$) r^2:0.9992

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	275.48	110.2
3	LD95	L2	True	625.00	635.46	101.7
4	LD96	L3	True	1250.00	1281.20	102.5
5	LD97	L4	True	2500.00	2712.82	108.5
6	LD98	L5	True	5000.00	5168.33	103.4
7	LD99	L6	True	10000.00	10083.60	100.8
8	LE01	L7	True	25000.00	24468.12	97.9



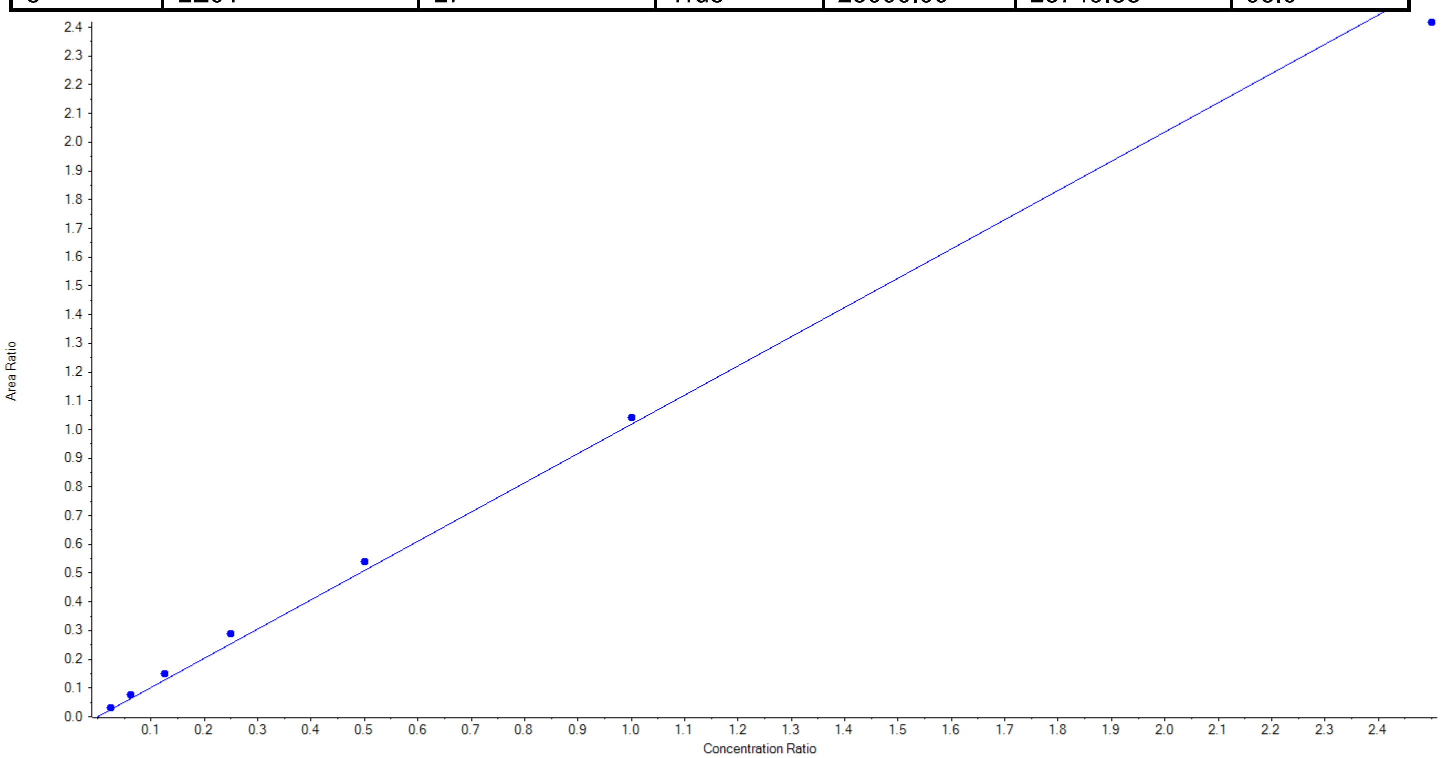
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFTrDA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	663.0 / 619.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.01789 x (r = 0.99863) (weighting: 1 / x) r^2:0.9973

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	318.14	127.3
3	LD95	L2	True	625.00	751.77	120.3
4	LD96	L3	True	1250.00	1460.41	116.8
5	LD97	L4	True	2500.00	2825.65	113.0
6	LD98	L5	True	5000.00	5294.72	105.9
7	LD99	L6	True	10000.00	10224.42	102.2
8	LE01	L7	True	25000.00	23749.88	95.0



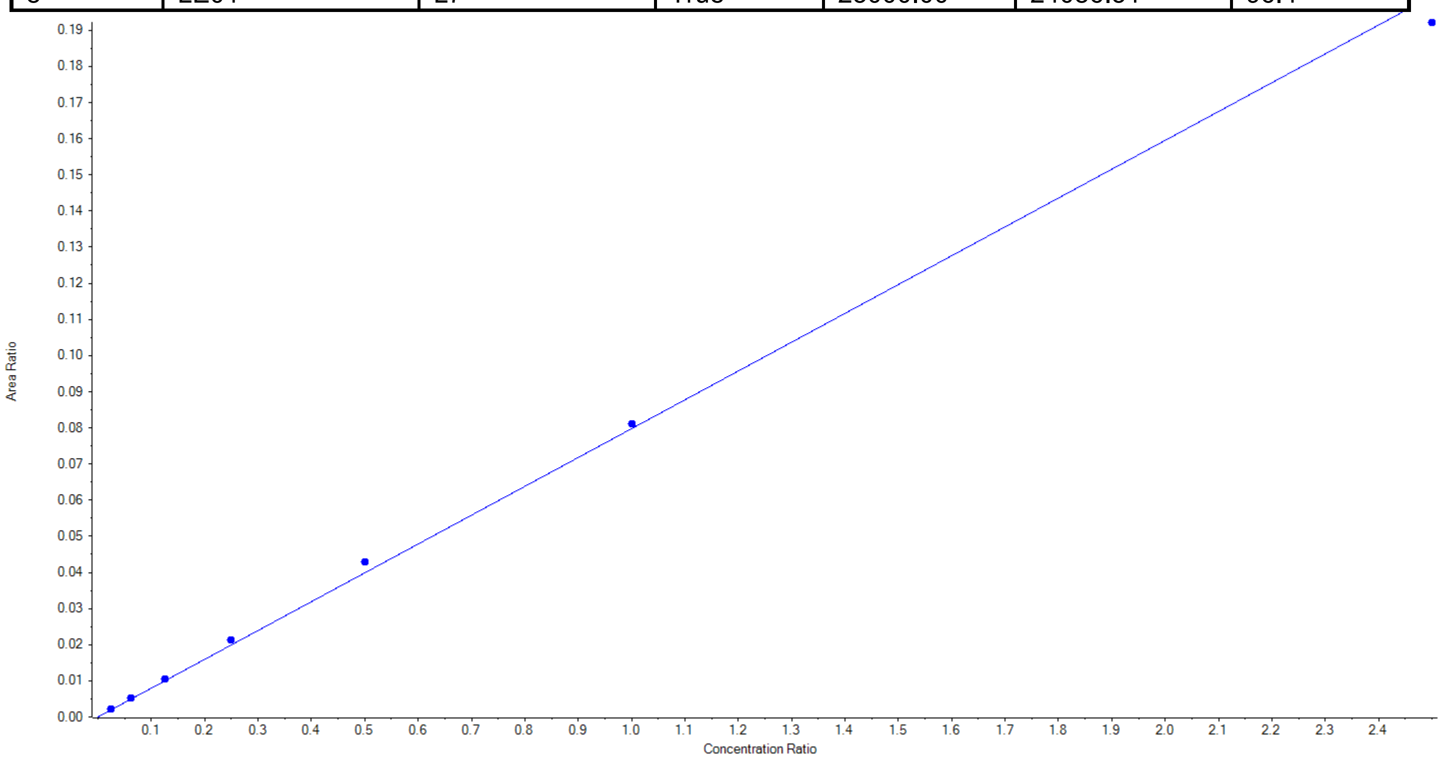
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFTrDA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	663.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.07977\ x$ ($r = 0.99910$) (weighting: $1 / x$) r^2:0.9982

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	289.27	115.7
3	LD95	L2	True	625.00	660.86	105.7
4	LD96	L3	True	1250.00	1332.59	106.6
5	LD97	L4	True	2500.00	2684.35	107.4
6	LD98	L5	True	5000.00	5395.76	107.9
7	LD99	L6	True	10000.00	10175.65	101.8
8	LE01	L7	True	25000.00	24086.51	96.4



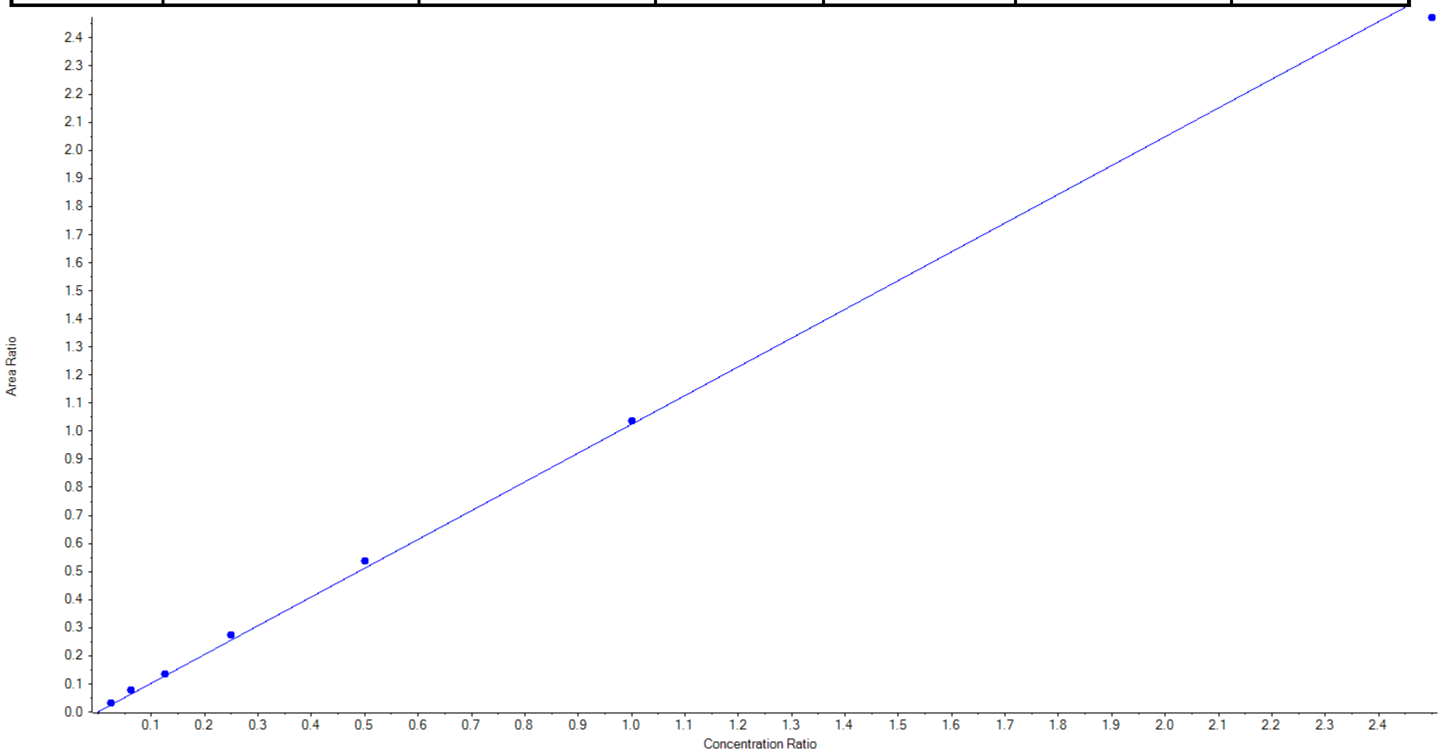
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFTeDA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	713.0 / 669.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.02422 x (r = 0.99950) (weighting: 1 / x) r^2:0.9990

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	328.47	131.4
3	LD95	L2	True	625.00	754.52	120.7
4	LD96	L3	True	1250.00	1326.54	106.1
5	LD97	L4	True	2500.00	2684.25	107.4
6	LD98	L5	True	5000.00	5259.75	105.2
7	LD99	L6	True	10000.00	10128.16	101.3
8	LE01	L7	True	25000.00	24143.31	96.6



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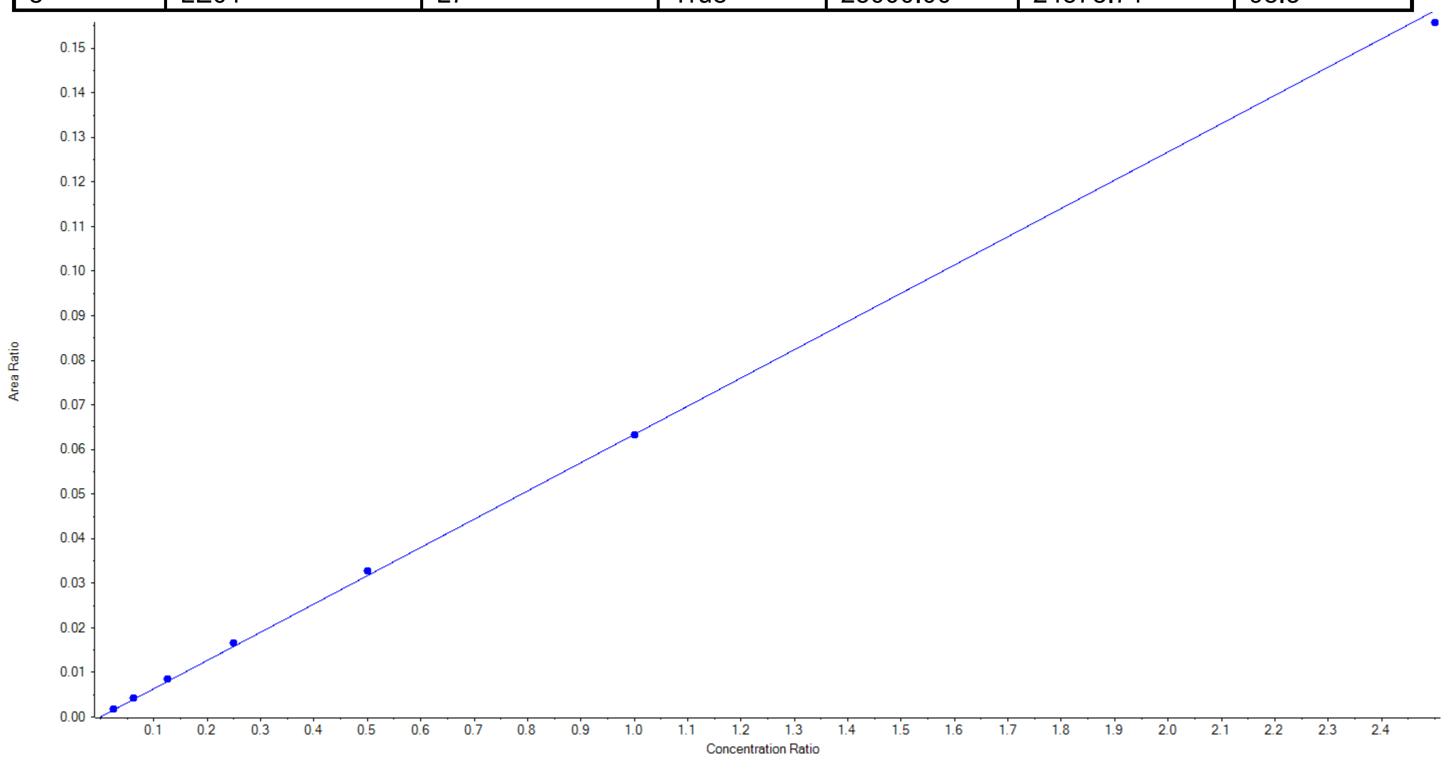
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	PFTeDA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	713.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.06338 x (r = 0.99986) (weighting: 1 / x) r^2:0.9997

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	293.73	117.5
3	LD95	L2	True	625.00	663.25	106.1
4	LD96	L3	True	1250.00	1328.88	106.3
5	LD97	L4	True	2500.00	2604.10	104.2
6	LD98	L5	True	5000.00	5158.19	103.2
7	LD99	L6	True	10000.00	9998.14	100.0
8	LE01	L7	True	25000.00	24578.71	98.3



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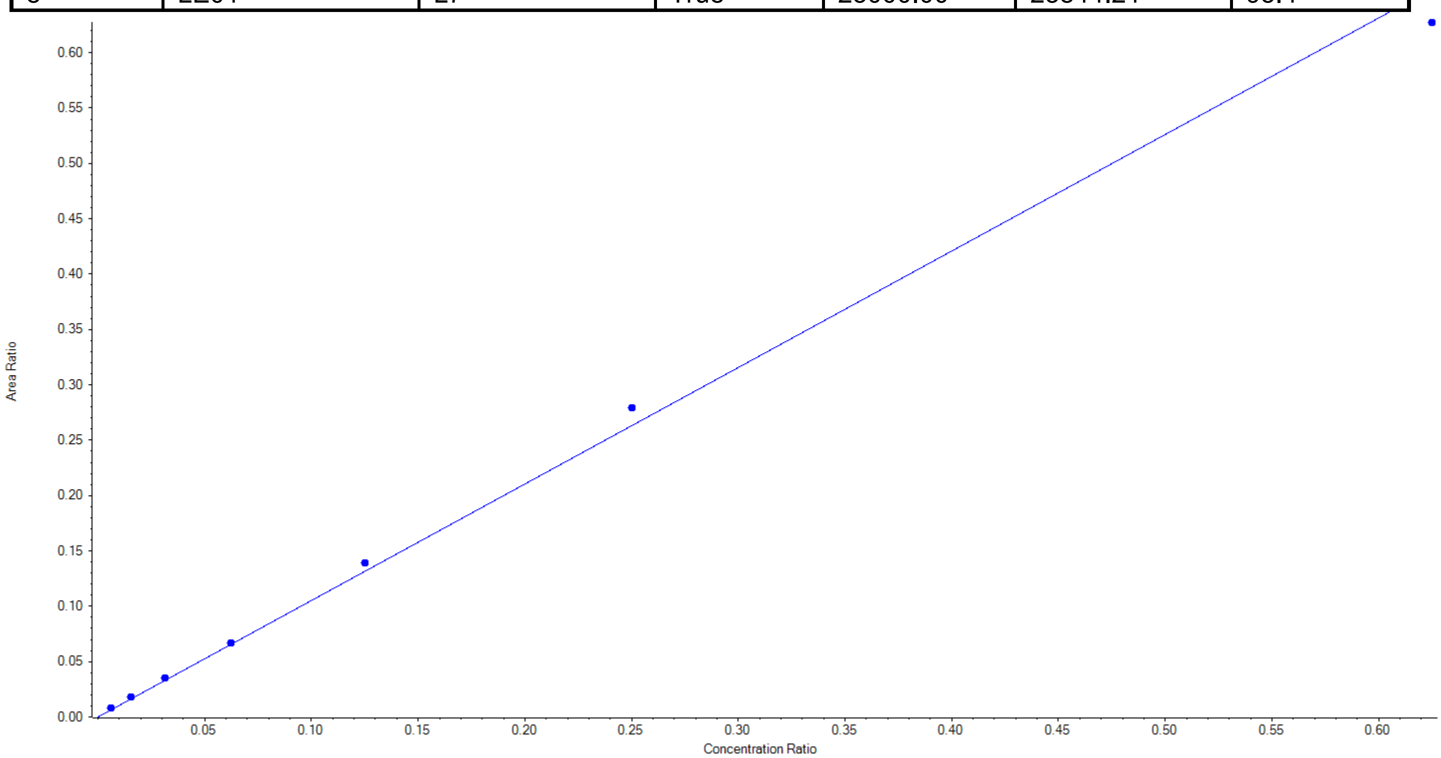
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	NMeFOSAA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	570.0 / 419.0	**Result Table**	20-1569_DW
Internal Standard	d3-MeFOSAA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.05225 x (r = 0.99868) (weighting: 1 / x) r^2:0.9974

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	305.65	122.3
3	LD95	L2	True	625.00	685.50	109.7
4	LD96	L3	True	1250.00	1339.83	107.2
5	LD97	L4	True	2500.00	2527.84	101.1
6	LD98	L5	True	5000.00	5299.33	106.0
7	LD99	L6	True	10000.00	10622.63	106.2
8	LE01	L7	True	25000.00	23844.21	95.4



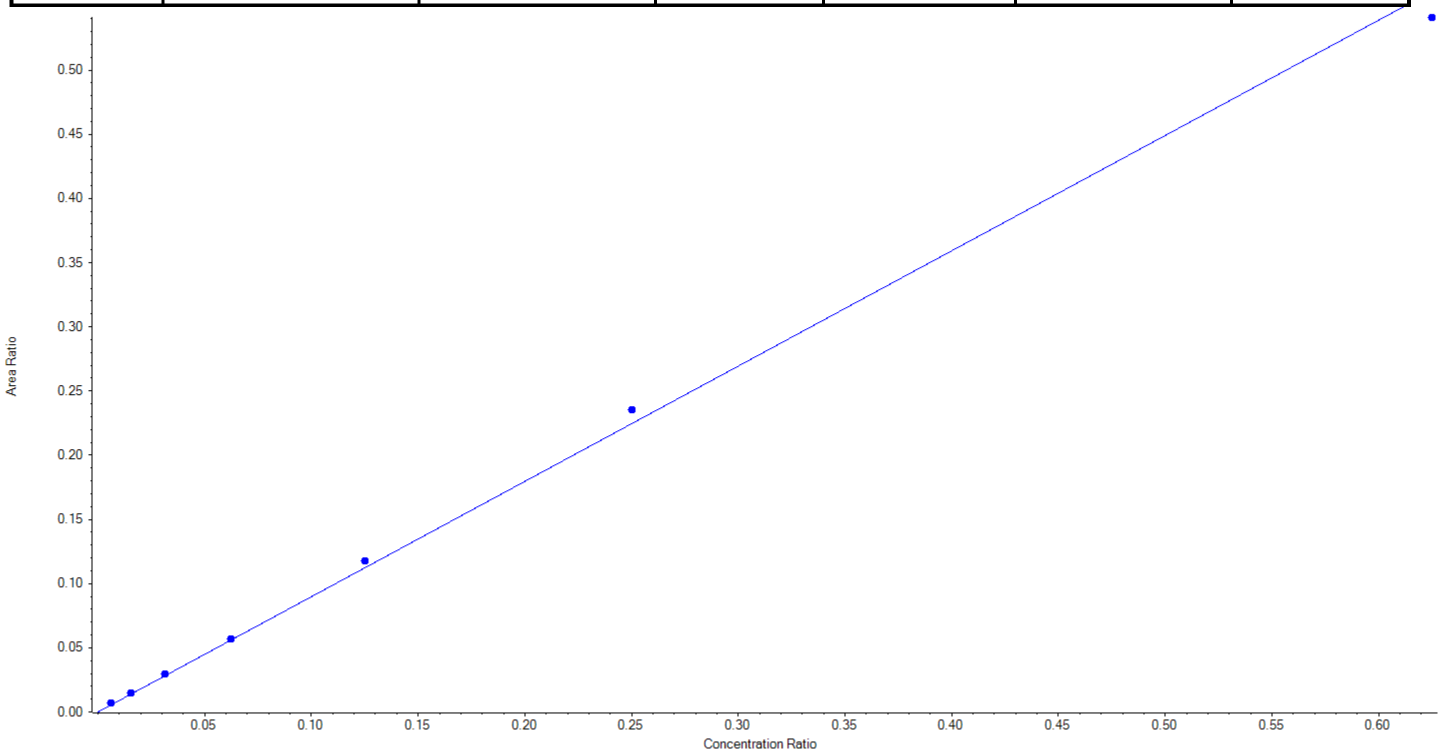
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	NMeFOSAA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	570.0 / 512.0	**Result Table**	20-1569_DW
Internal Standard	d3-MeFOSAA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.89809 x (r = 0.99921) (weighting: 1 / x) r^2:0.9984

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	310.91	124.4
3	LD95	L2	True	625.00	651.15	104.2
4	LD96	L3	True	1250.00	1311.10	104.9
5	LD97	L4	True	2500.00	2546.27	101.9
6	LD98	L5	True	5000.00	5242.50	104.9
7	LD99	L6	True	10000.00	10470.75	104.7
8	LE01	L7	True	25000.00	24092.32	96.4



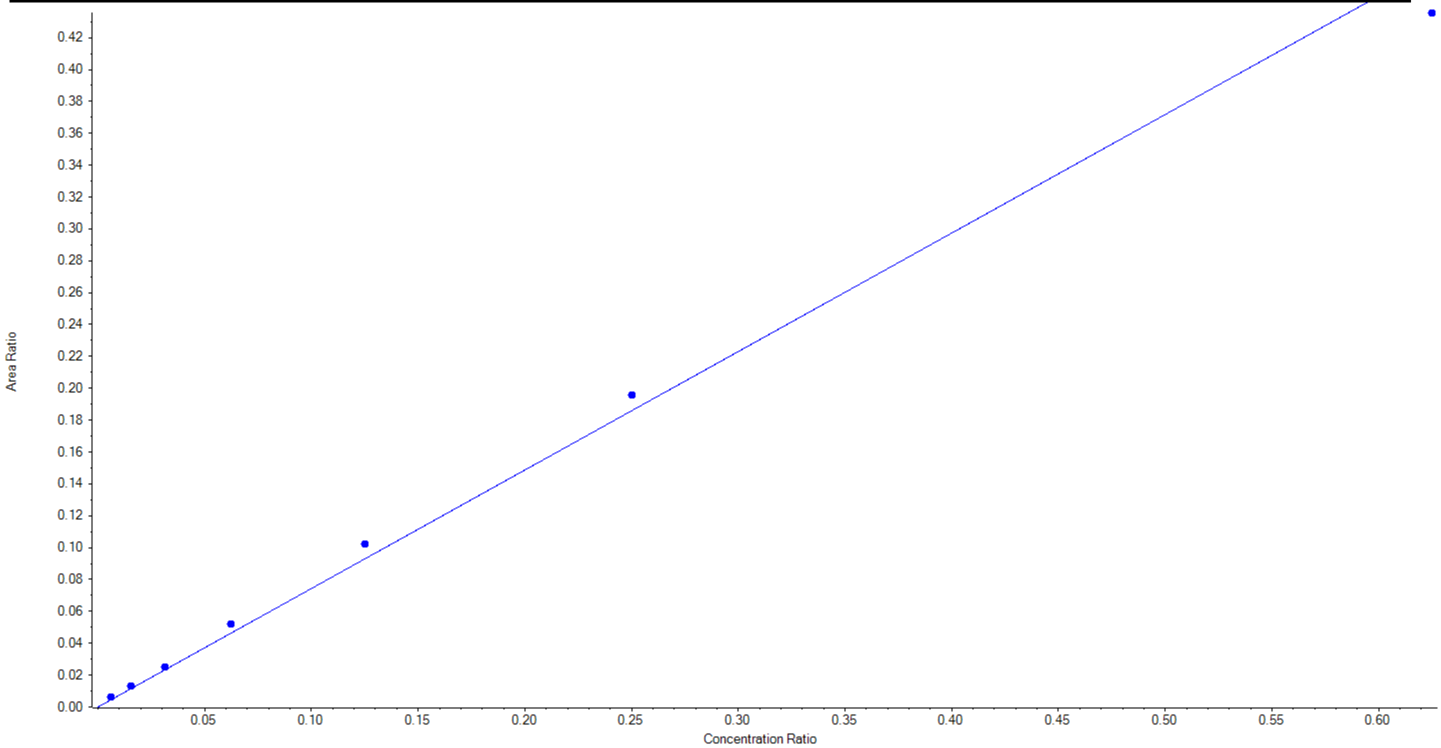
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	NEtFOSAA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	584.0 / 419.0	**Result Table**	20-1569_DW
Internal Standard	d3-MeFOSAA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.74351 x (r = 0.99774) (weighting: 1 / x) r^2:0.9955

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	328.85	131.5
3	LD95	L2	True	625.00	719.36	115.1
4	LD96	L3	True	1250.00	1334.59	106.8
5	LD97	L4	True	2500.00	2787.43	111.5
6	LD98	L5	True	5000.00	5509.73	110.2
7	LD99	L6	True	10000.00	10518.08	105.2
8	LE01	L7	True	25000.00	23426.96	93.7



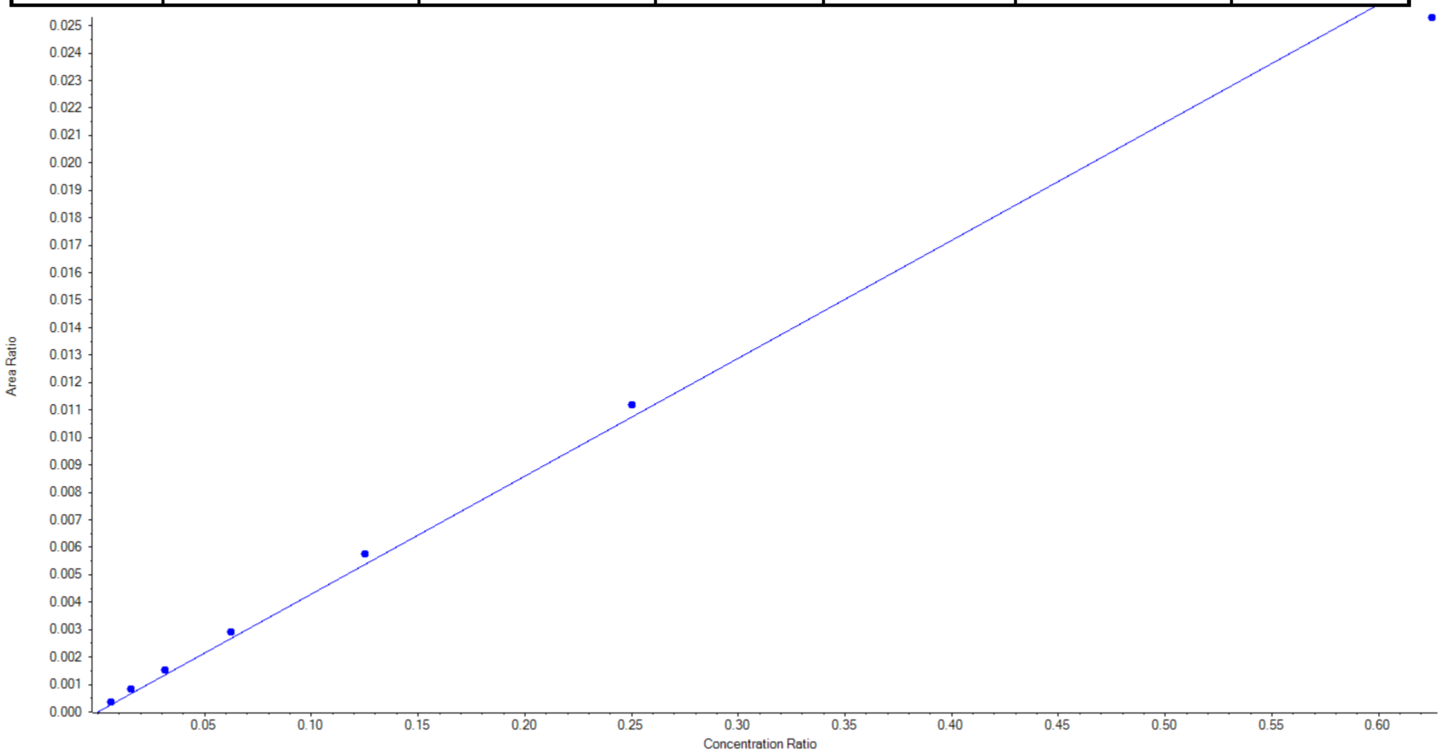
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	NEtFOSAA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	584.0 / 483.0	**Result Table**	20-1569_DW
Internal Standard	d3-MeFOSAA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.04295 x (r = 0.99856) (weighting: 1 / x) r^2:0.9971

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	354.02	141.6
3	LD95	L2	True	625.00	787.78	126.1
4	LD96	L3	True	1250.00	1436.41	114.9
5	LD97	L4	True	2500.00	2718.16	108.7
6	LD98	L5	True	5000.00	5363.64	107.3
7	LD99	L6	True	10000.00	10406.36	104.1
8	LE01	L7	True	25000.00	23558.63	94.2



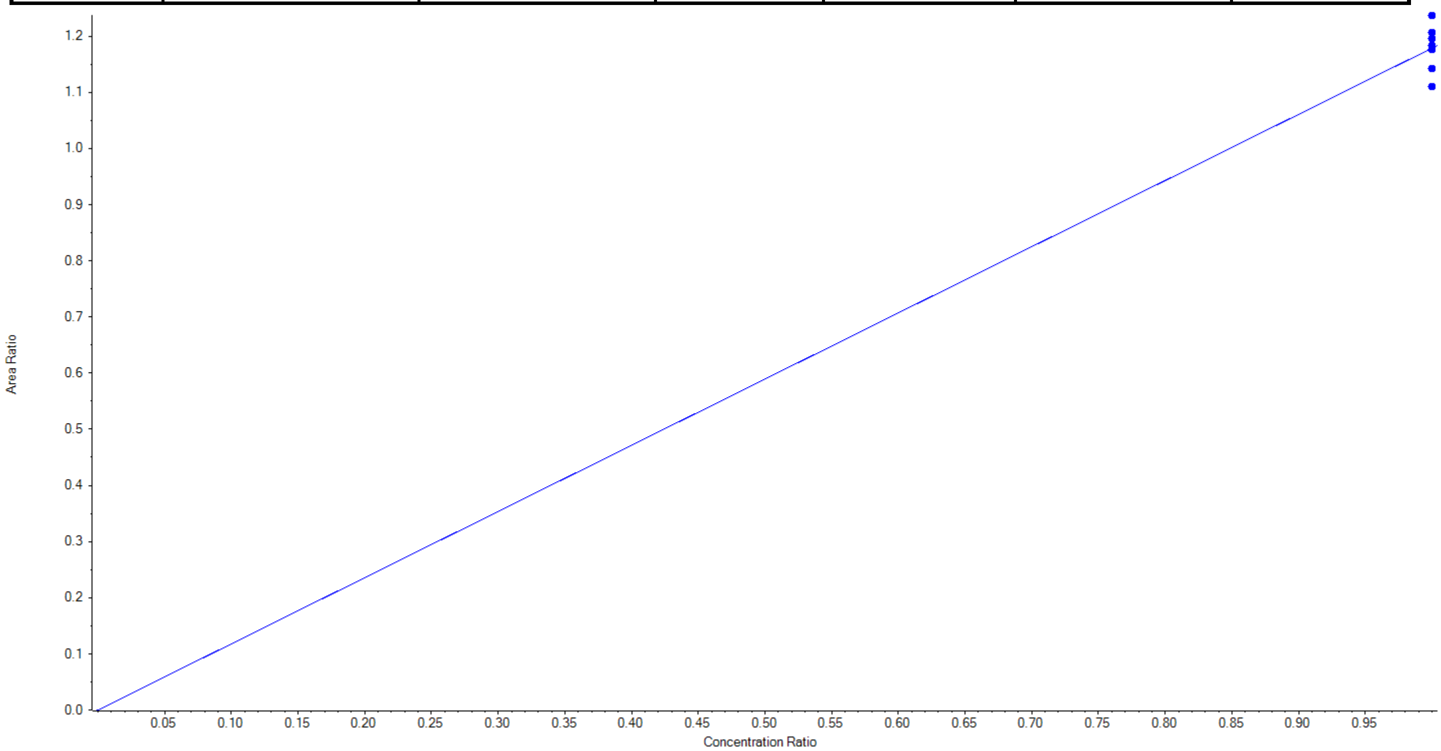
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	13C2-PFHxA	**Data File**	AE_12222020_5-371.wiff
MRM Transition	315.0 / 270.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.17861 x (std. dev. = 0.04204) (weighting: None) r^2:N/A

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	10000.00	9689.66	96.9
3	LD95	L2	True	10000.00	9412.61	94.1
4	LD96	L3	True	10000.00	10492.82	104.9
5	LD97	L4	True	10000.00	9983.65	99.8
6	LD98	L5	True	10000.00	10236.27	102.4
7	LD99	L6	True	10000.00	10147.32	101.5
8	LE01	L7	True	10000.00	10037.67	100.4



Calibration Summary Report

Created with Analyst Reporter
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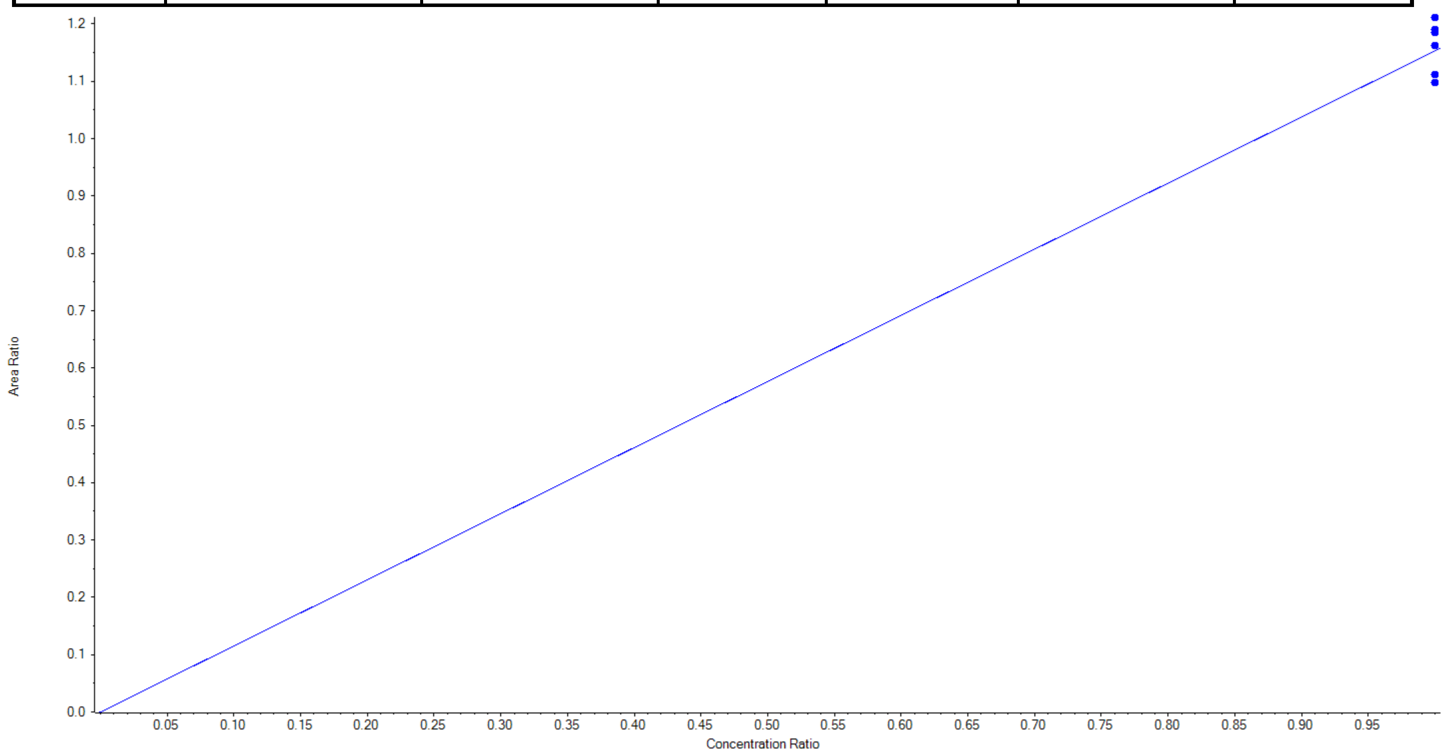
Analyte Name	13C2-PFDA	**Data File**	AE_12222020_5-371.wiff
MRM Transition	515.0 / 470.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.15308 x (std. dev. = 0.04547) (weighting: None) r^2:N/A

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	10000.00	9634.81	96.4
3	LD95	L2	True	10000.00	9526.68	95.3
4	LD96	L3	True	10000.00	10503.86	105.0
5	LD97	L4	True	10000.00	10282.56	102.8
6	LD98	L5	True	10000.00	10083.13	100.8
7	LD99	L6	True	10000.00	10326.85	103.3
8	LE01	L7	True	10000.00	9642.11	96.4



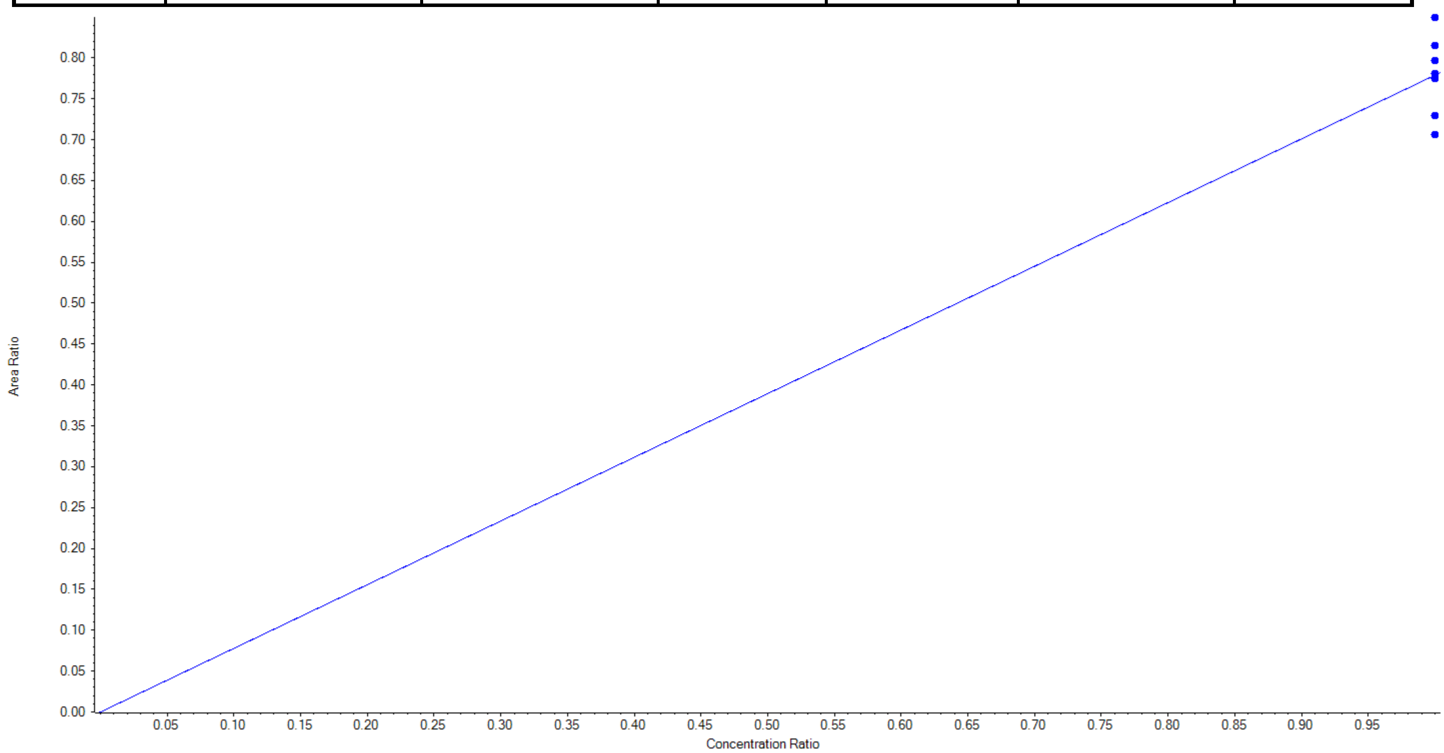
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	d5-EtFOSAA	**Data File**	AE_12222020_5-371.wiff
MRM Transition	589.0 / 419.0	**Result Table**	20-1569_DW
Internal Standard	d3-MeFOSAA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.77869 x (std. dev. = 0.04904) (weighting: None) r^2:N/A

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	40000.00	40944.57	102.4
3	LD95	L2	True	40000.00	37481.19	93.7
4	LD96	L3	True	40000.00	40071.76	100.2
5	LD97	L4	True	40000.00	43621.81	109.1
6	LD98	L5	True	40000.00	41874.03	104.7
7	LD99	L6	True	40000.00	39768.89	99.4
8	LE01	L7	True	40000.00	36237.75	90.6



Calibration Summary Report

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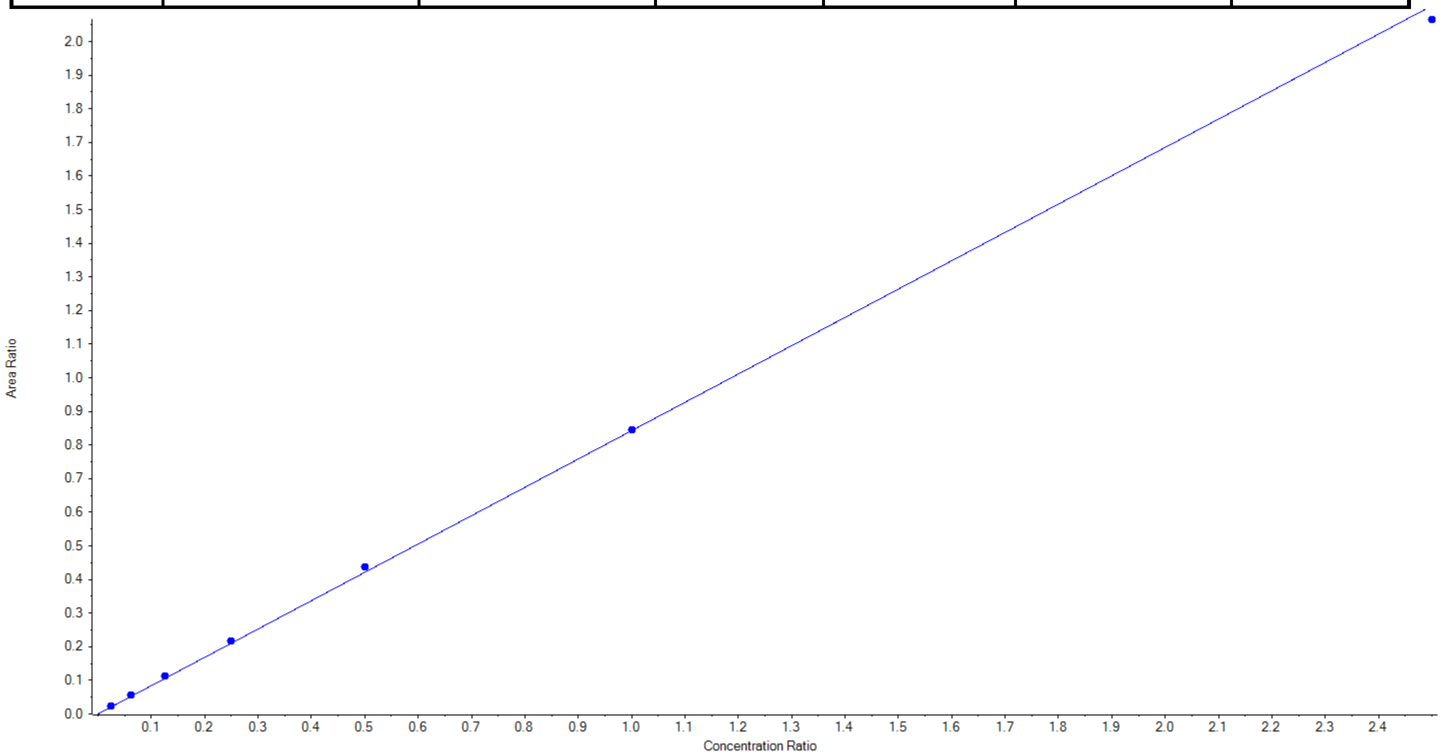
Analyte Name	HFPO-DA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	285.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.84260 x (r = 0.99977) (weighting: 1 / x) r^2:0.9995

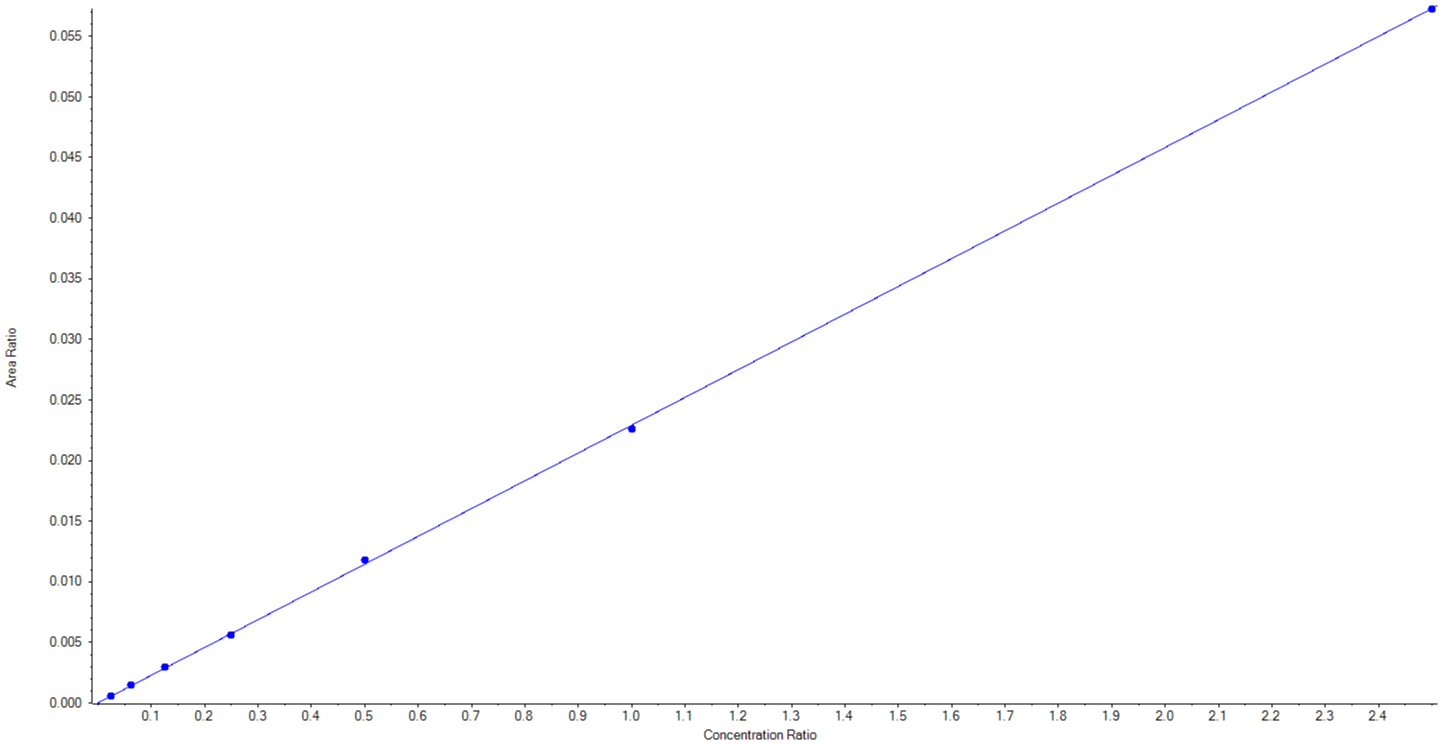
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	278.64	111.5
3	LD95	L2	True	625.00	676.78	108.3
4	LD96	L3	True	1250.00	1350.10	108.0
5	LD97	L4	True	2500.00	2595.29	103.8
6	LD98	L5	True	5000.00	5184.04	103.7
7	LD99	L6	True	10000.00	10026.87	100.3
8	LE01	L7	True	25000.00	24513.28	98.1



Analyte Name	HFPO-DA_2	Data File	AE_12222020_5-371.wiff
MRM Transition	285.0 / 118.8	Result Table	20-1569_DW
Internal Standard	13C2-PFOA	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	Acquisition Method	5-371.dam

Regression Equation: $y = 0.02292\ x\ (r = 0.99988)$ (weighting: 1 / x) r^2:0.9998

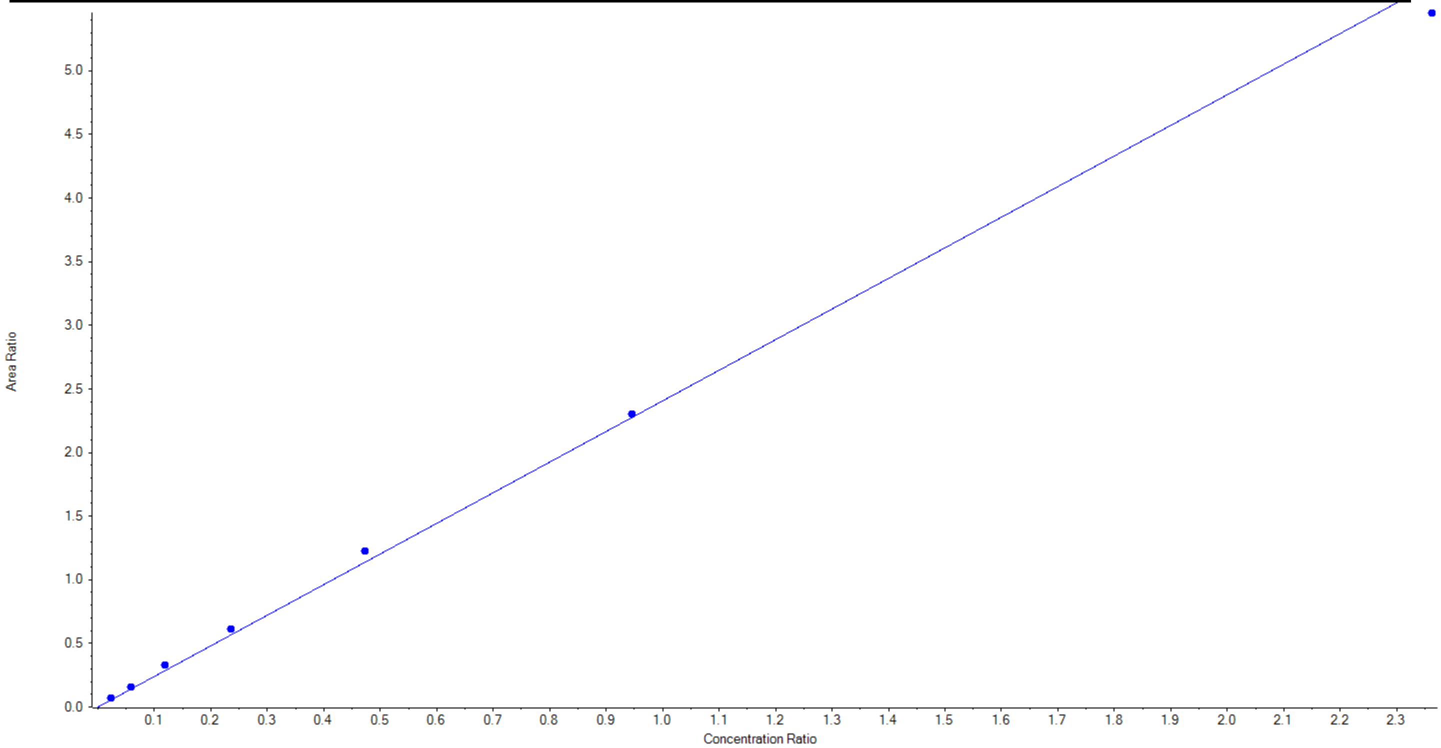
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	250.00	235.56	94.2
3	LD95	L2	True	625.00	635.61	101.7
4	LD96	L3	True	1250.00	1283.25	102.7
5	LD97	L4	True	2500.00	2457.94	98.3
6	LD98	L5	True	5000.00	5157.80	103.2
7	LD99	L6	True	10000.00	9872.57	98.7
8	LE01	L7	True	25000.00	24982.27	99.9



Analyte Name	ADONA_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	377.0 / 251.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 2.40631 x (r = 0.99908) (weighting: 1 / x) r^2:0.9982

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	236.25	302.73	128.1
3	LD95	L2	True	590.63	658.61	111.5
4	LD96	L3	True	1181.25	1361.92	115.3
5	LD97	L4	True	2362.50	2541.62	107.6
6	LD98	L5	True	4725.00	5079.60	107.5
7	LD99	L6	True	9450.00	9557.43	101.1
8	LE01	L7	True	23625.00	22668.72	96.0



Calibration Summary Report

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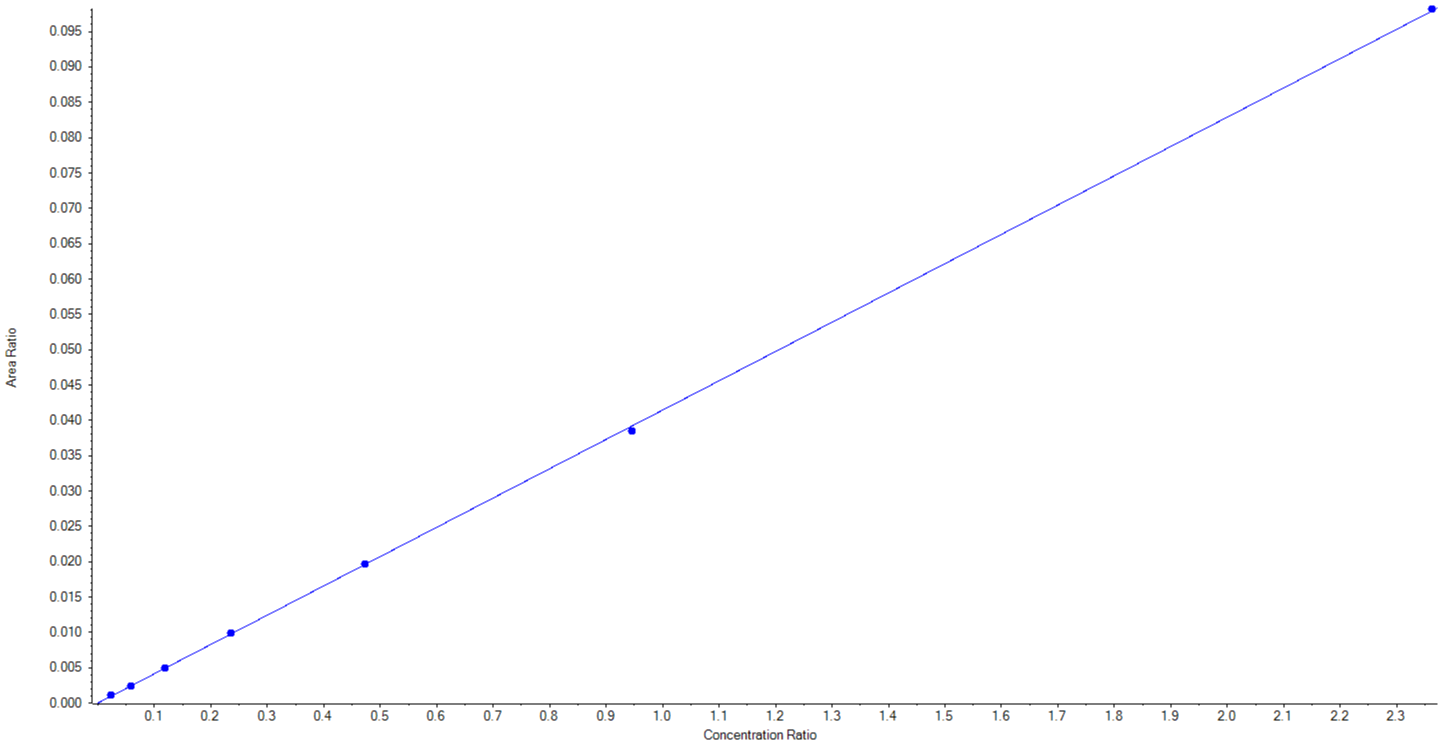
Analyte Name	ADONA_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	377.0 / 85.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.04144\ x\ (r = 0.99991)$ (weighting: 1 / x) r^2:0.9998

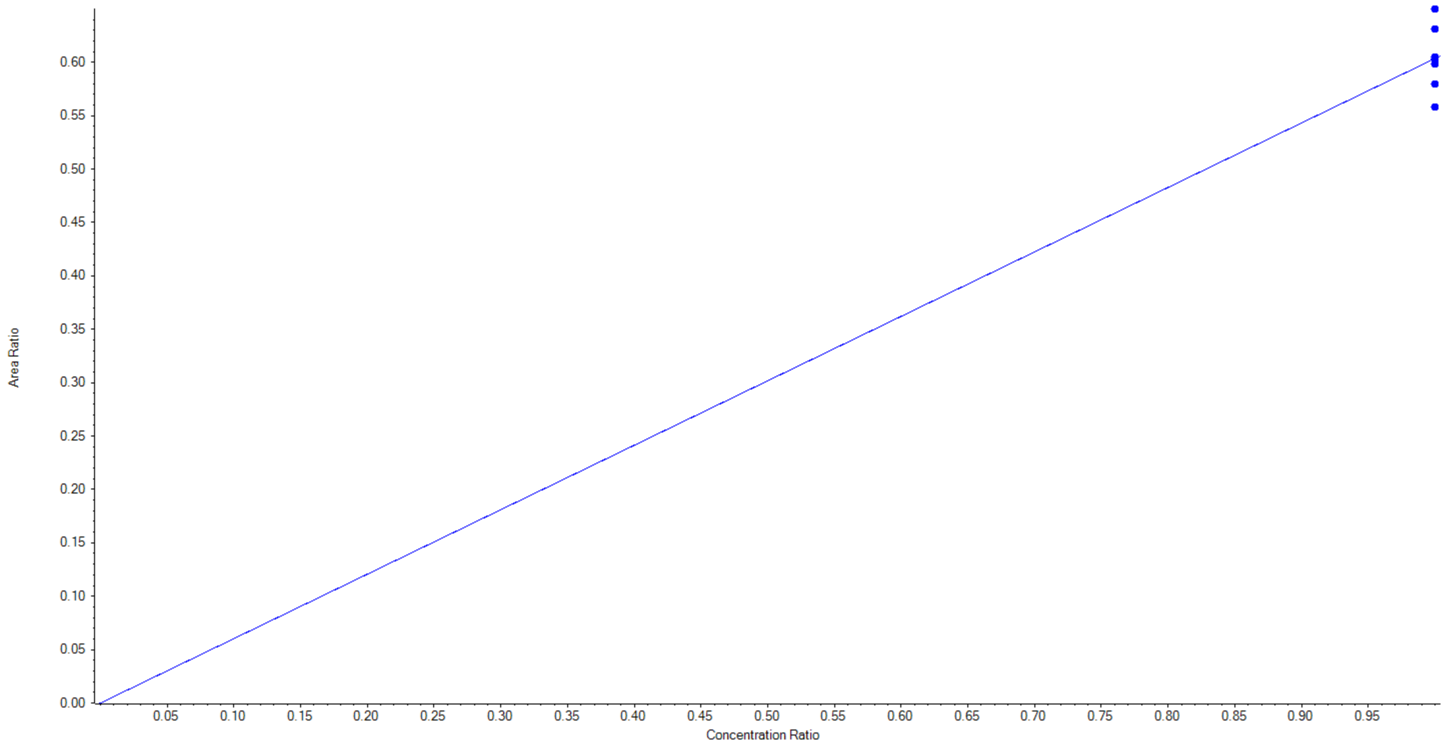
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	236.25	276.88	117.2
3	LD95	L2	True	590.63	586.81	99.4
4	LD96	L3	True	1181.25	1201.18	101.7
5	LD97	L4	True	2362.50	2397.16	101.5
6	LD98	L5	True	4725.00	4742.35	100.4
7	LD99	L6	True	9450.00	9274.62	98.1
8	LE01	L7	True	23625.00	23691.62	100.3



Analyte Name	13C3-HFPO-DA	**Data File**	AE_12222020_5-371.wiff
MRM Transition	287.0 / 169.0	**Result Table**	20-1569_DW
Internal Standard	13C2-PFOA	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 0.60353 x (std. dev. = 0.03037) (weighting: None) r^2:N/A

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	10000.00	9604.83	96.1
3	LD95	L2	True	10000.00	9251.06	92.5
4	LD96	L3	True	10000.00	9990.69	99.9
5	LD97	L4	True	10000.00	10021.49	100.2
6	LD98	L5	True	10000.00	9911.47	99.1
7	LD99	L6	True	10000.00	10452.88	104.5
8	LE01	L7	True	10000.00	10767.57	107.7



Calibration Summary Report

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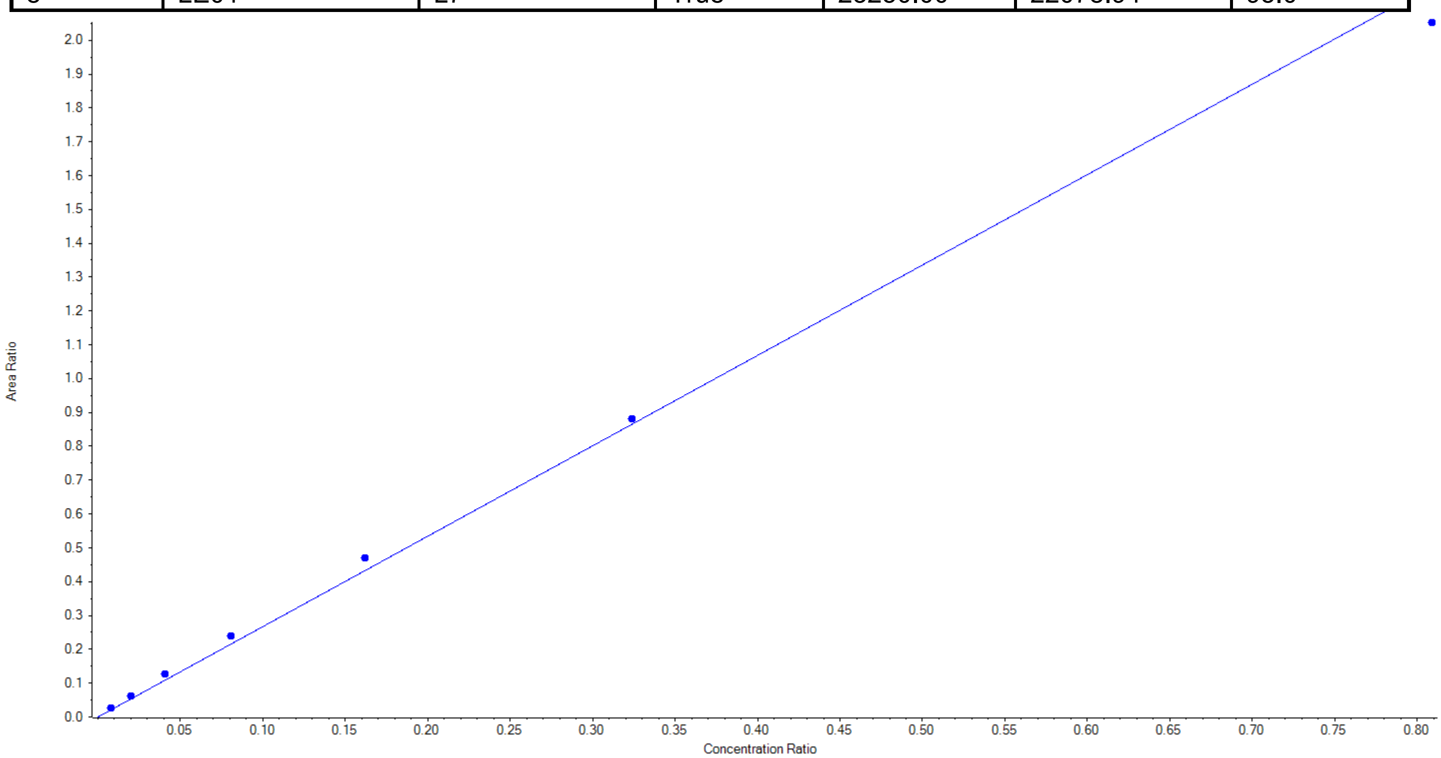
Analyte Name	9Cl-PF3ONS_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	531.0 / 351.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 2.67153 x (r = 0.99833) (weighting: 1 / x) r^2:0.9967

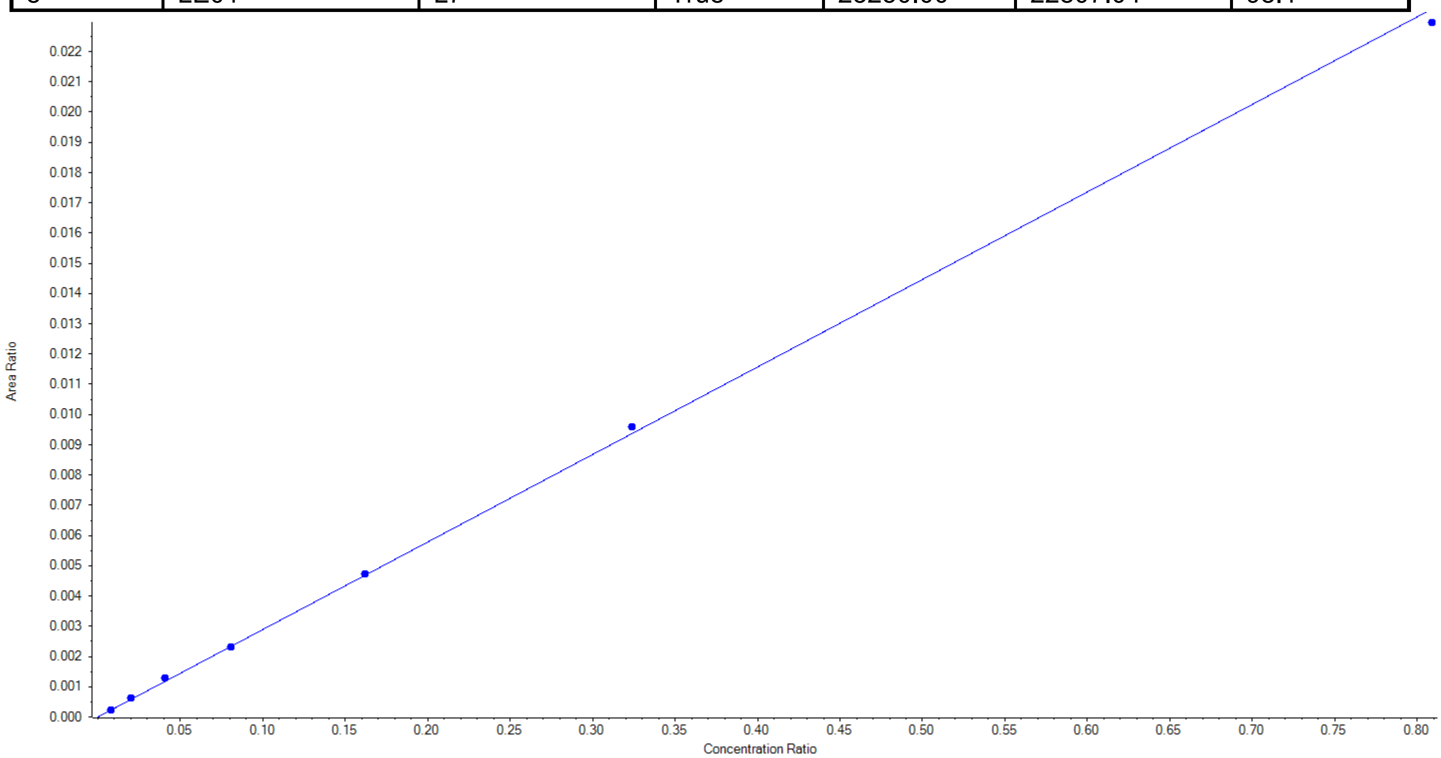
Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	232.50	275.29	118.4
3	LD95	L2	True	581.25	652.75	112.3
4	LD96	L3	True	1162.50	1356.01	116.7
5	LD97	L4	True	2325.00	2582.00	111.1
6	LD98	L5	True	4650.00	5067.41	109.0
7	LD99	L6	True	9300.00	9488.85	102.0
8	LE01	L7	True	23250.00	22078.94	95.0



Analyte Name	9Cl-PF3ONS_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	531.0 / 83.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.02893\ x$ ($r = 0.99956$) (weighting: $1 / x$) r^2:0.9991

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	232.50	217.55	93.6
3	LD95	L2	True	581.25	634.74	109.2
4	LD96	L3	True	1162.50	1286.93	110.7
5	LD97	L4	True	2325.00	2310.17	99.4
6	LD98	L5	True	4650.00	4713.19	101.4
7	LD99	L6	True	9300.00	9531.63	102.5
8	LE01	L7	True	23250.00	22807.04	98.1



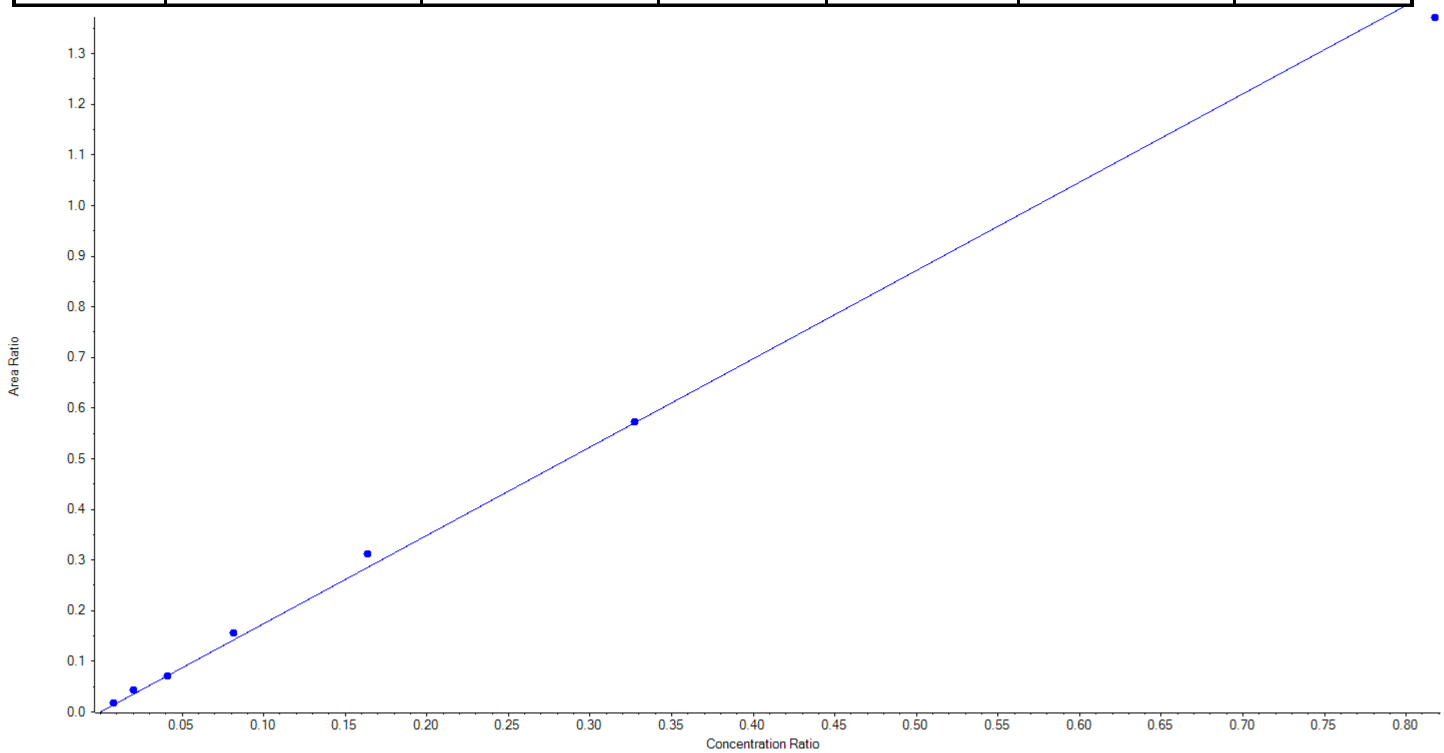
Calibration Summary Report

Created with Analyst Reporter
Printed: 28/12/2020 5:42:25 PM

Analyte Name	11Cl-PF3OUdS_1	**Data File**	AE_12222020_5-371.wiff
MRM Transition	631.0 / 451.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: y = 1.74386 x (r = 0.99870) (weighting: 1 / x) r^2:0.9974

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	True	235.00	278.80	118.6
3	LD95	L2	True	587.50	727.15	123.8
4	LD96	L3	True	1175.00	1160.28	98.8
5	LD97	L4	True	2350.00	2588.45	110.2
6	LD98	L5	True	4700.00	5135.02	109.3
7	LD99	L6	True	9400.00	9457.04	100.6
8	LE01	L7	True	23500.00	22600.76	96.2



Calibration Summary Report

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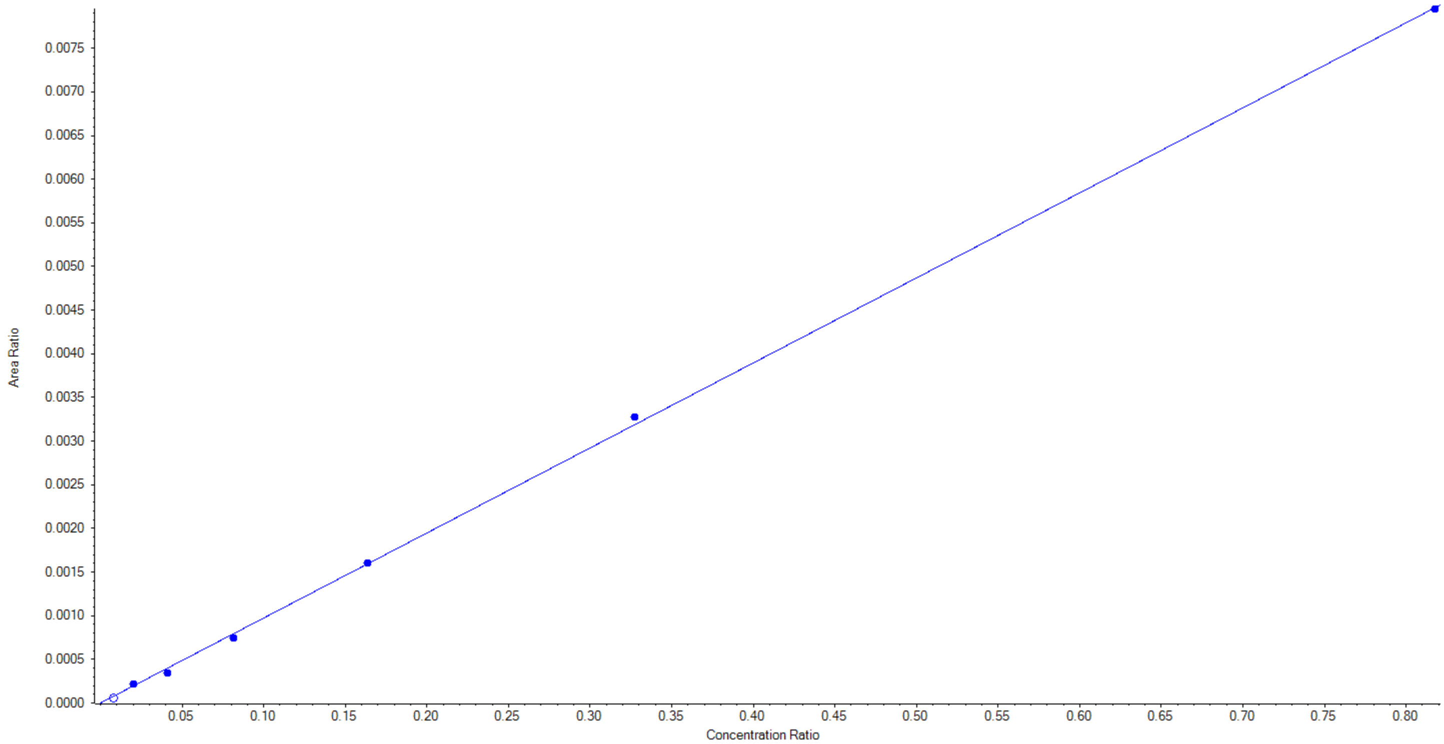
Printed: 28/12/2020 5:42:25 PM

Analyte Name	11Cl-PF3OUdS_2	**Data File**	AE_12222020_5-371.wiff
MRM Transition	631.0 / 83.0	**Result Table**	20-1569_DW
Internal Standard	13C4-PFOS	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Acquisition Method**	5-371.dam

Regression Equation: $y = 0.00974\ x$ ($r = 0.99927$) (weighting: $1 / x$) r^2:0.9985

Vial	Sample Name	Sample ID	Used for ICAL	Target Conc. (ng/L)	Calculated Conc. (ng/L)	Recovery (%)
2	LD94	L1	False	235.00	159.33	67.8
3	LD95	L2	True	587.50	650.13	110.7
4	LD96	L3	True	1175.00	1019.14	86.7
5	LD97	L4	True	2350.00	2182.62	92.9
6	LD98	L5	True	4700.00	4744.80	101.0
7	LD99	L6	True	9400.00	9658.28	102.8
8	LE01	L7	True	23500.00	23457.53	99.8



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	Drinking Water Calibration Curve Concentrations (ng/L)							IB (ng/L)	ICC (ng/L)
	LD94	**LD95**	**LD96**	**LD97**	**LD98**	**LD99**	**LE01**	**LE02**	**LE03**
PFHxA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFHpA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFOA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFNA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFDA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFUnA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFDoA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFTrDA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFTeDA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
NMeFOSAA (branched)	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
NEtFOSAA (branched)	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
PFBS	221.25	553.13	1,106.25	2,212.50	4,425.00	8,850.00	22,125.00	-	2,212.50
PFHxS (branched)	228.00	570.00	1,140.00	2,280.00	4,560.00	9,120.00	22,800.00	-	2,362.50
PFOS (branched)	231.25	578.13	1,156.88	2,313.75	4,627.50	9,255.00	23,137.50	-	2,387.50
HFPO-DA	250.00	625.00	1,250.00	2,500.00	5,000.00	10,000.00	25,000.00	-	2,500.00
Adona	236.25	590.63	1,181.25	2,362.50	4,725.00	9,450.00	23,625.00	-	2,362.50
9Cl-PF3ONS	232.50	581.25	1,162.50	2,325.00	4,650.00	9,300.00	23,250.00	-	2,325.00
11Cl-PF3OUdS	235.00	587.50	1,175.00	2,350.00	4,700.00	9,400.00	23,500.00	-	2,350.00
	Surrogates								
13C2-PFHxA	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
13C2-PFDA	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
d5-EtFOSAA	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00
13C3-HFPO-DA	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
	Internal Standards								
13C2-PFOA	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
13C4-PFOS	28,740.00	28,740.00	28,740.00	28,740.00	28,740.00	28,740.00	28,740.00	28,740.00	28,740.00
d3-MeFOSAA	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00

ICC only contains linear isomers.

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PFAS Calibration Quant Report

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Sample Name	LD94	Injection Vial	2
Sample ID	L1	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.28	200208.77	256.07	2758.2	False	13C4-PFOS	14964202.82	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	67802.36	260.41	843.3	False	13C4-PFOS	14964202.82	28740.00	PFBS	0.339	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	371981.06	320.15	400.5	False	13C2-PFOA	9428290.65	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	21067.32	290.33	290.9	False	13C2-PFOA	9428290.65	10000.00	PFHxA	0.057	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	318529.85	347.43	229.5	False	13C2-PFOA	9428290.65	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	8871.79	290.69	352.8	False	13C2-PFOA	9428290.65	10000.00	PFHpA	0.028	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	193237.50	267.71	672.8	False	13C4-PFOS	14964202.82	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	67187.22	250.15	397.9	False	13C4-PFOS	14964202.82	28740.00	PFHxS	0.348	0.366	✓
PFOA_1	413.0 / 369.0	2.22	330381.84	296.57	238.0	False	13C2-PFOA	9428290.65	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.22	31002.75	267.10	335.3	False	13C2-PFOA	9428290.65	10000.00	PFOA	0.094	0.098	✓
PFNA_1	463.0 / 419.0	2.59	252843.28	324.87	330.3	False	13C2-PFOA	9428290.65	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.59	84661.18	308.71	666.4	False	13C2-PFOA	9428290.65	10000.00	PFNA	0.335	0.343	✓
PFOS_1	499.0 / 80.0	2.58	211794.75	281.71	482.8	False	13C4-PFOS	14964202.82	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	45947.64	278.48	522.8	False	13C4-PFOS	14964202.82	28740.00	PFOS	0.217	0.218	✓
PFDA_1	513.0 / 469.0	2.94	313418.60	300.25	272.6	False	13C2-PFOA	9428290.65	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.94	21159.50	333.39	659.2	False	13C2-PFOA	9428290.65	10000.00	PFDA	0.068	0.062	✓
PFUnA_1	563.0 / 519.0	3.27	326010.13	326.26	379.7	False	13C2-PFOA	9428290.65	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	17677.26	260.51	535.5	False	13C2-PFOA	9428290.65	10000.00	PFUnA	0.054	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	357116.41	310.98	270.4	False	13C2-PFOA	9428290.65	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	40170.92	275.48	462.0	False	13C2-PFOA	9428290.65	10000.00	PFDoA	0.112	0.121	✓
PFTrDA_1	663.0 / 619.0	3.82	305321.11	318.14	541.0	False	13C2-PFOA	9428290.65	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.82	21754.90	289.27	502.9	False	13C2-PFOA	9428290.65	10000.00	PFTrDA	0.071	0.075	✓
PFTeDA_1	713.0 / 669.0	4.05	317189.11	328.47	1252.8	False	13C2-PFOA	9428290.65	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.05	17551.95	293.73	708.2	False	13C2-PFOA	9428290.65	10000.00	PFTeDA	0.055	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.10	64102.02	305.65	5840.7	False	d3-MeFOSAA	7972338.71	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.10	55652.04	310.91	450.2	False	d3-MeFOSAA	7972338.71	40000.00	NMeFOSAA	0.868	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	48731.68	328.85	591.6	False	d3-MeFOSAA	7972338.71	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	3030.39	354.02	157.1	True	d3-MeFOSAA	7972338.71	40000.00	NEtFOSAA	0.062	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	10767405.37	9689.66	10862.0	True	13C2-PFOA	9428290.65	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	10474545.60	9634.81	4495.6	True	13C2-PFOA	9428290.65	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	6354571.90	40944.57	3405.7	True	d3-MeFOSAA	7972338.71	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	221360.35	278.64	671.8	False	13C2-PFOA	9428290.65	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	5089.41	235.56	374.5	False	13C2-PFOA	9428290.65	10000.00	HFPO-DA	0.023	0.026	✓
ADONA_1	377.0 / 251.0	1.89	686817.73	302.73	1461.3	False	13C2-PFOA	9428290.65	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.89	10819.23	276.88	280.3	False	13C2-PFOA	9428290.65	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	5465377.93	9604.83	2607.8	True	13C2-PFOA	9428290.65	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.79	382921.58	275.29	684.3	False	13C4-PFOS	14964202.82	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.78	3277.20	217.55	117.3	False	13C4-PFOS	14964202.82	28740.00	9Cl-PF3ONS	0.009	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	253144.90	278.80	731.3	False	13C4-PFOS	14964202.82	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	807.97	159.33	54.9	False	13C4-PFOS	14964202.82	28740.00	11Cl-PF3OUdS	0.003	0.005	✓

Sample Name	LD95	Injection Vial	3
Sample ID	L2	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:34:27 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.28	486100.42	652.66	4868.8	False	13C4-PFOS	14255088.01	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	163252.51	658.20	1436.5	False	13C4-PFOS	14255088.01	28740.00	PFBS	0.336	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	897329.44	751.23	602.9	False	13C2-PFOA	9692714.23	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	54641.69	732.49	596.4	False	13C2-PFOA	9692714.23	10000.00	PFHxA	0.061	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	717036.07	760.76	320.9	False	13C2-PFOA	9692714.23	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	22036.36	702.34	604.6	False	13C2-PFOA	9692714.23	10000.00	PFHpA	0.031	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	474184.00	689.61	1001.4	False	13C4-PFOS	14255088.01	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	177529.97	693.86	615.3	False	13C4-PFOS	14255088.01	28740.00	PFHxS	0.374	0.366	✓
PFOA_1	413.0 / 369.0	2.22	895310.03	781.76	413.8	False	13C2-PFOA	9692714.23	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.22	75777.04	635.05	543.8	False	13C2-PFOA	9692714.23	10000.00	PFOA	0.085	0.098	✓
PFNA_1	463.0 / 419.0	2.59	634612.55	793.14	545.7	False	13C2-PFOA	9692714.23	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.59	210526.63	746.71	1191.4	False	13C2-PFOA	9692714.23	10000.00	PFNA	0.332	0.343	✓
PFOS_1	499.0 / 80.0	2.59	513177.79	716.54	664.0	False	13C4-PFOS	14255088.01	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.59	111929.59	712.12	597.5	False	13C4-PFOS	14255088.01	28740.00	PFOS	0.218	0.218	✓
PFDA_1	513.0 / 469.0	2.95	709371.62	661.02	504.7	False	13C2-PFOA	9692714.23	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.95	41684.40	638.86	1208.4	False	13C2-PFOA	9692714.23	10000.00	PFDA	0.059	0.062	✓
PFUnA_1	563.0 / 519.0	3.28	821281.63	799.48	509.4	False	13C2-PFOA	9692714.23	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	48415.59	694.04	613.5	False	13C2-PFOA	9692714.23	10000.00	PFUnA	0.059	0.063	✓
PFDoA_1	613.0 / 569.0	3.57	817296.16	692.30	415.2	False	13C2-PFOA	9692714.23	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.57	95261.06	635.46	559.2	False	13C2-PFOA	9692714.23	10000.00	PFDoA	0.117	0.121	✓
PFTrDA_1	663.0 / 619.0	3.83	741707.04	751.77	973.9	False	13C2-PFOA	9692714.23	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.82	51093.95	660.86	988.1	False	13C2-PFOA	9692714.23	10000.00	PFTrDA	0.069	0.075	✓
PFTeDA_1	713.0 / 669.0	4.05	749048.77	754.52	1763.9	False	13C2-PFOA	9692714.23	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.05	40744.03	663.25	822.4	False	13C2-PFOA	9692714.23	10000.00	PFTeDA	0.054	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.10	144923.81	685.50	2681.0	False	d3-MeFOSAA	8036604.21	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.10	117493.56	651.15	659.7	False	d3-MeFOSAA	8036604.21	40000.00	NMeFOSAA	0.811	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.27	107459.04	719.36	982.5	False	d3-MeFOSAA	8036604.21	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.27	6797.78	787.78	171.1	False	d3-MeFOSAA	8036604.21	40000.00	NEtFOSAA	0.063	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	10752891.74	9412.61	13738.6	True	13C2-PFOA	9692714.23	10000.00				
13C2-PFDA	515.0 / 470.0	2.94	10647460.05	9526.68	3045.1	False	13C2-PFOA	9692714.23	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.26	5863948.30	37481.19	3417.5	False	d3-MeFOSAA	8036604.21	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	552732.00	676.78	1223.7	False	13C2-PFOA	9692714.23	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	14117.99	635.61	916.4	False	13C2-PFOA	9692714.23	10000.00	HFPO-DA	0.026	0.026	✓
ADONA_1	377.0 / 251.0	1.89	1536112.66	658.61	2153.4	False	13C2-PFOA	9692714.23	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.89	23572.82	586.81	648.0	False	13C2-PFOA	9692714.23	10000.00	ADONA	0.015	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	5411709.54	9251.06	2918.5	False	13C2-PFOA	9692714.23	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.79	864945.20	652.75	1032.0	False	13C4-PFOS	14255088.01	28740.00	9Cl-PF3ONS			

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PFAS Calibration Quant Report

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Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.79	9108.82	634.74	305.3	False	13C4-PFOS	14255088.01	28740.00	9Cl-PF3ONS	0.011	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.42	628954.89	727.15	997.3	False	13C4-PFOS	14255088.01	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.42	3140.57	650.13	144.9	False	13C4-PFOS	14255088.01	28740.00	11Cl-PF3OUdS	0.005	0.005	✓

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PFAS Calibration Quant Report

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Sample Name	LD96	**Injection Vial**	4
Sample ID	L3	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:44:58 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	872957.36	1204.00	4601.9	False	13C4-PFOS	13876959.18	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	295142.39	1222.37	1935.5	False	13C4-PFOS	13876959.18	28740.00	PFBS	0.338	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	1599536.37	1525.06	643.8	False	13C2-PFOA	8510802.56	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	92371.74	1410.24	719.3	False	13C2-PFOA	8510802.56	10000.00	PFHxA	0.058	0.060	✓
PFHpA_1	363.0 / 319.0	1.84	1250800.67	1511.37	508.4	False	13C2-PFOA	8510802.56	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.84	36506.60	1325.12	607.6	False	13C2-PFOA	8510802.56	10000.00	PFHpA	0.029	0.031	✓
PFHxS_1	399.0 / 80.0	1.85	875527.45	1307.98	1004.2	False	13C4-PFOS	13876959.18	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.85	301428.80	1210.22	769.8	False	13C4-PFOS	13876959.18	28740.00	PFHxS	0.344	0.366	✓
PFOA_1	413.0 / 369.0	2.20	1439763.16	1431.75	613.2	False	13C2-PFOA	8510802.56	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.20	138209.22	1319.10	638.6	False	13C2-PFOA	8510802.56	10000.00	PFOA	0.096	0.098	✓
PFNA_1	463.0 / 419.0	2.57	986488.15	1404.13	734.5	False	13C2-PFOA	8510802.56	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.57	321517.95	1298.76	1261.9	False	13C2-PFOA	8510802.56	10000.00	PFNA	0.326	0.343	✓
PFOS_1	499.0 / 80.0	2.56	831351.08	1192.42	731.9	False	13C4-PFOS	13876959.18	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.56	183393.81	1198.59	988.1	False	13C4-PFOS	13876959.18	28740.00	PFOS	0.221	0.218	✓
PFDA_1	513.0 / 469.0	2.92	1235346.67	1311.00	747.6	False	13C2-PFOA	8510802.56	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.92	71613.51	1249.98	1013.5	False	13C2-PFOA	8510802.56	10000.00	PFDA	0.058	0.062	✓
PFUnA_1	563.0 / 519.0	3.25	1248765.31	1384.44	784.3	False	13C2-PFOA	8510802.56	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.24	76649.25	1251.35	960.4	False	13C2-PFOA	8510802.56	10000.00	PFUnA	0.061	0.063	✓
PFDoA_1	613.0 / 569.0	3.54	1509756.73	1456.44	831.5	False	13C2-PFOA	8510802.56	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.54	168642.84	1281.20	726.8	False	13C2-PFOA	8510802.56	10000.00	PFDoA	0.112	0.121	✓
PFTrDA_1	663.0 / 619.0	3.79	1265166.04	1460.41	1598.4	False	13C2-PFOA	8510802.56	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.79	90465.64	1332.59	944.7	False	13C2-PFOA	8510802.56	10000.00	PFTrDA	0.072	0.075	✓
PFTeDA_1	713.0 / 669.0	4.02	1156337.54	1326.54	2539.2	False	13C2-PFOA	8510802.56	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.02	71679.83	1328.88	962.5	False	13C2-PFOA	8510802.56	10000.00	PFTeDA	0.062	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.08	284441.52	1339.83	2303.4	False	d3-MeFOSAA	8070177.40	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.08	237562.95	1311.10	1198.0	False	d3-MeFOSAA	8070177.40	40000.00	NMeFOSAA	0.835	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.24	200196.90	1334.59	1737.5	False	d3-MeFOSAA	8070177.40	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.24	12446.51	1436.41	17075.8	False	d3-MeFOSAA	8070177.40	40000.00	NEtFOSAA	0.062	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.50	10525252.18	10492.82	8883.4	True	13C2-PFOA	8510802.56	10000.00				
13C2-PFDA	515.0 / 470.0	2.91	10308096.24	10503.86	3121.6	False	13C2-PFOA	8510802.56	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.23	6295434.78	40071.76	2481.6	False	d3-MeFOSAA	8070177.40	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.60	968175.34	1350.10	1476.6	False	13C2-PFOA	8510802.56	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.60	25027.60	1283.25	1070.0	False	13C2-PFOA	8510802.56	10000.00	HFPO-DA	0.026	0.026	✓
ADONA_1	377.0 / 251.0	1.87	2789158.31	1361.92	2966.9	False	13C2-PFOA	8510802.56	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.87	42368.75	1201.18	502.4	False	13C2-PFOA	8510802.56	10000.00	ADONA	0.015	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	5131728.80	9990.69	2661.8	False	13C2-PFOA	8510802.56	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.77	1749161.98	1356.01	1698.6	False	13C4-PFOS	13876959.18	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.77	17978.08	1286.93	354.0	False	13C4-PFOS	13876959.18	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.39	976971.06	1160.28	1602.0	False	13C4-PFOS	13876959.18	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.39	4792.58	1019.14	145.0	False	13C4-PFOS	13876959.18	28740.00	11Cl-PF3OUdS	0.005	0.005	✓

Sample Name	LD97	**Injection Vial**	5
Sample ID	L4	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:55:29 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	1926720.74	2571.88	8663.5	False	13C4-PFOS	14338277.87	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	633296.59	2538.50	3480.2	False	13C4-PFOS	14338277.87	28740.00	PFBS	0.329	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	3247806.34	2809.06	1022.4	False	13C2-PFOA	9381964.85	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	191795.21	2656.24	926.8	False	13C2-PFOA	9381964.85	10000.00	PFHxA	0.059	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	2570643.65	2817.74	575.8	False	13C2-PFOA	9381964.85	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	80322.28	2644.82	1145.9	False	13C2-PFOA	9381964.85	10000.00	PFHpA	0.031	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	1789782.38	2587.79	1747.2	False	13C4-PFOS	14338277.87	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	683047.39	2654.15	1042.9	False	13C4-PFOS	14338277.87	28740.00	PFHxS	0.382	0.366	✓
PFOA_1	413.0 / 369.0	2.21	2982652.15	2690.65	795.8	False	13C2-PFOA	9381964.85	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.21	290583.77	2515.88	786.1	False	13C2-PFOA	9381964.85	10000.00	PFOA	0.097	0.098	✓
PFNA_1	463.0 / 419.0	2.58	2109935.37	2724.35	1007.3	False	13C2-PFOA	9381964.85	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.58	735524.00	2695.23	1932.7	False	13C2-PFOA	9381964.85	10000.00	PFNA	0.349	0.343	✓
PFOS_1	499.0 / 80.0	2.58	1754364.07	2435.36	1092.1	False	13C4-PFOS	14338277.87	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	376831.41	2383.58	1101.3	False	13C4-PFOS	14338277.87	28740.00	PFOS	0.215	0.218	✓
PFDA_1	513.0 / 469.0	2.94	2756831.26	2654.00	1055.1	False	13C2-PFOA	9381964.85	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.94	169862.74	2689.57	1173.0	False	13C2-PFOA	9381964.85	10000.00	PFDA	0.062	0.062	✓
PFUnA_1	563.0 / 519.0	3.27	2782646.11	2798.51	1150.3	False	13C2-PFOA	9381964.85	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.26	183772.05	2721.62	1273.3	False	13C2-PFOA	9381964.85	10000.00	PFUnA	0.066	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	3076319.70	2692.12	1048.4	False	13C2-PFOA	9381964.85	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	393637.62	2712.82	1190.3	False	13C2-PFOA	9381964.85	10000.00	PFDoA	0.128	0.121	✓
PFTrDA_1	663.0 / 619.0	3.81	2698445.89	2825.65	1935.5	False	13C2-PFOA	9381964.85	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	200885.77	2684.35	1127.7	False	13C2-PFOA	9381964.85	10000.00	PFTrDA	0.074	0.075	✓
PFTeDA_1	713.0 / 669.0	4.04	2579358.11	2684.25	3133.7	False	13C2-PFOA	9381964.85	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	154843.55	2604.10	1646.9	False	13C2-PFOA	9381964.85	10000.00	PFTeDA	0.060	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	556842.10	2527.84	2500.6	False	d3-MeFOSAA	8373794.29	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	478727.25	2546.27	1474.9	False	d3-MeFOSAA	8373794.29	40000.00	NMeFOSAA	0.860	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	433861.78	2787.43	1825.8	False	d3-MeFOSAA	8373794.29	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	24439.05	2718.16	534.0	False	d3-MeFOSAA	8373794.29	40000.00	NEtFOSAA	0.056	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	11039582.62	9983.65	9104.7	True	13C2-PFOA	9381964.85	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	11123826.81	10282.56	3471.4	False	13C2-PFOA	9381964.85	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	7110992.05	43621.81	2159.0	False	d3-MeFOSAA	8373794.29	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	2051631.46	2595.29	1527.2	False	13C2-PFOA	9381964.85	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	52845.07	2457.94	4225.8	False	13C2-PFOA	9381964.85	10000.00	HFPO-DA	0.026	0.026	✓
ADONA_1	377.0 / 251.0	1.88	5737922.02	2541.62	5461.6	False	13C2-PFOA	9381964.85	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.88	93209.00	2397.16	883.0	False	13C2-PFOA	9381964.85	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	5674451.43	10021.49	3072.2	False	13C2-PFOA	9381964.85	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.78	3441336.84	2582.00	2298.8	False	13C4-PFOS	14338277.87	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.78	33345.25	2310.17	415.3	False	13C4-PFOS	14338277.87	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	2251969.37	2588.45	2228.6	False	13C4-PFOS	14338277.87	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	10605.13	2182.62	228.7	False	13C4-PFOS	14338277.87	28740.00	11Cl-PF3OUdS	0.005	0.005	✓

Sample Name	LD98	**Injection Vial**	6
Sample ID	L5	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:06:00 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	3831320.54	4958.25	11490.9	False	13C4-PFOS	14789346.52	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	1304354.24	5068.90	4589.1	False	13C4-PFOS	14789346.52	28740.00	PFBS	0.340	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	6408952.21	5460.13	1399.5	False	13C2-PFOA	9524633.60	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	364789.24	4976.42	1380.4	False	13C2-PFOA	9524633.60	10000.00	PFHxA	0.057	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	5181837.01	5594.84	763.5	False	13C2-PFOA	9524633.60	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	162211.63	5261.24	1279.3	False	13C2-PFOA	9524633.60	10000.00	PFHpA	0.031	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	3681120.84	5160.09	2098.7	False	13C4-PFOS	14789346.52	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	1344015.60	5063.23	1464.4	False	13C4-PFOS	14789346.52	28740.00	PFHxS	0.365	0.366	✓
PFOA_1	413.0 / 369.0	2.21	5968364.74	5303.41	1032.3	False	13C2-PFOA	9524633.60	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.21	600224.93	5118.92	864.7	False	13C2-PFOA	9524633.60	10000.00	PFOA	0.101	0.098	✓
PFNA_1	463.0 / 419.0	2.58	4406669.08	5604.66	1418.4	False	13C2-PFOA	9524633.60	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.58	1519277.93	5483.80	2290.9	False	13C2-PFOA	9524633.60	10000.00	PFNA	0.345	0.343	✓
PFOS_1	499.0 / 80.0	2.58	3623176.65	4876.20	1114.1	False	13C4-PFOS	14789346.52	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	792416.52	4859.43	1699.4	False	13C4-PFOS	14789346.52	28740.00	PFOS	0.219	0.218	✓
PFDA_1	513.0 / 469.0	2.94	5425253.18	5144.66	1426.2	False	13C2-PFOA	9524633.60	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.94	348079.72	5428.86	1492.1	False	13C2-PFOA	9524633.60	10000.00	PFDA	0.064	0.062	✓
PFUnA_1	563.0 / 519.0	3.26	5759588.03	5705.65	1518.8	False	13C2-PFOA	9524633.60	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.26	344967.64	5032.36	1564.5	False	13C2-PFOA	9524633.60	10000.00	PFUnA	0.060	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	6434601.35	5546.65	1534.0	False	13C2-PFOA	9524633.60	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	761343.17	5168.33	1446.5	False	13C2-PFOA	9524633.60	10000.00	PFDoA	0.118	0.121	✓
PFTrDA_1	663.0 / 619.0	3.81	5133248.29	5294.72	2450.3	False	13C2-PFOA	9524633.60	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	409936.68	5395.76	1831.9	False	13C2-PFOA	9524633.60	10000.00	PFTrDA	0.080	0.075	✓
PFTeDA_1	713.0 / 669.0	4.04	5131067.38	5259.75	3724.3	False	13C2-PFOA	9524633.60	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	311377.97	5158.19	1750.0	False	13C2-PFOA	9524633.60	10000.00	PFTeDA	0.061	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	1151510.78	5299.33	2628.8	False	d3-MeFOSAA	8260134.46	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	972268.63	5242.50	1262.6	False	d3-MeFOSAA	8260134.46	40000.00	NMeFOSAA	0.844	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	845946.88	5509.73	2277.1	False	d3-MeFOSAA	8260134.46	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	47570.04	5363.64	626.6	False	d3-MeFOSAA	8260134.46	40000.00	NEtFOSAA	0.056	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	11491049.19	10236.27	8653.5	True	13C2-PFOA	9524633.60	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	11073958.70	10083.13	2739.6	False	13C2-PFOA	9524633.60	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	6733425.99	41874.03	2741.8	False	d3-MeFOSAA	8260134.46	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	4160402.80	5184.04	2369.7	False	13C2-PFOA	9524633.60	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	112577.56	5157.80	2594.8	False	13C2-PFOA	9524633.60	10000.00	HFPO-DA	0.027	0.026	✓
ADONA_1	377.0 / 251.0	1.88	11642039.30	5079.60	5643.2	False	13C2-PFOA	9524633.60	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.88	187200.81	4742.35	1144.6	False	13C2-PFOA	9524633.60	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	5697497.23	9911.47	3041.3	False	13C2-PFOA	9524633.60	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.78	6966402.73	5067.41	2816.4	False	13C4-PFOS	14789346.52	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.78	70171.01	4713.19	564.1	False	13C4-PFOS	14789346.52	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	4608035.52	5135.02	2434.7	False	13C4-PFOS	14789346.52	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	23779.79	4744.80	375.3	False	13C4-PFOS	14789346.52	28740.00	11Cl-PF3OUdS	0.005	0.005	✓

Sample Name	LD99	Injection Vial	7
Sample ID	L6	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:16:32 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.28	6460029.04	9048.76	15634.8	False	13C4-PFOS	13663883.08	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.28	2202102.71	9262.54	5036.9	False	13C4-PFOS	13663883.08	28740.00	PFBS	0.341	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	10859162.25	10079.94	1735.6	False	13C2-PFOA	8741845.40	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	677255.53	10066.36	1628.7	False	13C2-PFOA	8741845.40	10000.00	PFHxA	0.062	0.060	✓
PFHpA_1	363.0 / 319.0	1.86	8825290.26	10381.94	1171.8	False	13C2-PFOA	8741845.40	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	296250.15	10469.10	1867.2	False	13C2-PFOA	8741845.40	10000.00	PFHpA	0.034	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	6176338.29	9370.93	2271.4	False	13C4-PFOS	13663883.08	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	2352334.43	9591.74	1788.0	False	13C4-PFOS	13663883.08	28740.00	PFHxS	0.381	0.366	✓
PFOA_1	413.0 / 369.0	2.22	10700262.61	10359.51	1140.4	False	13C2-PFOA	8741845.40	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.22	1113190.15	10343.76	1625.4	False	13C2-PFOA	8741845.40	10000.00	PFOA	0.104	0.098	✓
PFNA_1	463.0 / 419.0	2.59	7387519.41	10237.23	1448.1	False	13C2-PFOA	8741845.40	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.59	2651003.12	10425.57	3120.4	False	13C2-PFOA	8741845.40	10000.00	PFNA	0.359	0.343	✓
PFOS_1	499.0 / 80.0	2.59	6651167.43	9688.68	1380.9	False	13C4-PFOS	13663883.08	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.59	1435721.68	9529.64	1581.8	False	13C4-PFOS	13663883.08	28740.00	PFOS	0.216	0.218	✓
PFDA_1	513.0 / 469.0	2.95	9889573.79	10217.84	1439.5	False	13C2-PFOA	8741845.40	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.95	607330.50	10320.49	2031.8	False	13C2-PFOA	8741845.40	10000.00	PFDA	0.061	0.062	✓
PFUnA_1	563.0 / 519.0	3.27	9561652.58	10320.30	1800.4	False	13C2-PFOA	8741845.40	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	647270.57	10287.85	1708.7	False	13C2-PFOA	8741845.40	10000.00	PFUnA	0.068	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	10807095.16	10149.93	1591.3	False	13C2-PFOA	8741845.40	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	1363328.83	10083.60	2062.8	False	13C2-PFOA	8741845.40	10000.00	PFDoA	0.126	0.121	✓
PFTrDA_1	663.0 / 619.0	3.82	9097931.71	10224.42	2191.9	False	13C2-PFOA	8741845.40	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.82	709547.26	10175.65	2090.4	False	13C2-PFOA	8741845.40	10000.00	PFTrDA	0.078	0.075	✓
PFTeDA_1	713.0 / 669.0	4.04	9068338.50	10128.16	4268.6	False	13C2-PFOA	8741845.40	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	553942.10	9998.14	2336.4	False	13C2-PFOA	8741845.40	10000.00	PFTeDA	0.061	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.10	2024825.33	10622.63	2946.8	False	d3-MeFOSAA	7245963.70	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.10	1703470.53	10470.75	1682.3	False	d3-MeFOSAA	7245963.70	40000.00	NMeFOSAA	0.841	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.27	1416635.46	10518.08	1121.4	False	d3-MeFOSAA	7245963.70	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	80962.17	10406.36	1485.5	False	d3-MeFOSAA	7245963.70	40000.00	NEtFOSAA	0.057	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	10455003.08	10147.32	12277.5	True	13C2-PFOA	8741845.40	10000.00				
13C2-PFDA	515.0 / 470.0	2.94	10409509.37	10326.85	2898.9	False	13C2-PFOA	8741845.40	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.26	5609755.27	39768.89	2477.3	False	d3-MeFOSAA	7245963.70	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.62	7385632.86	10026.87	4420.2	False	13C2-PFOA	8741845.40	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	197775.29	9872.57	2928.9	False	13C2-PFOA	8741845.40	10000.00	HFPO-DA	0.027	0.026	✓
ADONA_1	377.0 / 251.0	1.89	20104579.56	9557.43	7662.6	False	13C2-PFOA	8741845.40	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.89	336020.36	9274.62	1324.9	False	13C2-PFOA	8741845.40	10000.00	ADONA	0.017	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	5514888.48	10452.88	3608.5	False	13C2-PFOA	8741845.40	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.79	12052049.94	9488.85	3027.0	False	13C4-PFOS	13663883.08	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.79	131109.58	9531.63	981.8	False	13C4-PFOS	13663883.08	28740.00	9Cl-PF3ONS	0.011	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	7840691.09	9457.04	2791.8	False	13C4-PFOS	13663883.08	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	44721.32	9658.28	604.2	False	13C4-PFOS	13663883.08	28740.00	11Cl-PF3OUdS	0.006	0.005	✓

Sample Name	LE01	**Injection Vial**	8
Sample ID	L7	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:27:03 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.28	15869184.12	20801.52	25637.3	False	13C4-PFOS	14601191.15	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.28	5203531.51	20482.21	8263.3	False	13C4-PFOS	14601191.15	28740.00	PFBS	0.328	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	26035715.23	23679.43	3031.2	False	13C2-PFOA	8922014.30	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	1681824.98	24492.93	2921.2	False	13C2-PFOA	8922014.30	10000.00	PFHxA	0.065	0.060	✓
PFHpA_1	363.0 / 319.0	1.86	20137369.99	23210.92	1662.4	False	13C2-PFOA	8922014.30	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.86	691165.82	23931.69	1952.7	False	13C2-PFOA	8922014.30	10000.00	PFHpA	0.034	0.031	✓
PFHxS_1	399.0 / 80.0	1.87	15011533.16	21313.89	2397.3	False	13C4-PFOS	14601191.15	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.87	5564943.95	21234.64	1905.2	False	13C4-PFOS	14601191.15	28740.00	PFHxS	0.371	0.366	✓
PFOA_1	413.0 / 369.0	2.22	25048742.70	23761.34	1706.4	False	13C2-PFOA	8922014.30	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.22	2682800.85	24425.19	2361.1	False	13C2-PFOA	8922014.30	10000.00	PFOA	0.107	0.098	✓
PFNA_1	463.0 / 419.0	2.60	17334837.56	23536.62	1766.5	False	13C2-PFOA	8922014.30	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.60	6141847.04	23666.22	3951.6	False	13C2-PFOA	8922014.30	10000.00	PFNA	0.354	0.343	✓
PFOS_1	499.0 / 80.0	2.59	16218787.78	22109.10	1612.1	False	13C4-PFOS	14601191.15	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.59	3596294.84	22338.16	1915.3	False	13C4-PFOS	14601191.15	28740.00	PFOS	0.222	0.218	✓
PFDA_1	513.0 / 469.0	2.95	24039842.65	24336.24	2126.3	False	13C2-PFOA	8922014.30	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.95	1439266.05	23963.85	2507.2	False	13C2-PFOA	8922014.30	10000.00	PFDA	0.060	0.062	✓
PFUnA_1	563.0 / 519.0	3.27	22023024.89	23290.37	2037.0	False	13C2-PFOA	8922014.30	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	1565330.55	24377.27	2107.6	False	13C2-PFOA	8922014.30	10000.00	PFUnA	0.071	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	25837763.28	23776.58	1785.3	False	13C2-PFOA	8922014.30	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	3376334.57	24468.12	1956.9	False	13C2-PFOA	8922014.30	10000.00	PFDoA	0.131	0.121	✓
PFTrDA_1	663.0 / 619.0	3.81	21568771.28	23749.88	2670.4	False	13C2-PFOA	8922014.30	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	1714165.51	24086.51	2202.6	False	13C2-PFOA	8922014.30	10000.00	PFTrDA	0.079	0.075	✓
PFTeDA_1	713.0 / 669.0	4.04	22062466.23	24143.31	4694.2	False	13C2-PFOA	8922014.30	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	1389836.86	24578.71	3032.9	False	13C2-PFOA	8922014.30	10000.00	PFTeDA	0.063	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.10	4831875.76	23844.21	2438.3	False	d3-MeFOSAA	7703237.21	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.10	4166894.60	24092.32	1221.0	False	d3-MeFOSAA	7703237.21	40000.00	NMeFOSAA	0.862	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.27	3354398.04	23426.96	935.8	False	d3-MeFOSAA	7703237.21	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	194854.47	23558.63	1165.5	False	d3-MeFOSAA	7703237.21	40000.00	NEtFOSAA	0.058	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.52	10555175.64	10037.67	11111.8	True	13C2-PFOA	8922014.30	10000.00				
13C2-PFDA	515.0 / 470.0	2.94	9919597.15	9642.11	3151.6	False	13C2-PFOA	8922014.30	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	5434239.61	36237.75	1681.0	False	d3-MeFOSAA	7703237.21	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.62	18428220.10	24513.28	6032.5	False	13C2-PFOA	8922014.30	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.62	510779.70	24982.27	3673.6	False	13C2-PFOA	8922014.30	10000.00	HFPO-DA	0.028	0.026	✓
ADONA_1	377.0 / 251.0	1.89	48667698.34	22668.72	8662.2	False	13C2-PFOA	8922014.30	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.89	876039.98	23691.62	1891.2	False	13C2-PFOA	8922014.30	10000.00	ADONA	0.018	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	5798002.69	10767.57	3140.6	False	13C2-PFOA	8922014.30	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.79	29966752.39	22078.94	5363.9	False	13C4-PFOS	14601191.15	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.79	335235.88	22807.04	1361.4	False	13C4-PFOS	14601191.15	28740.00	9Cl-PF3ONS	0.011	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	20023336.45	22600.76	2590.7	False	13C4-PFOS	14601191.15	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	116067.72	23457.53	1100.6	False	13C4-PFOS	14601191.15	28740.00	11Cl-PF3OUdS	0.006	0.005	✓

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QC Summary Report

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Printed: 28/12/2020 5:41:48 PM

Sample Name	LE03 ICC	Injection Vial	10
Sample ID	ICC	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:48:09 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Conc. (ng/L)	Target Conc. (ng/L)	Recovery (%)
PFBS_1	298.9 / 80.0	1.28	2499.73	2212.50	112.98
PFBS_2	298.9 / 99.0	1.27	2431.91	2212.50	109.92
PFHxA_1	313.0 / 269.0	1.52	2826.85	2500.00	113.07
PFHxA_2	313.0 / 119.0	1.52	2736.63	2500.00	109.47
PFHpA_1	363.0 / 319.0	1.85	3039.75	2500.00	121.59
PFHpA_2	363.0 / 169.0	1.85	2749.32	2500.00	109.97
PFHxS_1	399.0 / 80.0	1.86	2553.74	2362.50	108.09
PFHxS_2	399.0 / 99.0	1.86	2496.17	2362.50	105.66
PFOA_1	413.0 / 369.0	2.21	2865.98	2500.00	114.64
PFOA_2	413.0 / 169.0	2.21	2551.58	2500.00	102.06
PFNA_1	463.0 / 419.0	2.59	2892.61	2500.00	115.70
PFNA_2	463.0 / 219.0	2.59	2841.01	2500.00	113.64
PFOS_1	499.0 / 80.0	2.58	2305.38	2387.50	96.56
PFOS_2	499.0 / 99.0	2.58	2526.79	2387.50	105.83
PFDA_1	513.0 / 469.0	2.94	2831.42	2500.00	113.26
PFDA_2	513.0 / 219.0	2.94	2724.28	2500.00	108.97
PFUnA_1	563.0 / 519.0	3.27	2998.20	2500.00	119.93
PFUnA_2	563.0 / 269.0	3.27	2732.42	2500.00	109.30
PFDoA_1	613.0 / 569.0	3.56	2948.46	2500.00	117.94
PFDoA_2	613.0 / 319.0	3.56	2747.88	2500.00	109.92
PFTrDA_1	663.0 / 619.0	3.81	3000.68	2500.00	120.03
PFTrDA_2	663.0 / 169.0	3.81	2605.65	2500.00	104.23
PFTeDA_1	713.0 / 669.0	4.04	2807.58	2500.00	112.30
PFTeDA_2	713.0 / 169.0	4.04	2625.94	2500.00	105.04
NMeFOSAA_1	570.0 / 419.0	3.09	2600.26	2500.00	104.01
NMeFOSAA_2	570.0 / 512.0	3.09	2547.46	2500.00	101.90
NEtFOSAA_1	584.0 / 419.0	3.26	2929.46	2500.00	117.18
NEtFOSAA_2	584.0 / 483.0	3.26	2433.02	2500.00	97.32
13C2-PFHxA	315.0 / 270.0	1.51	10113.94	10000.00	101.14
13C2-PFDA	515.0 / 470.0	2.93	10595.02	10000.00	105.95
d5-EtFOSAA	589.0 / 419.0	3.25	40827.41	40000.00	102.07
HFPO-DA_1	285.0 / 169.0	1.61	2715.89	2500.00	108.64
HFPO-DA_2	285.0 / 118.8	1.61	2670.96	2500.00	106.84
ADONA_1	377.0 / 251.0	1.89	2723.65	2362.50	115.29
ADONA_2	377.0 / 85.0	1.88	2494.81	2362.50	105.60
13C3-HFPO-DA	287.0 / 169.0	1.61	10074.75	10000.00	100.75
9Cl-PF3ONS_1	531.0 / 351.0	2.78	2554.50	2325.00	109.87
9Cl-PF3ONS_2	531.0 / 83.0	2.78	2386.03	2325.00	102.62
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	2533.44	2350.00	107.81
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	2477.34	2350.00	105.42

Sample Name	LD97 CCV	Injection Vial	37
Sample ID	CCV	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 1:32:20 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Conc. (ng/L)	Target Conc. (ng/L)	Recovery (%)
PFBS_1	298.9 / 80.0	1.27	2334.15	2212.50	105.50
PFBS_2	298.9 / 99.0	1.27	2310.45	2212.50	104.43
PFHxA_1	313.0 / 269.0	1.51	2663.35	2500.00	106.53
PFHxA_2	313.0 / 119.0	1.51	2671.09	2500.00	106.84
PFHpA_1	363.0 / 319.0	1.84	2677.67	2500.00	107.11
PFHpA_2	363.0 / 169.0	1.84	2734.56	2500.00	109.38
PFHxS_1	399.0 / 80.0	1.85	2383.85	2280.00	104.55
PFHxS_2	399.0 / 99.0	1.85	2342.43	2280.00	102.74
PFOA_1	413.0 / 369.0	2.21	2775.70	2500.00	111.03
PFOA_2	413.0 / 169.0	2.20	2507.46	2500.00	100.30
PFNA_1	463.0 / 419.0	2.58	2844.16	2500.00	113.77
PFNA_2	463.0 / 219.0	2.58	2763.55	2500.00	110.54
PFOS_1	499.0 / 80.0	2.57	2390.91	2313.75	103.33
PFOS_2	499.0 / 99.0	2.57	2363.82	2313.75	102.16
PFDA_1	513.0 / 469.0	2.93	2578.37	2500.00	103.13
PFDA_2	513.0 / 219.0	2.93	2595.90	2500.00	103.84
PFUnA_1	563.0 / 519.0	3.26	2855.19	2500.00	114.21
PFUnA_2	563.0 / 269.0	3.26	2471.78	2500.00	98.87
PFDoA_1	613.0 / 569.0	3.56	2608.26	2500.00	104.33
PFDoA_2	613.0 / 319.0	3.56	2616.56	2500.00	104.66
PFTrDA_1	663.0 / 619.0	3.82	2931.78	2500.00	117.27
PFTrDA_2	663.0 / 169.0	3.81	2625.14	2500.00	105.01
PFTeDA_1	713.0 / 669.0	4.05	2737.26	2500.00	109.49
PFTeDA_2	713.0 / 169.0	4.04	2667.84	2500.00	106.71
NMeFOSAA_1	570.0 / 419.0	3.09	2602.06	2500.00	104.08
NMeFOSAA_2	570.0 / 512.0	3.09	2436.09	2500.00	97.44
NEtFOSAA_1	584.0 / 419.0	3.26	2528.96	2500.00	101.16
NEtFOSAA_2	584.0 / 483.0	3.25	2583.56	2500.00	103.34
13C2-PFHxA	315.0 / 270.0	1.50	9857.24	10000.00	98.57
13C2-PFDA	515.0 / 470.0	2.93	10186.66	10000.00	101.87
d5-EtFOSAA	589.0 / 419.0	3.24	37850.67	40000.00	94.63
HFPO-DA_1	285.0 / 169.0	1.60	2491.48	2500.00	99.66
HFPO-DA_2	285.0 / 118.8	1.60	2405.68	2500.00	96.23
ADONA_1	377.0 / 251.0	1.88	2676.95	2362.50	113.31
ADONA_2	377.0 / 85.0	1.88	2469.52	2362.50	104.53
13C3-HFPO-DA	287.0 / 169.0	1.60	9920.40	10000.00	99.20
9Cl-PF3ONS_1	531.0 / 351.0	2.77	2400.72	2325.00	103.26
9Cl-PF3ONS_2	531.0 / 83.0	2.77	2386.21	2325.00	102.63
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	2498.65	2350.00	106.33
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	2561.75	2350.00	109.01

QC Summary Report

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Sample Name	LD98 CCV	Injection Vial	43
Sample ID	CCV	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:46:00 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Conc. (ng/L)	Target Conc. (ng/L)	Recovery (%)
PFBS_1	298.9 / 80.0	1.27	4675.28	4425.00	105.66
PFBS_2	298.9 / 99.0	1.27	4686.16	4425.00	105.90
PFHxA_1	313.0 / 269.0	1.50	5384.77	5000.00	107.70
PFHxA_2	313.0 / 119.0	1.50	5571.46	5000.00	111.43
PFHpA_1	363.0 / 319.0	1.82	5616.43	5000.00	112.33
PFHpA_2	363.0 / 169.0	1.82	5546.64	5000.00	110.93
PFHxS_1	399.0 / 80.0	1.83	4825.17	4560.00	105.82
PFHxS_2	399.0 / 99.0	1.83	4832.81	4560.00	105.98
PFOA_1	413.0 / 369.0	2.18	6088.18	5000.00	121.76
PFOA_2	413.0 / 169.0	2.18	5650.36	5000.00	113.01
PFNA_1	463.0 / 419.0	2.54	5309.16	5000.00	106.18
PFNA_2	463.0 / 219.0	2.54	5734.31	5000.00	114.69
PFOS_1	499.0 / 80.0	2.54	4513.89	4627.50	97.54
PFOS_2	499.0 / 99.0	2.54	4499.75	4627.50	97.24
PFDA_1	513.0 / 469.0	2.89	5481.80	5000.00	109.64
PFDA_2	513.0 / 219.0	2.89	5566.66	5000.00	111.33
PFUnA_1	563.0 / 519.0	3.21	5487.13	5000.00	109.74
PFUnA_2	563.0 / 269.0	3.21	5164.65	5000.00	103.29
PFDoA_1	613.0 / 569.0	3.49	5474.36	5000.00	109.49
PFDoA_2	613.0 / 319.0	3.49	5410.54	5000.00	108.21
PFTrDA_1	663.0 / 619.0	3.73	5802.45	5000.00	116.05
PFTrDA_2	663.0 / 169.0	3.73	5483.37	5000.00	109.67
PFTeDA_1	713.0 / 669.0	3.95	5322.07	5000.00	106.44
PFTeDA_2	713.0 / 169.0	3.95	5436.45	5000.00	108.73
NMeFOSAA_1	570.0 / 419.0	3.04	5603.95	5000.00	112.08
NMeFOSAA_2	570.0 / 512.0	3.04	5469.01	5000.00	109.38
NEtFOSAA_1	584.0 / 419.0	3.20	6148.03	5000.00	122.96
NEtFOSAA_2	584.0 / 483.0	3.20	6169.41	5000.00	123.39
13C2-PFHxA	315.0 / 270.0	1.49	9981.35	10000.00	99.81
13C2-PFDA	515.0 / 470.0	2.88	10591.95	10000.00	105.92
d5-EtFOSAA	589.0 / 419.0	3.19	45353.12	40000.00	113.38
HFPO-DA_1	285.0 / 169.0	1.59	5232.77	5000.00	104.66
HFPO-DA_2	285.0 / 118.8	1.59	5251.06	5000.00	105.02
ADONA_1	377.0 / 251.0	1.86	5175.84	4725.00	109.54
ADONA_2	377.0 / 85.0	1.86	4926.88	4725.00	104.27
13C3-HFPO-DA	287.0 / 169.0	1.59	10108.20	10000.00	101.08
9Cl-PF3ONS_1	531.0 / 351.0	2.74	4766.00	4650.00	102.49
9Cl-PF3ONS_2	531.0 / 83.0	2.73	4360.49	4650.00	93.77
11Cl-PF3OUdS_1	631.0 / 451.0	3.34	4608.60	4700.00	98.06
11Cl-PF3OUdS_2	631.0 / 83.0	3.34	4801.04	4700.00	102.15

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PFAS QC Sample Quant Report

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Sample Name	LE03 ICC	Injection Vial	10
Sample ID	ICC	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:48:09 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.28	1833508.24	2499.73	9740.8	False	13C4-PFOS	14038423.75	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	594017.05	2431.91	2686.8	False	13C4-PFOS	14038423.75	28740.00	PFBS	0.324	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	3079403.22	2826.85	1063.3	False	13C2-PFOA	8839517.91	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	186175.25	2736.63	965.9	False	13C2-PFOA	8839517.91	10000.00	PFHxA	0.060	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	2612850.92	3039.75	549.0	False	13C2-PFOA	8839517.91	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	78668.33	2749.32	760.0	False	13C2-PFOA	8839517.91	10000.00	PFHpA	0.030	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	1729295.82	2553.74	2087.8	False	13C4-PFOS	14038423.75	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	628955.82	2496.17	1479.9	False	13C4-PFOS	14038423.75	28740.00	PFHxS	0.364	0.366	✓
PFOA_1	413.0 / 369.0	2.21	2993322.20	2865.98	727.3	False	13C2-PFOA	8839517.91	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.21	277667.28	2551.58	815.3	False	13C2-PFOA	8839517.91	10000.00	PFOA	0.093	0.098	✓
PFNA_1	463.0 / 419.0	2.59	2110719.84	2892.61	1016.0	False	13C2-PFOA	8839517.91	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.59	730480.04	2841.01	1654.2	False	13C2-PFOA	8839517.91	10000.00	PFNA	0.346	0.343	✓
PFOS_1	499.0 / 80.0	2.58	1625997.07	2305.38	1776.5	False	13C4-PFOS	14038423.75	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	391116.88	2526.79	1554.1	False	13C4-PFOS	14038423.75	28740.00	PFOS	0.241	0.218	✓
PFDA_1	513.0 / 469.0	2.94	2771071.33	2831.42	941.0	False	13C2-PFOA	8839517.91	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.94	162107.22	2724.28	1653.4	False	13C2-PFOA	8839517.91	10000.00	PFDA	0.058	0.062	✓
PFUnA_1	563.0 / 519.0	3.27	2808837.97	2998.20	1102.0	False	13C2-PFOA	8839517.91	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	173833.69	2732.42	990.1	False	13C2-PFOA	8839517.91	10000.00	PFUnA	0.062	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	3174438.11	2948.46	1032.4	False	13C2-PFOA	8839517.91	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	375672.22	2747.88	964.8	False	13C2-PFOA	8839517.91	10000.00	PFDoA	0.118	0.121	✓
PFTrDA_1	663.0 / 619.0	3.81	2699913.40	3000.68	1738.1	False	13C2-PFOA	8839517.91	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	183721.60	2605.65	1346.4	False	13C2-PFOA	8839517.91	10000.00	PFTrDA	0.068	0.075	✓
PFTeDA_1	713.0 / 669.0	4.04	2541878.01	2807.58	2680.0	False	13C2-PFOA	8839517.91	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	147114.21	2625.94	1561.9	False	13C2-PFOA	8839517.91	10000.00	PFTeDA	0.058	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	565621.82	2600.26	3578.4	False	d3-MeFOSAA	8268930.14	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	472953.00	2547.46	1589.8	False	d3-MeFOSAA	8268930.14	40000.00	NMeFOSAA	0.836	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	450259.29	2929.46	1950.7	False	d3-MeFOSAA	8268930.14	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	21601.38	2433.02	188494.2	False	d3-MeFOSAA	8268930.14	40000.00	NEtFOSAA	0.048	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	10537039.83	10113.94	9158.5	False	13C2-PFOA	8839517.91	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	10799149.10	10595.02	2472.3	False	13C2-PFOA	8839517.91	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	6572118.41	40827.41	2480.3	False	d3-MeFOSAA	8268930.14	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	2022833.77	2715.89	2036.9	False	13C2-PFOA	8839517.91	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	54104.72	2670.96	1576.1	False	13C2-PFOA	8839517.91	10000.00	HFPO-DA	0.027	0.026	✓
ADONA_1	377.0 / 251.0	1.89	5793360.87	2723.65	4140.8	False	13C2-PFOA	8839517.91	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.88	91397.03	2494.81	965.3	False	13C2-PFOA	8839517.91	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	5374777.34	10074.75	2539.6	False	13C2-PFOA	8839517.91	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.78	3333473.39	2554.50	2101.5	False	13C4-PFOS	14038423.75	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.78	33719.97	2386.03	447.7	False	13C4-PFOS	14038423.75	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	2158013.56	2533.44	1801.6	False	13C4-PFOS	14038423.75	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	11785.39	2477.34	394.9	False	13C4-PFOS	14038423.75	28740.00	11Cl-PF3OUdS	0.005	0.005	✓

Sample Name	LD97 CCV	Injection Vial	37
Sample ID	CCV	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 1:32:20 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	1917131.37	2334.15	8727.2	False	13C4-PFOS	15719969.22	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	631947.33	2310.45	3181.7	False	13C4-PFOS	15719969.22	28740.00	PFBS	0.330	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	3152562.34	2663.35	990.2	False	13C2-PFOA	9605045.05	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	197453.69	2671.09	1121.6	False	13C2-PFOA	9605045.05	10000.00	PFHxA	0.063	0.060	✓
PFHpA_1	363.0 / 319.0	1.84	2500944.75	2677.67	645.7	False	13C2-PFOA	9605045.05	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.84	85022.37	2734.56	1244.5	False	13C2-PFOA	9605045.05	10000.00	PFHpA	0.034	0.031	✓
PFHxS_1	399.0 / 80.0	1.85	1807607.97	2383.85	1962.6	False	13C4-PFOS	15719969.22	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.85	660916.36	2342.43	1079.5	False	13C4-PFOS	15719969.22	28740.00	PFHxS	0.366	0.366	✓
PFOA_1	413.0 / 369.0	2.21	3150093.28	2775.70	772.3	False	13C2-PFOA	9605045.05	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.20	296497.69	2507.46	1181.4	False	13C2-PFOA	9605045.05	10000.00	PFOA	0.094	0.098	✓
PFNA_1	463.0 / 419.0	2.58	2255098.65	2844.16	899.2	False	13C2-PFOA	9605045.05	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.58	772099.27	2763.55	1983.9	False	13C2-PFOA	9605045.05	10000.00	PFNA	0.342	0.343	✓
PFOS_1	499.0 / 80.0	2.57	1888314.99	2390.91	932.8	False	13C4-PFOS	15719969.22	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.57	409718.23	2363.82	1123.1	False	13C4-PFOS	15719969.22	28740.00	PFOS	0.217	0.218	✓
PFDA_1	513.0 / 469.0	2.93	2741949.34	2578.37	931.6	False	13C2-PFOA	9605045.05	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.93	167845.44	2595.90	1775.6	False	13C2-PFOA	9605045.05	10000.00	PFDA	0.061	0.062	✓
PFUnA_1	563.0 / 519.0	3.26	2906513.59	2855.19	890.5	False	13C2-PFOA	9605045.05	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.26	170870.68	2471.78	1311.4	False	13C2-PFOA	9605045.05	10000.00	PFUnA	0.059	0.063	✓
PFDoA_1	613.0 / 569.0	3.56	3051357.74	2608.26	782.2	False	13C2-PFOA	9605045.05	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.56	388697.94	2616.56	1099.3	False	13C2-PFOA	9605045.05	10000.00	PFDoA	0.127	0.121	✓
PFTrDA_1	663.0 / 619.0	3.82	2866371.44	2931.78	1511.1	False	13C2-PFOA	9605045.05	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	201126.04	2625.14	1565.9	False	13C2-PFOA	9605045.05	10000.00	PFTrDA	0.070	0.075	✓
PFTeDA_1	713.0 / 669.0	4.05	2692836.26	2737.26	2745.8	False	13C2-PFOA	9605045.05	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	162405.44	2667.84	1631.1	False	13C2-PFOA	9605045.05	10000.00	PFTeDA	0.060	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	585550.77	2602.06	2401.1	False	d3-MeFOSAA	8554372.91	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	467888.83	2436.09	905.7	False	d3-MeFOSAA	8554372.91	40000.00	NMeFOSAA	0.799	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	402120.61	2528.96	1634.2	False	d3-MeFOSAA	8554372.91	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.25	23729.80	2583.56	517.7	False	d3-MeFOSAA	8554372.91	40000.00	NEtFOSAA	0.059	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.50	11158978.35	9857.24	9274.9	False	13C2-PFOA	9605045.05	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	11282113.01	10186.66	3135.7	False	13C2-PFOA	9605045.05	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.24	6303270.72	37850.67	3960.9	False	d3-MeFOSAA	8554372.91	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.60	2016396.39	2491.48	2070.9	False	13C2-PFOA	9605045.05	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.60	52951.17	2405.68	1243.1	False	13C2-PFOA	9605045.05	10000.00	HFPO-DA	0.026	0.026	✓
ADONA_1	377.0 / 251.0	1.88	6187157.06	2676.95	5777.6	False	13C2-PFOA	9605045.05	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.88	98305.58	2469.52	949.6	False	13C2-PFOA	9605045.05	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	5750772.78	9920.40	3433.5	False	13C2-PFOA	9605045.05	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.77	3508056.29	2400.72	1760.8	False	13C4-PFOS	15719969.22	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.77	37761.86	2386.21	549.8	False	13C4-PFOS	15719969.22	28740.00	9Cl-PF3ONS	0.011	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.41	2383318.42	2498.65	1598.1	False	13C4-PFOS	15719969.22	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.41	13646.76	2561.75	413.8	False	13C4-PFOS	15719969.22	28740.00	11Cl-PF3OUdS	0.006	0.005	✓

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PFAS QC Sample Quant Report

Created with Analyst Reporter
Printed: 28/12/2020 5:40:07 PM

Sample Name	LD98 CCV	Injection Vial	43
Sample ID	CCV	Injection Volume	10.00
Sample Type	Quality Control	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:46:00 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	3935104.11	4675.28	15929.9	False	13C4-PFOS	16109318.83	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	1313490.61	4686.16	3719.9	False	13C4-PFOS	16109318.83	28740.00	PFBS	0.334	0.336	✓
PFHxA_1	313.0 / 269.0	1.50	6189305.18	5384.77	1312.9	False	13C2-PFOA	9326935.42	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.50	399930.92	5571.46	1392.5	False	13C2-PFOA	9326935.42	10000.00	PFHxA	0.065	0.060	✓
PFHpA_1	363.0 / 319.0	1.82	5093861.61	5616.43	826.5	False	13C2-PFOA	9326935.42	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.82	167461.41	5546.64	1272.5	False	13C2-PFOA	9326935.42	10000.00	PFHpA	0.033	0.031	✓
PFHxS_1	399.0 / 80.0	1.83	3749417.81	4825.17	2131.9	False	13C4-PFOS	16109318.83	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.83	1397348.69	4832.81	1475.2	False	13C4-PFOS	16109318.83	28740.00	PFHxS	0.373	0.366	✓
PFOA_1	413.0 / 369.0	2.18	6709318.97	6088.18	1122.6	False	13C2-PFOA	9326935.42	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.18	648788.09	5650.36	999.6	False	13C2-PFOA	9326935.42	10000.00	PFOA	0.097	0.098	✓
PFNA_1	463.0 / 419.0	2.54	4087689.77	5309.16	1410.6	False	13C2-PFOA	9326935.42	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.54	1555706.22	5734.31	2265.0	False	13C2-PFOA	9326935.42	10000.00	PFNA	0.381	0.343	✓
PFOS_1	499.0 / 80.0	2.54	3653318.37	4513.89	1018.2	False	13C4-PFOS	16109318.83	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.54	799255.24	4499.75	1571.4	False	13C4-PFOS	16109318.83	28740.00	PFOS	0.219	0.218	✓
PFDA_1	513.0 / 469.0	2.89	5660790.25	5481.80	1482.7	False	13C2-PFOA	9326935.42	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.89	349506.58	5566.66	1922.3	False	13C2-PFOA	9326935.42	10000.00	PFDA	0.062	0.062	✓
PFUnA_1	563.0 / 519.0	3.21	5424031.02	5487.13	1666.3	False	13C2-PFOA	9326935.42	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.21	346687.30	5164.65	1699.0	False	13C2-PFOA	9326935.42	10000.00	PFUnA	0.064	0.063	✓
PFDoA_1	613.0 / 569.0	3.49	6218925.70	5474.36	1597.3	False	13C2-PFOA	9326935.42	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.49	780479.38	5410.54	1751.5	False	13C2-PFOA	9326935.42	10000.00	PFDoA	0.126	0.121	✓
PFTrDA_1	663.0 / 619.0	3.73	5508728.94	5802.45	2289.2	False	13C2-PFOA	9326935.42	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.73	407945.93	5483.37	1278.1	False	13C2-PFOA	9326935.42	10000.00	PFTrDA	0.074	0.075	✓
PFTeDA_1	713.0 / 669.0	3.95	5084097.27	5322.07	3682.8	False	13C2-PFOA	9326935.42	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	3.95	321363.00	5436.45	1964.0	False	13C2-PFOA	9326935.42	10000.00	PFTeDA	0.063	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.04	1180635.94	5603.95	2242.7	False	d3-MeFOSAA	8008698.98	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.04	983402.43	5469.01	1094.0	False	d3-MeFOSAA	8008698.98	40000.00	NMeFOSAA	0.833	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.20	915215.64	6148.03	1832.5	False	d3-MeFOSAA	8008698.98	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.20	53050.93	6169.41	873.6	False	d3-MeFOSAA	8008698.98	40000.00	NEtFOSAA	0.058	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.49	10972302.18	9981.35	9768.5	False	13C2-PFOA	9326935.42	10000.00				
13C2-PFDA	515.0 / 470.0	2.88	11391323.04	10591.95	2691.7	False	13C2-PFOA	9326935.42	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.19	7070878.68	45353.12	2300.0	False	d3-MeFOSAA	8008698.98	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.59	4112345.97	5232.77	2140.6	False	13C2-PFOA	9326935.42	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.59	112234.16	5251.06	1476.3	False	13C2-PFOA	9326935.42	10000.00	HFPO-DA	0.027	0.026	✓
ADONA_1	377.0 / 251.0	1.86	11616373.24	5175.84	7983.2	False	13C2-PFOA	9326935.42	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.86	190448.44	4926.88	1055.6	False	13C2-PFOA	9326935.42	10000.00	ADONA	0.016	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.59	5689977.94	10108.20	2772.5	False	13C2-PFOA	9326935.42	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.74	7136808.27	4766.00	2959.5	False	13C4-PFOS	16109318.83	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.73	70714.08	4360.49	694.3	False	13C4-PFOS	16109318.83	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.34	4504759.09	4608.60	2736.9	False	13C4-PFOS	16109318.83	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.34	26209.19	4801.04	480.7	False	13C4-PFOS	16109318.83	28740.00	11Cl-PF3OUdS	0.006	0.005	✓

Raw Analytical Data

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It can be done

Sample Name	LE02 IB	Injection Vial	9
Sample ID	Instrument Blank	Injection Volume	10.00
Sample Type	Unknown	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:37:36 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	PFBS			
PFBS_2	298.9 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	PFBS	N/A	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	19024.64	17.33	64.6	True	13C2-PFOA	8909464.48	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	1022.46	14.91	40.4	True	13C2-PFOA	8909464.48	10000.00	PFHxA	0.054	0.060	✓
PFHpA_1	363.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFHpA	N/A	0.031	✓
PFHxS_1	399.0 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	PFHxS	N/A	0.366	✓
PFOA_1	413.0 / 369.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.22	2000.83	18.24	31.7	False	13C2-PFOA	8909464.48	10000.00	PFOA	N/A	0.098	
PFNA_1	463.0 / 419.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFNA			
PFNA_2	463.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFNA	N/A	0.343	✓
PFOS_1	499.0 / 80.0	2.60	17602.24	22.15	116.7	False	13C4-PFOS	15816377.56	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.60	3685.89	21.14	74.2	False	13C4-PFOS	15816377.56	28740.00	PFOS	0.209	0.218	✓
PFDA_1	513.0 / 469.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFDA			
PFDA_2	513.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFDA	N/A	0.062	✓
PFUnA_1	563.0 / 519.0	3.28	6859.89	7.26	55.5	False	13C2-PFOA	8909464.48	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.27	410.58	6.40	30.5	False	13C2-PFOA	8909464.48	10000.00	PFUnA	0.060	0.063	✓
PFDoA_1	613.0 / 569.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	PFDoA	N/A	0.121	✓
PFTrDA_1	663.0 / 619.0	3.83	9251.84	10.20	127.5	False	13C2-PFOA	8909464.48	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.83	669.39	9.42	64.4	False	13C2-PFOA	8909464.48	10000.00	PFTrDA	0.072	0.075	✓
PFTeDA_1	713.0 / 669.0	4.05	28368.90	31.09	396.7	False	13C2-PFOA	8909464.48	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.04	1697.79	30.07	87.9	True	13C2-PFOA	8909464.48	10000.00	PFTeDA	0.060	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.11	9611.11	44.26	260.0	True	d3-MeFOSAA	8254286.50	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.11	6845.21	36.94	98.9	True	d3-MeFOSAA	8254286.50	40000.00	NMeFOSAA	0.712	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.28	6969.16	45.42	177.1	True	d3-MeFOSAA	8254286.50	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.28	705.69	79.62	71.8	False	d3-MeFOSAA	8254286.50	40000.00	NEtFOSAA	0.101	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.52	11748123.49	11187.87	11224.9	False	13C2-PFOA	8909464.48	10000.00				
13C2-PFDA	515.0 / 470.0	2.95	11021015.88	10727.81	4582.5	False	13C2-PFOA	8909464.48	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.27	7539425.94	46919.62	3589.4	False	d3-MeFOSAA	8254286.50	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	2577.06	3.43	49.0	False	13C2-PFOA	8909464.48	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	HFPO-DA	N/A	0.026	
ADONA_1	377.0 / 251.0	1.90	5209.55	2.43	119.1	False	13C2-PFOA	8909464.48	10000.00	ADONA			
ADONA_2	377.0 / 85.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8909464.48	10000.00	ADONA	N/A	0.016	
13C3-HFPO-DA	287.0 / 169.0	1.61	5613070.83	10438.82	2757.3	False	13C2-PFOA	8909464.48	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.80	1371.80	0.93	32.2	False	13C4-PFOS	15816377.56	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	9Cl-PF3ONS	N/A	0.010	
11Cl-PF3OUdS_1	631.0 / 451.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15816377.56	28740.00	11Cl-PF3OUdS	N/A	0.005	✓

Sample Name	DB577PB-FS(0)	Injection Vial	38
Sample ID	Procedural Blank	Injection Volume	10.00
Sample Type	Unknown	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 1:53:24 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	PFBS			
PFBS_2	298.9 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	PFBS	N/A	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	77627.66	64.82	205.6	True	13C2-PFOA	9717866.67	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	3908.11	52.25	84.2	False	13C2-PFOA	9717866.67	10000.00	PFHxA	0.050	0.060	✓
PFHpA_1	363.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFHpA	N/A	0.031	✓
PFHxS_1	399.0 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	PFHxS	N/A	0.366	✓
PFOA_1	413.0 / 369.0	2.20	17308.46	15.07	37.2	False	13C2-PFOA	9717866.67	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.20	2296.18	19.19	37.1	False	13C2-PFOA	9717866.67	10000.00	PFOA	0.133	0.098	✓
PFNA_1	463.0 / 419.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFNA			
PFNA_2	463.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFNA	N/A	0.343	✓
PFOS_1	499.0 / 80.0	2.57	16792.11	19.84	123.0	False	13C4-PFOS	16844124.58	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.57	4693.14	25.27	98.3	False	13C4-PFOS	16844124.58	28740.00	PFOS	0.279	0.218	✓
PFDA_1	513.0 / 469.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFDA			
PFDA_2	513.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFDA	N/A	0.062	✓
PFUnA_1	563.0 / 519.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFUnA	N/A	0.063	✓
PFDoA_1	613.0 / 569.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFDoA	N/A	0.121	✓
PFTrDA_1	663.0 / 619.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFTrDA	N/A	0.075	✓
PFTeDA_1	713.0 / 669.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	PFTeDA	N/A	0.060	✓
NMeFOSAA_1	570.0 / 419.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	8841605.99	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	8841605.99	40000.00	NMeFOSAA	N/A	0.846	✓
NEtFOSAA_1	584.0 / 419.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	8841605.99	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	8841605.99	40000.00	NEtFOSAA	N/A	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.50	10659999.27	9307.15	6836.5	False	13C2-PFOA	9717866.67	10000.00				
13C2-PFDA	515.0 / 470.0	2.92	10513295.90	9382.29	2802.1	False	13C2-PFOA	9717866.67	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.24	6631558.41	38528.33	3159.7	False	d3-MeFOSAA	8841605.99	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	HFPO-DA	N/A	0.026	✓
ADONA_1	377.0 / 251.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	ADONA			
ADONA_2	377.0 / 85.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9717866.67	10000.00	ADONA	N/A	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	4735265.16	8073.76	3112.6	False	13C2-PFOA	9717866.67	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	9Cl-PF3ONS	N/A	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	16844124.58	28740.00	11Cl-PF3OUdS	N/A	0.005	✓

Sample Name	DB578LCS-FS(0)	Injection Vial	39
Sample ID	Laboratory Control Sample	Injection Volume	10.00
Sample Type	Unknown	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:03:55 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	1.27	6702654.05	8033.30	16450.3	False	13C4-PFOS	15969145.02	28740.00	PFBS			
PFBS_2	298.9 / 99.0	1.27	2316491.81	8337.12	8382.1	False	13C4-PFOS	15969145.02	28740.00	PFBS	0.346	0.336	✓
PFHxA_1	313.0 / 269.0	1.52	11300176.93	10032.62	1673.5	False	13C2-PFOA	9139773.95	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	742960.83	10562.17	1221.3	False	13C2-PFOA	9139773.95	10000.00	PFHxA	0.066	0.060	✓
PFHpA_1	363.0 / 319.0	1.85	8640922.34	9722.48	1127.4	False	13C2-PFOA	9139773.95	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	1.85	298806.34	10099.70	1390.9	False	13C2-PFOA	9139773.95	10000.00	PFHpA	0.035	0.031	✓
PFHxS_1	399.0 / 80.0	1.86	6549881.74	8503.11	2870.5	False	13C4-PFOS	15969145.02	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	1.86	2318033.15	8087.43	1951.1	False	13C4-PFOS	15969145.02	28740.00	PFHxS	0.354	0.366	✓
PFOA_1	413.0 / 369.0	2.21	10186098.92	9432.36	1076.7	False	13C2-PFOA	9139773.95	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.21	993905.63	8833.28	1619.6	False	13C2-PFOA	9139773.95	10000.00	PFOA	0.098	0.098	✓
PFNA_1	463.0 / 419.0	2.58	6928887.96	9183.65	1651.7	False	13C2-PFOA	9139773.95	10000.00	PFNA			
PFNA_2	463.0 / 219.0	2.58	2565474.30	9649.95	2741.4	False	13C2-PFOA	9139773.95	10000.00	PFNA	0.370	0.343	✓
PFOS_1	499.0 / 80.0	2.58	5870277.94	7316.74	2590.3	False	13C4-PFOS	15969145.02	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	1481625.65	8414.67	2572.4	False	13C4-PFOS	15969145.02	28740.00	PFOS	0.252	0.218	✓
PFDA_1	513.0 / 469.0	2.94	9461765.52	9350.21	1466.3	False	13C2-PFOA	9139773.95	10000.00	PFDA			
PFDA_2	513.0 / 219.0	2.94	611556.42	9939.84	1868.6	False	13C2-PFOA	9139773.95	10000.00	PFDA	0.065	0.062	✓
PFUnA_1	563.0 / 519.0	3.26	9294820.24	9595.50	1560.4	False	13C2-PFOA	9139773.95	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	3.26	638742.30	9710.29	1581.2	False	13C2-PFOA	9139773.95	10000.00	PFUnA	0.069	0.063	✓
PFDoA_1	613.0 / 569.0	3.55	11407650.64	10247.50	1740.9	False	13C2-PFOA	9139773.95	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	3.55	1417995.63	10031.30	1866.5	False	13C2-PFOA	9139773.95	10000.00	PFDoA	0.124	0.121	✓
PFTrDA_1	663.0 / 619.0	3.81	9416216.89	10121.39	2441.7	False	13C2-PFOA	9139773.95	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	3.81	723513.88	9924.20	2297.3	False	13C2-PFOA	9139773.95	10000.00	PFTrDA	0.077	0.075	✓
PFTeDA_1	713.0 / 669.0	4.03	8764895.42	9363.04	4421.4	False	13C2-PFOA	9139773.95	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	4.03	539201.30	9308.37	2246.2	False	13C2-PFOA	9139773.95	10000.00	PFTeDA	0.062	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	2167836.45	9974.77	4360.9	False	d3-MeFOSAA	8261601.34	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	1661270.73	8956.03	3066.0	False	d3-MeFOSAA	8261601.34	40000.00	NMeFOSAA	0.766	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	1521072.00	9905.13	1685.7	False	d3-MeFOSAA	8261601.34	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	3.26	76594.76	8634.71	1395.1	False	d3-MeFOSAA	8261601.34	40000.00	NEtFOSAA	0.050	0.059	✓
13C2-PFHxA	315.0 / 270.0	1.51	10473148.29	9722.37	7633.8	False	13C2-PFOA	9139773.95	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	10148195.59	9629.29	2478.4	False	13C2-PFOA	9139773.95	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.24	5904369.86	36711.75	2198.0	False	d3-MeFOSAA	8261601.34	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	1.61	6737411.81	8748.60	2879.0	False	13C2-PFOA	9139773.95	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	1.61	197395.00	9424.58	1177.5	False	13C2-PFOA	9139773.95	10000.00	HFPO-DA	0.029	0.026	✓
ADONA_1	377.0 / 251.0	1.88	20007220.81	9097.05	7414.9	False	13C2-PFOA	9139773.95	10000.00	ADONA			
ADONA_2	377.0 / 85.0	1.88	357139.29	9428.35	1861.2	False	13C2-PFOA	9139773.95	10000.00	ADONA	0.018	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	4853003.43	8797.87	3197.7	False	13C2-PFOA	9139773.95	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	2.78	12189078.84	8211.38	3227.1	False	13C4-PFOS	15969145.02	28740.00	9Cl-PF3ONS			

PFAS Sample Quant Report

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Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	2.78	124282.78	7731.01	759.0	False	13C4-PFOS	15969145.02	28740.00	9Cl-PF3ONS	0.010	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	3.40	7658583.87	7903.91	2469.1	False	13C4-PFOS	15969145.02	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	3.40	46172.22	8532.15	558.2	False	13C4-PFOS	15969145.02	28740.00	11Cl-PF3OUdS	0.006	0.005	✓

PFAS Sample Quant Report

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Printed: 28/12/2020 5:37:01 PM

Sample Name	G3899-FS(0)	**Injection Vial**	40
Sample ID	CBD DW01	**Injection Volume**	10.00
Sample Type	Unknown	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:14:26 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	PFBS			
PFBS_2	298.9 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	PFBS	N/A	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	64102.15	60.31	70.4	False	13C2-PFOA	8625071.02	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.52	3303.96	49.77	51.7	False	13C2-PFOA	8625071.02	10000.00	PFHxA	0.052	0.060	✓
PFHpA_1	363.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFHpA	N/A	0.031	✓
PFHxS_1	399.0 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	PFHxS	N/A	0.366	✓
PFOA_1	413.0 / 369.0	2.21	16348.80	16.04	29.0	False	13C2-PFOA	8625071.02	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.20	1862.09	17.54	32.1	True	13C2-PFOA	8625071.02	10000.00	PFOA	0.114	0.098	✓
PFNA_1	463.0 / 419.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFNA			
PFNA_2	463.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFNA	N/A	0.343	✓
PFOS_1	499.0 / 80.0	2.58	14775.24	18.54	106.3	False	13C4-PFOS	15863271.70	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.58	4524.40	25.87	139.0	False	13C4-PFOS	15863271.70	28740.00	PFOS	0.306	0.218	✓
PFDA_1	513.0 / 469.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFDA			
PFDA_2	513.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFDA	N/A	0.062	✓
PFUnA_1	563.0 / 519.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFUnA	N/A	0.063	✓
PFDoA_1	613.0 / 569.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFDoA	N/A	0.121	✓
PFTrDA_1	663.0 / 619.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFTrDA	N/A	0.075	✓
PFTeDA_1	713.0 / 669.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	PFTeDA	N/A	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	3664.43	17.53	171.2	True	d3-MeFOSAA	7945389.12	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.09	3175.37	17.80	86.4	True	d3-MeFOSAA	7945389.12	40000.00	NMeFOSAA	0.867	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.26	3379.21	22.88	210.7	True	d3-MeFOSAA	7945389.12	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	7945389.12	40000.00	NEtFOSAA	N/A	0.059	
13C2-PFHxA	315.0 / 270.0	1.51	8369748.83	8233.42	4494.6	False	13C2-PFOA	8625071.02	10000.00				
13C2-PFDA	515.0 / 470.0	2.93	10195255.45	10251.24	3175.0	False	13C2-PFOA	8625071.02	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.25	6108384.87	39491.80	2647.8	False	d3-MeFOSAA	7945389.12	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	HFPO-DA	N/A	0.026	✓
ADONA_1	377.0 / 251.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	ADONA			
ADONA_2	377.0 / 85.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	8625071.02	10000.00	ADONA	N/A	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.61	4446804.23	8542.55	2117.5	False	13C2-PFOA	8625071.02	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	9Cl-PF3ONS			

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	9Cl-PF3ONS	N/A	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15863271.70	28740.00	11Cl-PF3OUdS	N/A	0.005	✓

Sample Name	G3901-FS(0)	Injection Vial	41
Sample ID	Trip	Injection Volume	10.00
Sample Type	Unknown	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:24:57 AM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW
Sample Comment			

Results Summary

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
PFBS_1	298.9 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	PFBS			
PFBS_2	298.9 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	PFBS	N/A	0.336	✓
PFHxA_1	313.0 / 269.0	1.51	54812.86	47.53	57.7	False	13C2-PFOA	9357725.61	10000.00	PFHxA			
PFHxA_2	313.0 / 119.0	1.51	3614.56	50.19	32.3	True	13C2-PFOA	9357725.61	10000.00	PFHxA	0.066	0.060	✓
PFHpA_1	363.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFHpA			
PFHpA_2	363.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFHpA	N/A	0.031	✓
PFHxS_1	399.0 / 80.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	PFHxS			
PFHxS_2	399.0 / 99.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	PFHxS	N/A	0.366	✓
PFOA_1	413.0 / 369.0	2.22	22469.42	20.32	31.2	False	13C2-PFOA	9357725.61	10000.00	PFOA			
PFOA_2	413.0 / 169.0	2.20	2286.19	19.85	21.5	False	13C2-PFOA	9357725.61	10000.00	PFOA	0.102	0.098	✓
PFNA_1	463.0 / 419.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFNA			
PFNA_2	463.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFNA	N/A	0.343	✓
PFOS_1	499.0 / 80.0	2.58	17144.37	21.49	108.2	False	13C4-PFOS	15879495.16	28740.00	PFOS			
PFOS_2	499.0 / 99.0	2.59	4511.78	25.77	71.8	True	13C4-PFOS	15879495.16	28740.00	PFOS	0.263	0.218	✓
PFDA_1	513.0 / 469.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFDA			
PFDA_2	513.0 / 219.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFDA	N/A	0.062	✓
PFUnA_1	563.0 / 519.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFUnA			
PFUnA_2	563.0 / 269.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFUnA	N/A	0.063	✓
PFDoA_1	613.0 / 569.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFDoA			
PFDoA_2	613.0 / 319.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFDoA	N/A	0.121	✓
PFTrDA_1	663.0 / 619.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFTrDA			
PFTrDA_2	663.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFTrDA	N/A	0.075	✓
PFTeDA_1	713.0 / 669.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFTeDA			
PFTeDA_2	713.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	PFTeDA	N/A	0.060	✓
NMeFOSAA_1	570.0 / 419.0	3.09	2242.93	9.76	1050.5	False	d3-MeFOSAA	8736257.33	40000.00	NMeFOSAA			
NMeFOSAA_2	570.0 / 512.0	3.10	671.41	3.42	46.9	True	d3-MeFOSAA	8736257.33	40000.00	NMeFOSAA	0.299	0.846	✓
NEtFOSAA_1	584.0 / 419.0	3.28	552.03	3.40	69.2	False	d3-MeFOSAA	8736257.33	40000.00	NEtFOSAA			
NEtFOSAA_2	584.0 / 483.0	N/A	N/A	N/A	N/A	True	d3-MeFOSAA	8736257.33	40000.00	NEtFOSAA	N/A	0.059	
13C2-PFHxA	315.0 / 270.0	1.51	9505801.28	8618.84	3561.9	False	13C2-PFOA	9357725.61	10000.00				
13C2-PFDA	515.0 / 470.0	2.94	10048434.62	9312.56	2153.0	False	13C2-PFOA	9357725.61	10000.00		N/A	N/A	✓
d5-EtFOSAA	589.0 / 419.0	3.26	6760227.54	39749.50	3564.6	False	d3-MeFOSAA	8736257.33	40000.00		N/A	N/A	✓
HFPO-DA_1	285.0 / 169.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	HFPO-DA			
HFPO-DA_2	285.0 / 118.8	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	HFPO-DA	N/A	0.026	✓
ADONA_1	377.0 / 251.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	ADONA			
ADONA_2	377.0 / 85.0	N/A	N/A	N/A	N/A	True	13C2-PFOA	9357725.61	10000.00	ADONA	N/A	0.016	✓
13C3-HFPO-DA	287.0 / 169.0	1.60	5013298.12	8876.78	2117.3	False	13C2-PFOA	9357725.61	10000.00		N/A	N/A	✓
9Cl-PF3ONS_1	531.0 / 351.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	9Cl-PF3ONS			

PFAS Sample Quant Report

Created with Analyst Reporter
Printed: 28/12/2020 5:37:01 PM

Analyte	MRM Transition	RT	Area	Conc. (ng/L)	S/N Ratio	Modified	IS	IS Area	IS Conc. (ng/L)	Ratio Group	Ion Ratio	Expected Ion Ratio	Ratio OK
9Cl-PF3ONS_2	531.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	9Cl-PF3ONS	N/A	0.010	✓
11Cl-PF3OUdS_1	631.0 / 451.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	11Cl-PF3OUdS			
11Cl-PF3OUdS_2	631.0 / 83.0	N/A	N/A	N/A	N/A	True	13C4-PFOS	15879495.16	28740.00	11Cl-PF3OUdS	N/A	0.005	✓

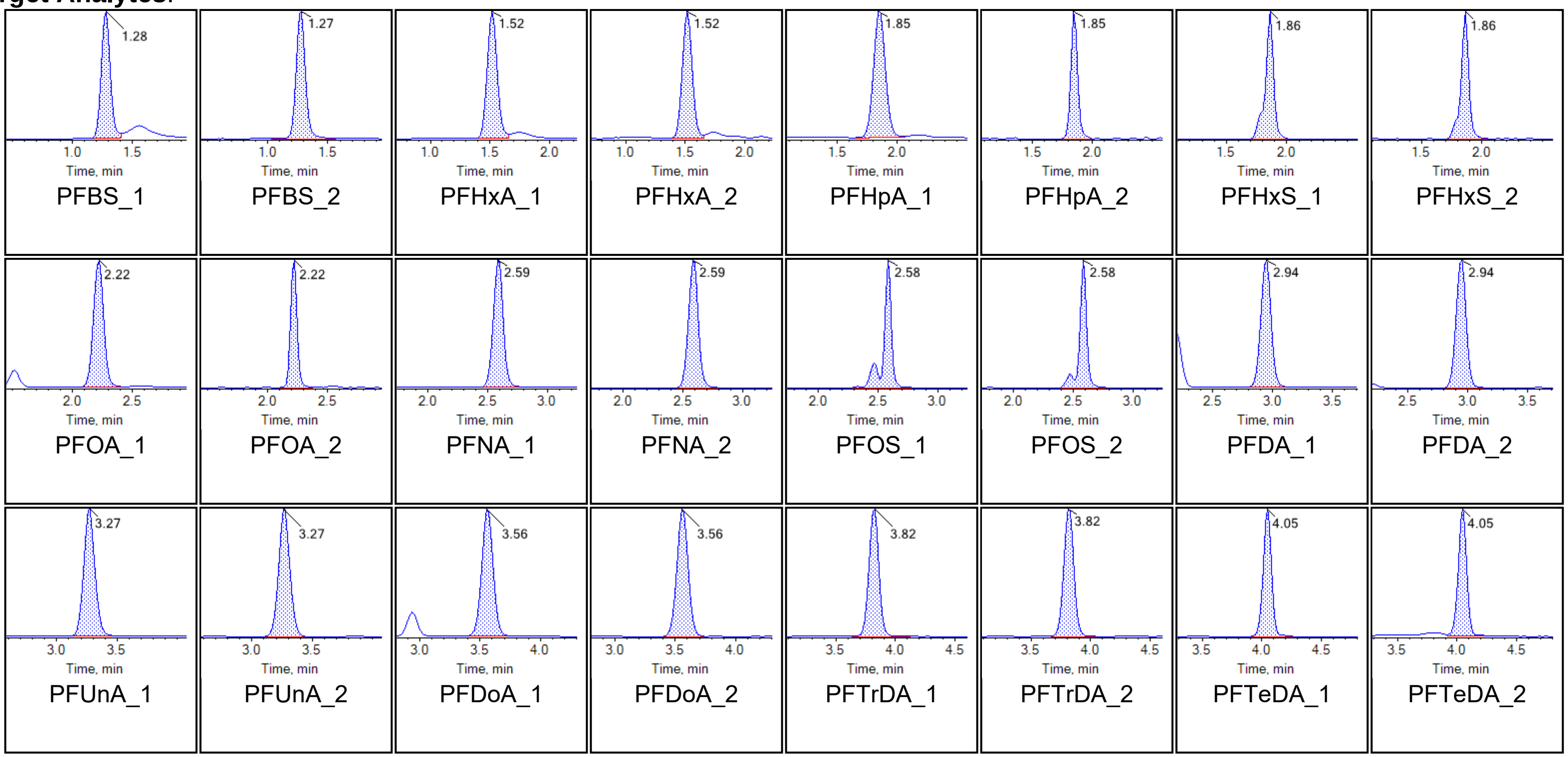
Chromatograms

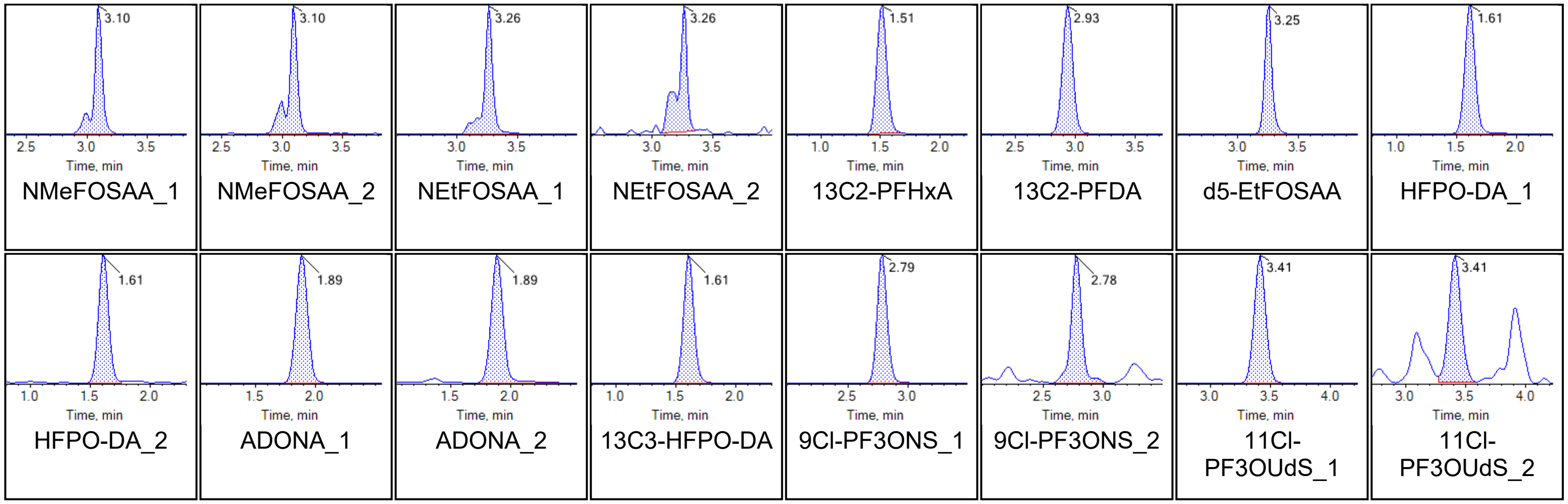
It can be done

Sample Name	LD94	**Injection Vial**	2
Sample ID	L1	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:23:57 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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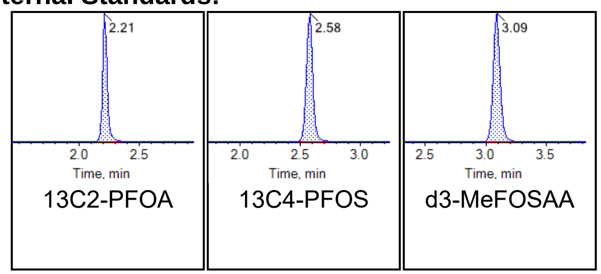
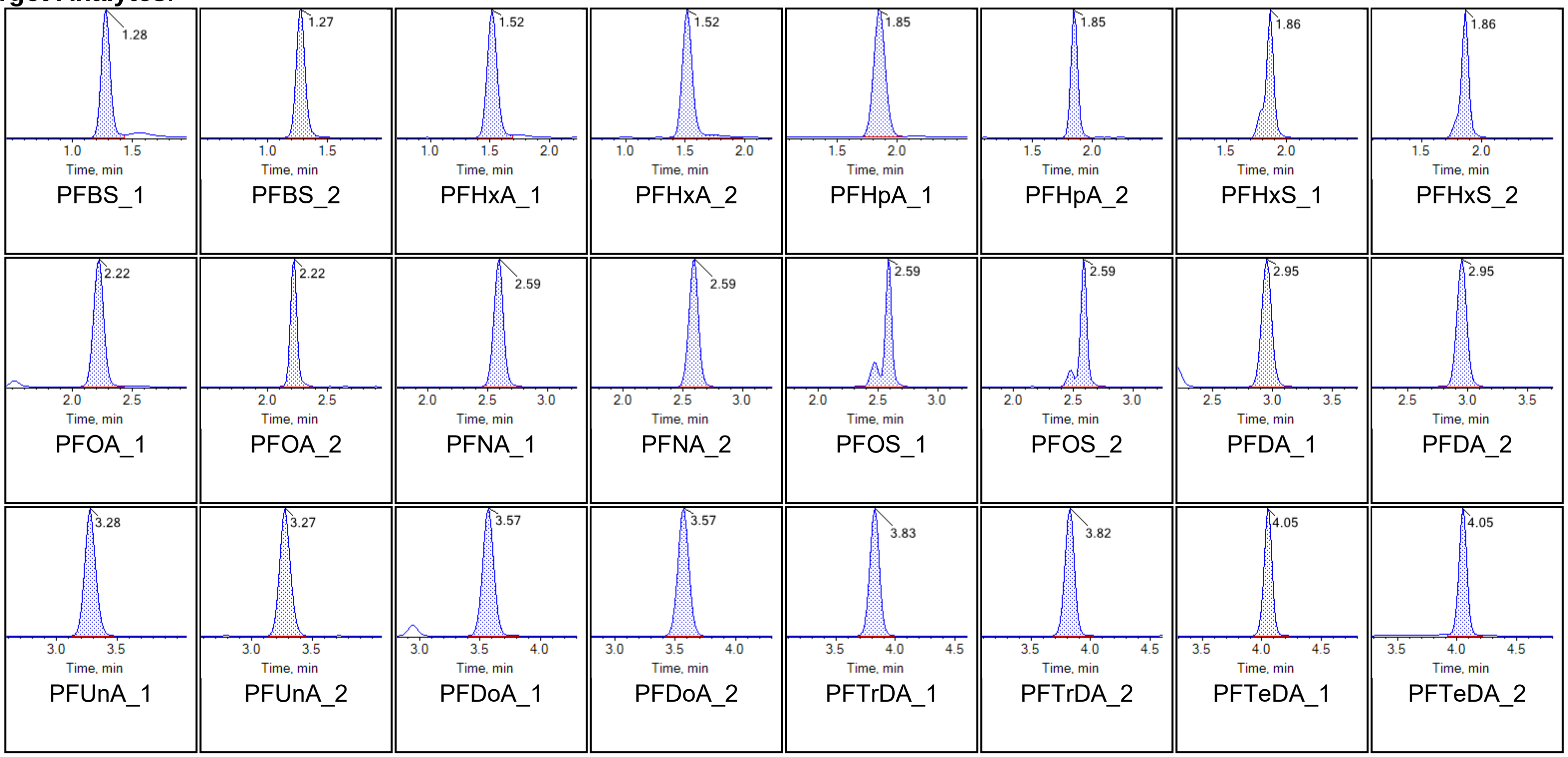
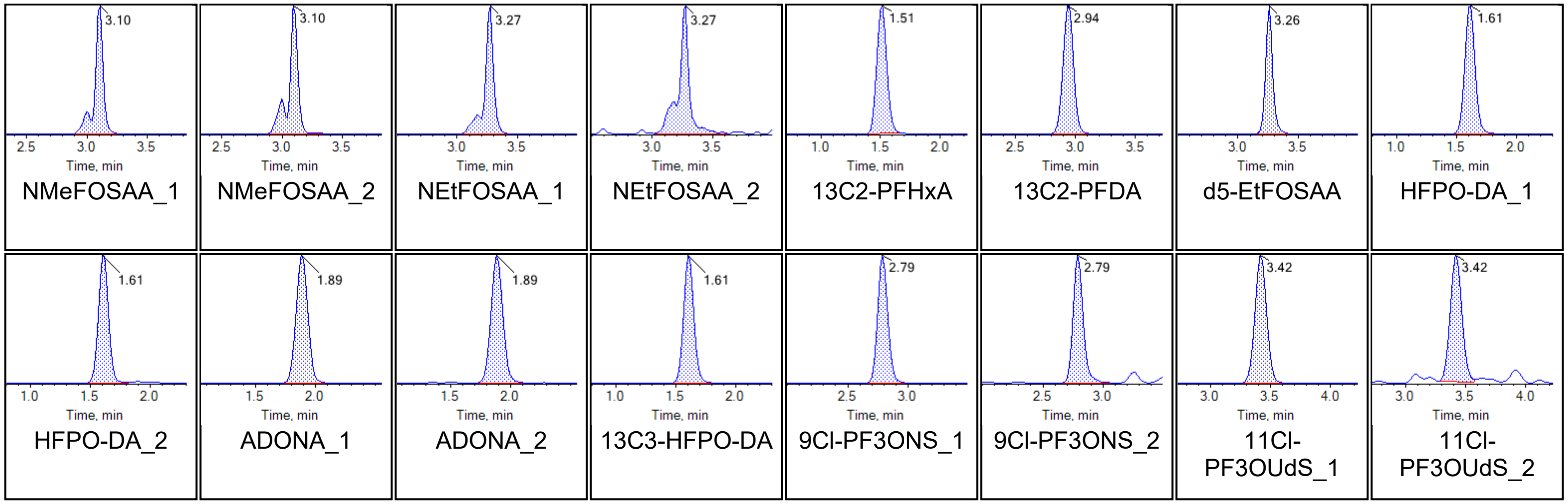


Sample Name	LD95	**Injection Vial**	3
Sample ID	L2	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:34:27 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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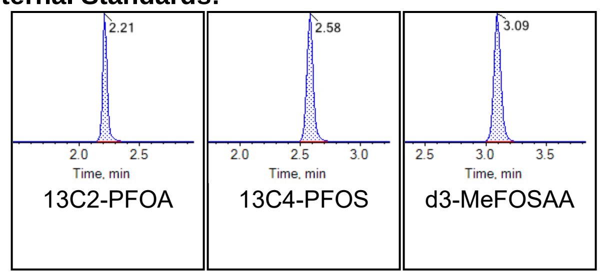
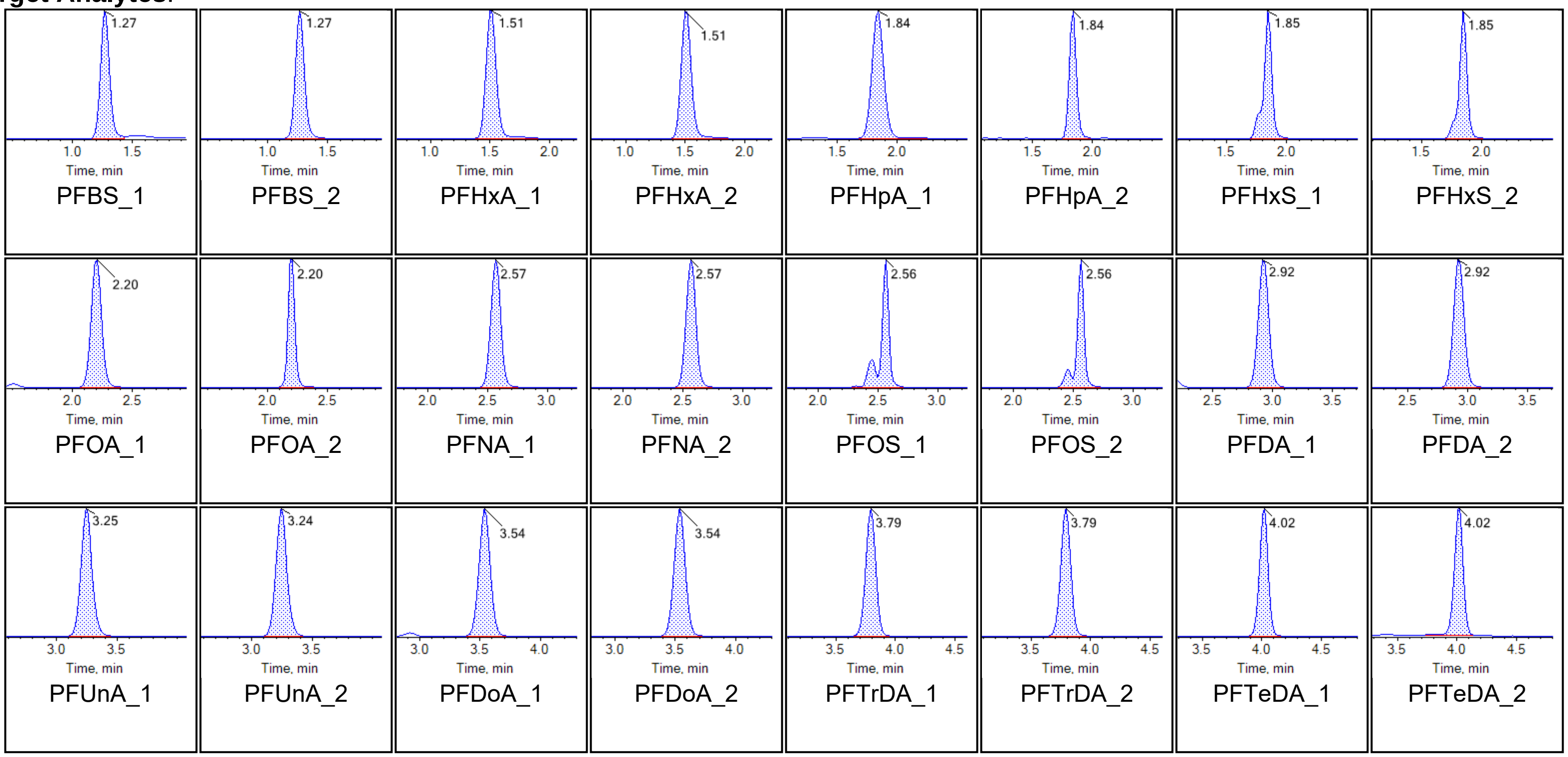
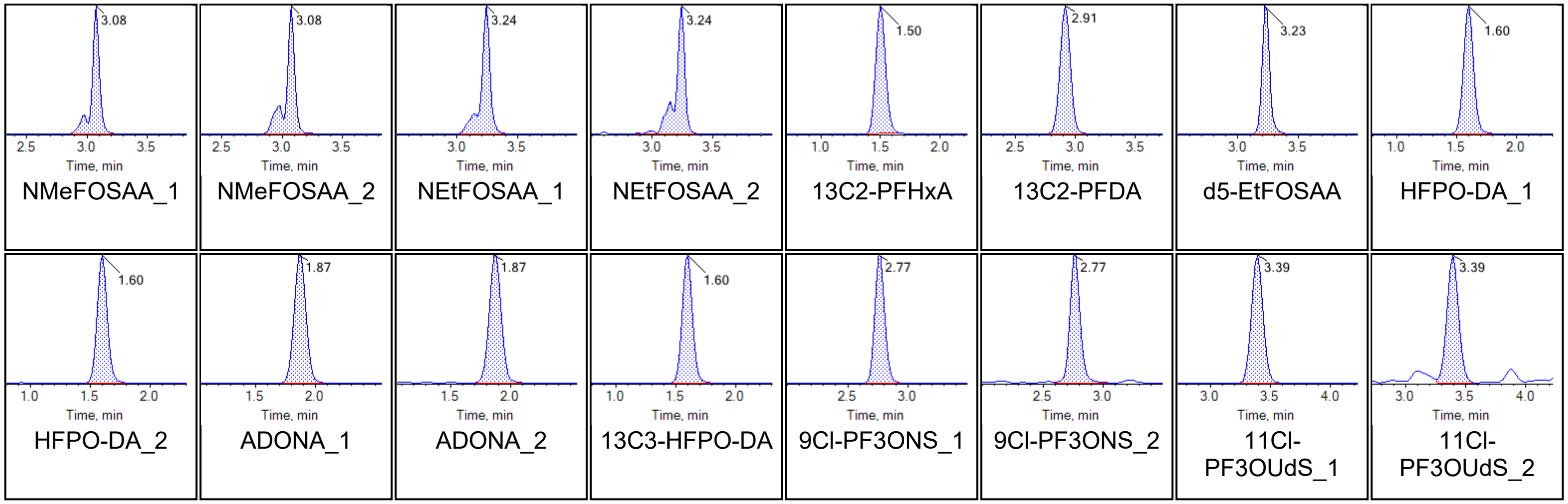


Sample Name	LD96	Injection Vial	4
Sample ID	L3	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:44:58 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW

Chromatograms

Target Analytes:





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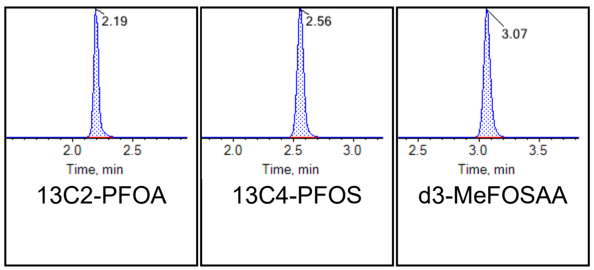
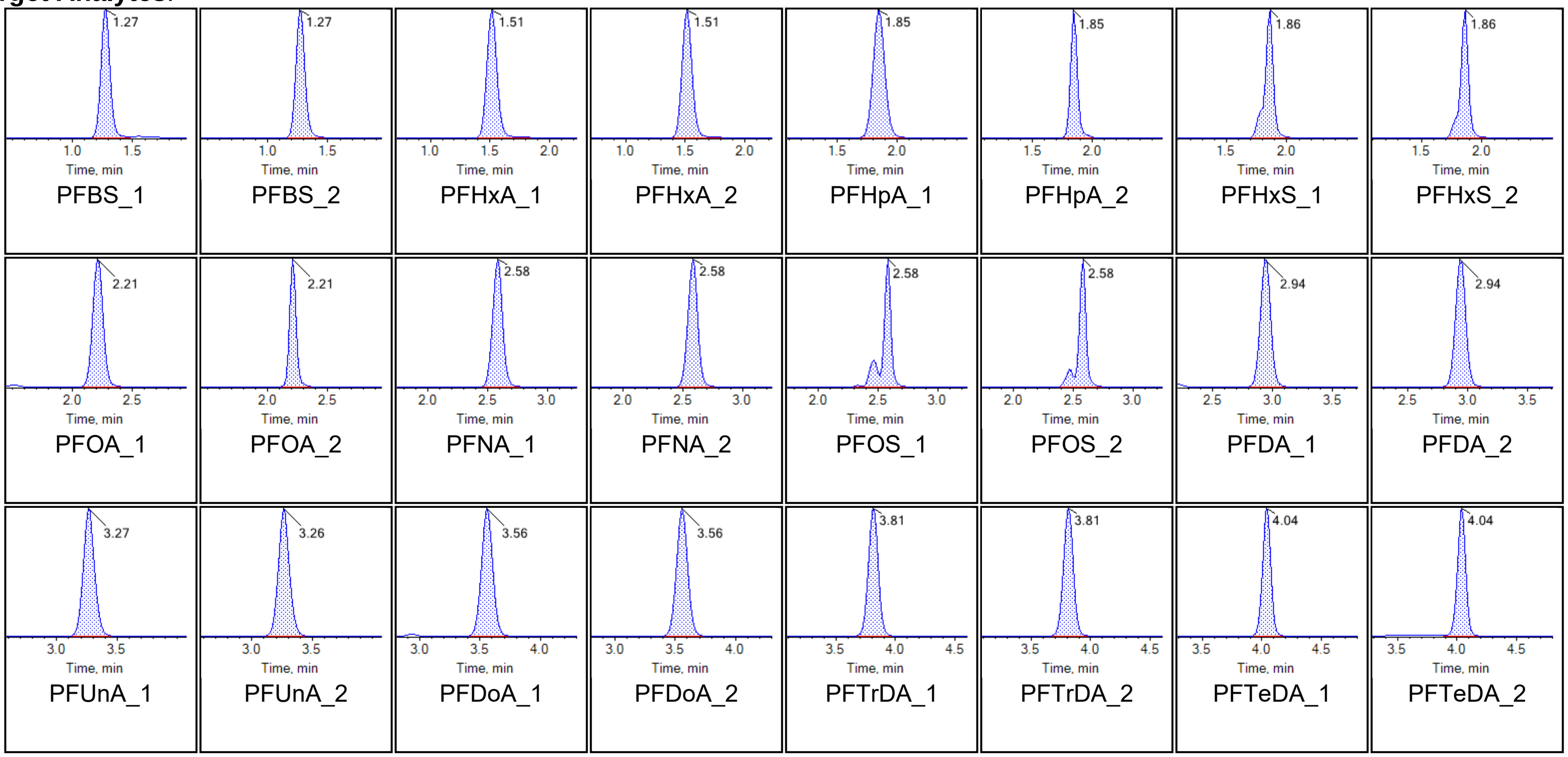
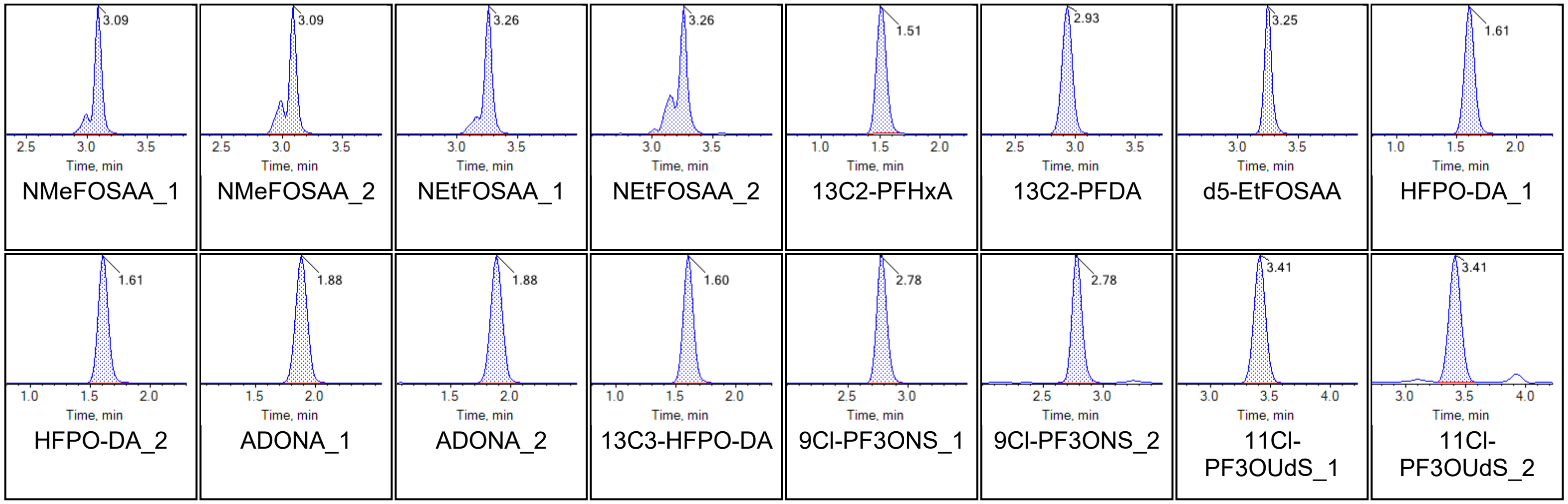


Sample Name	LD97	**Injection Vial**	5
Sample ID	L4	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 7:55:29 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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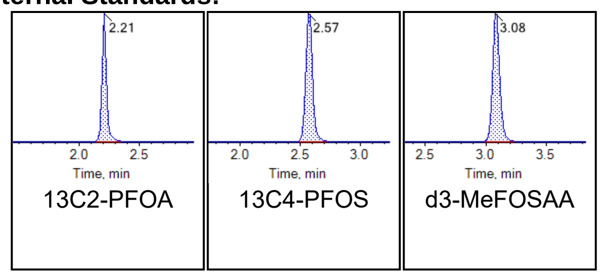
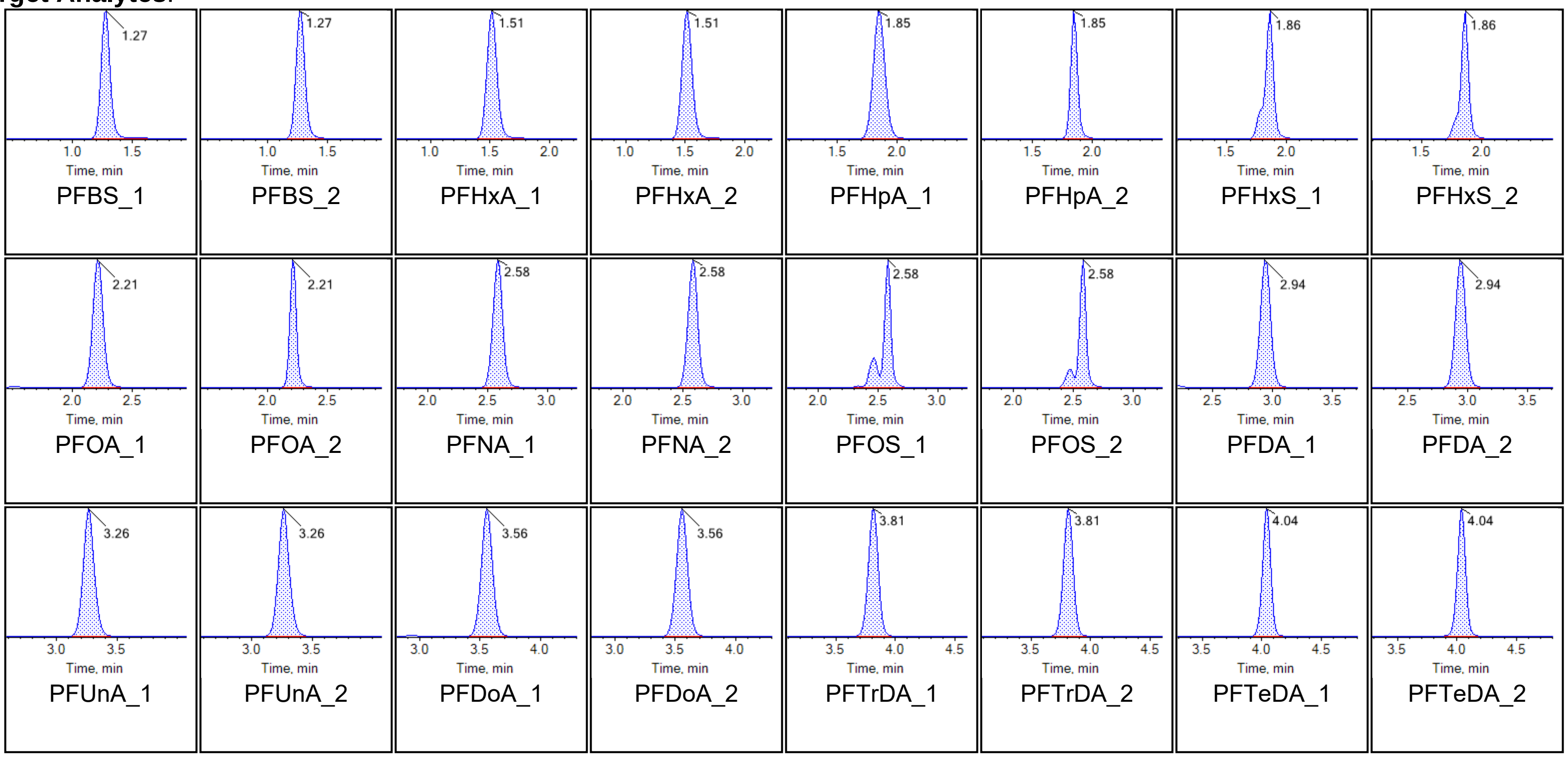
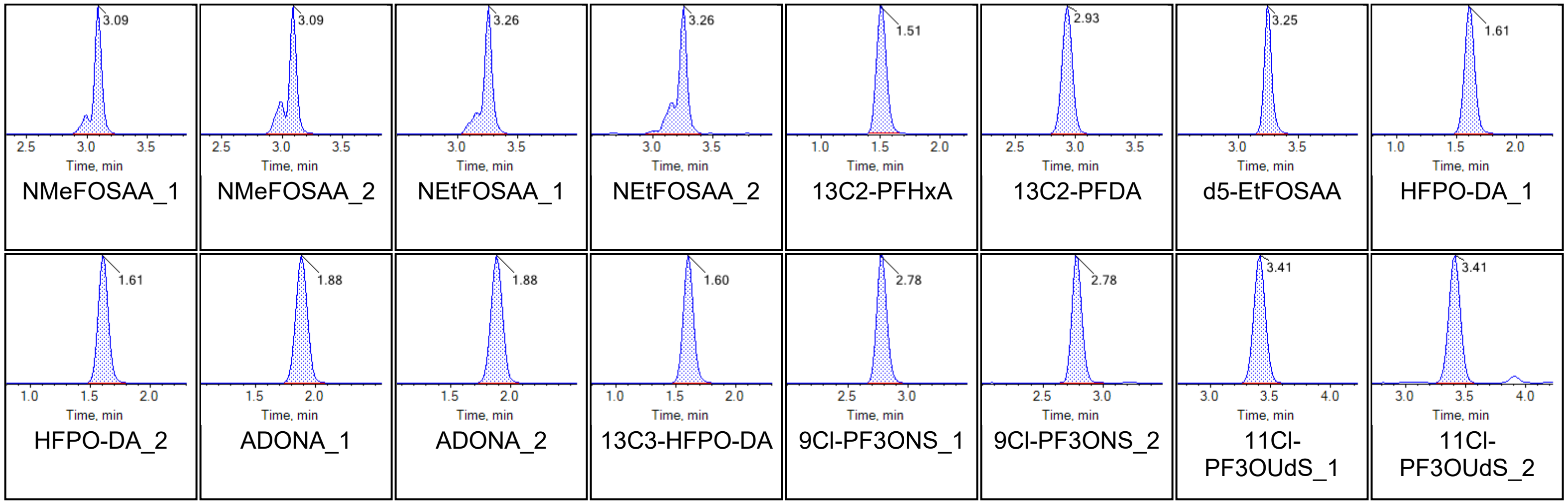


Sample Name	LD98	Injection Vial	6
Sample ID	L5	Injection Volume	10.00
Sample Type	Standard	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:06:00 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW

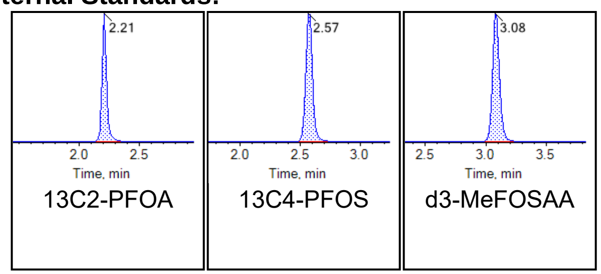
Chromatograms

Target Analytes:





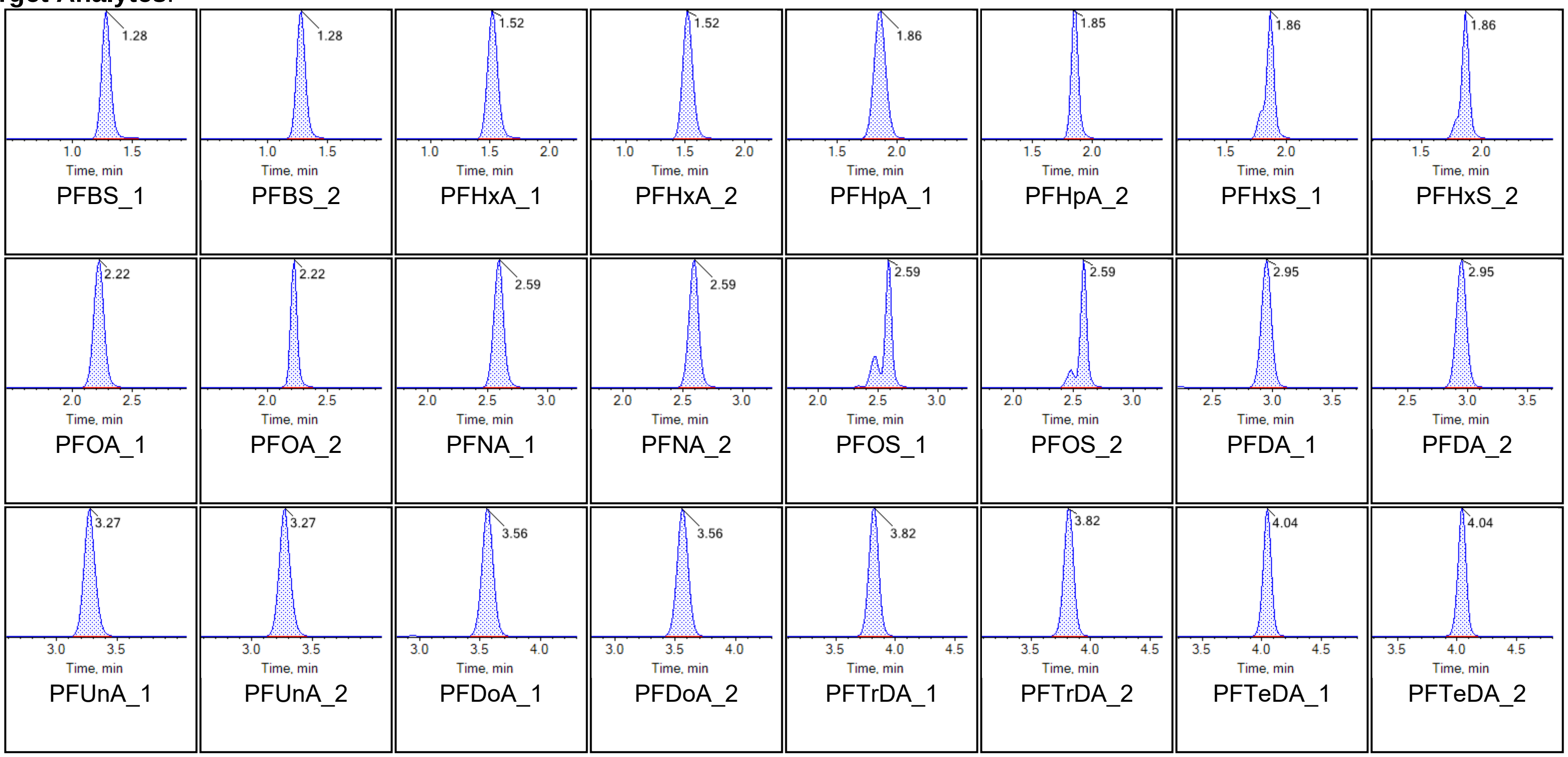
Internal Standards:

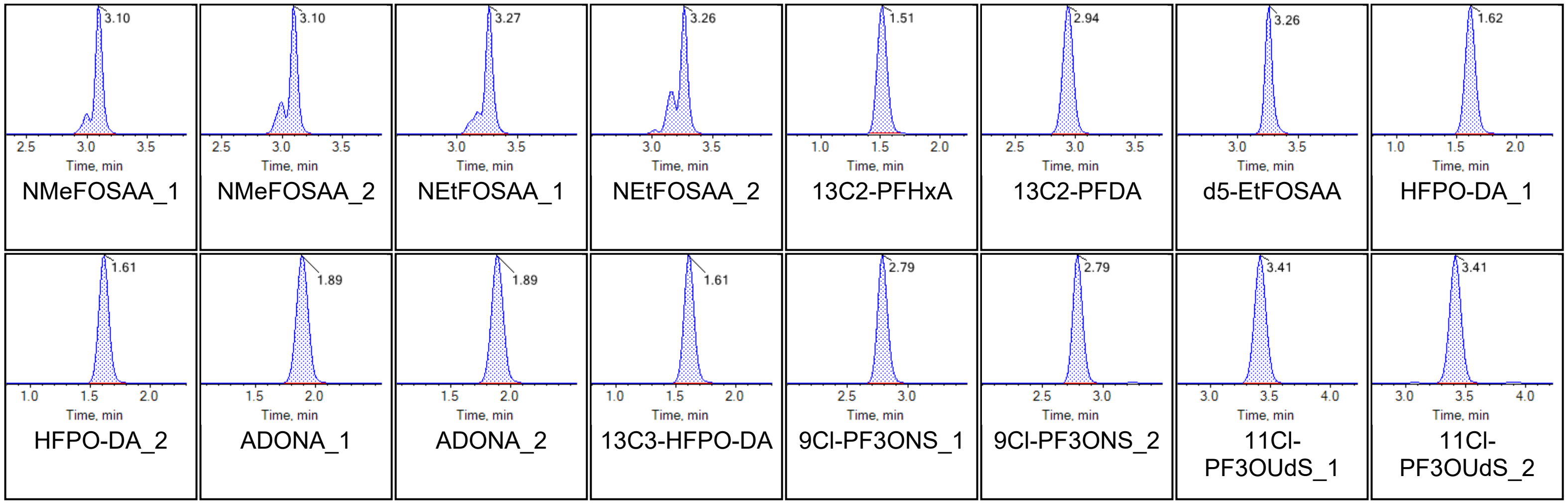


Sample Name	LD99	**Injection Vial**	7
Sample ID	L6	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:16:32 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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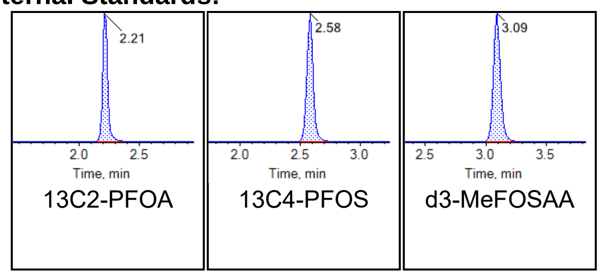
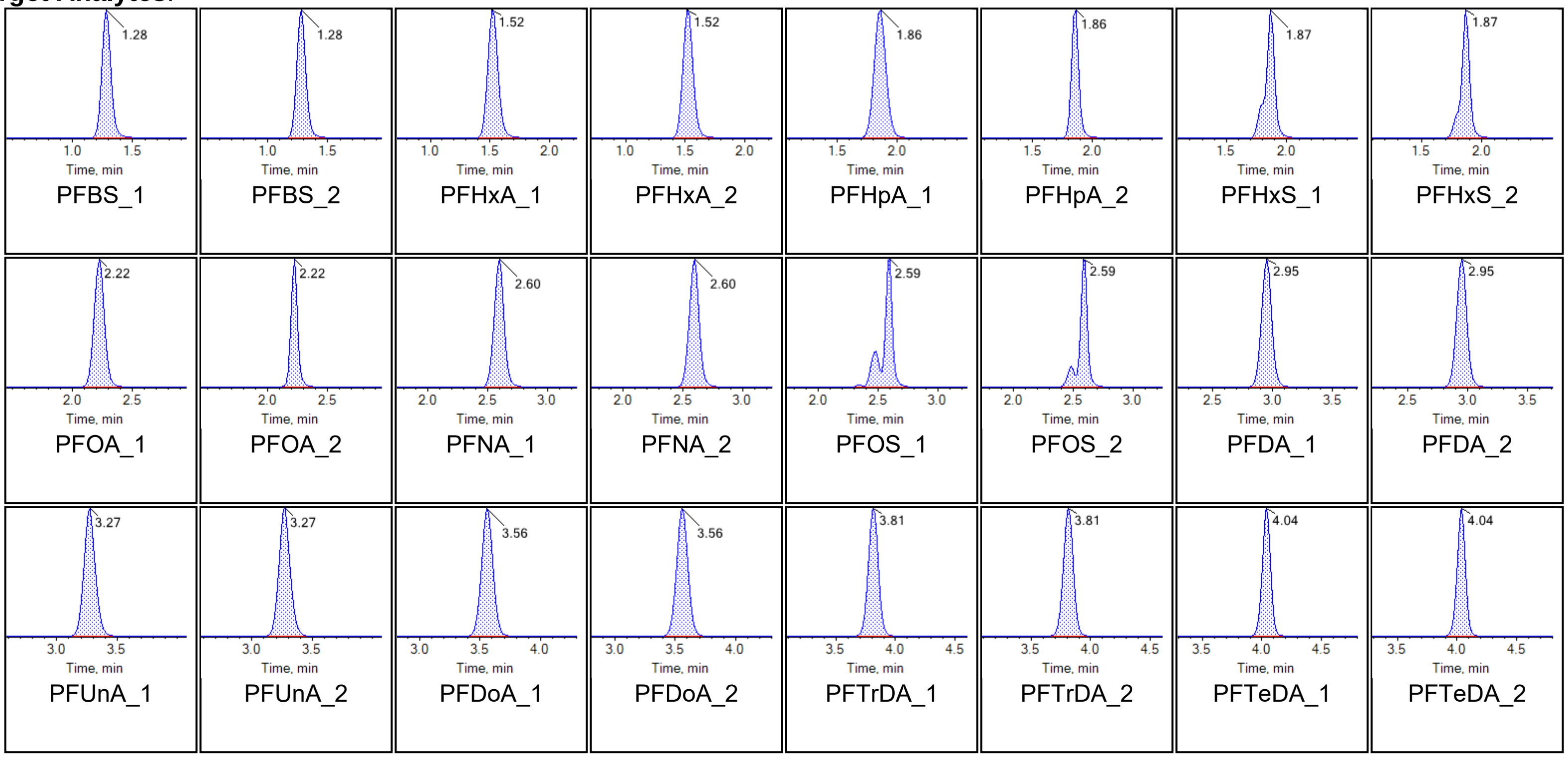
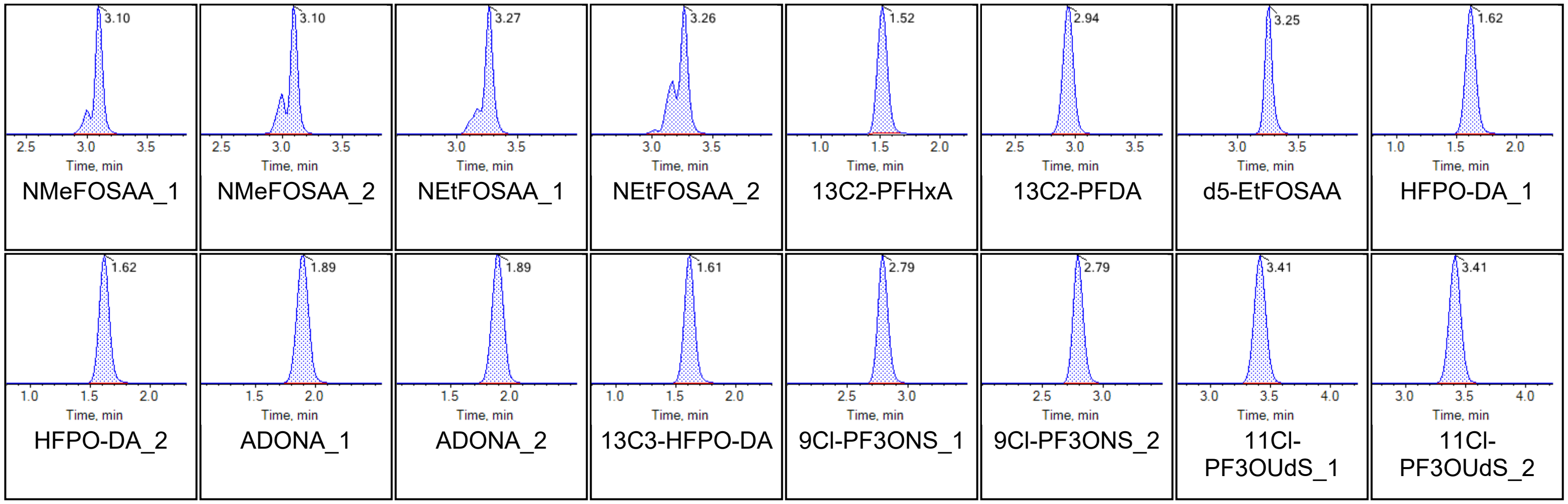


Sample Name	LE01	**Injection Vial**	8
Sample ID	L7	**Injection Volume**	10.00
Sample Type	Standard	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:27:03 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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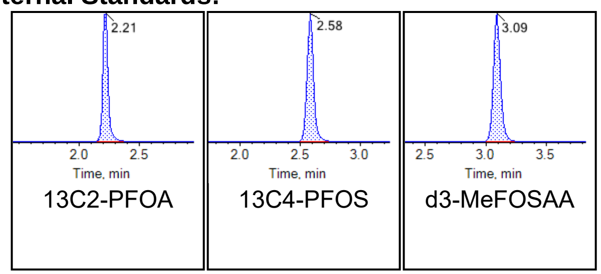
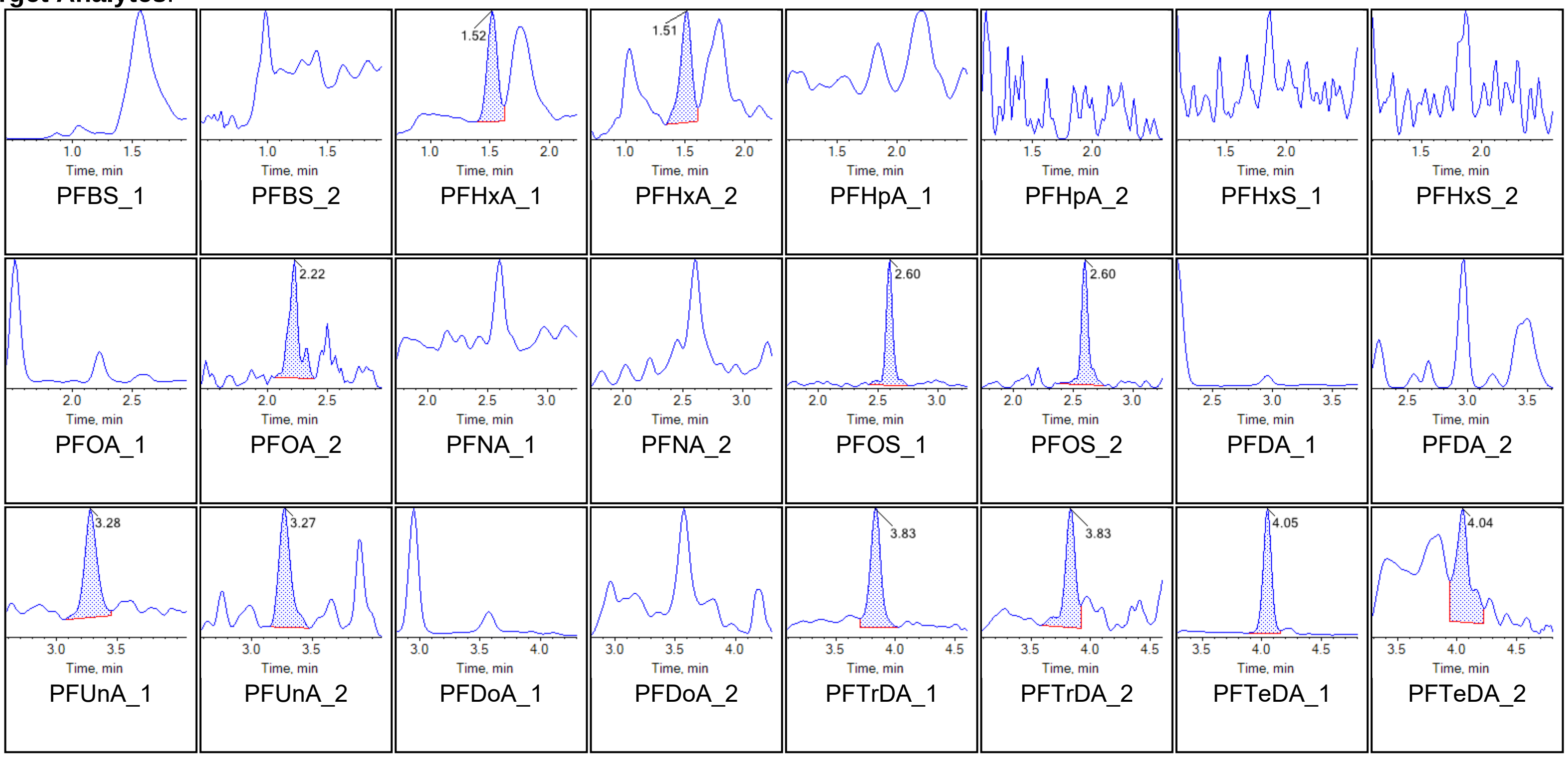
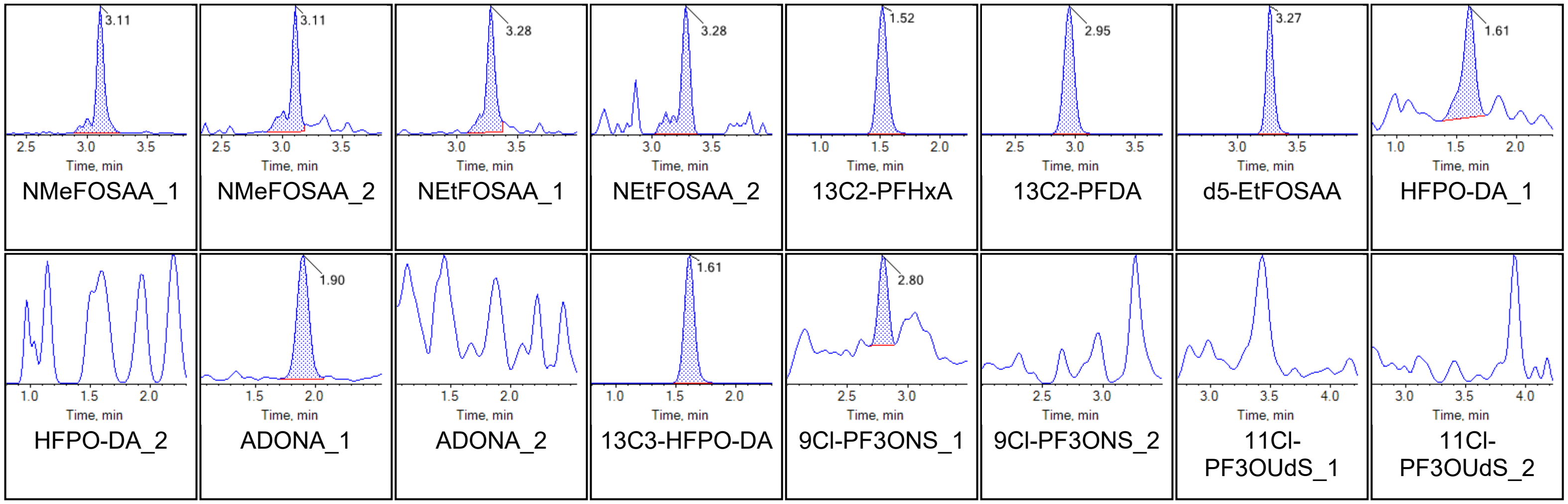


Sample Name	LE02 IB	Injection Vial	9
Sample ID	Instrument Blank	Injection Volume	10.00
Sample Type	Unknown	Instrument Name	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:37:36 PM	Data File	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	Result Table	20-1569_DW

Chromatograms

Target Analytes:





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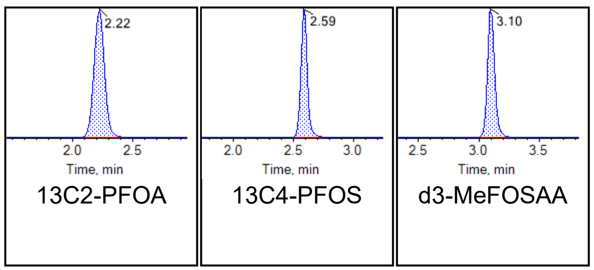
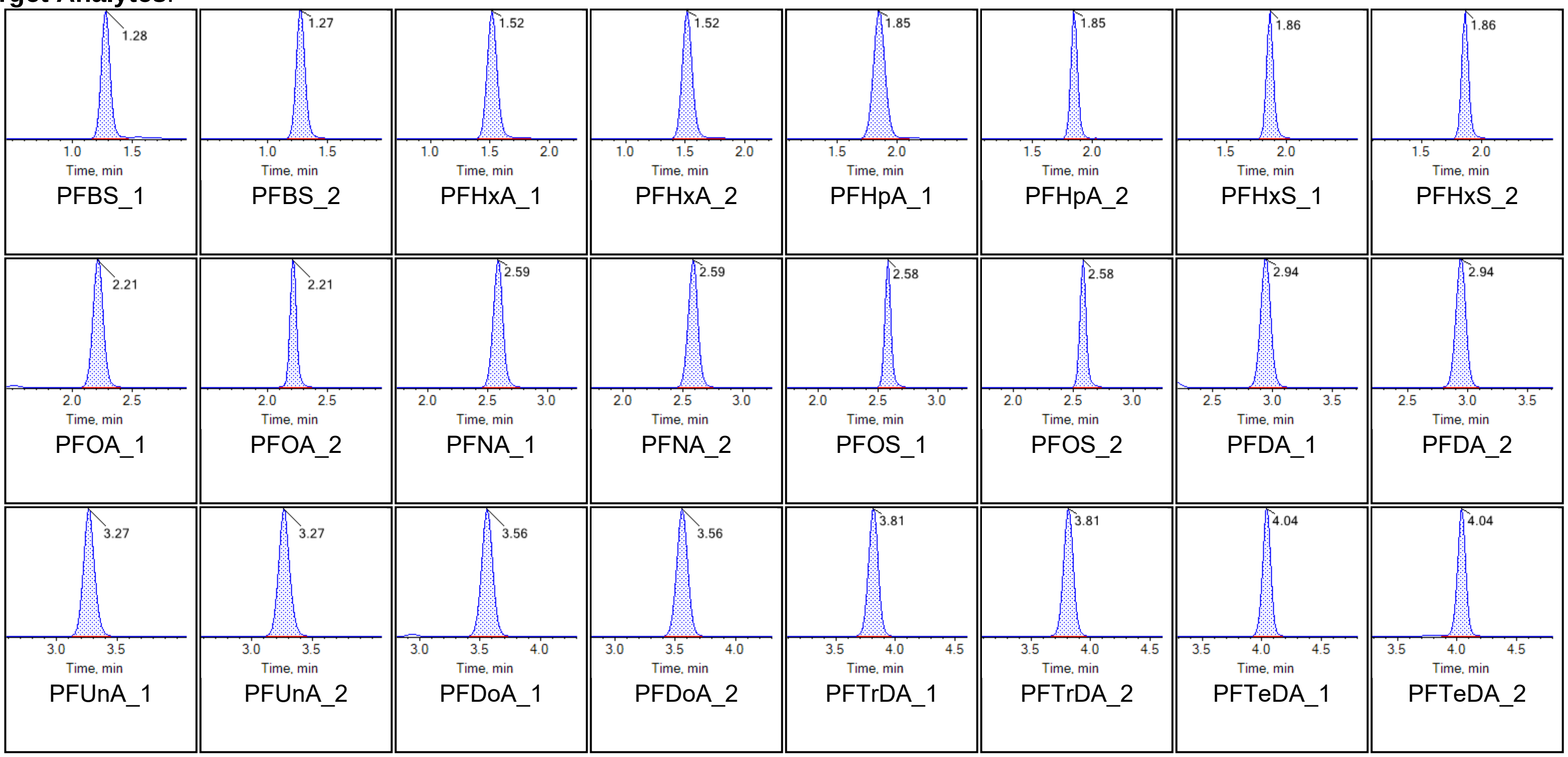
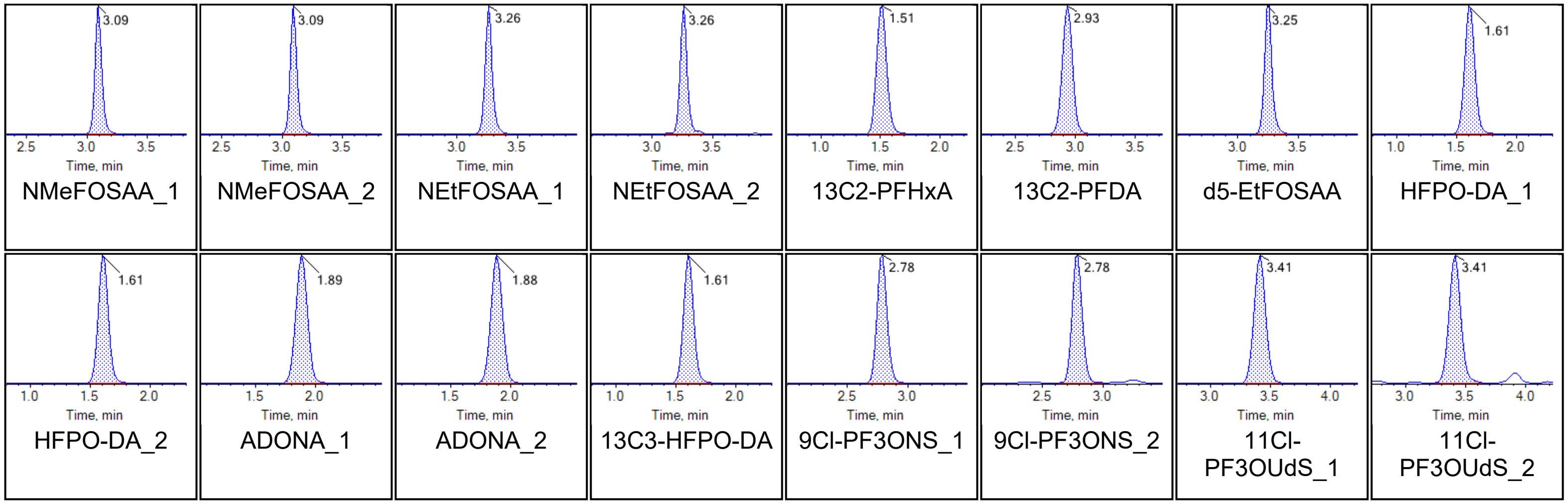


Sample Name	LE03 ICC	**Injection Vial**	10
Sample ID	ICC	**Injection Volume**	10.00
Sample Type	Quality Control	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/22/2020 8:48:09 PM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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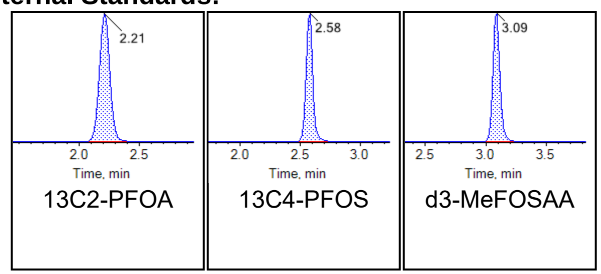
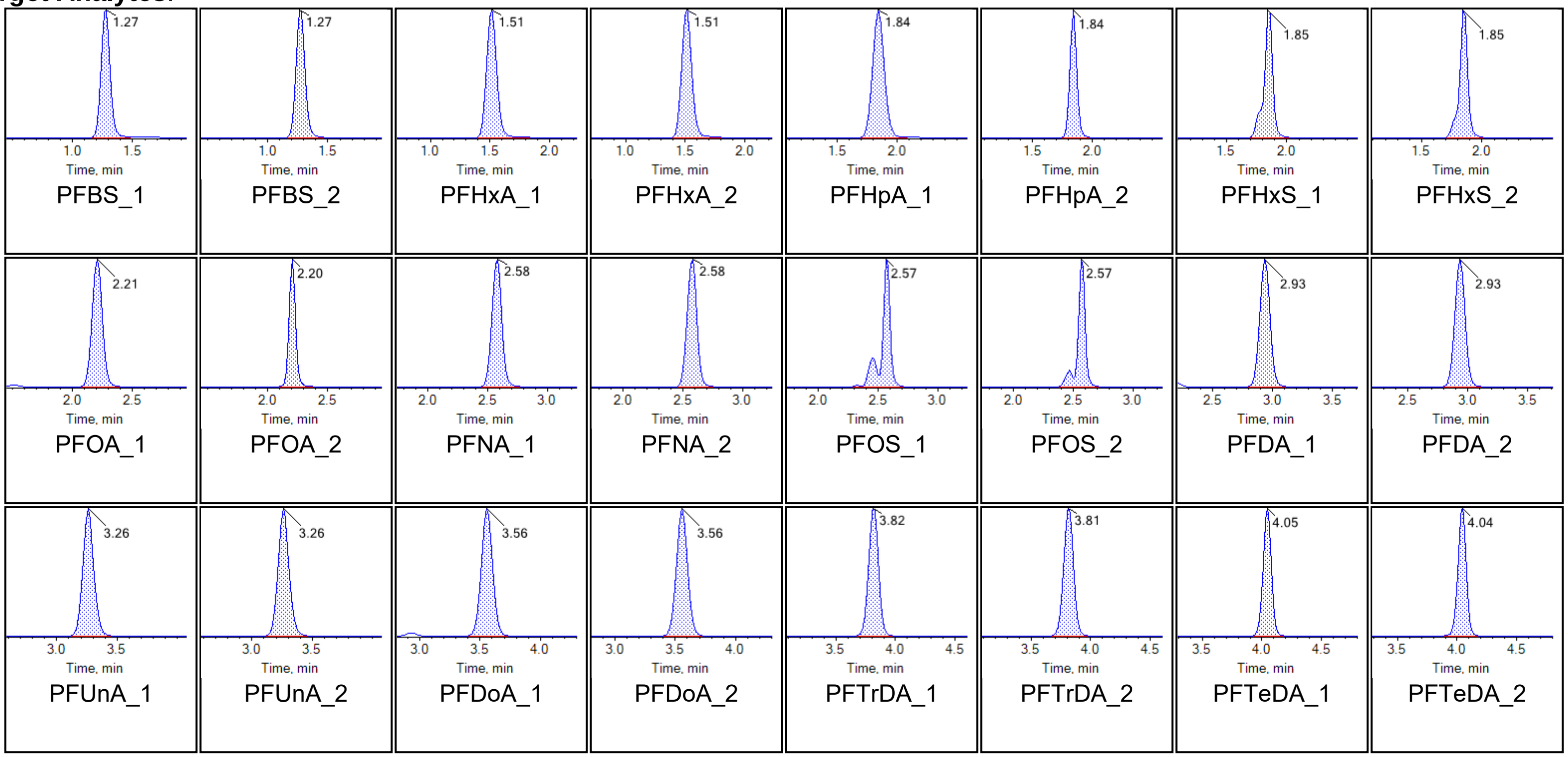
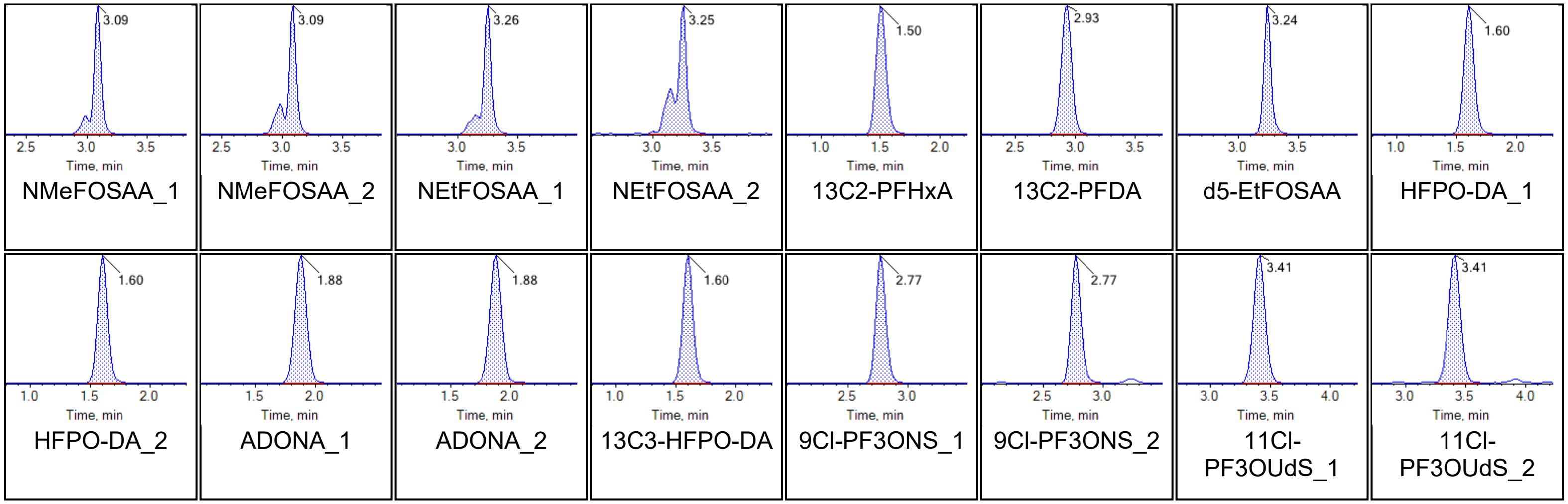


Sample Name	LD97 CCV	**Injection Vial**	37
Sample ID	CCV	**Injection Volume**	10.00
Sample Type	Quality Control	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 1:32:20 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

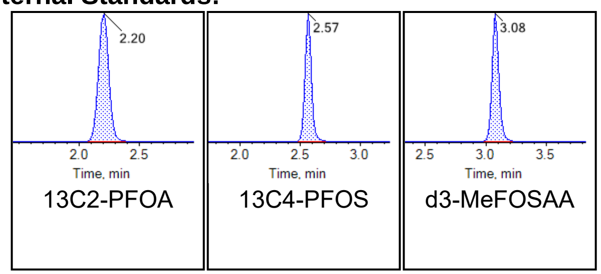
Chromatograms

Target Analytes:





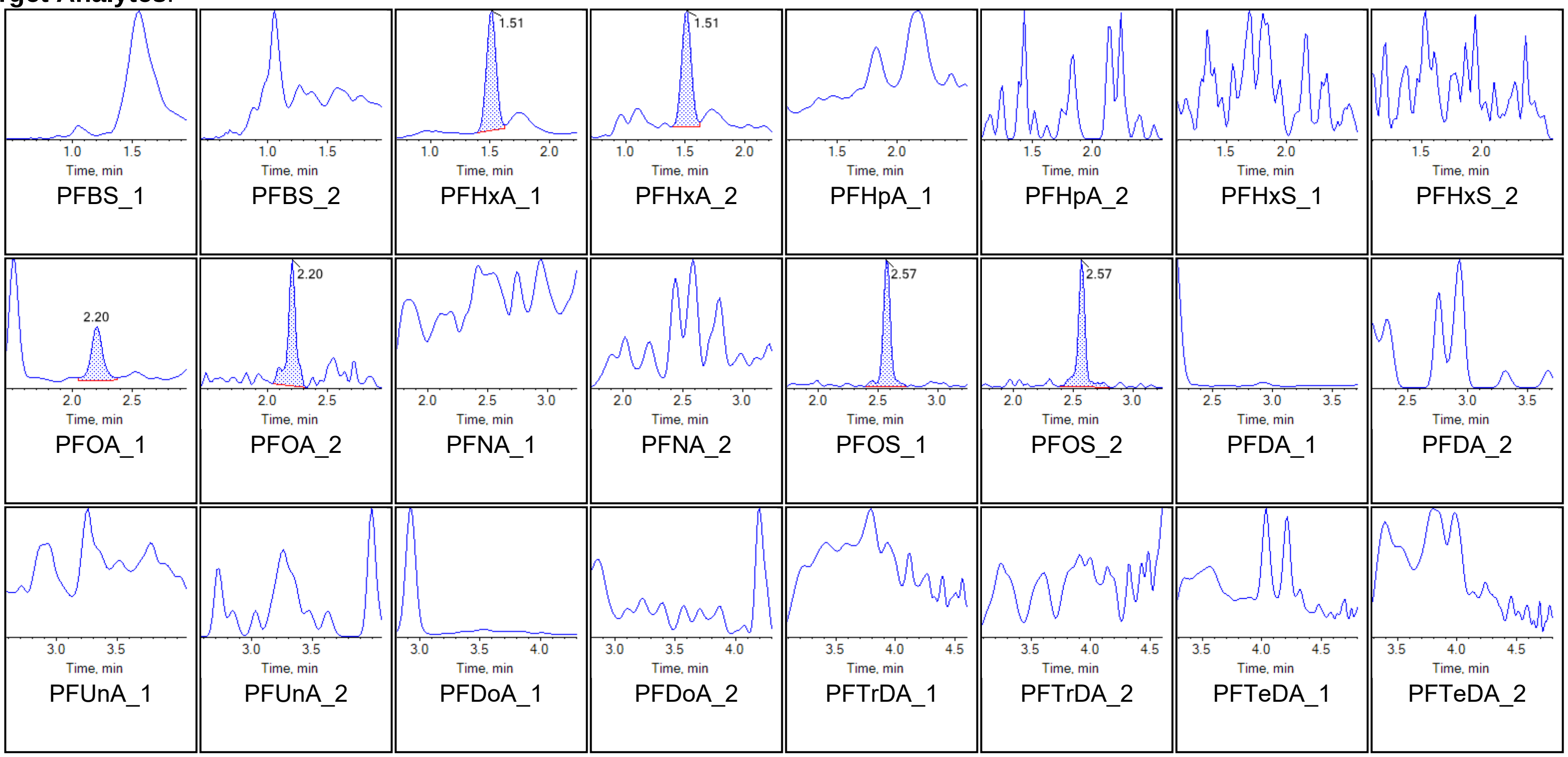
Internal Standards:

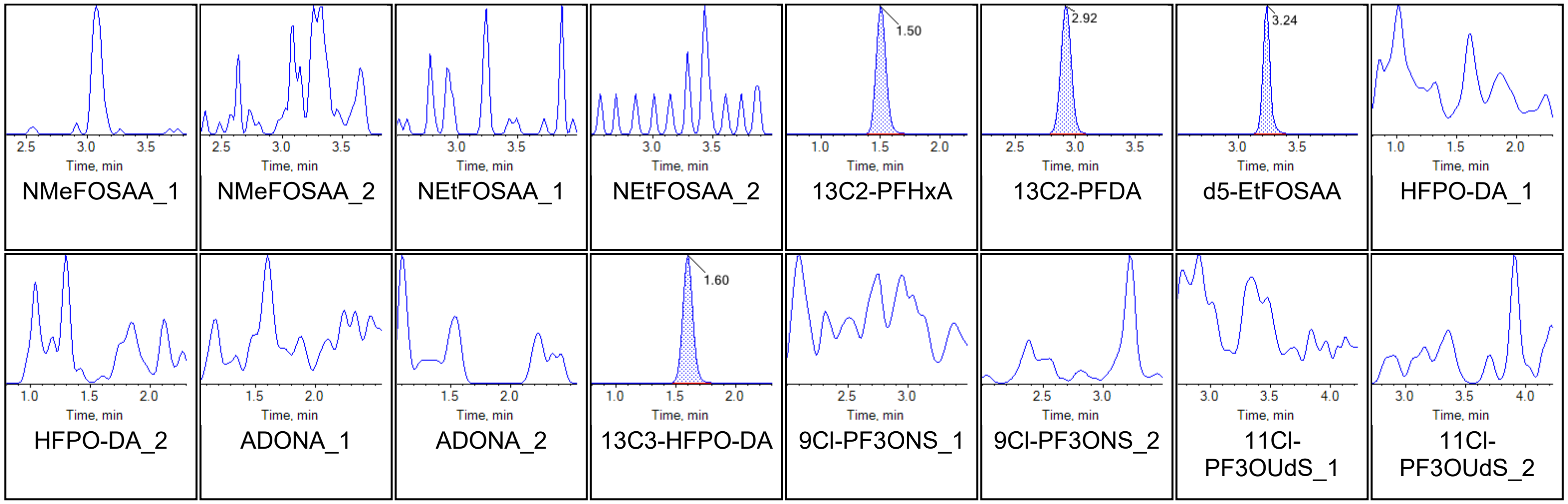


Sample Name	DB577PB-FS(0)	**Injection Vial**	38
Sample ID	Procedural Blank	**Injection Volume**	10.00
Sample Type	Unknown	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 1:53:24 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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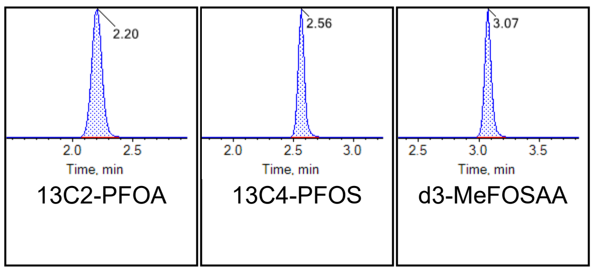
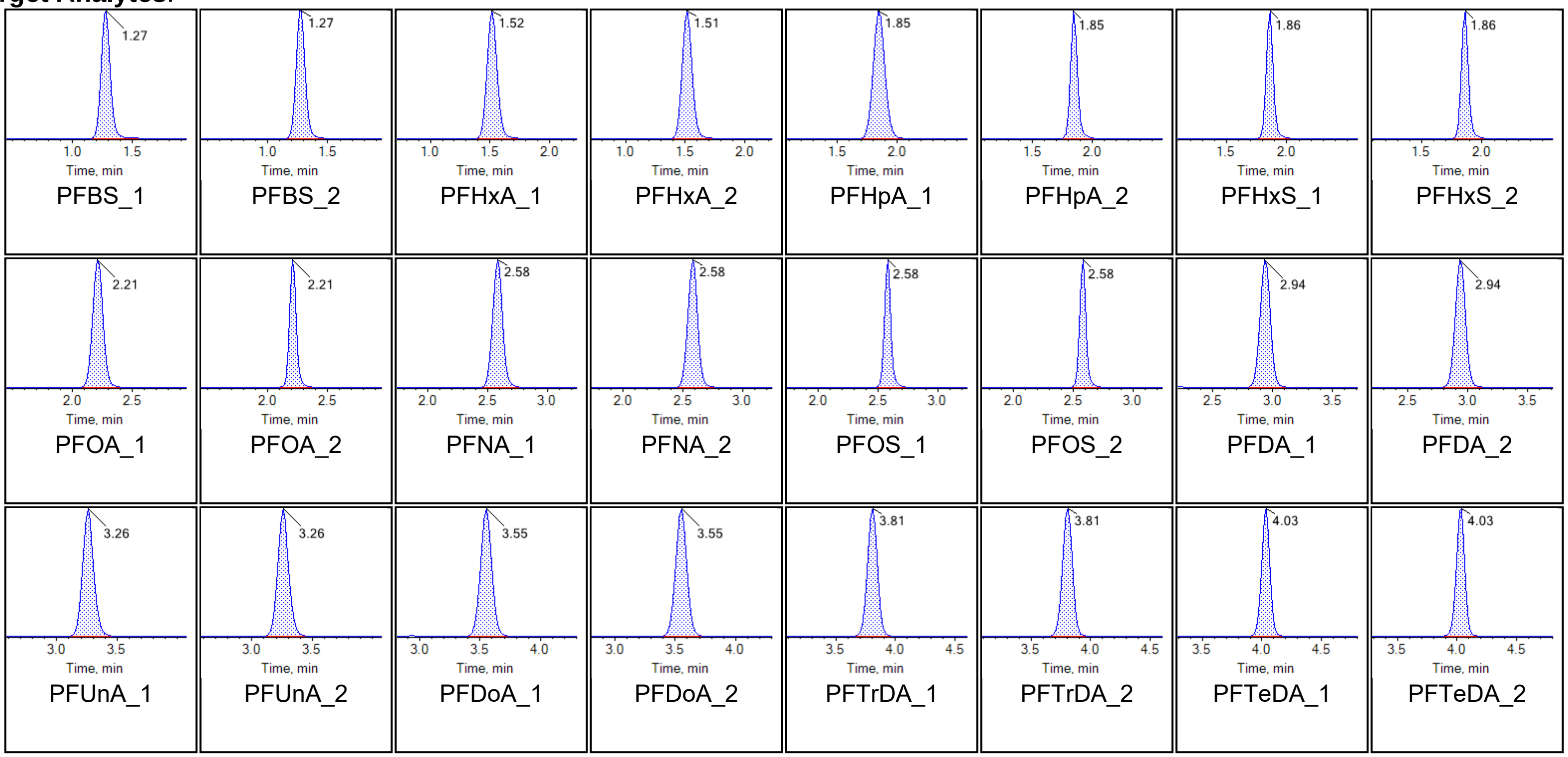
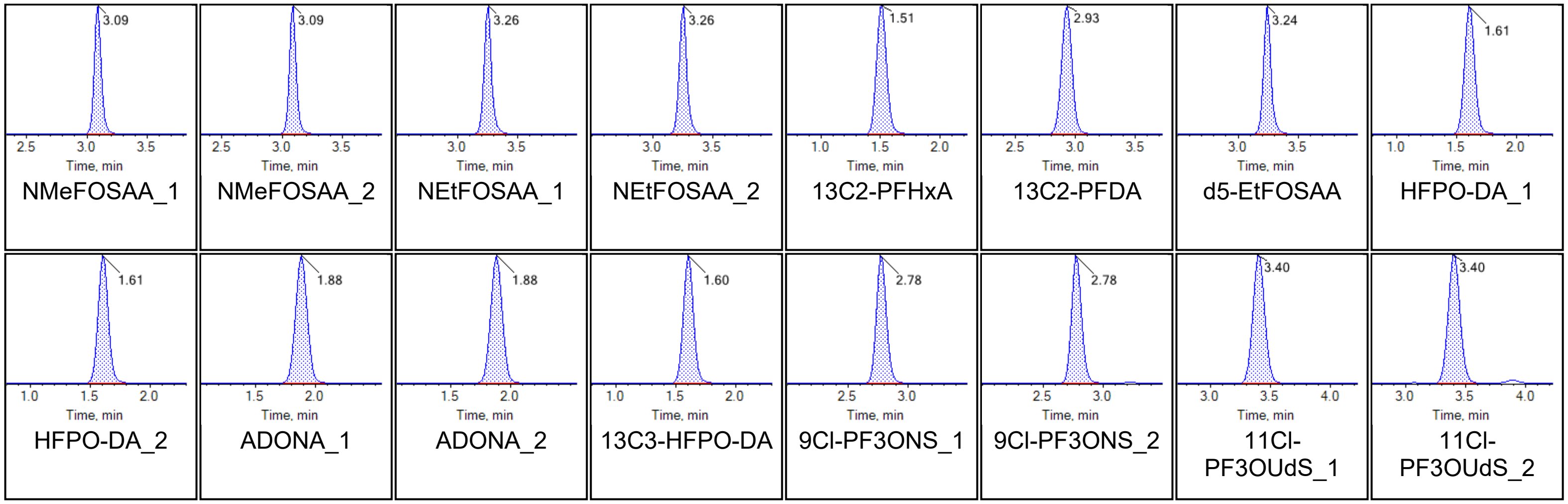


Sample Name	DB578LCS-FS(0)	**Injection Vial**	39
Sample ID	Laboratory Control Sample	**Injection Volume**	10.00
Sample Type	Unknown	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:03:55 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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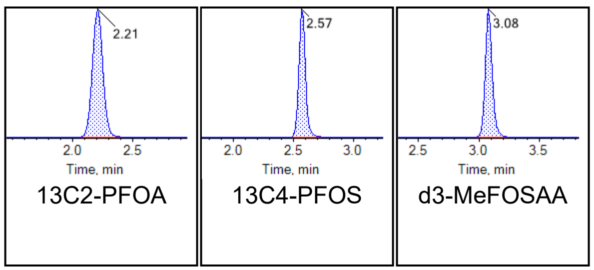
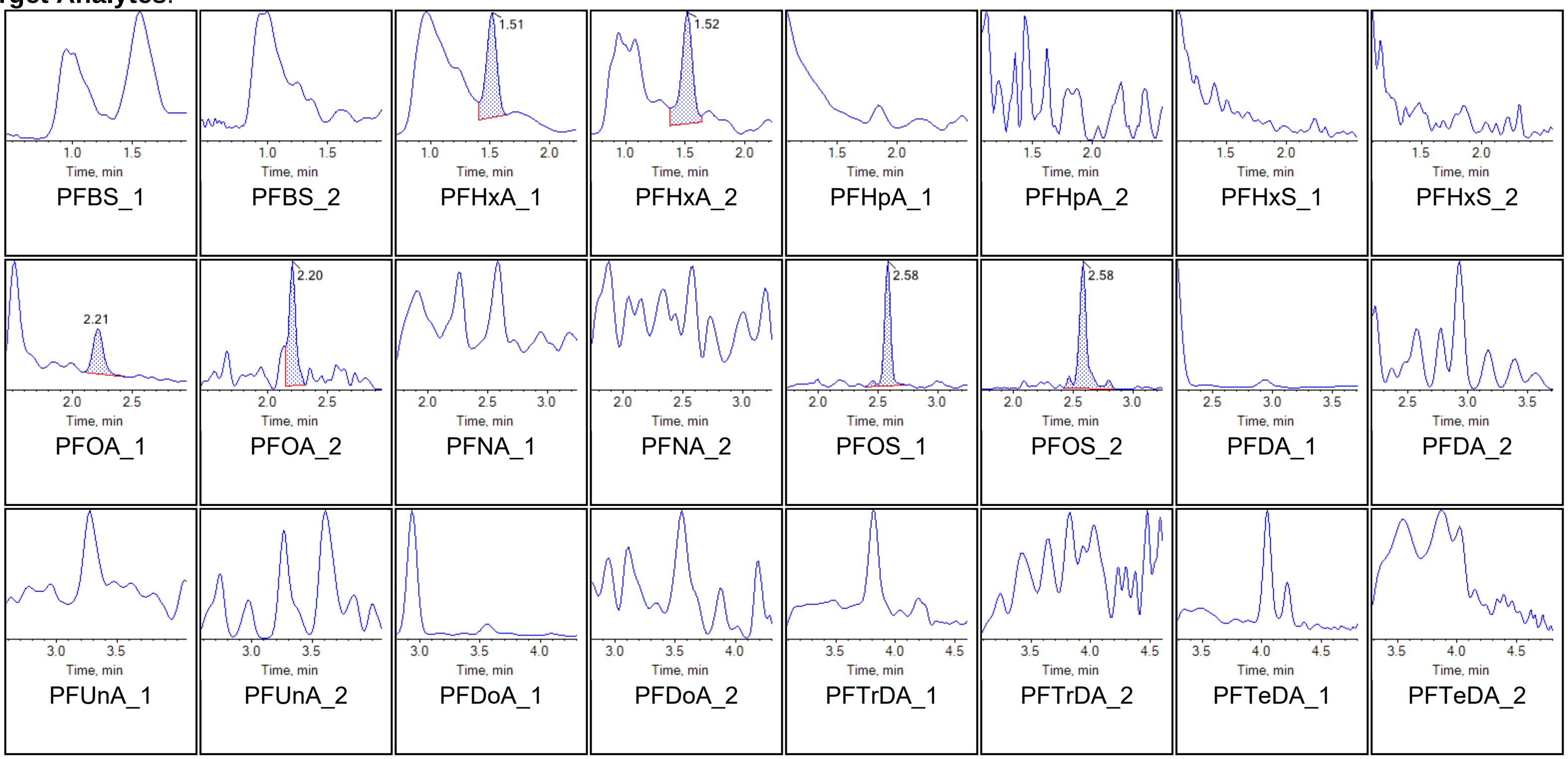
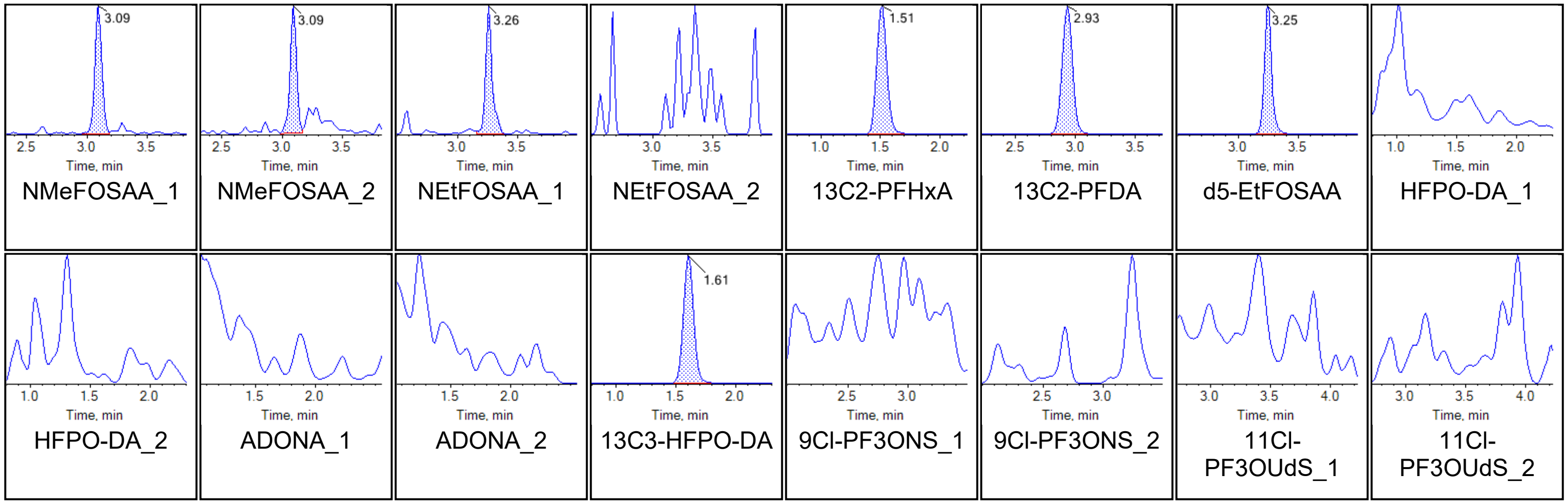


Sample Name	G3899-FS(0)	**Injection Vial**	40
Sample ID	CBD/DW01	**Injection Volume**	10.00
Sample Type	Unknown	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:14:26 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

Chromatograms

Target Analytes:





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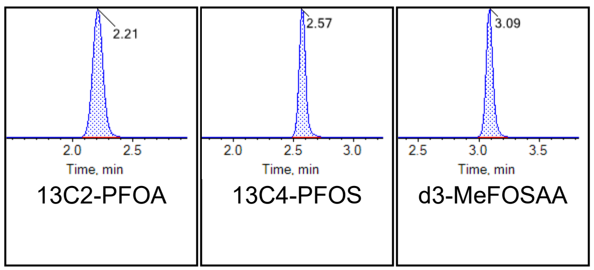
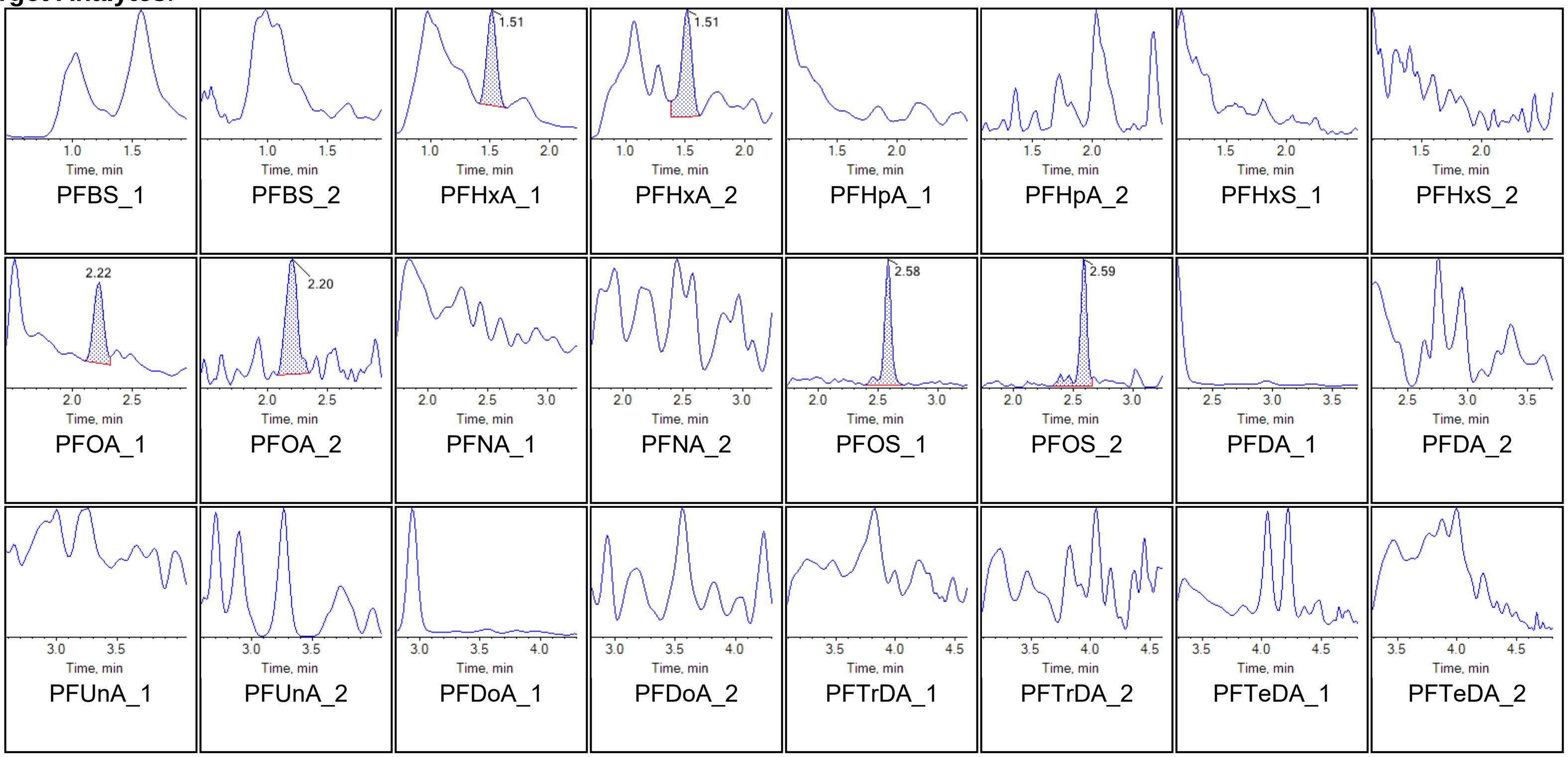
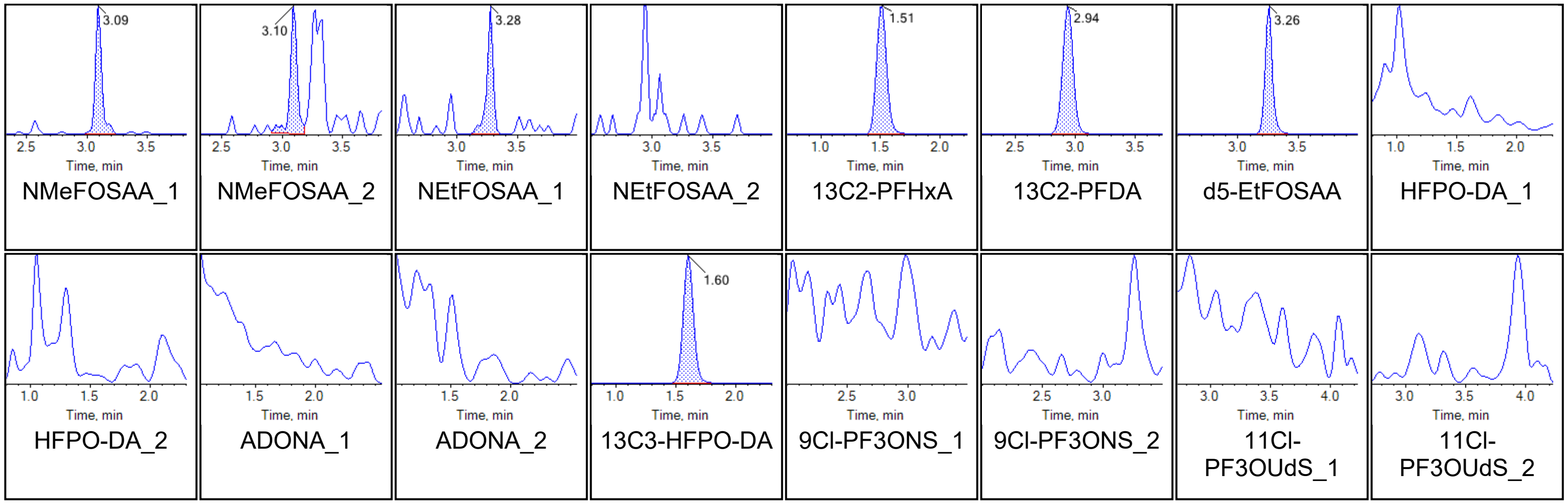


Sample Name	G3901-FS(0)	**Injection Vial**	41
Sample ID	Trip	**Injection Volume**	10.00
Sample Type	Unknown	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:24:57 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

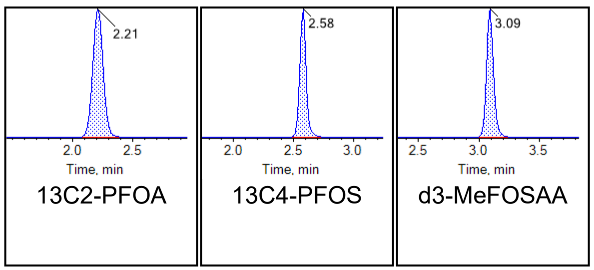
Chromatograms

Target Analytes:





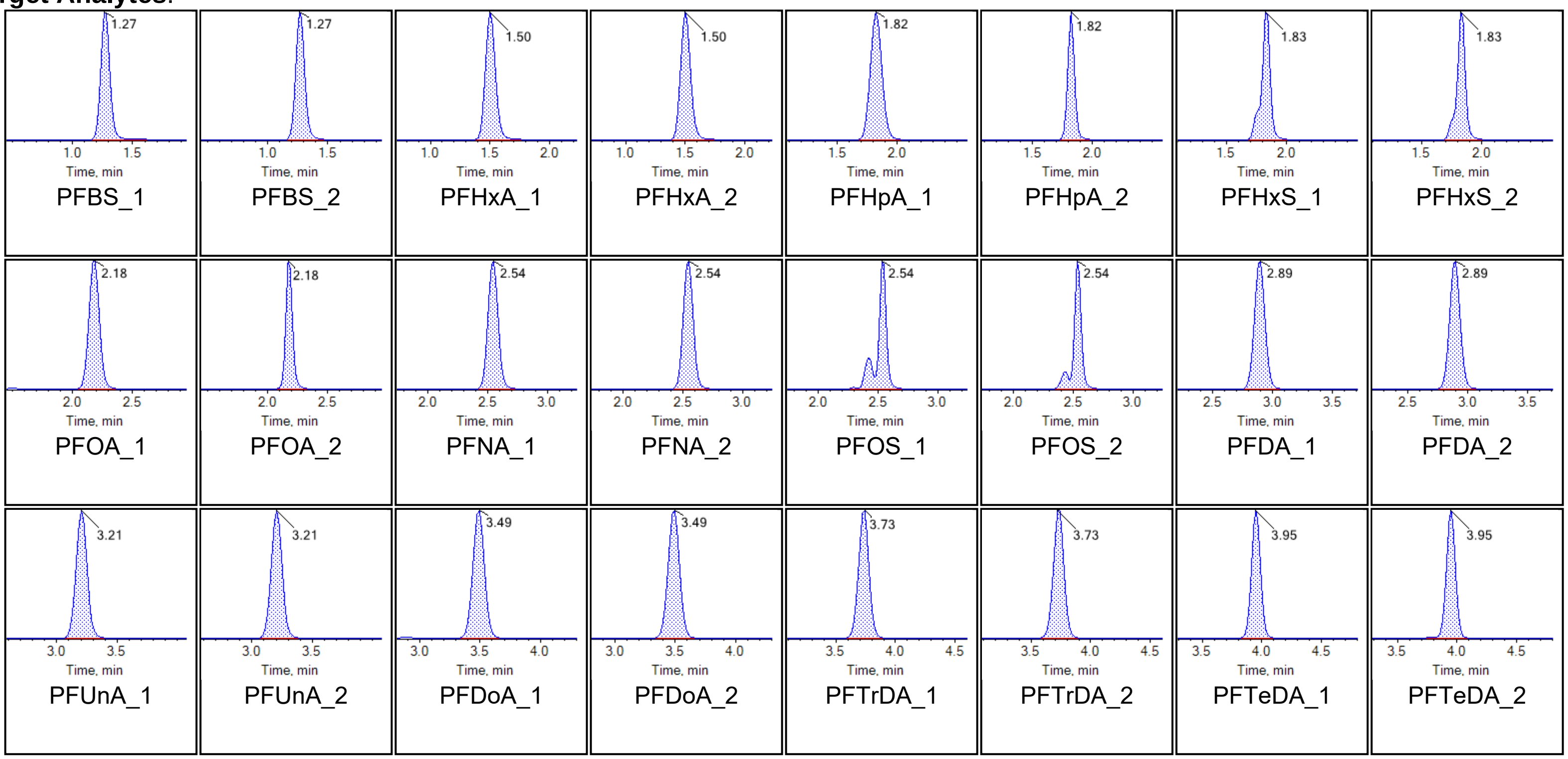
Internal Standards:

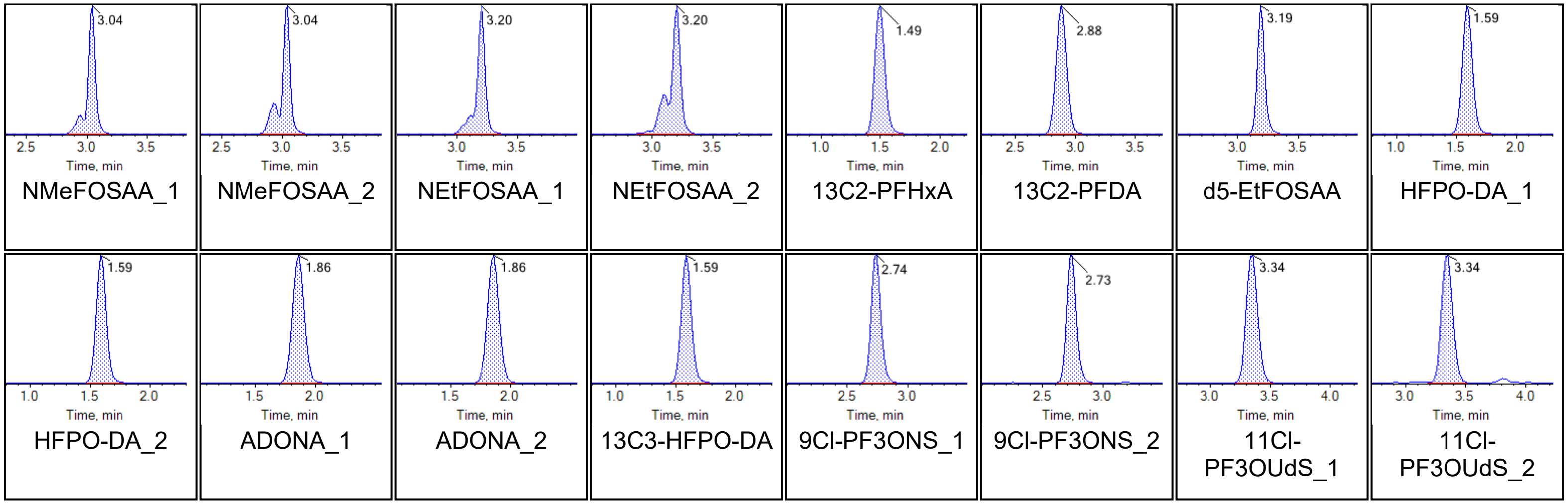


Sample Name	LD98 CCV	**Injection Vial**	43
Sample ID	CCV	**Injection Volume**	10.00
Sample Type	Quality Control	**Instrument Name**	Triple Quad 6500+ Low Mass
Acquisition Date	12/23/2020 2:46:00 AM	**Data File**	AE_12222020_5-371.wiff
Acquisition Method	5-371.dam	**Result Table**	20-1569_DW

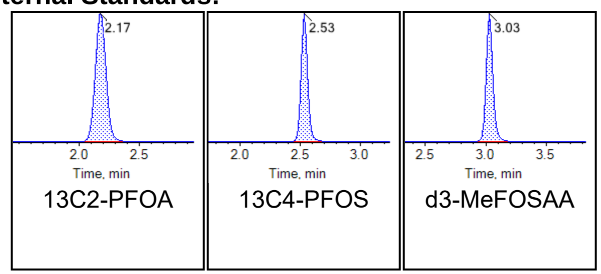
Chromatograms

Target Analytes:





Internal Standards:



Appendix B
United States Fish and Wildlife Service Species Report – Project Area

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Calvert County, Maryland

Local office

Chesapeake Bay Ecological Services Field Office

(410) 573-4599
(410) 266-9127

177 Admiral Cochrane Drive
Annapolis, MD 21401-7307

http://www.fws.gov/chesapeakebay/
http://www.fws.gov/chesapeakebay/endsppweb/ProjectReview/Index.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found This species only needs to be considered if the following condition applies: • Projects with a federal nexus that have tree clearing = to or > 15 acres: 1. REQUEST A SPECIES LIST 2. NEXT STEP: EVALUATE DETERMINATION KEYS 3. SELECT EVALUATE under the Northern Long-Eared Bat (NLEB) Consultation and 4(d) Rule Consistency key No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found This species only needs to be considered if the following condition applies: • The monarch is a candidate species and not yet listed or proposed for listing. There are generally no section 7 requirements for candidate species (FAQ found here: https://www.fws.gov/savethemonarch/FAQ-Section7.html). No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY

BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Oct 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Scoter Melanitta nigra — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black-billed Cuckoo Coccyzus erythropthalmus — Breeds May 15 to Oct 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9399

Blue-winged Warbler Vermivora pinus — Breeds May 1 to Jun 30

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Brown Pelican Pelecanus occidentalis — Breeds Jan 15 to Sep 30

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Loon gavia immer — Breeds Apr 15 to Oct 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/4464

Double-crested Cormorant phalacrocorax auritus — Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/3478

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle Aquila chrysaetos — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Hudsonian Godwit Limosa haemastica — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Kentucky Warbler Oporornis formosus — Breeds Apr 20 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

King Rail Rallus elegans — Breeds May 1 to Sep 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8936

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Long-tailed Duck Clangula hyemalis — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/7238

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-breasted Merganser Mergus serrator — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-necked Phalarope Phalaropus lobatus — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-throated Loon *Gavia stellata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Apr 15 to Aug 31
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Mar 10 to Jul 31
Surf Scoter *Melanitta perspicillata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere

White-winged Scoter *Melanitta fusca* — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Willet *Tringa semipalmata* — Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush *Hylocichla mustelina* — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

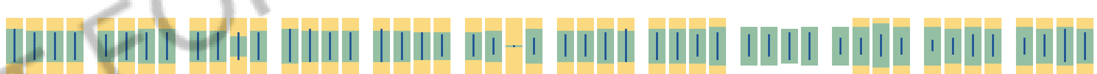
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

probability of presence | breeding season | survey effort – no data

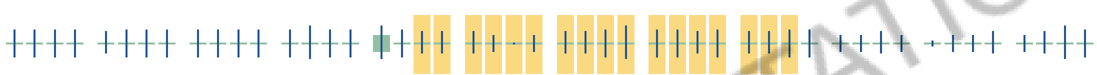
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

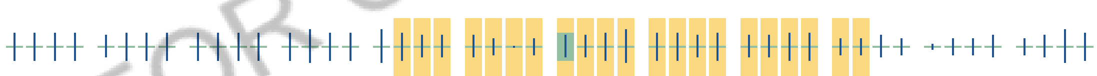


Black Scoter Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

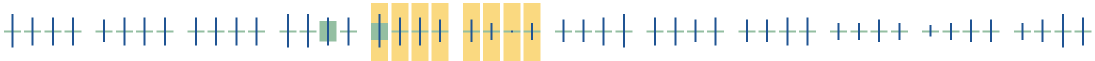
Black Skimmer BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



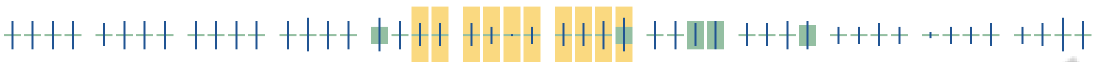
Black-billed Cuckoo BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



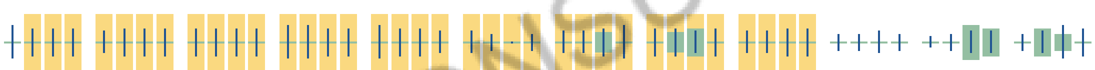
Blue-winged Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



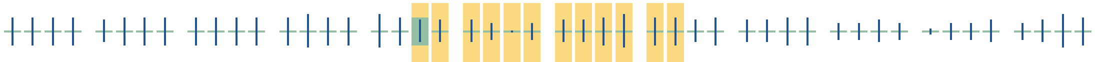
Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



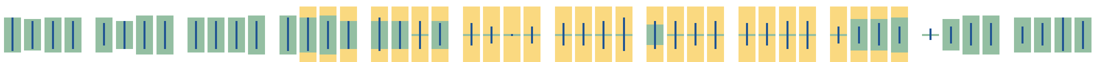
Brown Pelican
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



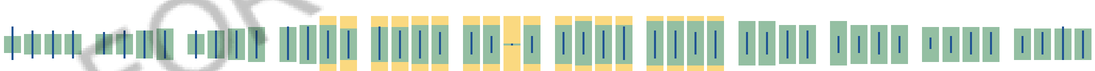
Canada Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



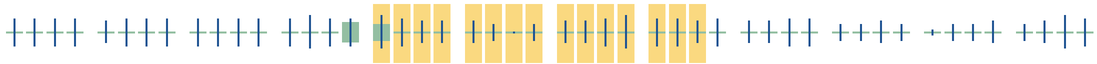
Common Loon
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Double-crested Cormorant
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Eastern Whip-poor-will
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

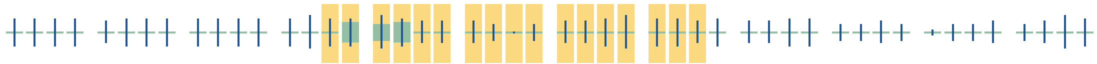


Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

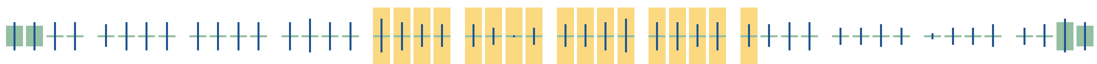
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Hudsonian Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

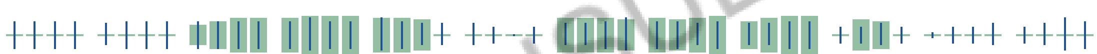
Kentucky Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



King Rail
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

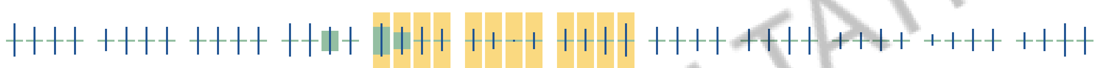


Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Long-tailed Duck
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

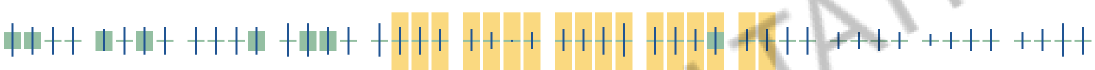
Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Purple Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Red-breasted Merganser
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Red-headed Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



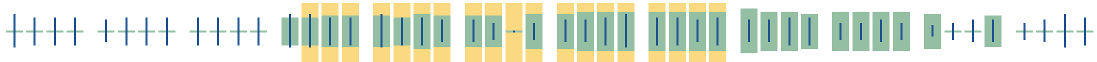
Red-necked Phalarope
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Red-throated Loon
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Ring-billed Gull
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

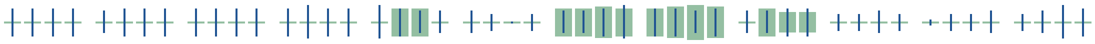
Royal Tern
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



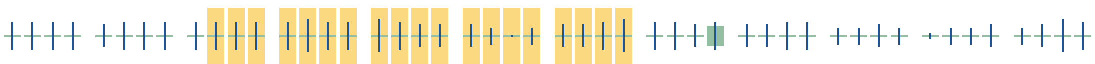
Ruddy Turnstone
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Rusty Blackbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

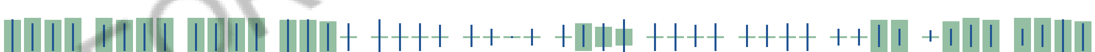
Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Sooty Tern
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

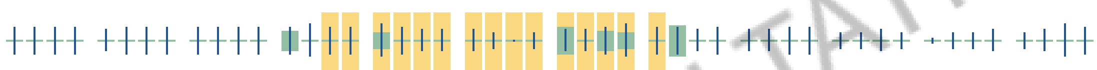


Surf Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



White-winged Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wood Thrush
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

THERE ARE NO KNOWN COASTAL BARRIERS AT THIS LOCATION.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C
Summary of Records Reviewed

Appendix C. Summary of Records Reviewed

Preliminary Assessment for Per- and Polyfluoroalkyl Substances

Naval Research Laboratory - Chesapeake Bay Detachment, Chesapeake Beach, Maryland

Date	Document Number	Title	Author Affiliation	Notes
Environmental Restoration Program Records				
January 11, 2022		Naval Safety Center Aviation Data Request Form	NAVFAC Washington Environmental	Request of information to identify in- and unintentional releases of PFAS substances including AFFF, pesticdes, paints, etc. Information will be used for future environmental investigations. Time frame of interest is listed as 1980-present. Requester is David Collins.
September 22, 2010		Maryland Department of the Environment Letter for Action 092210	Federal Facilities Divison of the Maryland Department of the Environment's Hazardous Waste Program	This is an email from the FFD of Maryland's Department of the Environment to Ms. Gilbertson from NAVFAC. It addresses a package of infromation the MDE received in regard to NRL-CBD's non-compliance with CERCLA. MDE states unpermitted landfill dumping has been illegal since 1914 and proximity to Chesapeake Bay makes them concerened about the environmental implications. It then states that the EPA will review the facility and give their opinion on the facility.
December 16, 2009		Maryland Department of the Environment Letter of Concern 121609	Federal Facilities Divison of the Maryland Department of the Environment's Hazardous Waste Program	This is an email from the FFD of MDE to NAVFAC that states the FFD has no record of state involvement in environmental response activites at NRL-CBD. Under the assumption NRL-CBD has been using "best practices", this has been shown to result in signifcant contaminant releases. MDE is concerned with CERCLA compliance and contacted EPA to review the status of the facility. MDE also requests from the Navy documentary evidence of actual or potential releases of hazardous materials.
October 22, 2010		Response Letter to MDE (CBD-IRP) 102210	NAVFAC Washington	Response email to MDE stating that the Navy is currently in the process of obtaining funds to conduct at PA/SI at NRL-CBD aiming for late FYY10 or early FY11. The Navy also provided the request tiers of dispute resolution process.
April 9, 2010		Response Letter to MDE 040910	NAVFAC Washington	Response email to MDE with 4 documents included. The four are as followed: Initila Assessment Study of Naval Research Laboratory, Response letter to the initial assessment study, hazard ranking score for NRL-Chesapeake Bay Detachment (Site 02), Environment Baseline Survey for Quarters W Housing Area. They also had additional soil and gw data for NRL that is being sent over in a separate cover.
March 19, 2009		2009 to 2014 Oil Operationos Permit_CBD	Maryland Department of the Environment	This is an email from MDEs Waste Management Administration to NRL-CBD with an enclosed validated Oil Operations Permit. Included are special and general conditions along with a list of CBD tanks for the oil operations permit.
September, 2006		Preliminary Assessment Naval Research Laboratory Chesapeake Bay Detachment Chesapeake Beach, Maryland	Malcolm Pirnie, Inc.	No mention of AFFF or fire-fighting foam. This is a PA for the NRL-CBD and summarizes the history of munitions use at UXO 1, 2 and 3. It also will provide necessary information for the Navy to differentiate MEC sites that need further action, and to determine if there is a human health/environmental risk.
2010		NRL-CBD Draft SI Revised Responses to Comments	Malcolm Pirnie, Inc.	A collection of comments and responses to comments in response to the Draft Site Inspection Report.
May, 2010		Site Inspection Report Naval Research Laboratory Chesapeake Bay Detachment Chesapeake Beach, Maryland	Malcolm Pirnie, Inc.	No mention of AFFF or fire-fighting foam. The purpose of this SI was to collect informatiom to determine if an RI/FS is necessary or if a immediate response was needed or not. This only addressed MC issues at the MRP eligible sites.
September 8, 2005	2275_ltr_2005	Discharge permit for NRL-CBD	Maryland Department of the Environment	No mention of AFFF or fire-fighting foam. Inlcuded in this document is a discharge permit for NRL-CBD along with discharge monitoring report forms and a copy of the code of federal regulations, part 136. This includes definitions, general conditions, and special conditions.

Date	Document Number	Title	Author Affiliation	Notes
September 10, 2007	2845_ltr_2007	Maryland Department of the Environment Acknowledgement of Permit Application	Maryland Department of the Environment	This is MDEs acknowledgement of NRL-CBD's permit application. Included is the public participation process involved in permitting.
November 15, 2007	2899_ltr_2007	Maryland Department of the Environment Application Complete	Maryland Department of the Environment	This is MDEs response stating that the review for the application is administratively complete.
August, 2009		Storm Water Survey Report	CH2M HILL	No mention of AFFF or fire-fighting foam. This report was created as a part of the Spill Prevention Control and Countermeasures plan. Field verification was performed. Maps were created and then updated based off of field verification. The results of field verification showed that the existing storm water mapping did not compare well to the actual field conditions.
January, 2022		Sampling and Analysis Plan Sites 3, 4, and 5 Remedial Investigation	CH2M HILL	Site 3 pre-dates the use of AFFF and the historical record does not indicate that AFFF has been disposed of in the landfill. Site 4 is the same as Site 3. Site 5 has a minimal overlap, but historical record indicates AFFF was not disposed of. PFAS is not suspected to be released at these 3 sites.
December 9, 2021		On-Base Remedial Investigation Scoping Session Site 10 - Fire Testing Area Naval Research Laboratory - Chesapeake Bay Detachment	CH2M HILL	No mention of AFFF or fire-forming foam. However, it does detail the SI findings for soil and groundwater and PFAS concentrations. PFOS exceeded screening level in 8 of 9 locations in soil, and did not exceeded screening levels in 11 GW monitoring wells. Piney point aquifer detected but did not exceed screening levels.
February, 2022		Per- and Polyflyoroalkyl Substances Site Inspection Report Site 10 - Fire Testing Area	CH2M HILL	This is a draft final, so unsure of if this information can be used. This is an SI designed for Site 10 due to the use of AFFF. The five objectives are listed, but primarly focus around determination of PFAS (PFOS, PFOA, and PFBS, specifically). Field investigation was conducted in late 2020 to early 2021 and included soil sampling in potential AFFF release area. Due to concentrations of sampled material, additional groundwater and soil sampling is recommended along with surface water, ecological risk screening, and Human health risk assessment.
June, 2018		Naval Research Laboratory - Chesapeake Bay Detachment Drinking Water Investigation	Department of the Navy	NRL-CBD has potential for offsite PFAS migration from AFFF usage. Review of county drinking records led to the belief that the deeper groundwater is protected by a thick (>100 foot) clay layer. Naval investigation showed shallow GW had PFAS and the deeper GW (specifically piney point aquifer) did not contain any detectable levels of PFAS. However, in May 2018 Navy learned of private drinking wells souteast of NRL-CBD using the shallow groundwater.
NIRIS				
March, 1984	N31260_000001	Initial Assessment Study of Naval Research Laboratory, Washington DC	Fred C. Hart Associates, Inc.	Presents the results of the Initial Assessment Study at NRL and NRL CBD. 9 potentially contaminated sites were identified, one in DC and 8 in CBD. This study concluded that none of the sites warranted further investigation under the NACIP program. Mentions that AFFF was used at CBD and that it was found in outside drum storage near bldg 110. PFAS not mentioned.
September, 2006	N31260_000002	Preliminary Assessment Naval Research Laboratory Chesapeake Bay Detachment, Chesapeake Beach, Maryland	Malcolm Pirnie, Inc	No mention of PFAS or AFFF. Discusses the Preliminary Assessment for NRL CBD. Small arms range, randle cliffs (zuni launch site), the hypervelocity low pressure gun, the rifle range, and randle cliffs (zuni launch site) were evaluated.

Date	Document Number	Title	Author Affiliation	Notes
May, 2010	N31260_000003	Site Inspection Report Naval Research Laboratory Chesapeake Bay Detachment, Chesapeake Beach Maryland	Malcolm Pirnie, Inc	No mention of PFAS or AFFF. Discusses results of the SI conducted at the following munition response sites at NRL CBD: Small Arms range, Randle Cliffs Zuni launch site and Gun Mounts, and Hypervelocity Low pressure gun
June 1, 2012	N31260_000005	June 2012 Update to Sampling and Analysis Plan for Remedial Investigation Unexploded Ordances (UXOS) 1, 2, and 3 NRL Chesapeake MD	Tetra Tech	No mention of PFAS or AFFF. Describes the scope of work required for determining the potential munitions constituents at four identified Munitions Response Sites.
December 31, 2002	N31260_000006	Final Asbestos and Lead Based Paint Survey NRL Chesapeake Beach MD	Michael Baker JR, INC. and Jenkins Environmental Inc.	No mention of AFFF or fire-fighting foam. Identifies asbestos and lead-based painted surface conditions prior to renovations.
November 1, 2009	N31260_000007	Final Fire Testing Area Site Assessment Report, NRL Chesapeake Beach MD	CH2M HILL	Mentions AFFF was tested at NRL-CBD as a fire suppressant and extinguishing agent. Presents the results and conclusions based off of the Site Assessment activities related to assessing the presence of shallow groundwater contamination at and downgradient of the FTA.
September 1, 2012	N31260_000021	Final Tier II Sampling and Analysis Plan Basewide Site Inspection NRL Chesapeake MD	CH2M HILL	No mention of AFFF or fire-fighting foam. Discusses the sampling plan for determining if a site-related release has occurred warranting additional action. Eight installation restoration sites and four areas of conern located at NRL-CBD are included.
June 1, 2012	N31260_000023	Accident Prevention Plan and Site Safety and Health Plan for UXO 1, 2, and 3 NRL Chesapeake Beach MD	Tetra Tech	No mention of AFFF or fire-fighting foam. This document presents support for the technical approach described in the sampling analysis plan. Specifically, for the remedial investigation at four MR areas located at NRL CBD.
March 8, 2012	N31260_000024	ROV Evaluation NAVFAC Elevated Tank (CBD Tank) NRL Chesapeake Beach MD	Mumford Bjorkman Associates, Inc	Discusses the internal and external evaluation of a 400,000 gal. elevated tank at NAVFAC facility, CBD. The purpose of this evaluation was to determine the condition of the tank's interior, exterior, foundation, and accessories.
May 1, 2014	N31260_000049	Final Soil Background Study Sampling and Analysis Plan Addendum NRL Chesapeake Beach MD	Tetra Tech	No mention of AFFF or fire-fighting foam. Discusses the sampling and analysis plan associated with the soil sampling event for completion of a soil background study at NRL-CBD.
September 8, 2014	N31260_000057	Field Task Modification Soil Background Study Sampling and Analysis Plan Addendum NRL Chesapeake Beach MD	Tetra Tech	No mention of AFFF or fire-fighting foam. Provides the addendum to the SAP due to regulatory requests to include a percentage of hexavalent chromium analysis at NRL-CBD sites (added to the analysis list by the Navy).
September 1, 2014	N31260_000058	Accident Prevention Plan for Soil Background Study at NRL Chesapeake Beach MD	Tetra Tech	No mention of AFFF or fire-fighting foam. Details the accident preventation plan for a soil background study involving sample collecting, handling, and storage at NRL-CBD.
August 1, 2007	N31260_000068	Decomissioning Plan and Results Building A100 Binder 2 of 2 NRL Chesapeake Beach MD	Naval Research Laboratory	Includes survey results for Building A100, a former hypervelocity gun facility. Procedures, data, maps, and all other information gathered from the survey.
August 1, 2007	N31260_000069	Decomissioning Plan and Results Building A100 Binder 1 of 2 NRL Chesapeake Beach MD	Naval Research Laboratory	Includes survey results for Building A100, a former hypervelocity gun facility. Procedures, data, maps, and all other information gathered from the survey.
February 1, 2017	N31260_000071	Final Sampling and Analysis Plan Site Inspection for Perfluorinated Compounds in Groundwater NRL Chesapeake Beach MD	CH2M HILL	Includes scoping for PFCs in groundwater at suspected source areas where AFFF has/is tested and could be releasing PFCs. It also details the sampling activities in support of a site inspection at for PFCs at NRL-CBD.

Date	Document Number	Title	Author Affiliation	Notes
February 1, 2017	N31260_000072	Final Sampling and Analysis Plan Site Inspection for Perfluorinated Compounds in Groundwater Appendix D Laboratory Standard Operating Procedures NRL Chesapeake Beach MD	CH2M HILL	Describes the techniques used for the determination of per and poly-fluorinated compounds (PFAS). Details the laboratory standard operating procedures, including methodology, equipment, extraction, etc.
April 1, 2017	N31260_000075	Final Technical Memorandum Groundwater Background Study Work Plan NRL Chesapeak Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This document presents the GW background study work plan for NRL-CBD. It is intended to present the approach to eliminate the data gap regarding the background evaluation for GW and to determine if COCs identified of GW can be reduced/eliminated at UXO 1, 2, and 3.
August 1, 2017	N31260_000077	Final Proposed Remedial Action Plan Soil at MRS 003 Small Arms Range NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This document discusses the preferred alternative for RA at MRS site 003, small arms range at NRL-CBD. This document focuses specifically on soil remedy and leaves GW for a spearate issue. This plan recommends excavation and off-site disposal of contaminated soil.
March 1, 2018	N31260_000087	Final proposed Remedial Action Plan Groundwater at Munitions Response Sites 1, 2, and 3 (MRS 1, 2 and 3) Hypervelocity Low Pressure Gun Randle Cliffs Zuni Launch Site Small Arms Range NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. The purpose of this document is to present the preferred alternative for RA of GW at MRS site 1, 2, and 3. This plan recommends land use controls as the preferred alternative.
March 1, 2018	N31260_000091	Final Proposed Plan Soil at Munitions Response Site 002 (MRS 002) Randle Cliffs, Zuni Launch Site and Gun Mounts NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This proposed plan is to identify the preferred alternative and allow for community involvement of the final remedy at MRS 2. The preferred plan is stated to be no action.
August 1, 2017	N31260_000094	Final Proposed Remedial Action Plan Soil at Munitions Response Site 003 (MRS 003) Small Arms Range NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This PRAP states that the preferred alternative for RA at MRS 003 in regards for soil remedy is excavation and off-site disposal of contamined soil.
March 28, 2018	N31260_000097	Final Technical Memorandum Regarding Comparison of Groundwater Background Threshold Values to Remedial Investigation Data for Metals NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This TM shows the comparison of GW Remedial Investigation metals data for three MRS (1, 2, 3) to GW Background Threshold Values (BTV) at NRL-CBD. This will determine if the maximum detected concentrations of metals identified as COCs are below background.
Decemeber 27, 2017	N31260_000102	Final Technical Memorandym Regarding Groundwater Background Study Results NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. Details the field investigation summary, the results of the background samping, and the evaluation of the GW background threshold values.
March 1, 2018	N31260_000106	Final Sampling and Analysis Plan Basewide Site Expanded Site Inspection NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This is a SAP to support an ESI (six sites: 3, 4, 5, 7, 9, and AOC D). Purpose of the ESI are to determine whether previous historical site activites have resulted in a release to soil or GW that poses a potential unnacptable risk to human health/environment, and to delineate buried waste disposed at sites 3, 4 and 5.
June 1, 2016	N31260_000111	Final Base Wide Site Inspection Report NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This report details the findings of the SI investigation. It answers if historical activities resulted in a release of constituents to soil or GW, if concentrations detected are unaccpetable to human health/environment, and if media-specific concentratiosn warrant further investigation/action to meet Navy's objective.

Date	Document Number	Title	Author Affiliation	Notes
March 1, 2018	N31260_000116	Final Technical Memorandum Evaluation of Per and Polyfluoroalkyl Substances in Groundwater NRL Chesapeake Beach MD	CH2M HILL	Based on investigation results AOC A, where AFFF was used, is clearly the source of PFAS contamination in groundwater. Highest concentrations in GW were found closest to AOC A and decreased with distance from the site. AOC A has been used for testing AFFF since 1968. Surficial aquifer is isolated from the underlying Piney Point aquifer by the clay confining unit (Calvert confining unit) present beneath the site. Transport tpathway into downgradient private water supply wells near NRL-CBD does not appear to be complete. Overall, this evaluation describes the results of a GW investigation of PFAS in the GW at NRL-CBD.
October 1, 2018	N31260_000118	Final Proposed Plan for Soil at Munitions Response Site 2 Randle Cliffs, Zuni Launch Site and Gun Mounts NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. Identifies preferred alternative and community involvement in the selection of the final remedy. The proposed plan is no action at MRS 002.
August 1, 2018	N31260_000120	Final Decision Document for Soil at Munition Response Site 3 Small Arms Range NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. Presents the final determination of the selected remedy for soil at MRS 003, being excavation and off-site disposal for soil. GW is being addressed in a separate DD.
March 1, 2019	N31260_000137	Final Decision Document Munitions Response Site 2 Randle Cliffs, Zuni Launch Site and Randle Cliffs, Gun Mounts NRL Chesapeake Beach MD	CH2M HILL	No mention of AFFF or fire-fighting foam. This states the selected remedy of no action for soil at MRS 002. Site-wide groundwater is being addressed in a separate DD.
July 1, 2018	N31260_000140	Final Addendum to the Sampling and Analysis Plan Site Inspection for Per and Polyfluoroalkyl Substances in Groundwater NRL Chesapeake Beach MD	CH2M HILL	Discusses the path forward for the site inspection for PFCs in GW at the suspected source area, AOC A, and at NRL-CBD. This SAP addendum documents an updated conceptual site model for Site 10 (formerly AOC A). It also documents changes to the off-base drinking water sampling areas and PFAS analysis list. Objectives remained unchanged.
July 1, 2018	N31260_000141	Final Addendum to the Sampling and Analysis Plan Site Inspection for Per and Polyfluoroalkyl Substances in Groundwater Appendix D Laboratory Standard Operating Procedures NRL Chesapeake Beach MD	CH2M HILL	Includes the revisions to the final sampling and analysis plan detailed above in N31260_000072
August 1, 2019	N31260_000144	Final Verification Sampling Report Unexploded Ordnance 3 (UXO 3) Small Arms Range Soil NRL Chesapeake Beach MD	Helios Resources	No mention of AFFF or fire-fighting foam. Report details the verification of sampling activities at UXO 3. Sampling included XRF field screening and fixed-base laboratory analysis.
February 22, 2019	N31260_000157	Final Remedial Action Work Plan Unexploded Ordnance 3 (UXO 3) Small Arms Range NRL Chesapeake Beach MD	Engineering/Remediation Resources Group Inc. and Wood Environment and Infrastructure Solutions Inc.	No mention of AFFF or fire-fighting foam. Remedial Action work plan for UXO 003 Small Arms Range at NRL-CBD. This was developed to guide the activities for implementing the RA and to address the RAOs. The purpose of the RA is to prevent risk to human health from lead in soil and prevent risk to environment from lead in soil.
November 1, 2019	N31260_000159	Final Construction Completion Report Small Arms Range Unexploded Ordnance 3 (UXO 3) NRL Chesapeake Beach MD	Engineering/Remediation Resources Group Inc. and Wood Environment and Infrastructure Solutions Inc.	No mention of AFFF or fire-fighting foam. This documents the field activties conducted at UXO 3 SAR at NRL-CBD. Activties from the RA included moving soil from UXO 3 SAR to an approved off-site disposal facility, confirmatory soil sampling beneath stockpile area and sidewalls/floor of excavation, and backfill/restoration of excavation area.
March 4, 2020	N31260_000162	Remedial Action Completion Report Unexploded Ordnance 3 (UXO 3) Small Arms Range NRL Chesapeake Beach MD	NAVFAC Washington	No mention of AFFF or fire-fighting foam. This document details the response complete at UXO 003 and to show that the response complete has achieved the established RAOs.

Date	Document Number	Title	Author Affiliation	Notes
July 1, 2020	N31260_000172	Final Results of Investgation of Per and Polyfluoroalkyl Substances in Off Base Drinking Water Chesapeake Beach Detachment NRL Chesapeake Beach MD	CH2M HILL	Cites a Navy document from 2016 that puts PFAS contamination with a focus on AFFF as a priority. With drinking water wells being within 1 mile of contamination, NRL-CBD was listed as high priority. Site 10 tested AFFF along with other fire suppressants. Also states that AFFF could've released PFAS that has migrated vertically to the subsurface via infiltrating precipitation which could eventually leak into the groundwater. Stormwater runoff was also listed as a potential contribution. This technical memorandum presents the results from the drinking water investigation.
December 11, 2019	N31260_000173	Final Meeting Summary for Restoration Advisory Board (RAV) Meeting Minutes Held on 11 December 2019 at the Northeast Community Center NRL Chesapeake Beach MD	NAVFAC Washington	No mention of AFFF or fire-fighting foam. This document is based off of informal notes and not a verbatim copy, moreover it is intended to summarize the overall discussions. Discussion included overview of environmental restoration sites, resotration advisory board chatering, future meeting plans, and other general questions/comments.
August 1, 2020	N31260_000178	Final Sampling and Analysis Plan Site 10 Fire Testing Area Site Inspection Chesapeake Bay Detachment NRL Chesapeake Beach MD	CH2M HILL	Mentions how AFFF has been used in extinguishing fires started with various fuel sources (gasoline, diesel, etc.) 1984 study showed wastewater from fire operations was drained to a holding pit and allowed to absorb into the soil. This document outlines the sampling activites for the SI for PFAS at Site 10. PFAS was detected in 3 of 42 private wells in 201. Objectives for the SI are to determine if PFAS is present in soi, water, and sediment, if there is PFAS if they exceed the PALs, further details the lateral and vertical extents of PFAS in the GW in the surficial aquifer, determine current and potential concentrations in PFAS, and further characterize the nature of TPH contamination in the shallow groundwater at the site.
March 1, 2021	N31260_000180	Community Involvement Plan Chesapeake Bay Detachment NRL Chesapeake Beach MD	CH2M HILL	Provides information about the community involvement plan for the environmental restoration at NRL-CBD. The community involvement plan identifies concerns about potentially contaminated sites at NRL-CBD and how the Navy will be involved and address the community's concerns. Further discusses the environmental restoration program at NRL-CBD.
March 1, 2015	N31260.AR.000064	Soil Background Study Report for Navy Research Laboratory - Chesapeake Bay Detachment Chesapeake Beach, Maryland	Tetra Tech	No mention of AFFF or fire-fighting foam. Report details background soil study.
OEL/iNFADS				
No applicable records found				
Naval Command Operations Reports (WNY)				
1970		NRL Command History - 1970 (OPNAV Report 5750-1)	Naval Research Laboratory	Photo of AFFF in use at a different location (not NRL). Described as being developed in the Chemistry Division.
1971		NRL Command History - 1971 (OPNAV Report 5750-1)	Naval Research Laboratory	Not of interest for PFAS investigation.
1972		NRL Command History - 1972 (OPNAV Report 5750-1)	Naval Research Laboratory	Not of interest for PFAS investigation.
1973		NRL Command History 1973 (OPNAV Report 5750-1)	Naval Research Laboratory	Not of interest for PFAS investigation.
1962		NRL Command History 1962 (OPNAV Report 5750-5)	Naval Research Laboratory	Not of interest for PFAS investigation.
1963		NRL Command History 1963 (OPNAV Report 5750-5)	Naval Research Laboratory	Not of interest for PFAS investigation.
1966		NRL Command History 1966 (OPNAV Report 5750-1)	Naval Research Laboratory	The Report of NRL Progress Scientific Highlights of 1966 describes 'light' water and the associated research. No specific locations or incidents at NRL cited.

Date	Document Number	Title	Author Affiliation	Notes
1981		Washington Naval Research Lab Annexes C.H. 1981 (Includes Five Year Plan (FY 81 - FY 85) and Naval Research Laboratory Brief)	Naval Research Laboratory	Not of interest for PFAS investigation.
1982		Washington NRL Briefs, 1982-1983 (Includes Titles of Unclassified NRL Significant accomplishments for 1980)	Naval Research Laboratory	Not of interest for PFAS investigation.
1978		Washington NRL Fact Book, 1978	Naval Research Laboratory	Not of interest for PFAS investigation.
1980		Washington NRL Fact Books, 1980-1981	Naval Research Laboratory	Picture of 'Suppression of fires in Enclosed Spaces - NRL's 10,000 Cu. Ft. Facility', with a large tank featured. No other information provided.
1982		Washington NRL Fact Books 1982 and 1984	Naval Research Laboratory	Mention of ongoing fire suppression research into AFFF.
1986		Washington NRL Fact Book 1986	Naval Research Laboratory	Not of interest for PFAS investigation.
1983		Washington NRL Five Year Plans, FY 83-87, FY 84-88	Naval Research Laboratory	Not of interest for PFAS investigation.
1978, 1980		Washington NRL Reviews, 1978 and 1980	Naval Research Laboratory	Not of interest for PFAS investigation.
1982		Washington NRL Review, 1982	Naval Research Laboratory	Descriptions of AFFF tests taking place in 1982 at NRL CBD and China Lake, CA
1983		Washington NRL Review, 1983	Naval Research Laboratory	Not of interest for PFAS investigation.
1985		Washington NRL Review, 1985	Naval Research Laboratory	Not of interest for PFAS investigation.
1986		Washington NRL Review, 1986	Naval Research Laboratory	Descriptions of development of non-stick and weather resistant fluoropolymers, and discussion about tephlon research.
1987		Washington NRL Review, 1987	Naval Research Laboratory	Not of interest for PFAS investigation.
1989		Washington NRL Review, 1989	Naval Research Laboratory	Not of interest for PFAS investigation.
1990		Washington NRL Review, 1990	Naval Research Laboratory	Not of interest for PFAS investigation.
1991		Washington NRL Review, 1991	Naval Research Laboratory	Not of interest for PFAS investigation.
1992		Washington NRL Review, 1992	Naval Research Laboratory	Not of interest for PFAS investigation.
1994		Washington NRL Review, 1994	Naval Research Laboratory	Not of interest for PFAS investigation.
1995		Washington NRL Review, 1995	Naval Research Laboratory	Not of interest for PFAS investigation.
1994		Washington NRL Directors/Cos 1973-1994 also list for 1923-1973 period	Naval Research Laboratory	Not of interest for PFAS investigation.
1994		Washington NRL FactBook 1994-1995	Naval Research Laboratory	Not of interest for PFAS investigation.
1997		Washington NRL FactBook 1997 (2/2)	Naval Research Laboratory	Not of interest for PFAS investigation.
2008		Command Operations Report, 2008	Naval Research Laboratory	Not of interest for PFAS investigation.
1987		1987 Fact Book	Naval Research Laboratory	Not of interest for PFAS investigation.
1988		1988 Fact Book	Naval Research Laboratory	Not of interest for PFAS investigation.
1989		1989 Fact Book	Naval Research Laboratory	Not of interest for PFAS investigation.
1990		NRL Review, June 1990	Naval Research Laboratory	Not of interest for PFAS investigation.
1978		Report of NRL Progress, November 1978	Naval Research Laboratory	Not of interest for PFAS investigation.
1979		Report of NRL Progress, June 1979	Naval Research Laboratory	Not of interest for PFAS investigation.
1976		1976 Review, Naval Research Laboratory	Naval Research Laboratory	A research study in 1976 describes using AFFF for smoke knockdown. The paper describes tests conducted in a NRL-designed chamber, but does not reference location of the chamber.
1977		1977 Review, Naval Research Laboratory	Naval Research Laboratory	Not of interest for PFAS investigation.
1996		1996 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.
1998		1998 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.
1999		NRL Fact Book, 1999	Naval Research Laboratory	Not of interest for PFAS investigation.
2002		2002 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.
2004		2004 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.

Date	Document Number	Title	Author Affiliation	Notes
2005		2005 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.
2003		2003 NRL Review	Naval Research Laboratory	Not of interest for PFAS investigation.
1993		1992-1993 Fact Book	Naval Research Laboratory	Not of interest for PFAS investigation.
1997		NRL Fact Book, 1997	Naval Research Laboratory	Not of interest for PFAS investigation.
National Archives				
No applicable written records found.				
Internet Records				
May 2022		U.S. Naval Research Laboratory CBD Homepage: https://www.nrl.navy.mil/Our-Work/Field-Sites/Chesapeake-Bay-Detachment-CBD/	Navy	Provides general knowledge about locations of individual branches, and in-depth information of specific research topics, including AFFF.
May 2022		FEMA National Flood Hazard Layer: https://www.fema.gov/flood-maps/national-flood-hazard-layer	FEMA	Provides the flood maps for the Calvert County area.
May 2022		U.S. Fish and Wildlife Service Listed Species in NRL CBD: https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=MD&stateName=Maryland&statusCategory=Listed	US F&W	Provides the endangered and threatened wildlife for the Calvert County area area.
May 2022		United States Census Bureau. 2018. American Community Survey. https://data.census.gov/cedsci/table?q=population%20of%20calvert%20county%20md&g=1600000US1150000	US Census Bureau	Provides population data for the Calvert County area.
May 2022		U.S. NRL AFFF page: https://www.nrl.navy.mil/accomplishments/materials/aqueous-film-foam/	Navy	Provides background on the development of AFFF, and details some uses of AFFF at Dulles International Airport, Bolling, and Andrews Air Force Bases
May 2022		ITRC PFAS Fact Sheet June 2018: https://pfas-1.itrcweb.org/wp-content/uploads/2018/07/ITRCPFASFactSheetSect4TablesJune18.xlsx ITRC PFAS Fact Sheet Home: https://pfas-1.itrcweb.org/fact-sheets/	Interstate Technology Regulatory Council	General PFAS information
May 2022		Public Health- PFAS: https://www.publichealth.va.gov/exposures/pfas.asp	U.S. Department of Veterans Affairs	General PFAS information
May 2022		PFC/PFAS: http://www.secnav.navy.mil/eie/Pages/PFC-PFAS.aspx	Assistant Secretary of the Navy; Energy, Installations and Environment	General PFAS information
May 2022		https://www.eurekalert.org/pub_releases/2009-11/nrl-nra110209.php	Naval Research Laboratory	Discusses the Navy Technology Center for Safety and Survivability, located at NRL DC. Describes the 10,000 cubit foot fire-testing area at NRL CBD that the Center uses for tests.

Date	Document Number	Title	Author Affiliation	Notes
Environmental Data Research. Inc.				
January 2022		GeoCheck Report	Enviornmental Data Research. Inc.	
January 2022		NEPA Search Map	Enviornmental Data Research. Inc.	
January 2022		Offsite Receptor Report	Enviornmental Data Research. Inc.	
January 2022		Historical Topo Map Report	Enviornmental Data Research. Inc.	
January 2022		Historical Aerial Photo Decade Package	Enviornmental Data Research. Inc.	

Appendix D
Interview Record

Communication Record	
Date: June 2022	
Name of Base, State: Naval Research Laboratory-Chesapeake Bay Detachment, Maryland	
Interviewer: CH2M	
Organization: CH2M	
Interviewee: George Malone	
Position/Job Title: Naval District Washington Fire Inspector	
General Discussion Notes and Information:	

Questions asked by CH2M followed by responses provided by Malone:

Question 1: Were fire trucks stationed at NRL CBD equipped with AFFF?

Response 1: Yes, fire trucks at CBD did carry AFFF.

Question 2: We have found references in old reports to a 'firehouse shack' at NRL CBD. We also know that AFFF was stored in containers at Building 50 (located by Bayside Road by the big slide gate to the western half of the facility). Was Building 50 considered the 'firehouse shack', or was that a different building?

Response 2: Bldg. 50 was the Fire House and it stored AFFF also the only thing I can think of for the firehouse shack, there was bldgs. next to the fire house on the hill side that was used by the fire dept. for storage back in the day.

Question 3: Was AFFF transferred from containers into fire trucks at the 'firehouse shack' or Building 50?

Response 3: AFFF was transferred at the fire house and around the fire house as needed.

Question 4: Where were fire trucks stored/serviced?

Response 4: Fire trucks were stored/ serviced at the fire house.

Question 5: Where were fire trucks washed?

Response 5: They were washed at Bldg. 50.

Question 6: Do you know the approximate time frame the firehouse would have been in use/stored AFFF? Same question for the fire engines. If you don't know that information, what timeframe were you working there, so we can at least say it was in use during that timeframe?

Response 6: I do not know the time frame. I was there from early 2002 tell around 2008.

Question 7: Do you recall any specifics of how the AFFF was stored and how transfer was done (ie, pouring into buckets or flow cells, mixed, etc)?

Response 7: No.

Question 8: Do you recall if the water from washing trucks or spilled substances drained to a specific place?

Response 8: The fire truck was washed in and out of the station.

Question 9: Were the fire trucks kept inside Building 50, or were they parked in the lot directly in front of it? Same question as to where they were washed.

Response 9: 4. Yes in Bldg. 50 washed at the station.

Question 10: Do you recall AFFF ever being used by the fire department outside of the FTA?

Response 10: I do not recall.

Question 11: Do you recall where empty or used AFFF containers were disposed?

Response 11: I do not recall.

Communication Record	
Date: June 2022	
Name of Base, State: Naval Research Laboratory-Chesapeake Bay Detachment, Maryland	
Interviewer: CH2M	
Organization: CH2M	
Interviewee: John Lyon	
Position/Job Title: Naval District Washington Fire Chief	
General Discussion Notes and Information:	

Questions asked by CH2M followed by responses provided by Lyon:

Question 1: Do you know the approximate time frame the firehouse would have been in use/stored AFFF? Same question for the fire engines. If you don't know that information, what timeframe were you working there, so we can at least say it was in use during that timeframe?

Response 1: I have been with NDWFD since June 1984.

Question 2: Do you recall any specifics of how the AFFF was stored and how transfer was done (ie, pouring into buckets or flow cells, mixed, etc)?

Response 2: Foam was stored in fire house in 5 gallon containers.

Question 3: Do you recall if the water from washing trucks or spilled substances drained to a specific place?

Response 3: Fire Apparatus was washed inside and outside of Fire House.

Question 4: Do you recall AFFF ever being used by the fire department outside of the FTA?

Response 4: Foam was used during live fire test on base.

Question 5: Do you recall where empty or used AFFF containers were disposed?

Response 5: Empty foam containers were thrown in dumpster.

PFAS Preliminary Assessment Questionnaire

Public Works Staff

Name:	Bill Drury
Title:	Small Craft Operator
Date of Interview:	4/6/2022
Contact information (email/phone number):	410-257-4056

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   NA

2. Is there a chrome-plating shop on base? Historically? Years of operation?

   NA

   a. Was foam used to suppress vapors in the process?

      NA

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   NA

4. Are there supply wells of any kind on base (such as, potable, irrigation, industrial) and if so, have they previously been tested for PFAS compounds?

   NA

5. Where are the current and historical landfills/disposal sites on base? What are the estimated years of use for each location? Confirm known landfills/disposal sites on map.

   NA

Industrial Wastewater Treatment Plant (IWTP) or Sanitary Wastewater Treatment Plant (WWTP)

1. Does the base currently have (or has the base historically had) an IWTP or WWTP? If yes, what are/were the years of use and where is effluent from the IWTP and WWTP discharged to?

   NA

2. Does the facility utilize oil water separators (OWSs) for the collection and separation of petroleum, and where AFFF might have been used for operations (such as, Fire Training Areas, Hangers, Maintenance Operations)? If so, where did the OWSs discharge to (such as WWTP, outfalls) and are there drawings available for the construction of these systems?

   NA

3. How are/have sludges and biosolids from the IWTP, WWTP, and OWS been disposed of (such as, land application, discharge to municipal sewer system, irrigation)?

   A pond was constructed adjacent to the north of Site 10. The Engineer's Estimate for dredging and constructing the pond at Site 10 was much lower than the actual bid cost, so the dredging was removed from the contract. The contractors dug into the pond to create the structure on the east side of the pond, the concrete box housing the outflow, 10-20 feet laterally. That dredged material was worked into the berm/dam at the east end of the pond. No other dredged material was ever taken from the pond and put at another location.

   a. If known, where are any current or historical drying beds/spray fields/sludge lagoons? Please identify the approximate location/s of such features on the facility map provided.

      NA

   b. If known, has any sludge been land-applied on base for fertilizer or for use as landfill cover? If so, please identify the approximate location/s of such features on the facility map attached.

      NA

4. Are there any current or historical diversionary flow valves that would allow for waste to bypass the base's treatment plant(s)?

   NA

5. Has a reverse osmosis system been used in the IWTP and/or WWTP? If so, where/how is the waste concentrate disposed?

   NA

6. Which buildings and drainage features, including OWSs, discharge to the IWTP and/or WWTP?

NA

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

   NA

2. How are unused or waste pesticides managed?

   NA

3. How are unused or waste paints managed?

   NA

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?

   NA

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      NA

   b. Emergency response sites (such as, plane, helicopter, or vehicle crash sites and fires)

      NA

   c. Emergency runway landings where foam might have been used as a precaution

      NA

d. Other (such as air show demonstrations, AFFF “salutes”)

NA

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed.

NA

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that have not already been previously discussed?

NA

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

NA

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

NA

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

NA

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

NA

d. Water supply wells (such as potable, agricultural, industrial)

NA

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

NA

f. Other

NA

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

   NA

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

   NA

PFAS Preliminary Assessment Questionnaire

Public Works Staff

Name:	Harold Rolfs
Title:	Customer Liaison for NRL CBD
Date of Interview:	4/6/2022
Contact information (email/phone number):	410-257-4002

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   No

2. Is there a chrome-plating shop on base? Historically? Years of operation?

   No

   a. Was foam used to suppress vapors in the process?

      NA

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   No designated areas for this.

4. Are there supply wells of any kind on base (such as, potable, irrigation, industrial) and if so, have they previously been tested for PFAS compounds?

   NA

5. Where are the current and historical landfills/disposal sites on base? What are the estimated years of use for each location? Confirm known landfills/disposal sites on map.

   Potentially a landfill existed behind Building 76.

Industrial Wastewater Treatment Plant (IWTP) or Sanitary Wastewater Treatment Plant (WWTP)

1. Does the base currently have (or has the base historically had) an IWTP or WWTP? If yes, what are/were the years of use and where is effluent from the IWTP and WWTP discharged to?

   Yes. Had heard of a line getting plugged up before the plant was constructed, leading to waste spilling out. WOuld have taken place more than one operator before current operator, would need to look at drawings. WWTP was installed between 1950s-1960s.

2. Does the facility utilize oil water separators (OWSs) for the collection and separation of petroleum, and where AFFF might have been used for operations (such as, Fire Training Areas, Hangers, Maintenance Operations)? If so, where did the OWSs discharge to (such as WWTP, outfalls) and are there drawings available for the construction of these systems?
   NA

3. How are/have sludges and biosolids from the IWTP, WWTP, and OWS been disposed of (such as, land application, discharge to municipal sewer system, irrigation)?
   Sludge has only ever been disposed at the County Appeal Landfill.

   a. If known, where are any current or historical drying beds/spray fields/sludge lagoons? Please identify the approximate location/s of such features on the facility map provided.
      NA

   b. If known, has any sludge been land-applied on base for fertilizer or for use as landfill cover? If so, please identify the approximate location/s of such features on the facility map attached
      NA
      .

4. Are there any current or historical diversionary flow valves that would allow for waste to bypass the base's treatment plant(s)?
   NA

5. Has a reverse osmosis system been used in the IWTP and/or WWTP? If so, where/how is the waste concentrate disposed?
   NA

6. Which buildings and drainage features, including OWSs, discharge to the IWTP and/or WWTP?

NA

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

   Less than 90 day facility nearby is used for waste paint and pesticide. No current storage onsite.

2. How are unused or waste pesticides managed?

   NA

3. How are unused or waste paints managed?

   NA

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?

   The reference to a 1984 Firehouse Shack does not ring any bells.

   AFFF was used at the Fire Testing Area, including: inside and outside Building 313, the burn pad, Building 308, the C252 burn area, the open burn area in pits. Building 50 had AFFF stored in a back room and could be a candidate for the fire shack mentioned in the 1984 report. 5 gal drums of AFFF were once shipped in to the building that currently contains Harold's office. They were also occasionally taken in at Building 76 for Clarence Whitehurst.

   No idea about foam being sprayed along a fence line.

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      NA

   b. Emergency response sites (such as, plane, helicopter, or vehicle crash sites and fires)

      A trailer in Westfield had a fire that was extinguished by the town of Chesapeake Beach. A dumpster fire one occurred at Building 75 and was put out with water. A vehicle fire at Building 76 was put out with a fire extinguisher.

d. Other (such as air show demonstrations, AFFF "salutes")

NA

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed.

NA

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that have not already been previously discussed?

NA

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

NA

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

NA

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

NA

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

NA

d. Water supply wells (such as potable, agricultural, industrial)

NA

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

NA

f. Other

NA

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview?Name, organization, position, phone number, e-mail.

   Contact John Farley and Clarence Whitehurst regarding the fire testing area.

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?NA

PFAS Preliminary Assessment Questionnaire

Environmental Staff

Name:	John Farley
Title:	Director, Fire Test Operations
Date of Interview:	12 April 2022
Contact information (email/phone number):	john.farley@nrl.navy.mil, Cell# (703) 283-9047

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   Do not know

2. Is there a chrome-plating shop on base? Historically? Provide years of operation.

   Do not know

   a. Was foam used to suppress vapors in the process?

      Do not know, suggest you contact NRL R&D Services

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   Do not know

4. What is the current and historical source of the potable water supply for the base? Has the potable water been tested for PFAS? If so, please provide results.

   The main base uses municiple (City Main) water services.

5. Are there supply wells of any kind on base (such as potable, irrigation, industrial) and if so, have they been tested for PFAS compounds?

   43 residential drinking wells were tested by NAFAC/EPA for PFAS.
   Only three wells tested positive but all three were below 70 PPT.

6. Where are the current and historical landfills/disposal sites on base? What were the estimated years of use for each location? Confirm locations of landfills/disposal areas on map.

   Do not know, for NRL CBD suggest you call Harold Rolfs (harold.rolfs@nrl.navy.mil)

7. Are there monitoring wells located within the vicinity of any areas where AFFF or materials containing PFAS may have been stored/used/released? Provide map or coordinates.

   Yes, can provide NAVFAC Map if needed.

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

   Do not know, suggest you contact NRL enviromental

2. How are unused or waste pesticides managed?

   Do not know, suggest you contact NRL Enviromental

3. How are unused or waste paints managed?

   They are controled by NRL Environmental for proper disosal

Firefighting Training Areas

1. As part of historical or current operational training, are any current or historical Firefighting Training Areas (FTAs) present on the facility? If yes, please show the location/s of the FTAs on the map provided.

   We do not conduct training, we conduct firefighting R&D fire testing all fire test plan are approved by NRL Safety/Environmental and all approved test plans have a signed NEPA CATEX memorandum cover letter.

2. To the best of your knowledge, what are/were the years of operation for each FTA you identified in your answer to Question #1 above?

   Since NRL developed AFFF in the 1960's there have been firefighting foam testing both at NRL DC and NRL-CBD. Since the 1980's all foam testing has been accomplished at NRL-CBD.

3. How many FTAs are currently active? Inactive (historical in nature)? To the extent possible, please specify which are active versus historical.

   The NRL-CBD fire test facility, located in Cheapeake, Beach MD is still active.

4. To the best of your knowledge, were fuels/flammables other than "typical" (such as JP-5, #2 Fuel Oil) used at the FTAs? If yes, what was used?

   At NRL CBD we have used unleaded (ethanol-free) gasoline, Hepatne, JP-5, JP-8, JP-4 JP-8, and aviation Jet A fuels. We have also used Type-2 deisel, F-76 mobility fuels and metanol.

5. For inactive FTAs, to the best of your knowledge, when was the last time that fire training using AFFF was conducted at each one?

   We do not train, we conduct firefighting R&D for both AFFF and fluorine-free foam testing.

6. When AFFF was used during a fire training exercise, to the best of your knowledge, was the AFFF used contained and disposed, and if so, how was the AFFF cleaned up and disposed?

   All foam products used at NRL-CBD are properly controlled, contained, and disposed of by the NRL waste manager Clean Harbors

7. To the best of your knowledge, are current and historical FTAs lined? If so, with anything other than concrete?

   The burn building, labs, and Flight Deck have cement decks and have trenchs to collect all effluent generated.

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?

   We have copies of AFFF qualification test reports.

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      No

   b. Emergency response sites (such as plane, helicopter, vehicle crash sites and fires)

      No

   c. Emergency runway landings where foam might have been used as a precaution

      N/A

d. Other (such as air show demonstrations, AFFF “salutes”)

N/A

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed?

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that haven’t already been previously discussed?

N/A

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

N/A

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

N/A

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

N/A

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

N/A

d. Water supply wells (such as potable, agricultural, industrial)

N/A

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

All collected effluent is disposed IAW the Clean Harbors contract

f. Other

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

   A have other POC in the document.

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

   No

PFAS Preliminary Assessment Questionnaire

Environmental Staff

Name:	Joseph Jordan Jr.
Title:	Env. Protection Specialist
Date of Interview:	02/24/2022
Contact information (email/phone number):	joseph.jordan@nrl.navy.mil

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   Not to my knowledge

2. Is there a chrome-plating shop on base? Historically? Provide years of operation.

   Not to my knowledge

   a. Was foam used to suppress vapors in the process?

   Not to my knowledge

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   Not to my knowledge

4. What is the current and historical source of the potable water supply for the base? Has the potable water been tested for PFAS? If so, please provide results.

   Not to my knowledge

5. Are there supply wells of any kind on base (such as potable, irrigation, industrial) and if so, have they been tested for PFAS compounds?

   Not to my knowledge

6. Where are the current and historical landfills/disposal sites on base? What were the estimated years of use for each location? Confirm locations of landfills/disposal areas on map.

Not to my knowledge

7. Are there monitoring wells located within the vicinity of any areas where AFFF or materials containing PFAS may have been stored/used/released? Provide map or coordinates.

Not to my knowledge

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

Not to my knowledge

2. How are unused or waste pesticides managed?

Not to my knowledge

3. How are unused or waste paints managed?

Not to my knowledge

Firefighting Training Areas

1. As part of historical or current operational training, are any current or historical Firefighting Training Areas (FTAs) present on the facility? If yes, please show the location/s of the FTAs on the map provided.

Not to my knowledge

2. To the best of your knowledge, what are/were the years of operation for each FTA you identified in your answer to Question #1 above?

Not to my knowledge

3. How many FTAs are currently active? Inactive (historical in nature)? To the extent possible, please specify which are active versus historical.

Not to my knowledge

4. To the best of your knowledge, were fuels/flammables other than "typical" (such as JP-5, #2 Fuel Oil) used at the FTAs? If yes, what was used?

   Not to my knowledge

5. For inactive FTAs, to the best of your knowledge, when was the last time that fire training using AFFF was conducted at each one?

   Not to my knowledge

6. When AFFF was used during a fire training exercise, to the best of your knowledge, was the AFFF used contained and disposed, and if so, how was the AFFF cleaned up and disposed?

   Not to my knowledge

7. To the best of your knowledge, are current and historical FTAs lined? If so, with anything other than concrete?

   Not to my knowledge

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?

   Not to my knowledge

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      Not to my knowledge

   b. Emergency response sites (such as plane, helicopter, vehicle crash sites and fires)

      Not to my knowledge

   c. Emergency runway landings where foam might have been used as a precaution

      Not to my knowledge

d. Other (such as air show demonstrations, AFFF "salutes")

Not to my knowledge

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed?

Not to my knowledge

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that haven't already been previously discussed?

Not to my knowledge

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

Not to my knowledge

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

Not to my knowledge

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

Not to my knowledge

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

Not to my knowledge

d. Water supply wells (such as potable, agricultural, industrial)

Not to my knowledge

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

Not to my knowledge

f. Other

Not to my knowledge

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

Not to my knowledge

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

Not to my knowledge

PFAS Preliminary Assessment Questionnaire

Public Works Staff

Name:	Mark Edes
Title:	Wastewater Treatment Plant Operator
Date of Interview:	4/6/2022
Contact information (email/phone number):	410-257-4013

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   NA

2. Is there a chrome-plating shop on base? Historically? Years of operation?

   NA

   a. Was foam used to suppress vapors in the process?

      NA

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   NA

4. Are there supply wells of any kind on base (such as, potable, irrigation, industrial) and if so, have they previously been tested for PFAS compounds?

   NA

5. Where are the current and historical landfills/disposal sites on base? What are the estimated years of use for each location? Confirm known landfills/disposal sites on map.

   NA

Industrial Wastewater Treatment Plant (IWTP) or Sanitary Wastewater Treatment Plant (WWTP)

1. Does the base currently have (or has the base historically had) an IWTP or WWTP? If yes, what are/were the years of use and where is effluent from the IWTP and WWTP discharged to?

   Yes, have personally operated the WWTP for 15 years.

2. Does the facility utilize oil water separators (OWSs) for the collection and separation of petroleum, and where AFFF might have been used for operations (such as, Fire Training Areas, Hangers, Maintenance Operations)? If so, where did the OWSs discharge to (such as WWTP, outfalls) and are there drawings available for the construction of these systems?

   No

3. How are/have sludges and biosolids from the IWTP, WWTP, and OWS been disposed of (such as, land application, discharge to municipal sewer system, irrigation)?

   Sludge is held in the digestor building and is pumped about twice a month downstairs into the treatment plant. When there was domestic waste due to the families living onbase, the pumping was conducted twice a week. Sludge is dropped into the drying bed once a year where the sludge dries out. The water is pumped back into the plant. The sludge is raked up and disposed of once dry in a landfill (currently Calvert County's landfill, Calvert County Appeal Landfill). There have been no releases from the treatment plan during the past 15 years, no overflows, no leaks.

   a. If known, where are any current or historical drying beds/spray fields/sludge lagoons? Please identify the approximate location/s of such features on the facility map provided.

      NA

   b. If known, has any sludge been land-applied on base for fertilizer or for use as landfill cover? If so, please identify the approximate location/s of such features on the facility map attached

      NA

4. Are there any current or historical diversionary flow valves that would allow for waste to bypass the base's treatment plant(s)?

   NA

5. Has a reverse osmosis system been used in the IWTP and/or WWTP? If so, where/how is the waste concentrate disposed?

   NA

6. Which buildings and drainage features, including OWSs, discharge to the IWTP and/or WWTP?

NA

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

   NA

2. How are unused or waste pesticides managed?

   NA

3. How are unused or waste paints managed?

   NA

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?
   No foam spraying at fire testing area or at the base observed.

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      NA

   b. Emergency response sites (such as, plane, helicopter, or vehicle crash sites and fires)

      NA

   c. Emergency runway landings where foam might have been used as a precaution

      NA

d. Other (such as air show demonstrations, AFFF “salutes”)

NA

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed.

NA

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that have not already been previously discussed?

NA

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

NA

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

NA

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

NA

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

NA

d. Water supply wells (such as potable, agricultural, industrial)

NA

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

NA

f. Other

NA

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

NA

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

NA

PFAS Preliminary Assessment Questionnaire

Environmental Staff

Name:	Stanley Karwoski
Title:	Engineering Technician
Date of Interview:	12 APRIL 2022
Contact information (email/phone number):	stanley.karwoski@nrl.navy.mil 410-257-4122

Note:

If you can recommend additional contacts that you feel may be able to provide additional information, please provide the name and as much contact information as you have. Thank you.

Base Information

1. Is there a Teflon-coating shop on base? Historically? Provide location and years of operation.

   Not to My Knowledge

2. Is there a chrome-plating shop on base? Historically? Provide years of operation.

   Not to My Knowledge

   a. Was foam used to suppress vapors in the process?

   Not to My Knowledge

3. Where are the current or former locations of auto hobby shops and car/truck washes?

   Not to My Knowledge

4. What is the current and historical source of the potable water supply for the base? Has the potable water been tested for PFAS? If so, please provide results.

   Water tower. Has been Tested, Contact NAVFAC for results

5. Are there supply wells of any kind on base (such as potable, irrigation, industrial) and if so, have they been tested for PFAS compounds?

   Yes, Wells feed the water tower. Have been tested, contactr NAVFAC for results

6. Where are the current and historical landfills/disposal sites on base? What were the estimated years of use for each location? Confirm locations of landfills/disposal areas on map.

   Do not know

7. Are there monitoring wells located within the vicinity of any areas where AFFF or materials containing PFAS may have been stored/used/released? Provide map or coordinates.

   Yes, Contact NAVFAC for map

Paints and Pesticide Use/Storage/Release

1. Do you know if specialty paints containing PFAS were used in large quantities on base? If so, please provide paint and pesticide storage warehouse and disposal locations.

   Not to My Knowledge

2. How are unused or waste pesticides managed?

   Do not know

3. How are unused or waste paints managed?

   Disposed of via HasWaste people at NRL main

Firefighting Training Areas

1. As part of historical or current operational training, are any current or historical Firefighting Training Areas (FTAs) present on the facility? If yes, please show the location/s of the FTAs on the map provided.

   Not to My Knowledge

2. To the best of your knowledge, what are/were the years of operation for each FTA you identified in your answer to Question #1 above?

   Do not know

3. How many FTAs are currently active? Inactive (historical in nature)? To the extent possible, please specify which are active versus historical.

   Do not know

4. To the best of your knowledge, were fuels/flammables other than "typical" (such as JP-5, #2 Fuel Oil) used at the FTAs? If yes, what was used?

   Do not know

5. For inactive FTAs, to the best of your knowledge, when was the last time that fire training using AFFF was conducted at each one?

   Do not know

6. When AFFF was used during a fire training exercise, to the best of your knowledge, was the AFFF used contained and disposed, and if so, how was the AFFF cleaned up and disposed?

   Do not know

7. To the best of your knowledge, are current and historical FTAs lined? If so, with anything other than concrete?

   Do not know

Records, Spill logs, Historical Information

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?

   Do not know

2. Do you have recollection or records of AFFF being used in response to the following:

   a. Fuel releases to prevent fires

      Not to My Knowledge

   b. Emergency response sites (such as plane, helicopter, vehicle crash sites and fires)

      Not to My Knowledge

   c. Emergency runway landings where foam might have been used as a precaution

      Not to My Knowledge

d. Other (such as air show demonstrations, AFFF "salutes")

none

3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed?

n/a

4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that haven't already been previously discussed?

Not to My Knowledge

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

n/a

Location Information

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:

a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

Not to My Knowledge

b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)

Not to My Knowledge

c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)

Not to my knowledge

d. Water supply wells (such as potable, agricultural, industrial)

Not to my knowledge

e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)

Not to my knowledge

f. Other

Not to my knowledge

General Information

1. Is there anyone else or other base organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

   Not to my knowledge

2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

   Not to my knowledge