Naval Facilities Engineering Systems Command Northwest
Silverdale, Washington

Final

Supplemental Site Inspection Report for Per- and Polyfluoroalkyl Substances Outlying Landing Field Coupeville

Naval Air Station Whidbey Island
Washington

October 2021

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Prepared for NAVFAC Northwest
by CH2M HILL, Inc.
Bellevue, Washington
Contract N62470-16-D-9000
CTO 4405

Executive Summary

The Department of the Navy (Navy), Naval Facilities Engineering Systems Command (NAVFAC) Northwest contracted CH2M HILL, Inc. (CH2M) to conduct a supplemental site inspection (SI) specific to known or suspected releases of per- and polyfluoroalkyl substances (PFAS) to the environment at Outlying Landing Field (OLF) in Coupeville, Washington, located in Island County. CH2M prepared this document under the NAVFAC Comprehensive Long-term Environmental Action – Navy 9000 Contract N62470-16-D-9000, Contract Task Order 4405, for submittal to NAVFAC Northwest, NAVFAC Atlantic, and the United States Environmental Protection Agency (USEPA).

The primary source of PFAS at most military installations is use of aqueous film-forming foam (AFFF), a type of firefighting foam. There is no formal documentation that AFFF was used at OLF Coupeville; however, AFFF was stored at Building 2709, and fire trucks containing AFFF were regularly washed in the gravel area west of Building 2709.

Investigations of potential PFAS releases were initiated at OLF Coupeville beginning in 2016 and have included sampling of on-Base water supply wells and off-Base drinking water wells (CH2M, 2018a); drilling, installation, and sampling of new on-Base groundwater monitoring wells to better understand the aquifer system and identify the presence/absence of PFAS on-Base (CH2M, 2018a); and an expedited SI which consisted of aquifer testing with groundwater modeling to improve the understanding of aquifer properties and advance the conceptual model of the system (CH2M, 2018b). The results of these previous groundwater and drinking water investigations at OLF Coupeville identified the presence of perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) in groundwater in both on-Base groundwater monitoring wells and off-Base drinking water wells at concentrations exceeding the USEPA lifetime health advisory of 70 parts per trillion (ppt). Additionally, samples collected from the Town of Coupeville's Keystone Well, a community drinking water well located off-Base to the west of OLF Coupeville, indicate that the Keystone Well exceeds the lifetime health advisory for PFOA. A preliminary assessment (PA) for OLF Coupeville was issued in November 2018 (CH2M, 2018c). The PA identified three potential source areas (PSAs) of PFAS that warranted further investigation, two on-Base and one off-Base. During the initial Supplemental SI scoping meeting, it was determined that the 1982 EA-6B accident location, the off-Base PSA identified in the PA, located west of OLF Coupeville, would not be included in the current inspection. Per Navy guidance, off-Base potential PFAS sources are not to be included in the PA or SI.

The overall objectives of the Supplemental SI were defined in the *Final Sampling and Analysis Plan, Supplemental Site Inspection, Outlying Landing Field Coupeville, Naval Air Station Whidbey Island* (CH2M, 2019) (SAP). The objectives were:

- Identify whether there were releases of PFAS-containing compounds to the environment from the on-Base PSAs identified in the PA as requiring further investigation.
- Refine the understanding of groundwater flow and potential PFAS migration between PSAs and/or on-Base groundwater monitoring wells and off-Base drinking water wells with PFOA and/or PFOS exceedances of the lifetime health advisory.
- Quantify the hydraulic properties of the aquifer system at OLF Coupeville.
- Refine the understanding of the distribution of PFAS within the groundwater system at OLF Coupeville.

The field investigation was conducted in two phases. Phase 1 was initiated in July 2019 and consisted of soil sampling at on-Base soil borings in locations identified as PSAs where AFFF may have been used or released, installation of new monitoring wells targeting elevated PFAS concentrations identified by depth-discrete groundwater sampling conducted during drilling of the well borings, and sampling of new and existing on-Base monitoring wells. Phase 2 of field activities was initiated in February 2020 and consisted of the installation and sampling of additional new monitoring wells. Investigations were performed in accordance with the SAP. A third phase of investigation, consisting of drilling and installation of monitoring wells off-Base, is planned and described in an addendum to the SAP (CH2M, 2020; in draft). The initiation of field work is scheduled for summer 2020;

description of Phase 3 field activities will be included in the Supplemental SI Report Addendum, and inclusion of Phase 3 data incorporated into updated the groundwater model as schedule allows.

Groundwater elevations measured at new and existing monitoring wells indicate that a groundwater mound, which was previously suspected to be centered in the north central portion of the Base, is likely located further to the northeast. This new understanding significantly reduces or eliminates the previously suspected easterly component of groundwater flow in the intermediate aquifer from contaminated areas associated with the identified PSAs at Building 2907 and Facilities 1, 2, and 11. Groundwater flow in the western portion of the Base has a strong westerly component, likely due to the pumping of the Keystone Well, which has lowered the potentiometric surface in that area. The degree to which pumping at the Keystone Well affects groundwater flow at more distant areas of the Base is uncertain.

Laboratory analysis of soil samples indicate that PFOA and PFOS are present in soil above soil screening levels at the identified PSAs at Building 2709 and Facilities 1, 2 and 11 at depths between 0 and 100 feet below ground surface. Based on these results, these locations are designated as PFAS PSAs.

Analysis of groundwater samples indicate that PFOA is present in shallow/perched groundwater both within the vadose zone source areas and south of those areas. PFOA is also present in shallow and intermediate aquifer zones west of the runway near the Keystone Well, indicating a potential secondary source area. PFOA is present in shallow and intermediate zones further to the south at MW05S/M. At this location, PFOA concentrations are significantly higher in intermediate zone groundwater (MW05M) indicating that PFOA is moving vertically downward as it migrates to the south. PFOA was also detected in a deep zone well south of MW05S/M (MW26D), which further suggests downward movement of PFOA moving southward. The source of PFAS contamination west of the runway remains uncertain due to a lack of information about groundwater flow at the time of release (before the Keystone Well became active). This question will be a main subject of the groundwater flow and solute transport modeling to be documented in a future addendum to this report.

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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
AFFF	aqueous film-forming foam
bgs	below ground surface
BH	borehole
CH2M	CH2M HILL, Inc.
CLEAN	Comprehensive Long-term Environmental Action—Navy
CSM	conceptual site model
CTO	Contract Task Order
CV	Coupeville
D	deep
DASN	Deputy Assistant Secretary of the Navy
DI	deionized
DO	dissolved oxygen
EI&E	Energy, Installations and Environment
EPA	Environmental Protection Agency
FD	field duplicate
GPRS	Ground-Penetrating Radar Systems LLC
GW	groundwater
ID	identification
IDW	investigation-derived waste
LC/MS/MS	Liquid Chromatography Tandem Mass Spectrometry
M	medium
mg/L	milligram per liter
mS/cm	milliSiemen per centimeter
mV	millivolt
MW	monitoring well
ng/L	nanograms per liter
NAD83	North American Datum of 1983
NAS	Naval Air Station
NAVD88	North American Vertical Datum of 1983
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
NTU	nephelometric turbidity unit
OLF	Outlying Landing Field
ORP	oxidation-reduction potential
PA	preliminary assessment
PAL	project action limit
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexane sulfonate
PFNA	perfluorononanoic acid

PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
pH	potential of Hydrogen
ppt	part per trillion
PSA	potential source area
PVC	polyvinyl chloride
PWS	public water system
QC	quality control
RSL	regional screening level
S	shallow
SAP	Sampling and Analysis Plan
SO	soil
SI	site inspection
SOP	standard operating procedure
SSL	soil screening level
UCMR3	Third Unregulated Contaminant Monitoring Rule
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WI	Whidbey Island
WQP	water quality parameter
WWTP	wastewater treatment plant

SECTION 1

Introduction

CH2M Hill, Inc. (CH2M) was contracted by Naval Facilities Engineering Systems Command (NAVFAC) Northwest to perform a supplemental site inspection (SI) for per- and polyfluoroalkyl substances (PFAS) at Outlying Landing Field (OLF) Coupeville in Island County, Washington (**Figure 1-1**). This Supplemental SI Report presents the data and findings obtained during field investigations associated with the Supplemental SI.

The overall objectives of the Supplemental SI were defined in the *Final Sampling and Analysis Plan, Supplemental Site Inspection, Outlying Landing Field Coupeville, Naval Air Station Whidbey Island* (CH2M, 2019), henceforth referred to as the SAP. The objectives were:

- Identify whether there were releases of PFAS-containing compounds to the environment from the on-Base Potential Source Areas (PSAs) identified in the PA as requiring further investigation.
- Refine the understanding of groundwater flow and potential PFAS migration directions between PSAs and/or on-Base groundwater monitoring wells and off-Base drinking water wells with perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonate (PFOS) exceedances of the United States Environmental Protection Agency (USEPA) lifetime health advisory.
- Quantify the hydraulic properties of the aquifer system at OLF Coupeville.
- Refine the understanding of the distribution of PFAS within the groundwater system at OLF Coupeville.

This Supplemental SI Report outlines the approach taken to achieve the listed objectives and provides conclusions based on data collected and recommendations for further study. This report was prepared for NAVFAC Northwest under the Comprehensive Long-term Environmental Action – Navy (CLEAN) 9000, Contract N62470-16-D-9000, Contract Task Order (CTO) 4405.

The SI Report is organized as follows:

- **Section 1** – Introduction
- **Section 2** – Site Background and Physical Setting
- **Section 3** – Investigation Methodology
- **Section 4** – Investigation Results
- **Section 5** – Conclusions and Recommendations
- **Section 6** – References

1.1 Per- and Polyfluoroalkyl Substances

PFAS are manufactured chemicals that have been used since the 1950s in many household and industrial products because of their stain- and water-repellant properties. Within the Department of the Navy's (Navy's) operations, PFAS are most commonly associated with aqueous film-forming foam (AFFF) used primarily for firefighting (including emergency response, equipment testing and/or training, and fire suppression systems in buildings). PFAS can also be present in other industrial and household materials, in vapor suppression systems, and in waste streams. PFAS are now present virtually everywhere in the world because of the large amounts that have been manufactured and used. Once these compounds are released to the environment, they break down very slowly. PFAS are considered "contaminants of emerging concern," which have no Safe Drinking Water Act regulatory standards or routine water quality testing requirements. The USEPA is studying PFAS to determine if national regulation is needed. The State of Washington does not have an established state standard or promulgated screening value for any PFAS constituent in either groundwater or drinking water.

USEPA issued the third Unregulated Contaminant Monitoring Rule (UCMR3)[1] in May 2012. The UCMR3 required monitoring of all large public water systems (PWSs) serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people between 2013 and 2015, for 30 substances. Six PFAS compounds were included in the UCMR3 contaminant list; of these six PFAS, USEPA issued health advisories[2] for only two, PFOA and PFOS. USEPA has also published toxicity values for PFOA and PFOS, as well as another PFAS compound, perfluorobutane sulfonate (PFBS). Health advisory levels are not regulatory standards. They are health-based concentrations, which should offer a margin of protection for all Americans throughout their lives from adverse health effects resulting from exposure to PFOA and PFOS in drinking water. The USEPA lifetime health advisory level is 70 parts per trillion[3] (ppt; also equivalent to 70 nanograms per liter [ng/L]) for PFOA and 70 ppt for PFOS. When both PFOA and PFOS are found in drinking water, the combined concentration should not exceed 70 ppt (USEPA, 2016a and 2016b).

1 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.

2 USEPA issued a lifetime health advisory level for PFOS and PFOA in May 2016, superseding the 2009 provisional health advisory. USEPA has not issued a health advisory for any other PFAS compounds.

3 70 ppt is equal to 70 nanograms per liter (ng/L) or 0.07 micrograms per liter (µg/L).

Legend

- City
- Secondary Road
- Local Connecting Road
- Important Local Road
- Base Boundary

N

0 1 2 Miles

1 inch = 2 miles

Figure 1-1
Base Location Map
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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SECTION 2

Site Background and Physical Setting

This section presents background information on OLF Coupeville including site history, potential sources of PFAS, and relevant information on the physical, environmental, and hydrogeologic setting at the site.

2.1 Site Background

OLF Coupeville is an active military airfield used for training operations associated with Naval Air Station (NAS) Whidbey Island. The airfield occupies 677 acres and is located approximately 2 miles southeast of Coupeville, Washington in Island County. Washington State Route 20 runs north-south along or near the eastern Base boundary and east-west near the northern boundary; Keystone Hill Road runs north-south along a portion of the western boundary. Portions of the airfield are within and are bordered by Ebey's Landing National Historical Reserve.

The airfield has been in operation since it was commissioned for use by the Navy in 1943. The airfield has one 5,400-foot runway, which is used for day and night field carrier landing practice operations. Such operations allow aviators and crew to fly in patterns, as well as practice touch-and-go, simulating carrier landings and takeoffs. OLF Coupeville has been continuously used for this purpose since 1967 (Navy, 2016). A runway safety area extends approximately 3,300 feet north and south of the runway footprint and is bordered by trees and residential parcels (**Figure 2-1**). The buildings at the site include the runway control tower, airfield operations building, potable water pumphouse, a fire station which consists of a two-story house and a crash truck shelter, and an electronic warfare signal emitter building.

2.1.1 Investigation History

PFAS compounds are found in AFFF used in Navy firefighting activities, and similar sites at other bases have documented AFFF use. Although there is no available documentation that AFFF was used at OLF Coupeville and there is limited information regarding the storage of AFFF on fire trucks at the site, PFAS was detected in groundwater samples collected from on-Base wells, with PFOA and/or PFOS exceeding the USEPA lifetime health advisory at six locations, indicating that AFFF likely was used/released at the site.

PFAS were first detected in one of the on-Base drinking water wells located in the southwest portion of OLF Coupeville near Building 2807 during groundwater sampling activities conducted in November 2016 by the Navy. Sampling was conducted in response to a 2014 policy requiring on-Base drinking water sampling for PFOA and PFOS for bases where groundwater was used as drinking water and PFAS could have been released nearby in the past (DASN, 2014). The PFAS detection prompted initiation of a groundwater investigation at OLF Coupeville (CH2M, 2018a). Twenty-seven groundwater monitoring wells were installed and sampled for PFAS between November 2016 and March 2017. In an expedited SI, initiated in December 2017, four additional groundwater monitoring wells were installed and sampled in December 2017 as part of an investigation into the effects on groundwater flow directions and rates caused by pumping of the Town of Coupeville's Keystone Well, located near the western Base boundary (**Figure 2-1**). Groundwater samples indicated that PFOA exceeded the USEPA lifetime health advisory at three of the four of the newly installed well locations. Aquifer testing and groundwater flow modeling were also conducted as part of this expedited SI.

In November 2016, the Navy also initiated off-Base drinking water sampling near OLF Coupeville. The Navy sampled drinking water wells (for which owner approval had been granted) within 1 mile of Building 2807. From November 2016 through October 2017, the Navy sampled 120 drinking water wells near OLF Coupeville, one of which was the Keystone Well. Eight residential drinking water wells to the south of OLF Coupeville have PFAS concentrations above the USEPA lifetime health advisory. In October 2017, the Navy began biannual sampling of drinking water wells where PFAS were detected and drinking water wells adjacent to properties with PFAS exceedances of the lifetime health advisory. There have been no locations at which PFOA and/or PFOS concentrations exceeded the project action limit (PAL) that had not exceeded the USEPA lifetime health advisory

in previous sampling efforts, with the exception of the Keystone Well, at which PFAS was in exceedance of the USEPA lifetime health advisory in September 2018.

A PA for PFAS at OLF Coupeville was completed in 2018 (CH2M, 2018c) to identify potential or actual PFAS sources at OLF Coupeville and identify areas requiring further investigation. The PA recommended two on-Base areas and one off-Base area as PSAs for further evaluation.

The two on-Base PSAs identified by the PA are Building 2709 and Facilities 1, 2, and 11. As shown on **Figure 2-1 (inset)**, Building 2709 is located east of the runway and south of the OLF access road. Building 2709 houses fire trucks containing AFFF. Facilities 1, 2, and 11 are considered as one PSA in the PA due to proximity. These buildings are located east of the runway and north of the OLF access road.

The off-Base PSA is the 1982 EA-6B accident location where a jet aircraft crashed during field carrier landing practice operations. This site was not included in the Supplemental SI per Navy policy guidance not to include off-Base PFAS sources in SIs at this time.

2.2 Physical Setting

This section describes the site setting, including geologic and hydrogeologic features relevant to this investigation.

2.2.1 Physical Characteristics

OLF Coupeville is situated on a broad plateau in central Whidbey Island at an elevation of approximately 195 feet above mean sea level. The paved runway is bordered by maintained grass, which extends to the public roads (Navy, 1994). The southernmost portion of the airfield is wooded and slopes steeply downward toward Admiralty Bay (**Figure 2-1**).

2.2.2 Climate

The climate at OLF Coupeville is a temperate marine climate with warm, dry summers and cool wet winters. Marine breezes from Puget Sound keep temperatures mild throughout the year (USGS, 1988). Temperatures range from 35 to 50 degrees Fahrenheit in the winter to 55 to 70 degrees Fahrenheit in the summer. OLF Coupeville lies within the rain shadow of the Olympic Mountains resulting in a lower annual rainfall than other areas in western Washington. Average annual precipitation is approximately 20 inches per year.

2.2.3 Geologic Setting

Whidbey Island lies within the Puget Lowland, a topographic and structural depression between the Olympic Mountains and the Cascade Range. The geology of the area is heavily influenced by glacial advances and retreats. The geologic units on Whidbey Island thus consist of a sequence of Quaternary age (less than 2 million years old) glacial and interglacial deposits that may be over 3,000 feet thick (USGS, 1982). The near-surface deposits are mostly glacial sediment of the most recent Fraser glaciation (10,000 to 20,000 years old).The glacial and post-glacial sediments make up most of the overburden units underlying the Base.

Lithology observed in soil borings at OLF Coupeville is consistent with previous mapping by Polenz et al (2005). Surficial geology at OLF Coupeville consists of the Partridge Gravel, which was deposited by glacial meltwaters and is composed of sand, gravel, and sand-gravel mixtures with minor interlayered silt and silty sand. Based on soil borings completed in 2017, the Partridge Gravel generally extends to depths of 180 to 200 feet below ground surface (bgs) at OLF Coupeville and is characterized by fine to medium sand with intermittent occurrences of gravel and laterally discontinuous layers of silt and clay, some of which can be up to 30 feet thick (CH2M, 2018a). Pleistocene deposits, including Vashon till, lie beneath the Partridge Gravel. In the vicinity of OLF Coupeville, these deposits consist of heterogeneous clay, claystone, and silt and frequently contain organic material, such as plant material and peat.

2.2.4 Hydrogeologic Setting

The unconfined groundwater table at OLF Coupeville generally occurs within the Partridge Gravel between 90 and 130 feet bgs (approximately 100 to 60 feet North American Vertical Datum of 1983 [NAVD88]). Perched groundwater may be present above the water table controlled by local occurrences of low-permeability silt and clay layers. With depth, localized layers of silt and clay may promote semiconfined to confined aquifer conditions within the Partridge Gravel. Many local water supply wells are screened in the lower portion of the Partridge Gravel. These wells are typically screened below 150 feet bgs in transmissive sand and gravel.

The April 2017 groundwater elevation study of 27 monitoring wells located within the OLF Coupeville boundary (CH2M, 2018a) indicated groundwater elevation fluctuations of up to 0.6 foot over a 48-hour monitoring period. The monitoring wells for this study were screened within three general elevation intervals, which were categorized based on their elevation relative to mean sea level: “shallow” (screened above 50 feet NAVD88), “intermediate” (screened 0 to 50 feet NAVD88), and “deep” (screened near or below sea level NAVD88). The shallow, intermediate, and deep elevation zone designations do not indicate three discrete aquifers or water-bearing zones. Rather, with the exception of some shallow wells possibly screened within localized areas of perched groundwater, the shallow, intermediate, and deep elevation zones are located within the single aquifer system that most local water supply wells (including the Keystone Well) are completed in.

Groundwater levels measured in wells screened in the shallow zone are encountered between 90 and 130 feet bgs, which may support the interpretation that some are screened in perched conditions which are laterally discontinuous across the Base. Static water levels in wells screened in the intermediate zone indicate semiconfined conditions, with hydrostatic heads rising 30 to 40 feet above the base of the silt/clay aquitard (where present). Groundwater elevation data and groundwater modeling studies infer the presence of a groundwater mound (divide) centered in the northern portion of OLF Coupeville. This interpretation is supported by the Island County Water Resource Management Plan (Island County, 2005), which suggests that OLF Coupeville is located on a hydrogeologic divide, and groundwater flow is likely to be radial away from OLF Coupeville. The dominant flow direction in the intermediate zone over the majority of OLF Coupeville is to the southwest, shifting to the south-southeast in the southern portion of the site. Groundwater flow in the deep zone is inferred to be predominantly to the south/southeast. Vertical gradients on-Base at OLF Coupeville are predominantly downward (CH2M, 2018a and 2018b).

The aquifer testing and groundwater flow modeling conducted in 2017-2018 provided additional insights to the hydrogeology at OLF Coupeville (CH2M, 2018b). The conclusions of the modeling supported the interpretation of a groundwater mound centered near the north end of the runway with groundwater flowing radially outward heading toward the coastal areas of the island. The modeling also indicated that several monitoring wells where PFOA/PFOS exceeded the USEPA lifetime health advisory are within the hydraulic capture zone of the Keystone Well.

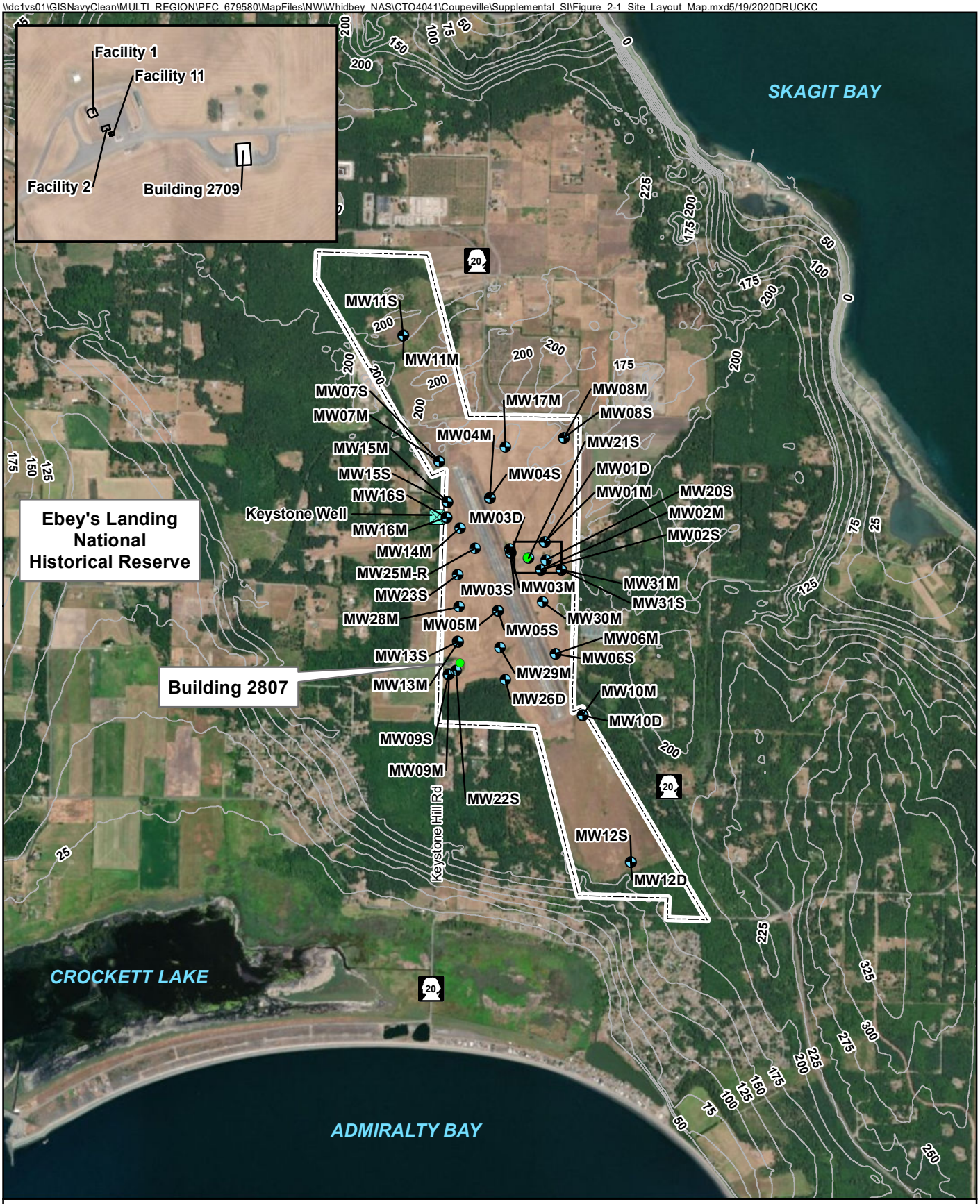
2.2.5 Hydrologic Setting

No surface water bodies are present at OLF Coupeville. The Base is generally level (elevations ranging from about 180 to 200 feet above mean sea level with higher elevations on the eastern side of the installation). As a result, surface drainage is directed to the southwest (Landau Associates, 1984). Surface water on-Base drains via infiltration into soil or runoff in shallow ditches immediately after precipitation events. Surface topography for OLF Coupeville and the surrounding area is depicted on **Figure 2-1**. The nearest major surface water bodies are Admiralty Bay (0.7 mile to the south), Crockett Lake (1 mile to the southwest), and Saratoga Passage (1 mile to the east) (**Figure 2-1**).

2.2.6 Water Use

Two potable drinking water supply wells are present at OLF Coupeville: one at Facility 11 and one at Building 2807.

The Town of Coupeville operates a community drinking water well, the Keystone Well, just west of OLF Coupeville (off-Base, shown on **Figure 2-1**). The Keystone Well was installed in 2008 and is screened within the intermediate zone and is currently used as a potable water source for the Town of Coupeville. The Keystone Well is the newest and largest capacity well in the Fort Casey wellfield, with a current production capacity of approximately 240 gallons per minute. It is also the only Town of Coupeville water supply well to have been impacted by PFAS contamination according to sampling and water quality testing to date. The Fort Casey wellfield also includes four additional, actively used wells, located near the intersection of Wanamaker Road and Keystone Hill Road, approximately 0.4 miles southwest of OLF Coupeville, that produce between 35 and 45 gallons per minute. The Town is planning to retain three of the wells as active water supply wells for the future. Admiral Cove Water District also operates drinking water wells south of OLF Coupeville (approximately 0.5 mile) (Navy, 2017). Several smaller public and private drinking water wells are located near OLF Coupeville (WSDOH, 2017).



Legend

- Monitoring Well Location
- Keystone Well
- Base Supply Well
- Elevation Contour (25 ft Interval)
- Building Location
- Base Boundary

N

0 0.25 0.5 Mile

1 inch = 0.5 mile

Imagery Source: Esri

Figure 2-1
Site Layout Map
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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SECTION 3

Investigation Methodology

This section describes the methodology used in the Supplemental SI to accomplish the stated objectives.

3.1 Investigation Approach

The field activities discussed in this report were performed in accordance with the SAP (CH2M 2019). Deviations from the SAP are discussed in **Section 3.13**. Field activities were planned and carried out in two phases. Phase 1 was conducted July to December of 2019 and included drilling of on-Base soil borings, soil sampling, geotechnical analyses, depth-discrete groundwater sampling, monitoring well installation, and sampling of new and existing on-Base monitoring wells. Phase 2 of field activities was conducted from February to May of 2020 and included installation and sampling of additional on-Base monitoring wells, measuring of synoptic water levels, and aquifer testing. Details of the aquifer testing, including field methodology and results, will be presented in the forthcoming SSI Report Addendum, to be completed following aquifer testing and groundwater modeling tasks. Drilling and sampling locations for both phases of field operations are shown on **Figure 3-1**.

3.2 Phase 1 Field Operations Summary

Twelve total soil borings were drilled at on-Base locations during Phase 1 (**Figure 3-1**). **Table 3-1** provides a crosswalk reference for the naming of the drilling and sampling locations. The locations of the 12 soil borings and the sampling activities performed at each are as follows:

- Six soil borings (SO01-SO06) were drilled at or near the two on-Base PFAS PSAs identified in the PA (three soil borings at each of the two PSAs). Soil Samples were collected from all six locations for analysis of the 18 PFAS listed in USEPA Method 537.1 via Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS).
  - Geotechnical analyses were done at SO05 (near Building 2709) and SO06 (near Facilities 1, 2, and 11). For soil sampling and geotechnical analysis, these two locations are referred to as BH20 and BH21, respectively.
  - Groundwater depth-discrete sampling was done at SO05 and SO06. For the purpose of groundwater vertical profiling, these two locations are referred to as GW01 and GW02, respectively. These two soil borings were completed as monitoring wells WI-CV-MW20S and WI-CV-MW21S.
  - Soil borings (SO01-SO04) were abandoned following logging of lithology and collection of soil samples using PFAS-free bentonite grout.
- Two soil borings (GW05 and GW06) were drilled at locations between the on-Base PFAS PSAs and existing monitoring wells with PFAS impacts near the Keystone Well. Groundwater depth-discrete sampling for PFAS was done at GW06. No groundwater depth-discrete sampling for PFAS was done at GW05 due to absence of perched groundwater above target screen interval. Soil borings GW05 and GW06 were completed as monitoring wells WI-CV-MW03S and WI-CV-MW25M-R, respectively.
- Three soil borings (GW03, GW04, and GW07) were drilled at locations between existing impacted on-Base monitoring wells and impacted drinking water wells south of OLF Coupeville. Groundwater depth-discrete sampling for PFAS was done at each of these soil borings, and each was completed as a monitoring well (GW03, GW04, and GW07 were completed as WI-CV-MW22S, WI-CV-MW23S, and WI-CV-MW26D, respectively).
- One soil boring was drilled in the northeast portion of OLF Coupeville as a source of lithologic and groundwater level information and completed as monitoring well WI-CV-MW17M. No soil or groundwater depth-discrete sampling was done at this location.

The screen intervals for Phase 1 monitoring wells were determined based on the lithology and saturation conditions observed in the soil cores and the groundwater level data and analytical results obtained from the groundwater depth-discrete sampling effort.

Drilling, soil sampling, depth-discrete groundwater sampling, and monitoring well construction, were performed July 31-November 5, 2019. Monitoring well development was performed November 6-11, 2019.

Following well development, each of the eight newly installed monitoring wells were sampled for PFAS, along with the 31 existing monitoring wells at OLF Coupeville. Sampling of the existing monitoring wells was performed October 15-22, 2019. Sampling of the newly completed monitoring wells was performed from November 8-14, 2019.

3.3 Phase 2 Field Operations Summary

Phase 2 field activities included the drilling of five additional soil borings, each of which was completed as a monitoring well, measuring of synoptic water levels, and aquifer testing. The locations of the Phase 2 monitoring wells are shown in **Figure 3-1** and were selected based on where additional data was needed after an evaluation of Phase 1 soil and groundwater PFAS data. The locations of these wells are as follows:

- Two monitoring wells, WI-CV-MW28M and WI-CV-MW29M, were installed west of the runway targeting the intermediate aquifer zone.
- One monitoring well, WI-CV-MW30M, was installed east of the runway targeting the intermediate aquifer zone.
- Two wells, WI-CV-MW31M and WI-CV-MW31S, were installed as a well pair southeast of Building 2709 targeting the intermediate and shallow aquifer zones, respectively.

Screen intervals for Phase 2 monitoring wells were determined based on the lithology and saturation conditions observed in the soil cores during drilling.

Drilling and monitoring well construction were performed February 18-March 13, 2020. Wells WI-CV-MW29M and WI-CV-MW31M were constructed as 4-inch diameter wells to serve as pumping wells during Phase 2 aquifer testing. Monitoring well development was performed March 12-14, 2020.

After installation and well development, four of the five Phase 2 monitoring wells was sampled for PFAS. Well WI-CV-MW31S was dry at the time of development and groundwater sampling. Phase 2 monitoring well sampling was performed March 16-18, 2020. Aquifer testing was conducted May 18-22, 2020.

3.4 Site Preparation and Utility Location

During both phases of field operations, prior to the initiation of drilling activities, proposed drilling locations were demarcated, and an 811 call-before-you-dig ticket was submitted for public utility providers. Each drilling location was also scanned for utilities by Ground-Penetrating Radar Systems LLC (GPRS), a licensed third-party utility locating company. GPRS scanned a 25-feet radius around each location using a combination of ground-penetrating radar and radio frequency instruments. Four of the 17 drilling locations (SO03, SO04, GW02/SO06, and GW03) required minor adjustments to be a minimum of 5 feet away from buried utilities.

3.5 Soil Borings

A total of 17 soil borings were completed during both phases of field operations. Boreholes were drilled using sonic drilling techniques by a Washington-licensed driller in accordance with applicable standard operating procedures (SOPs) included in the SAP. Each drilling location was hand cleared to a depth of 5 feet bgs using non-invasive methods prior to drilling to ensure that no undetected buried utilities were present. No materials containing PFAS were used during drilling. To limit the potential for cross-contamination between water-bearing zones, soil borings targeting the intermediate or deep zones were drilled using a telescoping isolation casing

system in which a larger diameter outer casing was sealed to silt or clay units separating water-bearing zones and drilling was continued with a smaller diameter casing.

Continuous soil cores were collected for lithologic classification and screened for volatile organic compounds using a photoionization detector. Soil cores were closely examined for signs of saturation and the presence of fine-grained beds that could indicate the presence of perched groundwater or confining conditions. Lithology observed in the soil cores was classified according to the Unified Soil Classification System and logged in accordance with applicable SOPs included in the SAP. Soil boring logs are included in **Appendix A**. During Phase 1 drilling, additional analytical sampling was conducted during advancement of soil borings, as described in **Sections 3.5.1** and **3.5.2**

3.5.1 Soil Sampling

Soil samples were collected at each of the six soil borings drilled near the on-Base PFAS PSAs (SO01 through SO04, SO05/BH20, and SO06/BH21) as described in **Section 3.2 (Figure 3-1)**. Up to six soil samples were collected from each boring between the ground surface and 100 feet bgs. Soil samples were collected near the ground surface, at the first encountered groundwater, and at lithologic transitions (that is, sand to silt contacts). Soil samples were sent to an offsite laboratory for PFAS analysis.

A total of four soil samples were collected for analysis of geotechnical parameters at SO05/BH20 and SO06/BH21 (two samples at each location). These samples were collected to establish transport-related parameters for solute transport modeling. Sampling depths were determined based on lithology and were selected to achieve a representative sampling of the different soil types encountered in the subsurface at OLF Coupeville. Geotechnical samples were sent to an offsite laboratory for geotechnical analysis.

3.5.2 Groundwater Depth-discrete Sampling

Groundwater depth-discrete sampling was performed by collecting groundwater grab samples during sonic drilling at six locations: GW01 through GW04, GW06, and GW07. No groundwater depth-discrete sampling for PFAS was done at GW05 due to absence of perched groundwater above target screen interval. Samples were collected via a drive-ahead sampler in accordance with applicable SOPs included in the SAP. Sampling depths were determined by the field team in consultation with senior technical consultants during drilling, selected based on lithology and presence of water. Up to four depth-discrete groundwater samples were collected per boring, including one sample collected just below the water table, one to two samples collected from productive units in the intermediate aquifer zone, and one sample collected at or near the total depth of the boring.

When the upper depth of a desired sampling interval was reached with the sonic drill, a drive-ahead sampler with a 2-foot retractable screen was pushed down into the formation to collect groundwater. Water was pumped to the surface using a submersible pump. A minimum of three sampler volumes were purged prior to collecting the sample. Field water quality parameters (WQPs) were taken at the time of sampling using a water quality meter in accordance with applicable SOPs in the SAP.

The depth-discrete samples were sent to an offsite laboratory for PFAS analysis. Samples were sent immediately after the completion of each borehole and analyzed on an expedited turnaround time (designated as 72 hours), so the analytical data could be used to help determine where the permanent monitoring well screens would be set.

3.6 Monitoring Well Installation

Thirteen of the 17 total soil borings drilled during both phases of field operations were completed as monitoring wells. Monitoring wells were installed in accordance with State of Washington well construction standards by a Washington-licensed driller (Yellow Jacket Drilling of Portland, Oregon).

3.6.1 Monitoring Well Construction

Monitoring wells were constructed with a Schedule 80 polyvinyl chloride (PVC) riser connected to a 10-foot, factory slotted 0.020-inch PVC screen with a bottom cap. With the exception of the two 4-inch wells installed

during Phase 2, monitoring wells are 2-inch wells. A sand filter pack (12/20 washed silica) was placed around the annular space of the well screen from the bottom of the boring extending to a minimum height of 2 feet above the top of the well screen. A bentonite seal, at least two feet thick, was placed above the top of the sand pack. After the bentonite had been hydrated, a cement-bentonite grout was placed in the remaining annular space. Well construction materials were free of fluorine. No fluorine containing greases, bentonite, or other materials were used. Monitoring wells were finished with flush-mount completions that included a metal well vault and concrete pad. A locking watertight cap was placed on the top of the PVC casing. The wells were labeled on the exterior of the well vault with a metal stamp indicating the well identification. Monitoring well construction information is provided in **Table 3-2**. Monitoring well completion diagrams are provided in **Appendix B**.

3.6.2 Monitoring Well Development

After construction, each newly installed monitoring well was developed by the drilling subcontractor using a combination of bailing, surging, and pumping throughout the well screen in accordance with the applicable SOP included in the SAP. During monitoring well development, the CH2M field staff measured field WQPs, including potential of Hydrogen (pH), temperature, conductivity, and turbidity with a water quality meter. Development continued for a maximum of 1 hour (excluding surge and bail period), or until turbidity readings were below 10 nephelometric turbidity unit (NTU) and water was free of visible sediment, measurement stabilization for three consecutive WQP readings or a minimum of 10 well casing volumes had been purged, whichever occurred first. Surge blocks and pumps with Teflon parts were avoided during development.

Wells that ran dry during development due to low recharge rates were allowed to recharge to ensure the full screen interval was surged and bailed and then purged to the extent practicable (up to three total purges). One of the Phase 2 monitoring wells, WI-CV-MW31S, was dry at the start of development and was not developed.

Development information, including turbidity, pH, specific conductivity, temperature, and gallons of water removed were recorded as field notes. In addition, the water quality meter was calibrated daily (at a minimum) and the calibration documented in the field documentation. Well development logs are provided in **Appendix B**.

3.7 Groundwater Sampling

Groundwater samples were collected from the 13 newly installed monitoring wells and 31 existing monitoring wells at OLF Coupeville (**Figure 3-1**). Groundwater samples were collected under low flow/low stress conditions using PFAS-free bladder pumps or submersible pumps with the pump intake placed at the middle of the well screen interval. Wells were purged at a rate such that drawdown in the well was less than 0.3 foot. During purging, depth to water readings and WQPs were measured and recorded at regular time intervals of at least 3 minutes. Depth to water was measured with a water level indicator, and WQPs were measured using a water quality meter, calibrated daily at a minimum. Purging continued until WQPs stabilized for three consecutive readings according to the following stabilization criteria:

- Temperature within 0.1 degree Celsius
- pH within 0.1 pH units
- Conductivity within 0.01 millisiemens per centimeter (mS/cm)
- Oxidation-reduction potential (ORP) within 10 millivolts (mV)
- Dissolved oxygen (DO) within 0.05 milligram per liter (mg/L)
- Turbidity measurements are within 10 percent or less than 10 NTU

If excess drawdown was observed at a well with the minimum achievable purge rate, the purge rate was increased to evacuate all the water from the well. Sampling was performed once the water level had recovered to a minimum of 90 percent of the static water level within a 24-hour period. One set of WQPs was recorded immediately prior to collecting the sample.

Groundwater sampling data sheets are provided in **Appendix C**.

3.8 Sample Analysis and Quality Control

Groundwater and soil samples were collected according to the applicable SOPs referenced in the SAP. Groundwater and soil samples were sent to Battelle Analytical Services in Norwell, Massachusetts to be analyzed for the 18 PFAS compounds listed in USEPA Method 537.1. Samples were analyzed using LC/MS/MS compliant with the Quality Systems Manual v. 5.1.1 Table B-15. Geotechnical samples were sent to CORE Laboratories in Bakersfield, California to be analyzed for dry bulk density, total porosity, total and fraction organic carbon, and grain size distribution.

Field quality control (QC) samples were collected during the sampling program. These samples were obtained to ensure that disposable and reusable sampling equipment were free of contaminants, evaluate field methodology, establish ambient field background conditions, and evaluate whether cross-contamination occurred during sampling and/or shipping. Several types of field QC samples that were collected and analyzed are defined as follows:

- **Equipment Rinsate Blank (decontaminated equipment):** Equipment blanks were collected at the frequency of one per day of sampling. These samples were obtained by running laboratory-grade deionized (DI) water over or through decontaminated sample collection equipment.
- **Equipment Rinsate Blank (disposable equipment):** Equipment blanks were collected at the frequency of one per lot. These samples were obtained by running laboratory-grade DI water over or through unused sample collection equipment.
- **Field Blank:** Field blanks were collected at the frequency of one per week. These samples were collected by pouring the laboratory-provided blank water into the blank container.
- **Duplicate Sample:** Field duplicate (FD) samples were collected at the same time and under identical conditions as their respective associated sample at the frequency of one per 10 field samples of similar matrix.

In addition to field QC samples, the following lab QC samples were also collected at a rate of one per every 20 samples of a given medium:

- **Matrix Spike:** An aliquot of sampled groundwater and/or soil was spiked with known quantities of analytes of interest and subjected to the entire analytical procedure. By measuring the recovery of these spiked quantities, the appropriateness of the method for the matrix was demonstrated.
- **Matrix Spike Duplicate:** These samples were collected as second aliquots of the same matrix as the matrix spike to determine the precision of the method.

3.9 Water Level Surveys

Both Phase 1 and Phase 2 of the SSI included synoptic water level surveys at OLF Coupeville monitoring wells. The Phase 1 survey was performed on November 14, 2019, and the Phase 2 survey was performed on April 15-16, 2020. Depth to water was measured with a water level indicator following applicable SOPs in the SAP. Both surveys were conducted at least 24 hours after well installation and development had been completed for the respective phases. Depth to water was measured from the top of the PVC riser and recorded to the nearest 0.01 foot.

3.10 Land Surveying

Monitoring wells installed during Phases 1 and 2 were horizontally and vertically surveyed by a Washington-licensed surveyor. The surveyor provided easting and northing horizontal coordinates according to Washington State Plane North Zone based on the North American Datum of 1983 (NAD83). Horizontal coordinates were provided to the nearest 0.01 foot. The surveyor provided vertical elevations in feet above mean sea level based on

the North American Vertical Datum of 1988 (NAVD88). Vertical coordinates were provided to the nearest 0.001 foot. The survey reports are provided in **Appendix D**.

3.11 Decontamination Procedures

Decontamination activities were conducted in accordance with the applicable SOPs included in the SAP. Non-disposable equipment was decontaminated using the following solutions in this order:

1. Wash with Alconox/Liquinox solution
2. Rinse with distilled water
3. Rinse with laboratory-grade DI water (laboratory certified PFAS-free)

Disposable sampling equipment and personal protective equipment, such as Masterflex tubing and nitrile gloves, were not decontaminated after use and instead were disposed of as nonhazardous solid waste. After use, disposable equipment was placed in plastic contractor bags and disposed in an onsite trash dumpster.

Reusable heavy equipment, such as drilling rods and augers, was decontaminated before and in between the collection of each sample using a high-pressure steam cleaner with potable-grade water. Pressure washing was conducted at the temporary decontamination pad, which had been constructed prior to the start of drilling activities.

3.12 Investigation-derived Waste Management

Investigation-derived waste (IDW) management activities were conducted in accordance with the SAP. IDW generated during the Supplemental SI included soil cuttings, well development groundwater, groundwater sampling purge water, disposable sampling equipment, and decontamination rinse water from non-disposable sampling equipment and heavy equipment. IDW was containerized and stored in either a fractionation tank or tote (for aqueous IDW), or roll-off container (for solid IDW), which were properly labeled and staged with secondary containment. IDW containers were inspected weekly during the Supplemental SI and thereafter until removal from the site.

Prior to disposal, CH2M field staff collected waste characterization samples from the fractionation tank, totes, and the roll-off container. Solid and aqueous IDW samples analyzed for PFAS and full Toxicity Characteristic Leaching Procedure analyses (volatile organic compounds, semivolatile organic compounds, pesticides, and inorganic constituents), ignitability, reactive cyanide, reactive sulfide, and corrosivity. The waste characterization profiles are provided in **Appendix E**. Based on the analytical results, IDW generated through Phase 2 was identified as nonhazardous.

Samples from two of the three totes generated during Phase 1 of the SI had concentrations of combined PFOA and PFOS above the lifetime health advisory of 70 ng/L and required treatment by solidification. The totes were transported offsite for solidification and disposal on April 22, 2020. Solid (soil) IDW was transported offsite and disposed of as nonhazardous waste by Capitol Environmental Services, Inc. in two mobilizations, on January 16, 2021, and May 19, 2020.

The aquifer testing purge water was classified as nonhazardous, with a combined sum of PFOA and PFOS concentrations of less than 70 ng/L. However, due to increasing difficulty in identifying facilities able to accept any PFAS-containing water for disposal, it was determined that the aqueous IDW from OLF Coupeville could be discharged to the Ault Field wastewater treatment plant (WWTP) if it met the following criteria

- Combined PFOA and PFOS concentrations do not exceed 70 ppt
- Total suspended solids less than 350 parts per million
- pH between 6.5 and 8.5

Aqueous IDW at OLF Coupeville met all these requirements. The aqueous IDW was removed from the fractionation tank via vac truck and discharged to the Ault Field WWTP via gravity discharge on August 31, 2020.

The frac tank was removed from OLF Coupeville on September 1, 2020. Frac tank clean-out of residual water and solids was performed at the IDW subcontractor's (R Transport) facility in Arlington, Washington. The waste generated from the frac tank cleaning was containerized in a 300-gallon polyethylene tote and returned to OLF Coupeville. Transport and disposal of waste to an off-site facility in Grand View, Idaho, was conducted on August 11, 2021.

3.13 Data Validation

The data quality evaluation and validation are performed using a multitiered approach. The process begins with an internal laboratory review, continues with an independent review by a third-party validator, and ends with an overall review by the CH2M project chemistry team. The data validation reports are provided in **Appendix F**.

3.14 Deviations from the Sampling and Analysis Plan

The below list summarizes deviations from the SAP during site inspection activities and justifications for those deviations. All deviations were approved by the Navy via Field Change Requests (FCRs). Copies of each of the approved FCRs are included in **Appendix G**.

- Depth-discrete groundwater sample analytical results for GW03 did not provide conclusive information as to concentrations of PFOA and/or PFOS; and screen interval selection based on data from the intervals sampled would have resulted in a screen depth interval that is redundant to that of two adjacent installed wells. Therefore, the screen interval was selected based on borehole lithology, targeting the shallow zone above the shallowest of the depth-discrete groundwater samples. The Data Quality Objective (DQO) for this well was to screen first encountered groundwater, but due to complications during drilling a depth-discrete groundwater sample was not obtained at this depth. This complication did not change the DQO for the well, and the screen depth selected is believed to coincide with first (shallow) groundwater. See FCR 01 in **Appendix G**.
- Depth-discrete groundwater samples were not collected at GW05. This data was not required to determine the screen interval because the monitoring well was installed in a well cluster, with existing deep and intermediate wells previously installed. Therefore, the screen interval was selected based on borehole lithology targeting the shallow zone. See FCR 01 in **Appendix G**.
- The laboratory turnaround time for analysis of soil samples from locations SO01 and SO02 was modified to 72-hour to aid in determination of well construction. See FCR01 in **Appendix G**.
- GW05 was drilled in a cluster location with existing monitoring wells MW03M and MW03D. The name of the well installed at GW05 was changed to MW03S, rather than MW24 as cited in the SAP, to be more consistent with the nomenclature of the other wells in the cluster. See FCR 01 in **Appendix G**.
- Field blanks were collected at a frequency of once per week instead of one per site per day. This was done per project chemist recommendation and with concurrence of the Navy Remedial Project Manager. See FCR 01 in **Appendix G**.
- Well development methodology was altered at locations at which development under SOP I-C-2 *Monitoring Well Development* could not be followed if the well experienced significant drawdown and/or purged dry during initial development. The well would be purged dry, allowed to recharge, and purged a total of three well volumes if possible (in separate attempts after each recharge period). See FCR 02 in **Appendix G**.
- WI-CV-MW25M-R was installed as a replacement for WI-CV-MW25M, which was damaged during well construction and subsequently abandoned on December 6, 2019. WI-CV-MW25M-R was drilled and constructed from December 4-5, 2019 with the same screen interval as WI-CV-MW25M. WI-CV-MW25M-R was developed on December 6, 2019 and sampled on December 10, 2019. See FCR 03 in **Appendix G**.
- The diameter of two wells drilled during Phase 2 was modified to 4-inch (rather than 2-inch) to accommodate pumping during aquifer testing. See FCR 04 in **Appendix G**.

- The number of single well aquifer tests was reduced from four to two. See FCR 04 in **Appendix G**.
- MW31S was not developed or sampled because the well was dry. No FCR was required for this deviation.

Data quality and usability were not affected by these deviations.

Table 3-1. Phase 1 Drilling and Sampling Location Identification Crosswalk

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Soil Boring ID	Groundwater Vertical Profile Boring ID	Monitoring Well ID	Soil Sampling ID	Depth-Discrete Groundwater Sample ID	Monitoring Well Sample ID	Location Description	Depth of Boring (feet bgs)
SO01	--	--	WI-CV-SO01-X[c]	--	--	Building 2709	100
SO02	--	--	WI-CV-SO02-X	--	--	Building 2709	100
SO03	--	--	WI-CV-SO03-X	--	--	Facilities 1, 2, and 11	200
SO04	--	--	WI-CV-SO04-X	--	--	Facilities 1, 2, and 11	100
SO05/BH20	GW01	WI-CV-MW20S	WI-CV-BH20-X-MMYY[d]	WI-CV-GW20-X-MMYY	WI-CV-GW20S-MMYY	Building 2709	200
SO06/BH21	GW02	WI-CV-MW21S	WI-CV-BH21-X-MMYY	WI-CV-GW21-X-MMYY	WI-CV-GW21S-MMYY	Facilities 1, 2, and 11	209
--	GW03	WI-CV-MW22S	--	WI-CV-GW22-X-MMYY	WI-CV-GW22S-MMYY	Between existing impacted on-Base monitoring wells and impacted off-Base drinking water wells	194
--	GW04	WI-CV-MW23S	--	WI-CV-GW23-X-MMYY	WI-CV-GW23S-MMYY	Between existing impacted on-Base monitoring wells and impacted off-Base drinking water wells	200
--	GW05[a]	WI-CV-MW03S[b]	--	--	WI-CV-GW03S-MMYY	Between PFAS PSAs and existing impacted on-Base monitoring wells	130
--	GW06	WI-CV-MW25M-R[e]	--	WI-CV-GW25-X-MMYY	WI-CV-GW25M-R-MMYY	Between PFAS PSAs and existing impacted on-Base monitoring wells	208
--	GW07	WI-CV-MW26D	--	WI-CV-GW26-X-MMYY	WI-CV-GW26D-MMYY	Between existing impacted on-Base monitoring wells and impacted off-Base drinking water wells	200
--	--	WI-CV-MW17M	--	--	WI-CV-GW17M-MMYY	Northeast section of OLF Coupeville	200

Notes:

[a] No vertical profile samples were collected from this location due to the absence of perched groundwater above the target screen interval

[b] Well location MW24S was redesignated MW03S due to its association with existing well cluster MW03M/MW03D.

[c] placeholder for depth designation

[d] placeholder for date (month and year) of sample collection

[e] Monitoring well MW25M-R is replacement well for MW25M, which was damaged following construction and required redrilling.

-- = ID type not applicable to this location

bgs = below ground surface

BH = borehole

CV = Coupeville

D = deep screen interval

GW = groundwater

ID = identification

M = intermediate screen interval

MM = month

MW = monitoring well

OLF = Outlying Landing Field

PFAS = per- and polyfluoroalkyl substances

PSA = potential source area

S= shallow screen interval

SO = Soil

WI = Whidbey Island

YY = year

Table 3-2. Monitoring Well Construction Summary

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Monitoring Well ID	Installation Date	Ground Elevation (feet NAVD88)	TOC Elevation (feet NAVD88)	Total Depth (feet btoc)	Well Casing Diameter (inches)	Completion	Screen Length (feet)	Top of Screen Depth (feet bgs)	Screen Top Elevation (feet NAVD88)	Bottom of Screen Depth (feet bgs)	Screen Bottom Elevation (feet NAVD88)	Elevation Interval	Northing (feet NAD83)	Easting (feet NAD83)
Phase 1 Monitoring Wells														
WI-CV-MW03S	8/14/2019	193.52	193.08	130.00	2	Flush	10	120	73.08	130	63.08	S	439392.68	1201753.55
WI-CV-MW17M	8/18/2019	202.41	201.98	160.00	2	Flush	10	150	51.98	160	41.98	M	441502.92	1201653.23
WI-CV-MW20S	11/4/2019	194.40	194.00	110.33	2	Flush	10	100	94.00	110	84.00	S	439263.77	1202453.93
WI-CV-MW21S	9/20/2019	196.73	196.25	117.30	2	Flush	10	107	89.25	117	79.25	S	439283.74	1202097.83
WI-CV-MW22S	10/22/2019	188.27	188.03	122.30	2	Flush	10	112	76.03	122	66.03	S	437065.13	1200698.29
WI-CV-MW23S	9/7/2019	192.94	192.62	140.00	2	Flush	10	130	62.62	140	52.62	S	438959.83	1200713.43
WI-CV-MW25M	12/4/2019	NA	NA	160.00	2	Abandoned[a]	10	150	NA	160	NA	M	NA	NA
WI-CV-MW25M-R	12/4/2019	192.61	192.33	160.00	2	Flush	10	150	42.33	160	32.33	M	439503.02	1201047.61
WI-CV-MW26D	8/15/2019	191.30	190.96	199.50	2	Flush	10	189.5	1.46	199.5	-8.54	D	436874.04	1201650.35
Phase 2 Monitoring Wells														
WI-CV-MW28M	3/13/2020	189.35	189.08	170.30	2	Flush	10	160	29.08	170	19.08	M	438316.32	1200737.93
WI-CV-MW29M	3/10/2020	189.76	189.56	170.30	4	Flush	10	160	29.56	170	19.56	M	437523.51	1201553.16
WI-CV-MW30M	2/21/2020	194.05	193.72	170.30	2	Flush	10	160	33.72	170	23.72	M	438435.55	1202392.04
WI-CV-MW31M	2/25/2020	193.73	193.33	150.30	4	Flush	10	140	53.33	150	43.33	M	439026.82	1202771.23
WI-CV-MW31S	2/27/2020	193.82	193.34	117.30	2	Flush	10	107	86.34	117	76.34	S	439027.90	1202764.19

Notes:

[a] WI-CV-MW25M was damaged during installation and was subsequently abandoned and replaced by WI-CV-MW25M-R.

bgs = below ground surface

btoc = below top of casing

CV = Coupeville

D = deep screen interval

M = intermediate screen interval

MW = monitoring well

NA = not available

NAD83 = Washington State Plane North Zone, North American Datum of 1983

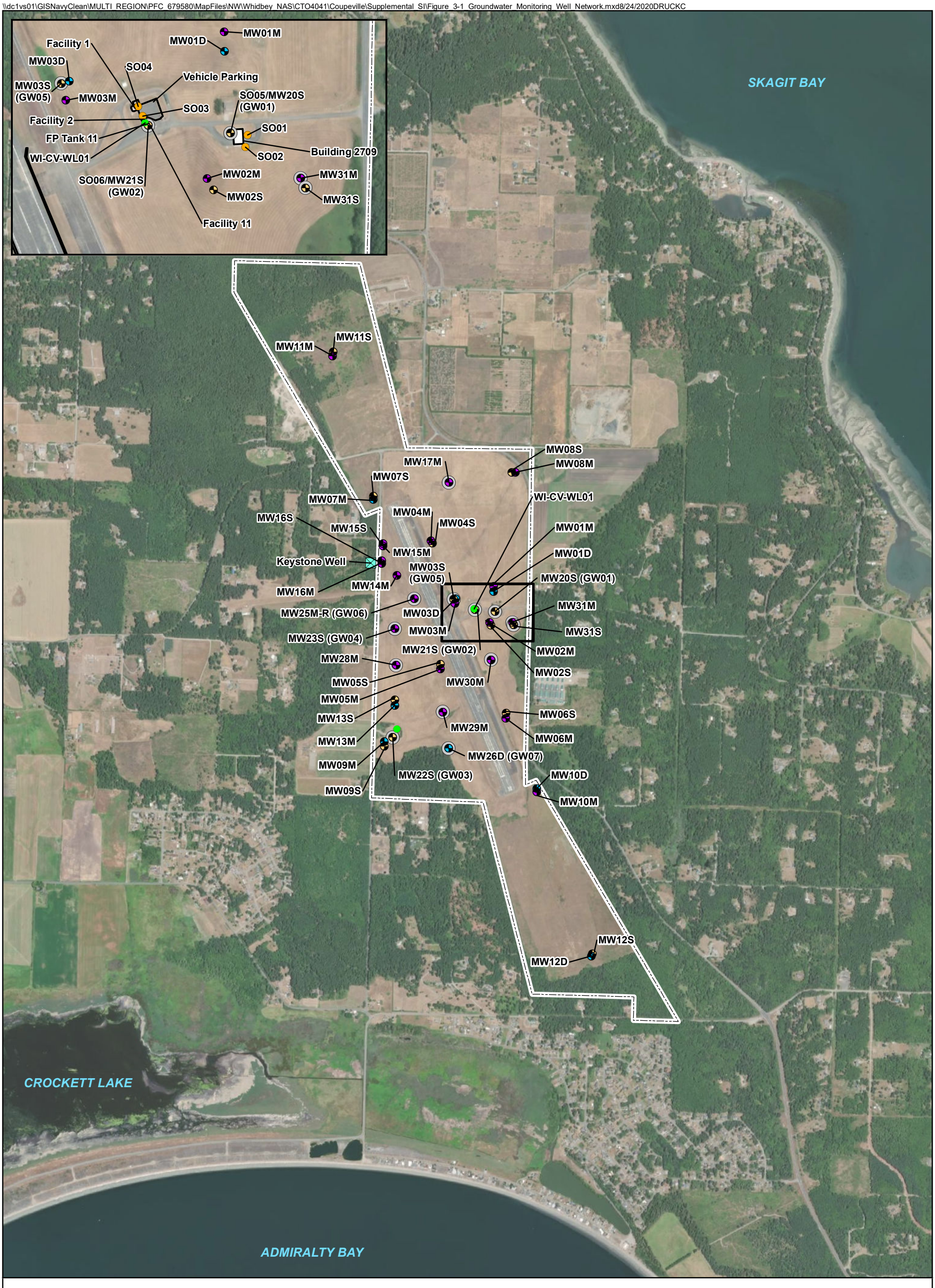
NAVD88 = North American Vertical Datum of 1988

S = shallow screen interval

TOC = top of casing

WI = Whidbey Island

\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_3-1_Groundwater_Monitoring_Well_Network.mxd8/24/2020DRUCKC



Legend

- Shallow Elevation Interval Monitoring Well
- Middle Elevation Interval Monitoring Well
- Deep Elevation Interval Monitoring Well
- Keystone Well
- Base Supply Well
- Supplemental Site Investigation Monitoring Well Installation
- Soil Boring
- Building/Structure Locations
- Base Boundary

Note:
Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
Monitoring well MW25M-R is replacement well for MW25M (GW06), which was damaged following construction and required redrilling.
OLF = Outlying Landing Field

N

0 0.15 0.3 Miles

1 inch = 0.3 mile

Imagery Source: Esri

Figure 3-1
Groundwater Monitoring Well Network and Soil Boring Locations
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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SECTION 4

Investigation Results

This section presents the results of the investigation described in **Section 3**.

To evaluate the extent of contamination, the PFAS analytical data were screened against the PALs as prescribed by the SAP. The PALs for this investigation are summarized below:

- The PALs for PFOA and PFOS in soil are based on the USEPA Soil Screening Levels (SSLs) for soil leaching to groundwater determined using USEPA's online calculator based on a hazard quotient of 0.1 (PFOA = 0.0172 micrograms per kilogram [µg/kg]; PFOS = 0.0378 µg/kg). The PAL for PFBS (0.0002 µg/kg) is based on the USEPA SSL derived from the regional screening level (RSL) table (USEPA, 2021)[4].
- The PALs for PFOA and PFOS in groundwater are based on a hazard quotient of 0.1 and were generated using USEPA's online calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019) (PFOA = 40 ng/L; PFOS = 40 ng/L)[5]. The PAL for PFBS of 600 ng/L is consistent with the May 2021 RSL Table (USEPA, 2021).

Screening criteria do not exist for the remaining 15 PFAS compounds for soil or groundwater; therefore, PALs were not developed for these compounds. However, in accordance with Navy guidance, data are presented for the 18 PFAS compounds listed in Quality Systems Manual v. 5.1.1 Table B-15; data for compounds other than PFBS, PFOA, and PFOS are presented in **Appendix H**. This data may be further evaluated in the future if criteria are established.

4.1 Soil

This section presents the investigation results pertaining to the extent of PFAS contamination in soil at OLF Coupeville. A discussion of soil geotechnical parameters will be provided in the forthcoming addendum to this report, which will discuss the groundwater flow and solute transport model, for which the geotechnical data was an input.

The analytical results from soil samples at on-Base PSAs are presented in **Table 4-1 and Figure 4-1**. Raw data tables are provided in **Appendix H**. The results are summarized below:

- **PFBS** – PFBS was not detected in any soil samples.
- **PFOA** – PFOA was detected in 18 samples (excluding FDs) with detections occurring in each of the 6 soil borings. The lowest detected concentration was 0.87 µg/kg in SO04 at a depth of 11-12 feet bgs. The highest detected concentration was 74.7 µg/kg in SO03 at a depth of 57-58 feet bgs. Each of the 18 detections of PFOA exceeded the PAL (conservative SSL) of 0.0172 µg/kg for PFOA in soil.
- **PFOS** – PFOS was detected in 22 samples (excluding FDs) with detections occurring in each of the 6 soil borings. The lowest detected concentration was 4.92 µg/kg in SO06/BH21 at a depth of 0.5-1.0 foot bgs. The highest detected concentration was 936 µg/kg in SO06/BH21 at a depth of 3.0-4.0 feet bgs. Each of the 22 detections of PFOS exceeded the PAL (conservative SSL) of 0.0378 µg/kg for PFOS in soil.

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4 https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Although the computation of SSL values for PFAS compounds does not include some chemical-specific transport properties of the constituents, these values represent generalized preliminary screening criteria for evaluation of the presence of PFAS in vadose zone source areas. The SSLs were defined as PALs for the Supplemental SI because the investigation is focused on PFAS impacts to groundwater and potential PFAS migration from soil to groundwater. SSL values are not intended for use in remedial action or risk assessment decision-making. SSL exceedances will also not be treated as definitive evidence that leaching is occurring or may occur in the future.

5 The USEPA lifetime health advisory for PFOA and PFOS in drinking water is 70 ng/L for each individually and 70 ng/L for the cumulative concentration of the two chemicals; for this investigation, the more conservative regional screening level of 40 ng/L is used as the basis for the groundwater PAL rather than the lifetime health advisory; however, the lifetime health advisory is referenced in the context of off-Base drinking water exceedances.

Figure 4-1 shows the detected concentrations of the various PFAS compounds in soils near the PSAs. In general, PFOS was detected more frequently and at higher concentrations in soil than PFOA. The presence of PFOA and PFOS significantly above the PALs in soil near the on-Base PSAs indicates that PFAS was likely released to the environment at these locations. Based on these results, the areas around Building 2709 and Facilities 1, 2, and 11 are confirmed as vadose zone source areas for PFOA and PFOS.

4.2 Groundwater

This section presents the investigation results pertaining to groundwater at OLF Coupeville, including general groundwater geochemistry and the extent of contamination in groundwater.

4.2.1 General Groundwater Geochemistry

Groundwater geochemistry at OLF Coupeville is based on an evaluation of the field WQPs measured prior to sampling at each monitoring well and depth-discrete sampling depth. Field WQPs are presented in **Table 4-2**. It should be noted that depth-discrete samples may not be representative of the actual geochemistry at those depths and locations because these samples were collected as grab samples prior to parameter stabilization. Therefore, depth-discrete WQPs are discussed separately.

Monitoring Wells

pH measurements were generally neutral to slightly basic, ranging from 6.39 to 9.43. One anomalously high (basic) pH value of 12.41 was recorded at WI-CV-MW02M; however, this value is not consistent with pH measured during previous sampling events at this location and may be due to instrument malfunction.

Specific conductivity values, which provide an indication of total dissolved solids, generally ranged between 0.079 and 1.79 mS/cm. These values fall within the typical range for groundwater specific conductivity (0.05-5 mS/cm) (USGS, 2019).

DO values were generally low with readings less than 1 mg/L at many locations, indicating anaerobic conditions. DO values at shallow zone wells were generally higher with readings between 0 and 8.5 mg/L, indicating anaerobic to aerobic conditions in shallow and/or perched groundwater. The two DO readings greater than 8 mg/L, recorded at MW08S and MW13S, may be anomalous or attributable to instrument sensitivity. DO values in intermediate zone wells were slightly elevated as well with readings up to 6.49 mg/L; however, DO at these wells was generally less than 2 mg/L, indicating anaerobic to slightly aerobic conditions. DO at deep zone wells was less than 1 mg/L, indicating anaerobic conditions.

ORP values show a general trend of decreasing with depth, indicating more oxidizing conditions at shallower depths and more reducing conditions at deeper depths. Wells with higher DO tended to have higher ORP values. ORP values in shallow zone wells were generally between 0 and 200 mV, indicating mildly to strongly oxidizing conditions in shallow and/or perched groundwater. However, there were four shallow zone wells where negative ORP values as low as -187 mV were recorded, indicating mildly to strongly reducing conditions at these locations. ORP values in intermediate zone wells were mostly negative with readings generally between -50 and -300 mV, which indicates moderately to strongly reducing conditions. However, there were five intermediate zone wells where positive values were recorded as high as 100 mV, indicating mildly to moderately oxidizing conditions in intermediate zone groundwater in these locations. ORP values in deep zone wells were between -80 and -158 mV, indicating moderately to strongly reducing condition in deep groundwater. These data suggest a fairly complex distribution of redox zones throughout the aquifer system which is common in many of these types of heterogeneous systems.

Turbidity values in monitoring well samples generally ranged from less than 10 to 185 NTU. However, anomalously high values between 850 and 935 NTU were measured at WI-CV-22S, WI-CV-MW26D, and WI-CV-MW21S.

Depth-discrete Samples

As stated above, some field WQPs in depth-discrete samples were not consistent with monitoring well samples, particularly DO, ORP, and turbidity, primarily because these samples were collected as grab samples, prior to parameter stabilization and without well development. pH values for depth-discrete samples were generally consistent with the stabilized pH values for the corresponding monitoring well samples. One anomalously high (basic) value of 11.6 was recorded in GW07 at the 128-130 feet bgs interval. One anomalously low (acidic) pH value of 3.95 was also recorded in GW07 at the 192-194 feet bgs interval.

Specific conductivity values for depth-discrete samples were generally consistent with the stabilized conductivity values for the corresponding monitoring well samples. One anomalously low value of 0.001 mS/cm was measured in GW06 at the 206-208 feet bgs interval. One anomalously high value of 4.5 mS/cm was measured in GW07 at the 192-194 feet bgs interval.

No clear pattern was observed in DO or ORP values measured during depth-discrete sampling. DO and ORP values were not consistent with values for the corresponding monitoring wells.

Turbidity values in depth-discrete samples ranged from 100 to more than 1,000 NTU, which is significantly higher than the stabilized turbidity values for the corresponding monitoring well samples. This is common during grab sampling.

4.2.2 Groundwater Depth-discrete Sampling Results

The groundwater depth-discrete sampling analytical results from grab samples collected from on-Base soil borings are presented in **Table 4-3**. Raw data tables are provided in **Appendix H**. The purpose of the depth-discrete sampling was to guide selection of monitoring well screen intervals to target intervals with elevated PFAS concentrations for installation of permanent monitoring wells. In general, screen intervals were selected to coincide with the depth-discrete interval with the highest concentrations of PFAS compounds (PFOA and/or PFOS in particular) as summarized below:

- **GW01 (Sample ID GW20)** – PFOA was detected in samples from two of the three depth-discrete sampling intervals ranging from an estimated 13.1 ng/L at the 190-192 feet depth interval to an estimated 728 ng/L at the 99-101 feet depth interval. PFOS was detected in samples from all three depth-discrete sampling intervals ranging from an estimated 4.11 ng/L at the 140-142 feet depth interval to an estimated 380 ng/L at the 99-101 feet depth interval. Out of the three sampling intervals, the 99-101 feet interval had the most detected PFAS compounds and the highest concentrations. Based on these results, monitoring well WI-CV-MW20S was screened at 100-110 feet bgs, which coincides with the 99-101 feet depth-discrete sampling interval.
- **GW02 (Sample ID GW21)** – PFOA was not detected any samples from the two depth-discrete sampling intervals. PFOS was detected in samples from both of the depth-discrete sampling intervals ranging from an estimated 0.38 ng/L at the 159-161 feet depth interval to an estimated 4.55 ng/L at the 113-115 feet depth interval. Based on these results, monitoring well WI-CV-MW21S was screened at 107-117 feet bgs which coincides with the 113-115 depth-discrete sampling interval.
- **GW03 (Sample ID GW22)** – PFOA and PFOS were not detected in samples from any of the four depth-discrete sampling intervals. As discussed in the **Section 3.14** Deviations from the Sampling and Analysis Plan, selecting the screen interval for monitoring well WI-CV-MW22S to coincide with the 179-181 feet interval would have been redundant to two other wells screened in adjacent areas. Ultimately, WI-CV-MW22S was screened at 112-122 feet bgs, which is where the first saturated conditions were observed in the soil core samples.
- **GW04 (Sample ID GW23)** – PFOA was detected in the sample from the 129-131 feet depth interval at an estimated 4.15 ng/L. PFOS not detected in any samples from the four depth-discrete sampling intervals. Based on these results, monitoring well WI-CV-MW23S was screened at 130-140 feet bgs which coincides with the 129-131 feet depth-discrete sampling interval.

- **GW06 (Sample ID GW25)** – PFOA was detected in samples from two of the three depth-discrete sampling intervals ranging from 43.8 ng/L at the 130-132 feet depth interval to 182 ng/L at the 154-156 feet depth interval. PFOS was detected in samples from all three depth-discrete sampling intervals ranging from an estimated 2 ng/L at the 206-208 feet depth interval to 13.4 ng/L at the 130-132 feet depth interval. Based on these results, monitoring well WI-CV-MW25M (later replaced by WI-CV-MW25M-R) was screened at 150-160 feet bgs which coincides with the 154-156 feet depth-discrete sampling interval.
- **GW07 (Sample ID GW26)** – PFOA was detected in samples from two of the three depth-discrete sampling intervals ranging from an estimated 32.6 ng/L at the 167-169 feet depth interval to an estimated 45.6 ng/L at the 192-194 feet depth interval. PFOS was detected in the sample from the 192-194 feet depth interval at an estimated 0.72 ng/L. Based on these results, monitoring well WI-CV-MW26D was screened at 189.5-199.5 feet bgs which coincides with the 192-194 depth-discrete sampling interval.

4.2.3 Monitoring Well Sampling Results

The groundwater sampling analytical results from on-Base groundwater monitoring wells are presented in **Table 4-4**. The concentrations of the three individual PFAS compounds (PFBS, PFOA, and PFOS, as specified in scope of the Navy CTO 4405 and the SAP) within the three groundwater zones are shown on **Figures 4-2a** through **4-4c**, which present the data by compound and well depth. Raw data tables are provided in **Appendix H**. The results are summarized below.

- **PFBS** – PFBS was detected in samples from 26 monitoring wells ranging from an estimated 0.14 ng/L at WI-CV-MW03M to 215 ng/L at WI-CV-MW05M. None of the detections of PFBS exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOA** – PFOA was detected in samples from 23 monitoring wells. The lowest detected concentration was an estimated 0.65 ng/L at WI-CV-MW11M. The highest detected concentration was 526 ng/L at WI-CV-MW02S. Samples from 11 monitoring wells exceeded the PAL of 40 ng/L for PFOA in groundwater.
- **PFOS** – PFOS was detected in samples from 16 monitoring wells. The lowest detected concentration was an estimated 0.44 ng/L at WI-CV-MW01D. The highest detected concentration was an estimated 213 ng/L in the FD sample at WI-CV-MW23S. Samples from three monitoring wells exceeded the PAL of 40 ng/L for PFOS in groundwater.

Comparisons between the monitoring well sampling results and the corresponding depth-discrete sampling results are summarized below:

- **WI-CV-MW20S** – Detections of PFAS compounds at WI-CV-MW20S were approximately one order of magnitude lower than in the corresponding GW01 depth-discrete sample (99-101 feet bgs). Several PFAS compounds not detected in the monitoring well sample were detected in low concentrations in the depth-discrete sample. Additionally, the depth-discrete sample exceeded the PALs for PFOA and PFOS, while the monitoring well sample only exceeded the PAL for PFOA.
- **WI-CV-MW21S** – Detections of PFAS compounds at WI-CV-MW21S were generally one to two orders of magnitude higher than in the corresponding GW02 depth-discrete sample (113-115 feet bgs).
- **WI-CV-MW22S** – The screened interval for WI-CV-MW22S does not directly correspond to a particular GW03 depth-discrete sampling interval. However, several PFAS compounds were detected at low levels at WI-CV-MW22S while the shallowest depth-discrete samples were non-detect for all PFAS compounds.
- **WI-CV-MW23S** – PFOS was detected at a concentration above the PAL in the sample from WI-CV-MW23S but was not detected in the corresponding GW04 depth-discrete sample (129-131 feet bgs) or any of the other depth-discrete sampling depths. PFOA was detected at similar concentrations in the WI-CV-MW23S sample (4.47 ng/L) and the corresponding GW04 depth-discrete sample (4.15 ng/L). Other PFAS constituents were detected at similar to slightly higher concentrations in the WI-CV-MW23S monitoring well sample than the associated depth-discrete samples.

- **WI-CV-MW25M-R** – PFOS was not detected in the sample from WI-CV-MW25M-R but was detected in concentrations below the PAL in the corresponding GW06 depth-discrete sample (154-156 feet bgs). PFOA exceeded the PAL in both the WI-CV-MW25M-R monitoring well sample and in the corresponding GW06 depth-discrete sample.
- **WI-CV-MW26D** – Results from the WI-CV-MW26D monitoring well sample were generally consistent with the results of the corresponding GW07 depth-discrete sample (collected at 192-194 feet bgs): PFOS was not detected in the monitoring well sample, and detected at less than 1 ng/L in the corresponding GW07 depth-discrete sample, and PFOA was detected at 33.4 and 45.6 ng/L in the monitoring well and depth-discrete samples, respectively.

PFOA and PFOS were the only PFAS constituents detected in groundwater monitoring well samples at concentrations exceeding the PALs. PFBS was not detected above the PAL of 600 ng/L. In each of the three elevation zones, PFOA was the contaminant detected most frequently at concentrations exceeding the PALs.

In the shallow zone (**Figure 4-2a**), PFOA concentrations are highest near Building 2709 (WI-CV-MW02S and GW01/WI-CV-MW20S), with lesser concentrations (though still in excess of the PALs) west of the runway (WI-CV-MW05S). In the intermediate aquifer zone (**Figure 4-2b**), PFOA concentrations are highest west of the runway (WI-CV-MW05M and WI-CV-GW06/MW25M-R) and near the Keystone Well (WI-CV-MW14M, WI-CV-MW15S/M well pair, and WI-CV-MW16S/M well pair). In the deep aquifer zone (**Figure 4-2c**), PFOA concentrations are highest in the western portion of the site toward the south end of the runway (WI-CV-MW26D); however, concentrations do not exceed the PAL.

In the shallow zone (**Figure 4-3a**), PFOS concentrations are highest near Building 2709 (WI-CV-MW02S), Facilities 1, 2, and 11 (GW02/WI-CV-MW21S), and due west of these areas (GW04/WI-CV-MW23S). In the intermediate and deep aquifer zones (**Figures 4-3b and 4-3c**), PFOS concentrations did not exceed the PAL at any location and were generally less than 5 ng/L.

In the shallow zone (**Figure 4-4a**), PFBS concentrations are highest near Building 2709 (WI-CV-MW02S) and to the southwest, on the west side of the runway (WI-CV-MW05S). In the intermediate and deep aquifer zones (**Figure 4-4b and 4-4c**), PFBS concentrations were highest to the west of the runway. All PFBS concentrations were below the project PAL of 600 ng/L.

4.3 Conceptual Site Model for Physical and Contaminant Systems

4.3.1 Groundwater Potentiometric Surface

The initial site conceptual model (CSM) for the physical system OLF Coupeville was described in the 2018 OLF investigation report (CH2M 2018a). The CSM was updated and refined in the 2018 OLF aquifer testing and groundwater modeling report (CH2M 2018b). Based on the data collected during this Supplemental SI, the CSM was further updated and refined. Groundwater elevation data from the April 2020 synoptic water level survey are presented in **Table 4-5**. Vertical gradients are presented in **Table 4-6**. Groundwater elevation maps for the intermediate and deep zones are shown on **Figures 4-5** and **4-6**, respectively. **Figure 4-7** shows vertical gradients. Updated and new cross sections A-A' through F-F' are presented in **Figures 4-8** through **4-18**.

The first encountered groundwater in the northern portion of the site is present in perched zones between 60 and 115 feet NAVD88, or 90 and 130 feet bgs. At this interval, a discontinuous clay and silt layer is encountered, which pinches out in the southern portion of the site. The underlying intermediate zone is likely semiconfined, with confined conditions in some areas of the northern portion of the site near wells WI-CV-MW04S/M, WI-CV-MW17M, and WI-CV-MW08S/M (**Figure 4-10**) and unconfined conditions in the southern portion, near wells WI-CV-MW10M and WI-CV-MW12S/D (**Figure 4-9**). The potentiometric surface for the intermediate zone ranges from a high of approximately 83 feet NAVD88 (122 feet bgs) in the northeastern corner of the Base near WI-CV-MW08S/M to a low of approximately 52 feet NAVD88 (136 feet bgs) at the southernmost end of the Base. A heterogeneous clay, claystone, and silt confining layer underlies the intermediate zone and is interpreted to

define the bottom of the Partridge Gravel. Organic material (for example, plant material and peat) was frequently observed in this interval. Transmissive sand zones are present within and beneath the organic silt and clay unit.

As depicted in **Figure 4-5**, groundwater flow in the intermediate zone is to the south-southwest. Data from new monitoring wells WI-CV-MW17M, in the northern portion of the Base, and WI-CV-MW31M, east of Building 2709, have provided a better understanding of the previously inferred groundwater mound centered in the northern portion of the Base and the resulting groundwater flow directions driven by this mound. Based on this new data, the groundwater mound may be centered further to the northeast than previously thought and potentially mostly off-Base. The resulting potentiometric surface (**Figure 4-5**) indicates that easterly or southeasterly groundwater flow from contaminated on-Base wells, as previously postulated in CH2M, 2018b, is unlikely within the intermediate aquifer zone.

Hydraulic heads near the western boundary of the Base (near WI-CV-MW14M, WI-CV- MW15S/M, and WI-CV-MW16S/M) are somewhat depressed by pumping at the Keystone Well, which has induced a westward gradient in that part of the Base toward the Keystone Well. Pumping of the Keystone Well influences groundwater flow conditions in close proximity to the well itself, but the extent to which Keystone Well operations has impacted flow patterns at greater distances from the well is uncertain.

As depicted in **Figure 4-6**, groundwater flow in the deep zone is to the south-southeast. Wells WI-CV-MW07M, WI-CV-MW09M, and WI-CV-MW13M are considered deep zone wells, despite the M designation, because the elevation of these well screens (in feet NAV88) is within the deep zone elevation interval. The interpretation of groundwater conditions within the deep elevation interval is consistent with previous interpretations (CH2M, 2018b).

As shown in **Figure 4-7**, vertical head gradients at are generally downward. The highest downward vertical gradients are observed east of the runway between the shallow and intermediate zones at the WI-CV-MW04 and WI-CV-MW02 well pairs and between the shallow and intermediate zones at the WI-CV-MW01 well pair. Vertical gradients west of the runway are generally lower. Very low upward gradients are calculated between the shallow and intermediate zones at the WI-CV-MW03 well pair and the WI-CV-MW15 well pair.

4.3.2 PFAS Distribution and Potential Migration Pathways

Figures 4-11 through **4-18** show PFOA and PFOS concentrations on cross sections C-C' through F-F'. PFOA is the most prevalent PFAS compound (with applicable screening values) present in groundwater at OLF Coupeville. The presence of PFOA above the PAL in shallow/perched groundwater near Building 2709 (WI-CV-MW02S and GW01/WI-CV-MW20S) suggests shallow or perched groundwater in this location has likely been contaminated by PFOA leaching from soil at the source areas. The cross section in **Figure 4-11** shows PFOA concentrations above the PAL southwest of the source areas at Building 2709 and Facilities 1, 2, and 11 in both the shallow and intermediate zones (WI-CV-MW05S/M). The presence of high concentrations of PFOA in the intermediate zone southwest of the source areas at Building 2709 and Facilities 1, 2, and 11 (WI-CV-MW05M) suggests PFOA may be migrating vertically downward from the shallow zone near the source areas in the direction of inferred groundwater flow, which is consistent with vertical head gradients near the source areas.

The initial release of PFAS to the groundwater system may have occurred before the Keystone Well was installed in 2008, and groundwater flow at the time of contamination may have been different than what it is presently. These pre-2008 groundwater flow conditions are not well understood; however, at that time, the main hydraulic stress would likely have been the Fort Casey wellfield southwest of the Base. Under such conditions, PFAS compounds present in source areas at Building 2709 and/or Facilities 1, 2, and 11 would be expected to migrate to the south with natural and pumping-augmented groundwater flow. The cross section in **Figure 4-17** shows PFOA detections near or above the PAL in the deep zone in the western portion of the Base near the south end of the runway (WI-CV-MW29M and GW07/WI-CV-MW26D), which suggests that downward vertical migration of PFOA continues toward the south and provides evidence for potential off-Base migration toward parcels south of OLF Coupeville with drinking water sample results exceeding the USEPA lifetime health advisory for PFOA.

The presence of high concentrations of PFOA near the Keystone Well, as shown in **Figure 4-13** (WI-CVMW16S/M and WI-CV-MW15S), is not likely related to the source areas identified at Building 2709 and Facilities 1, 2, and 11 because inferred groundwater flow is toward the southwest of these confirmed source areas and there is minimal PFOA in groundwater samples in wells between the source areas and the Keystone Well (see **Figure 4-15**). Rather, these elevated PFOA concentrations may indicate the presence of a separate source area west of the runway near the Keystone Well, which may explain the presence of PFOA above the lifetime health advisory at the Keystone Well.

The presence of PFOS above the PAL is confined to the shallow zone. PFOS is present in shallow/perched groundwater near Building 2709 and Facilities 1, 2, and 11 (WI-CV-MW02S, GW01/WI-CV-MW20S, and GW02/WI-CV-MW21S), suggesting shallow/perched groundwater has been contaminated by PFOS leaching from soil at source areas associated with Building 2709 and Facilities 1, 2, and 11 (**Figures 4-12** and **4-16**). PFOS is also present in the shallow aquifer zone west of the runway (WI-CV-MW23S) (**Figure 4-14**); however, connection of PFOS in this area to a source area remains uncertain.

As shown in **Figures 4-15** and **4-16**, neither PFOA nor PFOS are detected above PALs in areas directly west (see the WI-CV-MW03 well cluster) or east (WI-CV-MW31M) of the confirmed source areas, which suggests that an east-west migration pathway may not exist for either of these contaminants; however, given the highly heterogeneous nature of these aquifer sediments it is possible that preferential pathways may exist that facilitate westerly migration from the primary source area near Building 2709.

Table 4-1. Summary of Soil Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Sample ID	Soil SLs (µg/kg)[a]	Soil-to-Groundwater SSL (µg/kg)[b]	WI-CV-BH20-2-1019	WI-CV-BH20-24-1019	WI-CV-BH20-42-1019	WI-CV-BH20-80-1019	WI-CV-BH20-95-1019	WI-CV-BH21-1-0919	WI-CV-BH21-4-0919	WI-CV-BH21-25-0919
Sample Depth (feet bgs)			1.0-2.0	23-24	41-42	79-80	94-95	0.5-1.0	3.0-4.0	24-25
Sample Date			10/22/19	10/23/19	10/23/19	10/23/19	10/23/19	9/6/19	9/6/19	9/8/19
Sample Type			Parent	Parent	Parent	Parent	Parent	Parent	Parent	Parent
Chemical Name										
Semivolatile Organic Compounds (µg/kg)										
Perfluorobutanesulfonic acid (PFBS)	1,900	0.0002	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.08 U	1.04 U
Perfluorooctane Sulfonate (PFOS)	130	0.0378	**101**	**19.9 J-**	**60**	2.04 U	2.52 U	**4.92 J**	**936**	**16.9**
Perfluorooctanoic Acid (PFOA)	130	0.0172	**4.1 J**	2.15 U	2.17 U	2.04 U	2.52 U	**0.96 J**	**2.41 J**	1.04 U

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). The SL for PFBS is derived from the USEPA RSL table (USEPA, 2021).

[b]SSLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator. The SSL for PFBS is derived from the RSL table (USEPA, 2021).

Notes:

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) soil screening level (SSL), derived from USEPA online regional screening level calculator for soil leaching to groundwater.

Borehole locations BH20 and BH21 are identified as SO05 and SO06, respectively.

P in the sample ID indicates that a duplicate was collected at this location.

-- = no screening criteria available

µg/kg = micrograms per kilogram

bgs = below ground surface

BH = borehole

CV = Coupeville

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

SO = soil sample identifier

SSL = soil screening level

U = The material was analyzed for, but not detected

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-1. Summary of Soil Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Sample ID	Soil SLs (µg/kg)[a]	Soil-to-Groundwater SSL (µg/kg)[b]	WI-CV-BH21-50-0919	WI-CV-BH21-71-0919	WI-CV-BH21-97-0919	WI-CV-BH21P-97-0919	WI-CV-SO01-1	WI-CV-SO01-13	WI-CV-SO01-39	WI-CV-SO01-71	WI-CV-SO01-93
Sample Depth (feet bgs)			49-50	70-71	96-97	96-97	0.5-1.0	12-13	38-39	70-71	92-93
Sample Date			9/8/19	9/8/19	9/8/19	9/8/19	9/15/19	9/15/19	9/15/19	9/15/19	9/15/19
Sample Type			Parent	Parent	Parent	Field Duplicate	Parent	Parent	Parent	Parent	Parent
Chemical Name											
Semivolatile Organic Compounds (µg/kg)											
Perfluorobutanesulfonic acid (PFBS)	1,900	0.0002	1.25 U	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U
Perfluorooctane Sulfonate (PFOS)	130	0.0378	402	12.5	1.14 U	1.14 U	8.47	34.7	9.89	478	1.18 U
Perfluorooctanoic Acid (PFOA)	130	0.0172	8.34	1.64 J	7.9	9.47	1.11 U	1.12 U	1.01 U	1.09 J	0.99 J

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). The SL for PFBS is derived from the USEPA RSL table (USEPA, 2021).

[b]SSLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator. The SSL for PFBS is derived from the RSL table (USEPA, 2021).

Notes:

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) soil screening level (SSL), derived from USEPA online regional screening level calculator for soil leaching to groundwater.

Borehole locations BH20 and BH21 are identified as SO05 and SO06, respectively.

P in the sample ID indicates that a duplicate was collected at this location.

-- = no screening criteria available

µg/kg = micrograms per kilogram

bgs = below ground surface

BH = borehole

CV = Coupeville

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

SO = soil sample identifier

SSL = soil screening level

U = The material was analyzed for, but not detected

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-1. Summary of Soil Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Sample ID	Soil SLs (µg/kg)[a]	Soil-to-Groundwater SSL (µg/kg)[b]	WI-CV-SO02-01	WI-CV-SO02-24	WI-CV-SO02-48	WI-CV-SO02-73	WI-CV-SO02P-73	WI-CV-SO02-92	WI-CV-SO03-3	WI-CV-SO03-27	WI-CV-SO03-58	WI-CV-SO03-73
Sample Depth (feet bgs)			0.5-1.0	24-25	48-49	73-75	73-75	92-93	2.0-3.0	26-27	57-58	72-73
Sample Date			8/15/19	8/15/19	8/15/19	8/16/19	8/16/19	8/16/19	9/12/19	9/13/19	9/13/19	9/13/19
Sample Type			Parent	Parent	Parent	Parent	Field Duplicate	Parent	Parent	Parent	Parent	Parent
Chemical Name												
Semivolatile Organic Compounds (µg/kg)												
Perfluorobutanesulfonic acid (PFBS)	1,900	0.0002	1.09 U	1.07 U	1.06 U	1.12 U	1.1 U	1.18 U	1.14 U	1.04 U	1.14 U	1.12 U
Perfluorooctane Sulfonate (PFOS)	130	0.0378	51.3	1.07 U	44.8	20.1	18.4	5.37 J	23.9	1.04 U	33.1	1.12 U
Perfluorooctanoic Acid (PFOA)	130	0.0172	1.09 U	1.07 U	3.85 J	1.62 U	1.48 U	1.18 U	71.7	1.9 J	74.7	2.95 J

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). The SL for PFBS is derived from the USEPA RSL table (USEPA, 2021).

[b]SSLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator. The SSL for PFBS is derived from the RSL table (USEPA, 2021).

Notes:

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) soil screening level (SSL), derived from USEPA online regional screening level calculator for soil leaching to groundwater.

Borehole locations BH20 and BH21 are identified as SO05 and SO06, respectively.

P in the sample ID indicates that a duplicate was collected at this location.

-- = no screening criteria available

µg/kg = micrograms per kilogram

bgs = below ground surface

BH = borehole

CV = Coupeville

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

SO = soil sample identifier

SSL = soil screening level

U = The material was analyzed for, but not detected

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-1. Summary of Soil Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Sample ID	Soil SLs (µg/kg)[a]	Soil-to-Groundwater SSL (µg/kg)[b]	WI-CV-SO03-92	WI-CV-SO04-1	WI-CV-SO04-12	WI-CV-SO04-40	WI-CV-SO04-63	WI-CV-SO04P-63	WI-CV-SO04-79
Sample Depth (feet bgs)			91-92	0.5-1.0	11-12	39-40	62-63	62-63	78-79
Sample Date			9/13/19	9/13/19	9/14/19	9/14/19	9/14/19	9/14/19	9/14/19
Sample Type			Parent	Parent	Parent	Parent	Parent	Field Duplicate	Parent
Chemical Name									
Semivolatile Organic Compounds (µg/kg)									
Perfluorobutanesulfonic acid (PFBS)	1,900	0.0002	1.1 U	1.08 U	1.04 U	1.15 U	1.18 U	1.16 U	1.12 U
Perfluorooctane Sulfonate (PFOS)	130	0.0378	1.1 U	802	136	6.49	102 J	58.8 J	1.12 U
Perfluorooctanoic Acid (PFOA)	130	0.0172	1.44 J	4.59 J	0.87 J	1.15 U	23.1 J	12.6 J	10.9

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). The SL for PFBS is derived from the USEPA RSL table (USEPA, 2021).

[b]SSLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator. The SSL for PFBS is derived from the RSL table (USEPA, 2021).

Notes:

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) soil screening level (SSL), derived from USEPA online regional screening level calculator for soil leaching to groundwater.

Borehole locations BH20 and BH21 are identified as SO05 and SO06, respectively.

P in the sample ID indicates that a duplicate was collected at this location.

-- = no screening criteria available

µg/kg = micrograms per kilogram

bgs = below ground surface

BH = borehole

CV = Coupeville

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

SO = soil sample identifier

SSL = soil screening level

U = The material was analyzed for, but not detected

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-2. Summary of Groundwater Field Water Quality Parameters

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	Sample Depth[a] (feet bgs)	Sample Date	Sample Time	Final Water Quality Stability Parameters					
				pH	Conductivity (mS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxidation- Reduction Potential (mV)	Turbidity (NTU)
Phase 1 Depth-Discrete Grab Sampling									
GW01	100	10/23/2019	15:55	7.43	0.658	13.72	1.53	-37	>999
GW01	141	10/24/2019	11:10	7.02	0.535	12.94	5.01	13	>999
GW01	192	10/25/2019	11:15	8.16	0.418	12.49	1.11	-35	>999
GW02	115	9/10/2019	11:25	8.53	0.314	16.1	12.02	-34	>999
GW02	160	9/11/2019	13:40	8.68	0.446	19.25	2.35	-140	>999
GW03	133	8/29/2019	13:20	7.83	0.163	21.8	4.29	23	>999
GW03	164	8/30/2019	12:50	7.30	0.495	18.55	2.06	-76	262
GW03	181	9/4/2018	11:55	6.95	0.22	17.08	1.47	53	116
GW03	194	9/5/2019	13:30	9.43	0.087	28.8	5.22	155	>999
GW04	130	8/8/2019	11:00	6.70	0.434	14.57	5.99	-134	>999
GW04	147	8/9/2019	09:20	6.78	0.442	15.20	3.78	-218	135.0
GW04	168	8/19/2019	14:30	9.49	0.079	23.10	11.87	-8	>999
GW04	196	8/10/2019	12:05	7.45	0.487	16.15	10.33	-195	431.0
GW06	131	9/22/2019	12:00	6.39	0.463	17.34	9.97	-1	>999
GW06	155	9/22/2019	17:00	8.30	0.262	17.39	3.81	-72	>999
GW06	207	10/19/2019	16:00	7.21	0.001	12.59	7.72	-41	318.0
GW07	130	8/3/2019	13:40	11.60	0.155	23.90	6.71	18	201.0
GW07	168	8/4/2019	13:00	No WQPs taken. Limited sample volume with slow recharge.					
GW07	193	8/5/2019	11:05	3.95	4.5	22.28	9.81	291	276.0
Phase 1 Monitoring Well Sampling									
WI-CV-MW02M	157.5	10/15/2019	17:50	12.41	0.618	12.81	0	-69	5.7
WI-CV-MW02S	100	10/15/2019	15:34	8.62	0.611	14.83	0	4	5.2
WI-CV-MW14M	166	10/16/2019	11:10	8.18	0.41	12.46	0	-175	13.7
WI-CV-MW16S	135	10/16/2019	14:15	7.75	0.372	12.28	4.69	36	49.8
WI-CV-MW15S	137	10/16/2019	12:40	7.58	0.462	12.26	6.43	123	9.1
WI-CV-MW16M	169	10/16/2019	15:50	7.68	0.434	12.9	2.61	2	30.2
WI-CV-MW15M	169	10/16/2019	10:40	8.10	0.503	12.16	0.21	-188	6.2
WI-CV-MW13M	177.5	10/17/2019	10:45	8.32	0.453	11.81	0	15	8.0
WI-CV-MW08M	155	10/17/2019	14:25	8.58	0.488	13.04	1.4	-143	14.0
WI-CV-MW01M	153	10/17/2019	16:35	8.42	0.569	12.29	0	70	7.1
WI-CV-MW08S	125	10/17/2019	13:40	7.51	0.5	12.29	8.5	193	6.5
WI-CV-MW13S	112	10/18/2019	10:03	6.46	0.563	11.51	8.4	195	32.0
WI-CV-MW12D	188	10/18/2019	11:15	7.63	0.517	11.09	0	-119	4.5
WI-CV-MW12S	NA	10/18/2019	No WQPs taken - well dry.						
WI-CV-MW10M	145	10/18/2019	14:55	7.92	0.601	11.71	3.3	37	50.9
WI-CV-MW09M	187	10/18/2019	13:50	8.10	0.376	12.13	0.22	-156	5.4
WI-CV-MW09S	NA	10/18/2019	No WQPs taken - well dry.						
WI-CV-MW10D	196	10/18/2019	16:25	7.56	0.495	11.83	0	-92	7.8
WI-CV-MW06M	179	10/19/2019	15:40	8.17	0.592	11.79	0	-89	44.0
WI-CV-MW03M	149	10/19/2019	12:40	8.70	0.405	11.74	0	-115	5.3
WI-CV-MW03D	227	10/19/2019	10:25	7.84	0.547	11.80	0	-158	14.7
WI-CV-MW04M	155	10/19/2019	11:35	7.97	1.15	11.45	0	-191	67.5
WI-CV-MW04S	117	10/19/2019	14:10	7.36	1.75	11.35	5.64	168	9.8
WI-CV-MW06S	138	10/19/2019	164:5	7.43	1.79	11.48	3.73	148	0.0
WI-CV-MW05S	122.5	10/20/2019	11:00	7.81	0.377	11.38	0.99	-9	0.0
WI-CV-MW05M	165	10/20/2019	11:05	7.87	0.304	11.73	6.49	101	15.2
WI-CV-MW01D	207	10/20/2019	13:35	8.42	0.341	11.92	0	-129	2.7

Table 4-2. Summary of Groundwater Field Water Quality Parameters

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	Sample Depth[a] (feet bgs)	Sample Date	Sample Time	Final Water Quality Stability Parameters					
				pH	Conductivity (mS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxidation- Reduction Potential (mV)	Turbidity (NTU)
WI-CV-MW07S	135	10/22/2019	13:35	7.77	0.63	14.36	0.78	27	0.0
WI-CV-MW07M	183	10/22/2019	10:35	7.68	0.411	14.56	0	-135	8.8
WI-CV-MW11S	136	10/22/2019	12:30	7.95	0.46	14.20	0	-87	36.4
WI-CV-MW11M	160	10/22/2019	10:10	8.30	0.615	12.35	0	-164	19.6
WI-CV-MW03S	125	11/8/2019	11:00	7.21	0.491	11.64	3.74	98	3.8
WI-CV-MW17M	155	11/8/2019	16:00	8.06	0.53	11.62	1.85	-75	75.3
WI-CV-MW22S	120	11/11/2019	15:30	7.43	0.838	12.77	1.4	125	185.0
WI-CV-MW20S	105	11/11/2019	11:20	6.99	0.839	12.35	1.08	48	32.2
WI-CV-MW26D	194.5	11/12/2019	15:20	8.10	0.359	11.40	0	-80	865.0
WI-CV-MW23S	135	11/13/2019	12:35	8.20	0.44	13.06	0	-169	139.0
WI-CV-MW21S	112	11/14/2019	11:00	8.80	0.531	13.03	2.99	-165	934.0
WI-CV-MW25M-R	155	12/10/2019	10:15	7.24	0.399	10.15	0.52	-100	10.0
Phase 2 Monitoring Well Sampling									
WI-CV-MW28M	166	3/18/2020	11:10	9.11	0.251	11.36	4.71	-134	98.5
WI-CV-MW29M	165	3/17/2020	16:40	9.24	0.481	11.85	0.06	-279	6.4
WI-CV-MW30M	164	3/17/2020	12:05	8.65	0.361	11.10	0	-190	1.8
WI-CV-MW31M	145	3/17/2020	14:20	9.01	0.755	12.00	0	-249	15
WI-CV-MW31S	NA	3/17/2020	No WQPs taken - well dry.						

Notes:

[a]Sample depth indicates midpoint of monitoring well screen.

°C = degrees Celsius

bgs = below ground surface

CV = Coupeville

D = deep screen interval

GW = groundwater

ID = identification

M = intermediate screen interval

mg/L = milligram(s) per liter

mS/cm = milliseimen(s) per centimeter

mV = millivolt(s)

MW = monitoring well

NTU = nephelometric turbidity unit(s)

pH = potential of Hydrogen

S = shallow screen interval

WI = Whidbey Island

WQP = water quality parameter

Table 4-3. Summary of Depth-Discrete Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Groundwater Vertical Profile Location Name	USEPA Lifetime Health Advisory (May 2016) (ng/L)	Tap Water SLs (ng/L)[a]	GW-01	GW-01	GW-01	GW-02	GW-02	GW-03	GW-03
Sample ID			WI-CV-GW20-100-1019	WI-CV-GW20-141-1019	WI-CV-GW20-192-1019	WI-CV-GW21-115-0919	WI-CV-GW21-160-0919	WI-CV-GW22-133-0819	WI-CV-GW22-164-0819
Sample Depth (feet bgs)			99-101	140-142	190-192	113-115	159-161	132-134	163-165
Sample Date			10/23/19	10/24/19	10/25/19	9/10/19	9/11/19	8/29/19	8/30/19
Sample Type			Parent	Parent	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	107 J	1.41 J	0.51 UJ	16.4 J	0.4 J	0.48 U	0.48 UJ
Perfluorooctane Sulfonate (PFOS)	70	40	380 J	4.11 J	18.5 J	4.55 J	0.38 J	0.48 U	0.48 UJ
Perfluorooctanoic acid (PFOA)	70	40	728 J	4.71 U	13.1 J	1.6 UJ	0.45 U	0.48 U	0.48 UJ

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

Notes:

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) Lifetime Health Advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

-- = no screening criteria available

bgs = below ground surface

CV = Coupeville

GW = groundwater

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J+ = Analyte present. Value may be biased high. Actual value may be lower.

LHA = lifetime health advisory

ng/L = nanograms per liter

RSL = regional screening levels

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

WI = Whidbey Island

Table 4-3. Summary of Depth-Discrete Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Groundwater Vertical Profile Location Name	USEPA Lifetime Health Advisory (May 2016) (ng/L)	Tap Water SLs (ng/L)[a]	GW-03	GW-03	GW-04	GW-04	GW-04	GW-04	GW-06
Sample ID			WI-CV-GW22-181-0819	WI-CV-GW22-194-0919	WI-CV-GW23-130-0819	WI-CV-GW23-147-0819	WI-CV-GW23-168-0819	WI-CV-GW23-196-0819	WI-CV-GW25-131-0919
Sample Depth (feet bgs)			179-181	192-194	129-131	146-148	167-169	195-197	130-132
Sample Date			9/4/19	9/5/19	8/8/19	8/9/19	8/9/19	8/10/19	9/22/19
Sample Type			Parent	Parent	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	9.63	0.47 U	3.06 J	0.16 J	0.2 J	0.49 U	12.6
Perfluorooctane Sulfonate (PFOS)	70	40	0.47 U	0.47 U	0.51 U	0.46 U	0.48 UJ	0.49 U	13.4
Perfluorooctanoic acid (PFOA)	70	40	1.34 U	0.47 U	4.15 J	0.46 U	0.48 UJ	0.49 U	<u>43.8</u>

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

Notes:

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) Lifetime Health Advisory.

<u>Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.</u>

-- = no screening criteria available

bgs = below ground surface

CV = Coupeville

GW = groundwater

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J+ = Analyte present. Value may be biased high. Actual value may be lower.

LHA = lifetime health advisory

ng/L = nanograms per liter

RSL = regional screening levels

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

WI = Whidbey Island

Table 4-3. Summary of Depth-Discrete Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Groundwater Vertical Profile Location Name	USEPA Lifetime Health Advisory (May 2016) (ng/L)	Tap Water SLs (ng/L)[a]	GW-06	GW-06	GW-07	GW-07	GW-07
Sample ID			WI-CV-GW25-155-0919	WI-CV-GW25-207-1019	WI-CV-GW26-130-0819	WI-CV-GW26-168-0819	WI-CV-GW26-193-0819
Sample Depth (feet bgs)			154-156	206-208	128-130	167-169	192-194
Sample Date			9/22/19	10/19/19	8/3/19	8/4/19	8/5/19
Sample Type			Parent	Parent	Parent	Parent	Parent
Chemical Name							
Perfluorobutanesulfonic acid (PFBS)	--	600	36.0	1.33 J	0.27 J	24.5 J	8.37 J
Perfluorooctane Sulfonate (PFOS)	70	40	4.02 J	2 J	0.57 UJ	5.61 UJ	0.72 J
Perfluorooctanoic acid (PFOA)	70	40	182	4.81 U	0.48 UJ	32.6 J+	45.6 J+

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

Notes:

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) Lifetime Health Advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

-- = no screening criteria available

bgs = below ground surface

CV = Coupeville

GW = groundwater

ID = identification

J = Analyte present. Value may or may not be accurate or precise.

J+ = Analyte present. Value may be biased high. Actual value may be lower.

LHA = lifetime health advisory

ng/L = nanograms per liter

RSL = regional screening levels

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW01M		WI-CV-MW01D	WI-CV-MW02S	WI-CV-MW02M	WI-CV-MW03S	WI-CV-MW03M
Sample ID			WI-CV-GW01M-1019	WI-CV-GW01MP-1019	WI-CV-GW01D-1019	WI-CV-GW02S-1019	WI-CV-GW02M-1019	WI-CV-GW03S-1119	WI-CV-GW03M-1019
Sample Screen Interval (feet bgs)			148-158	148-158	202-212	91.5-101.5	152.5-162.5	120-130	145-155
Sample Date			10/17/19	10/17/19	10/20/19	10/15/19	10/15/19	11/8/19	10/19/19
Sample Type			Parent	Field Duplicate	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	0.49 U	0.48 U	0.49 U	**184**	0.45 U	**50.0**	**0.14 J**
Perfluorooctane Sulfonate (PFOS)	70	40	0.98 U	0.96 U	**0.44 J**	**97.3 J**	0.89 U	0.91 U	0.89 U
Perfluorooctanoic acid (PFOA)	70	40	1.47 U	**0.93 J**	1.47 U	**526**	1.34 U	**1.04 J**	1.34 U

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location.

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW03D	WI-CV-MW04S	WI-CV-MW04S	WI-CV-MW04M	WI-CV-MW05S	WI-CV-MW05M	WI-CV-MW06S
Sample ID			WI-CV-GW03D-1019	WI-CV-GW04S-1019	WI-CV-GW04SP-1019	WI-CV-GW04M-1019	WI-CV-GW05S-1019	WI-CV-GW05M-1019	WI-CV-GW06S-1019
Sample Screen Interval (feet bgs)			222-232	111.6-121.6	111.6-121.6	148.7-158.7	114-124	160-170	130-140
Sample Date			10/19/19	10/19/19	10/19/19	10/19/19	10/20/19	10/20/19	10/19/19
Sample Type			Parent	Parent	Field Duplicate	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	0.44 U	0.48 U	0.46 U	0.43 UJ	**169 J-**	**215**	0.42 U
Perfluorooctane Sulfonate (PFOS)	70	40	0.88 U	**0.89 J**	**0.79 J**	0.86 UJ	**3.47 J**	**1.39 J**	0.85 U
Perfluorooctanoic acid (PFOA)	70	40	1.32 U	1.44 U	1.39 U	**1.19 J**	**130**	**357**	1.27 U

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location.

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW06M		WI-CV-MW07S	WI-CV-MW07M	WI-CV-MW08S	WI-CV-MW08M	WI-CV-MW09M
Sample ID			WI-CV-GW06M-1019	WI-CV-GW06MP-1019	WI-CV-GW07S-1019	WI-CV-GW07M-1019	WI-CV-GW08S-1019	WI-CV-GW08M-1019	WI-CV-GW09M-1019
Sample Screen Interval (feet bgs)			174-184	174-184	129.5-139.5	183-193	120.9-130.9	150-160	182-192
Sample Date			10/19/19	10/19/19	10/22/19	10/22/19	10/17/19	10/17/19	10/18/19
Sample Type			Parent	Field Duplicate	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	0.46 U	0.47 U	**0.31 J**	0.45 U	**0.71 J**	**1.45 J**	**8.61**
Perfluorooctane Sulfonate (PFOS)	70	40	0.93 U	0.94 U	0.93 U	0.89 U	0.89 U	**1.77 J**	0.83 U
Perfluorooctanoic acid (PFOA)	70	40	1.39 U	1.42 U	1.39 U	**0.71 J**	**2.46 J**	1.34 U	**1.37 J**

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location.

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

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USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW09M	WI-CV-MW10M	WI-CV-MW10D	WI-CV-MW11S	WI-CV-MW11M	WI-CV-MW12D	WI-CV-MW13S
Sample ID			WI-CV-GW09MP-1019	WI-CV-GW10M-1019	WI-CV-GW10D-1019	WI-CV-GW11S-1019	WI-CV-GW11M-1019	WI-CV-GW12D-1019	WI-CV-GW13S-1019
Sample Screen Interval (feet bgs)			182-192	144.2-154.2	191.3-201.3	130-140	155-165	182.6-192.6	104.7-114.7
Sample Date			10/18/19	10/18/19	10/18/19	10/22/19	10/22/19	10/18/19	10/18/19
Sample Type			Field Duplicate	Parent	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	**10.3**	**3.04 J**	0.42 U	0.49 U	0.46 U	0.44 U	**2.61 J**
Perfluorooctane Sulfonate (PFOS)	70	40	0.85 U	0.89 U	0.83 U	**1.27 J**	**0.77 J**	0.88 U	**1.82 J**
Perfluorooctanoic acid (PFOA)	70	40	**1.76 J**	1.34 U	1.25 U	1.46 U	**0.65 J**	1.32 U	1.39 U

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location.

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

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Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW13M	WI-CV-MW14M	WI-CV-MW15S	WI-CV-MW15M	WI-CV-MW16S	WI-CV-MW16M	WI-CV-MW17M
Sample ID			WI-CV-GW13M-1019	WI-CV-GW14M-1019	WI-CV-GW15S-1019	WI-CV-GW15M-1019	WI-CV-GW16S-1019	WI-CV-GW16M-1019	WI-CV-GW17M-1119
Sample Screen Interval (feet bgs)			172.5-182.5	161-171	132-142	164-174	130-140	164-174	150-160
Sample Date			10/17/19	10/16/19	10/16/19	10/16/19	10/16/19	10/16/19	11/8/19
Sample Type			Parent	Parent	Parent	Parent	Parent	Parent	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	**88.6**	**32.3**	**16.3**	**8.12**	**18.9**	**24.1**	**1.12 J**
Perfluorooctane Sulfonate (PFOS)	70	40	0.98 U	**0.48 J**	**0.61 J**	0.91 U	**2.79 J**	**4.93**	0.91 U
Perfluorooctanoic acid (PFOA)	70	40	**23.6**	**68.6**	**102**	**5.35**	**212**	**181**	1.36 U

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

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WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW20S	WI-CV-MW21S		WI-CV-MW22S	WI-CV-MW23S		WI-CV-MW25M-R
Sample ID			WI-CV-GW20S-1119	WI-CV-GW21S-1119	WI-CV-GW21SP-1119	WI-CV-GW22S-1119	WI-CV-GW23S-1119	WI-CV-GW23SP-1119	WI-CV-GW25M-R-1219
Sample Screen Interval (feet bgs)			100-110	107-117	107-117	112-122	130-140	130-140	150-160
Sample Date			11/11/19	11/13/19	11/13/19	11/11/19	11/13/19	11/13/19	12/10/19
Sample Type			Parent	Parent	Field Duplicate	Parent	Parent	Field Duplicate	Parent
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	600	**12.4**	**24.2 J**	**24.2 J**	**0.2 J**	**2.21 J**	**2.14 J**	**26.8**
Perfluorooctane Sulfonate (PFOS)	70	40	**30.4**	**165 J**	**154 J**	0.83 U	**202 J**	**213 J**	0.98 U
Perfluorooctanoic acid (PFOA)	70	40	**67.8 J-**	**4.85 J**	**4.76 J**	1.25 U	**4.47 J**	**3.49 J**	**174**

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location.

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

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D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-4. Summary of Monitoring Well Groundwater Sampling Results

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	**USEPA Lifetime Health Advisory (May 2016) (ng/L)**	**Tap Water SLs (ng/L)[a]**	WI-CV-MW26D	WI-CV-MW28M		WI-CV-MW29M	WI-CV-MW30M	WI-CV-MW31M
Sample ID			WI-CV-GW26D-1119	WI-CV-GW28M-0320	WI-CV-GW28MP-0320	WI-CV-GW29M-0320	WI-CV-GW30M-0320	WI-CV-GW31M-0320
Sample Screen Interval (feet bgs)			189.5-199.5	160-170	160-170	160-170	160-170	140-150
Sample Date			11/12/19	3/18/20	3/18/20	3/17/20	3/17/20	3/17/20
Sample Type			Parent	Parent	Field Duplicate	Parent	Parent	Parent
Chemical Name								
Perfluorobutanesulfonic acid (PFBS)	--	600	**6.2**	**73.0**	**75.5**	**25.6**	0.44 U	0.43 U
Perfluorooctane Sulfonate (PFOS)	70	40	0.91 U	1.02 U	2.05 U	0.82 U	0.88 U	0.86 U
Perfluorooctanoic acid (PFOA)	70	40	**33.4**	**55.5**	**55.8**	**65.2**	1.32 U	1.29 U

Notes:

[a]SLs for PFOA and PFOS are based on an HQ of 0.1 and were generated using the USEPA RSL calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD, 2019). The SL for PFBS is consistent with USEPA's May 2021 RSL table (USEPA, 2021).

All results displayed in ng/L.

Bolded text indicates detection.

Shading indicates exceedance of United States Environmental Protection Agency (USEPA) lifetime health advisory.

Underlined text indicates exceedance of USEPA Tapwater RSL, HQ = 1.0.

P in the sample ID indicates that a duplicate was collected at this location

Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.

-- = no screening criteria available

CV = Coupeville

D = deep screen interval

bgs = below ground surface

GW = groundwater

HQ = hazard quotient

ID - identfication

J = Analyte present. Value may or may not be accurate or precise.

J- = Analyte present. Value may be biased low. Value may be higher.

M = intermediate screen interval

MW = monitoring well

ng/L = nanograms per liter

RSL = regional screening level

S = shallow screen interval

U = The material was analyzed for, but not detected.

UJ = Analyte not detected, quantitation limit may be inaccurate.

USEPA = United States Environmental Protection Agency

WI = Whidbey Island

Table 4-5. Summary of Groundwater Elevations

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Monitoring Well ID	TOC Elevation (feet NAVD88)	Round 1 11/14/2019		Round 2 04/15/2020		Round 2 04/16/2020	
		DTW (feet btoc)	GWE (feet NAVD88)	DTW (feet btoc)	GWE (feet NAVD88)	DTW (feet btoc)	GWE (feet NAVD88)
WI-CV-MW01D	194.58	141.01	53.57	140.90	53.68	--	--
WI-CV-MW01M	194.61	123.75	70.86	124.22	70.39	--	--
WI-CV-MW02M	193.11	123.31	69.80	123.55	69.56	--	--
WI-CV-MW02S	193.17	93.50	99.67	93.45	99.72	--	--
WI-CV-MW03D	193.07	142.70	50.37	141.48	51.59	--	--
WI-CV-MW03M	193.14	123.02	70.12	123.83	69.31	--	--
WI-CV-MW03S	193.08	122.96	70.12	123.81	69.27	--	--
WI-CV-MW04M	193.19	123.82	69.37	123.90	69.29	--	--
WI-CV-MW04S	193.20	107.87	85.33	106.85	86.35	--	--
WI-CV-MW05M	190.64	122.96	67.68	123.67	66.97	--	--
WI-CV-MW05S	190.38	120.67	69.71	121.37	69.01	--	--
WI-CV-MW06M	197.87	146.59	51.28	146.60	51.27	--	--
WI-CV-MW06S	197.97	134.78	63.19	134.80	63.17	--	--
WI-CV-MW07M	199.57	131.12	68.45	--	--	130.12	69.45
WI-CV-MW07S	200.02	126.99	73.03	--	--	126.93	73.09
WI-CV-MW08M	205.21	121.87	83.34	--	--	122.46	82.75
WI-CV-MW08S	205.17	118.21	86.96	--	--	118.64	86.53
WI-CV-MW09M	187.23	125.63	61.60	125.95	61.28	--	--
WI-CV-MW09S	187.15	109.06	78.09	109.08	78.07	--	--
WI-CV-MW10D	188.25	141.26	46.99	--	--	141.22	47.03
WI-CV-MW10M	188.33	135.92	52.41	--	--	136.17	52.16
WI-CV-MW11M	202.14	131.65	70.49	--	--	131.03	71.11
WI-CV-MW11S	202.01	130.76	71.25	--	--	130.69	71.32
WI-CV-MW12D	186.85	160.79	26.06	--	--	160.85	26.00
WI-CV-MW12S	186.97	106.14	80.83	--	--	106.15	80.82
WI-CV-MW13M	189.11	126.92	62.19	127.27	61.84	--	--
WI-CV-MW13S	189.28	110.70	78.58	111.40	77.88	--	--
WI-CV-MW14M	191.61	123.31	68.30	124.17	67.44	--	--
WI-CV-MW15M	193.35	125.82	67.53	126.76	66.59	--	--
WI-CV-MW15S	192.92	125.19	67.73	126.35	66.57	--	--
WI-CV-MW16M	192.27	126.52	65.75	127.60	64.67	--	--
WI-CV-MW16S	192.16	126.22	65.94	127.48	64.68	--	--
WI-CV-MW17M	201.98	130.24	71.74	130.80	71.18	--	--
WI-CV-MW20S	194.00	93.19	100.81	93.45	100.55	--	--
WI-CV-MW21S	196.25	104.07	92.18	96.80	99.45	--	--
WI-CV-MW22S	188.03	114.15	73.88	115.67	72.36	--	--
WI-CV-MW23S	192.62	125.01	67.61	124.68	67.94	--	--
WI-CV-MW25M-R	192.33	--	--	124.22	68.11	--	--
WI-CV-MW26D	190.96	144.05	46.91	143.86	47.10	--	--
WI-CV-MW28M	189.08	--	--	125.44	63.64	--	--
WI-CV-MW29M	189.56	--	--	128.08	61.48	--	--

Table 4-5. Summary of Groundwater Elevations

Supplemental Site Inspection Report

Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Monitoring Well ID	TOC Elevation (feet NAVD88)	Round 1 11/14/2019		Round 2 04/15/2020		Round 2 04/16/2020	
		DTW (feet btoc)	GWE (feet NAVD88)	DTW (feet btoc)	GWE (feet NAVD88)	DTW (feet btoc)	GWE (feet NAVD88)
WI-CV-MW30M	193.72	--	--	125.97	67.75	--	--
WI-CV-MW31M	193.33	--	--	123.52	69.81	--	--
WI-CV-MW31S	193.34	--	--	dry	n/a	--	--
Keystone Hill Well	194.74	--	--	--	--	--	--

Notes:

-- = data not collected/available

btoc = below top of casing

CV = Coupeville

D = deep screen interval

DTW = depth to water

NAVD88 = North American Vertical Datum of 1988

GWE = groundwater elevation

M = intermediate screen interval

MW = monitoring well

n/a = not applicable

R = replacement

S = shallow screen interval

TOC = top of casing

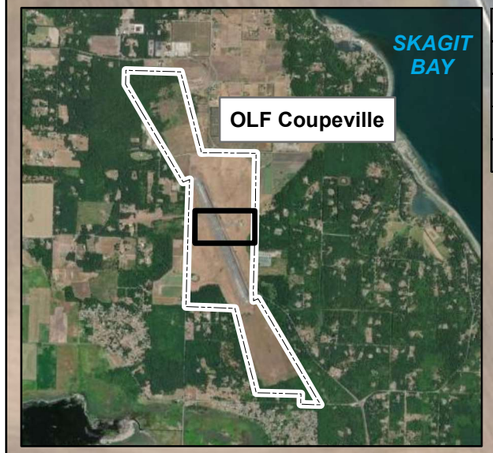
WI = Whidbey Island

Table 4-6. Vertical Hydraulic Gradient Calculations
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field, Coupeville, Washington

Well ID	Date	Depth to Water (feet bgs)	TOC Elevation (feet NAVD88)	Total Well Depth (feet btoc)	GWE (feet NAVD88)	Change in Head (feet)	Distance between center point of well screens (feet)	Screen Top Depth (feet btoc)	Screen Bottom Depth (feet btoc)	Screen Length (feet)	Center Point of Screen (feet NAVD88)	Vertical Hydraulic Gradient
WI-CV-MW01M	April 2020	124.22	194.61	163.36	70.39			148.00	158.00	10.00	153.00	
WI-CV-MW01D	April 2020	140.90	194.58	217.42	53.68	16.71	54.00	202.00	212.00	10.00	207.00	0.3094
WI-CV-MW02S	April 2020	93.45	193.17	110.00	99.72			95.00	105.00	10.00	100.00	
WI-CV-MW02M	April 2020	123.55	193.11	167.96	69.56	30.16	57.50	152.50	162.50	10.00	157.50	0.5245
WI-CV-MW03S	April 2020	123.81	193.07	132.80	69.27			120.00	130.00	10.00	125.00	
WI-CV-MW03M	April 2020	123.83	193.14	160.36	69.31	-0.04	25.00	145.00	155.00	10.00	150.00	-0.00168
WI-CV-MW03D	April 2020	141.48	193.07	237.43	51.59	17.72	77.00	222.00	232.00	10.00	227.00	0.2301
WI-CV-MW04S	April 2020	106.85	193.20	126.93	86.35			112.00	122.00	10.00	117.00	
WI-CV-MW04M	April 2020	123.90	193.19	159.05	69.29	17.06	38.00	150.00	160.00	10.00	155.00	0.4489
WI-CV-MW05S	April 2020	121.37	190.38	124.56	69.01			114.00	124.00	10.00	119.00	
WI-CV-MW05M	April 2020	123.67	190.64	175.35	66.97	2.04	46.00	160.00	170.00	10.00	165.00	0.0443
WI-CV-MW06S	April 2020	134.80	197.97	140.43	63.17			130.00	140.00	10.00	135.00	
WI-CV-MW06M	April 2020	146.60	197.87	189.51	51.27	11.90	44.00	174.00	184.00	10.00	179.00	0.2705
WI-CV-MW07S	April 2020	126.93	200.02	145.02	73.09			130.00	140.00	10.00	135.00	
WI-CV-MW07M	April 2020	130.12	199.57	193.75	69.45	3.64	48.00	178.00	188.00	10.00	183.00	0.0758
WI-CV-MW08S	April 2020	118.64	205.17	131.26	86.53			120.00	130.00	10.00	125.00	
WI-CV-MW08M	April 2020	122.46	205.21	165.21	82.75	3.78	30.00	150.00	160.00	10.00	155.00	0.1260
WI-CV-MW09S	April 2020	109.08	187.15	110.92	78.07			94.00	104.00	10.00	99.00	
WI-CV-MW09M	April 2020	125.95	187.23	197.33	61.28	16.79	88.00	182.00	192.00	10.00	187.00	0.1908
WI-CV-MW10M	April 2020	136.17	188.33	159.45	52.16			140.00	150.00	10.00	145.00	
WI-CV-MW10D	April 2020	141.22	188.25	206.67	47.03	5.13	51.00	191.00	201.00	10.00	196.00	0.1006
WI-CV-MW11S	April 2020	130.69	202.01	140.43	71.32			130.00	140.00	10.00	135.00	
WI-CV-MW11M	April 2020	131.03	202.14	170.43	71.11	0.21	25.00	155.00	165.00	10.00	160.00	0.0084
WI-CV-MW13S	April 2020	111.40	189.28	114.98	77.88			104.00	114.00	10.00	109.00	
WI-CV-MW13M	April 2020	127.27	189.11	187.76	61.84	16.04	68.50	172.50	182.50	10.00	177.50	0.2342
WI-CV-MW15S	April 2020	126.35	192.92	148.17	66.57			132.00	142.00	10.00	137.00	
WI-CV-MW15M	April 2020	126.76	193.35	178.90	66.59	-0.02	32.00	164.00	174.00	10.00	169.00	-0.0006
WI-CV-MW16S	April 2020	127.48	192.16	144.9	64.68			130.00	140.00	10.00	135.00	
WI-CV-MW16M	April 2020	127.60	192.27	179.92	64.67	0.01	34.00	164.00	174.00	10.00	169.00	0.0002

Notes:
Vertical hydraulic gradients are calculated as shallow minus deep water elevations divided by difference in shallow minus deep center point of screens; therefore, positive values indicate downward gradients and negative values indicate upward gradients.
bgs= below ground surface
btoc = below top of casing
CV = Coupeville
D = deep screen interval
GWE = groundwater elevation
ID = identification
M = intermediate screen interval
MW = monitoring well
NAVD88 = North American Vertical Datum of 1988
S = shallow screen interval
TOC = top of casing
WI = Whidbey Island

\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_4-1_Summary_of_Soil_PFAS_Concentrations.mxd8/24/2020DRUCKC



SO03	9/12/19	9/13/19			
Depth (ft bgs)	2.0-3.0	26-27	57-58	72-73	91-92
PFBS	1.14 U	1.04 U	1.14 U	1.12 U	1.1 U
PFOS	**23.9**	1.04 U	**33.1**	1.12 U	1.1 U
PFOA	**71.7**	**1.9 J**	**74.7**	**2.95 J**	**1.44 J**

SO04	9/13/19	9/14/19			
Depth (ft bgs)	0.5-1.0	11-12	39-40	62-63	78-79
PFBS	1.08 U	1.04 U	1.15 U	1.18 U	1.12 U
PFOS	**802**	**136**	**6.49**	**102 J**	1.12 U
PFOA	**4.59 J**	**0.87 J**	1.15 U	**23.1 J**	**10.9**

SO01	9/15/19				
Depth (ft bgs)	0.5-1.0	12-13	38-39	70-71	92-93
PFBS	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U
PFOS	**8.47**	**34.7**	**9.89**	**478**	1.18 U
PFOA	1.11 U	1.12 U	1.01 U	**1.09 J**	**0.99 J**

SO06/BH21	9/6/19		9/8/19			
Depth (ft bgs)	0.5-1.0	3.0-4.0	24-25	49-50	70-71	96-97
PFBS	1.04 U	1.08 U	1.04 U	1.25 U	1.23 U	1.14 U
PFOS	**4.92 J**	**936**	**16.9**	**402**	**12.5**	1.14 U
PFOA	**0.96 J**	**2.41 J**	1.04 U	**8.34**	**1.64 J**	**9.47**

MW01D
MW03D
MW03S
MW03M
Facility 1
Vehicle Parking
Facility 2
FP Tank 11
Facility 11
MW21S
MW20S
Building 2709
MW02M
MW02S
MW31M
MW31S

SO05/BH20	10/22/19	10/23/19			
Depth (ft bgs)	1.0-2.0	23-24	41-42	79-80	94-95
PFBS	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U
PFOS	**101**	**19.9 J**	**60**	2.04 U	2.52 U
PFOA	**4.1 J**	2.15 U	2.17 U	2.04 U	2.52 U

SO02	8/15/19			8/16/19	
Depth (ft bgs)	0.5-1.0	24-25	48-49	73-75	92-93
PFBS	1.09 U	1.07 U	1.06 U	1.12 U	1.18 U
PFOS	**51.3**	1.07 U	**44.8**	**20.1**	**5.37 J**
PFOA	1.09 U	1.07 U	**3.85 J**	1.62 U	1.18 U

Notes:

Bolded text indicates detection.

Shading indicates exceedance of USEPA SSLs derived from RSLs for soil leaching to groundwater.

USEPA SSLs derived from RSLs for soil leaching to groundwater are as follows: PFBS - 13 µg/kg; PFOS - 0.0178 µg/kg; PFOA - 0.0172 µg/kg.

Where applicable, the higher concentration between the primary and field duplicate samples is shown.

ft bgs = feet below ground surface

J = Analyte detected, concentration is estimated

LHA = lifetime health advisory

OLF = Outlying Landing Field

PFAS = per- and polyfluoroalkyl substances

PFBS = perfluorobutanesulfonic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

RSL = regional screening level

SSL = soil screening level

U = not detected

USEPA = United States Environmental Protection Agency

units = micrograms per kilogram (µg/kg)

Legend

- Shallow Elevation Interval Monitoring Well
- Middle Elevation Interval Monitoring Well
- Deep Elevation Interval Monitoring Well
- Soil Boring
- Building/Structure Location

N

0 75 150 Feet

1 inch = 150 feet

Imagery Source: Esri

Figure 4-1
Summary of Soil PFAS Concentrations
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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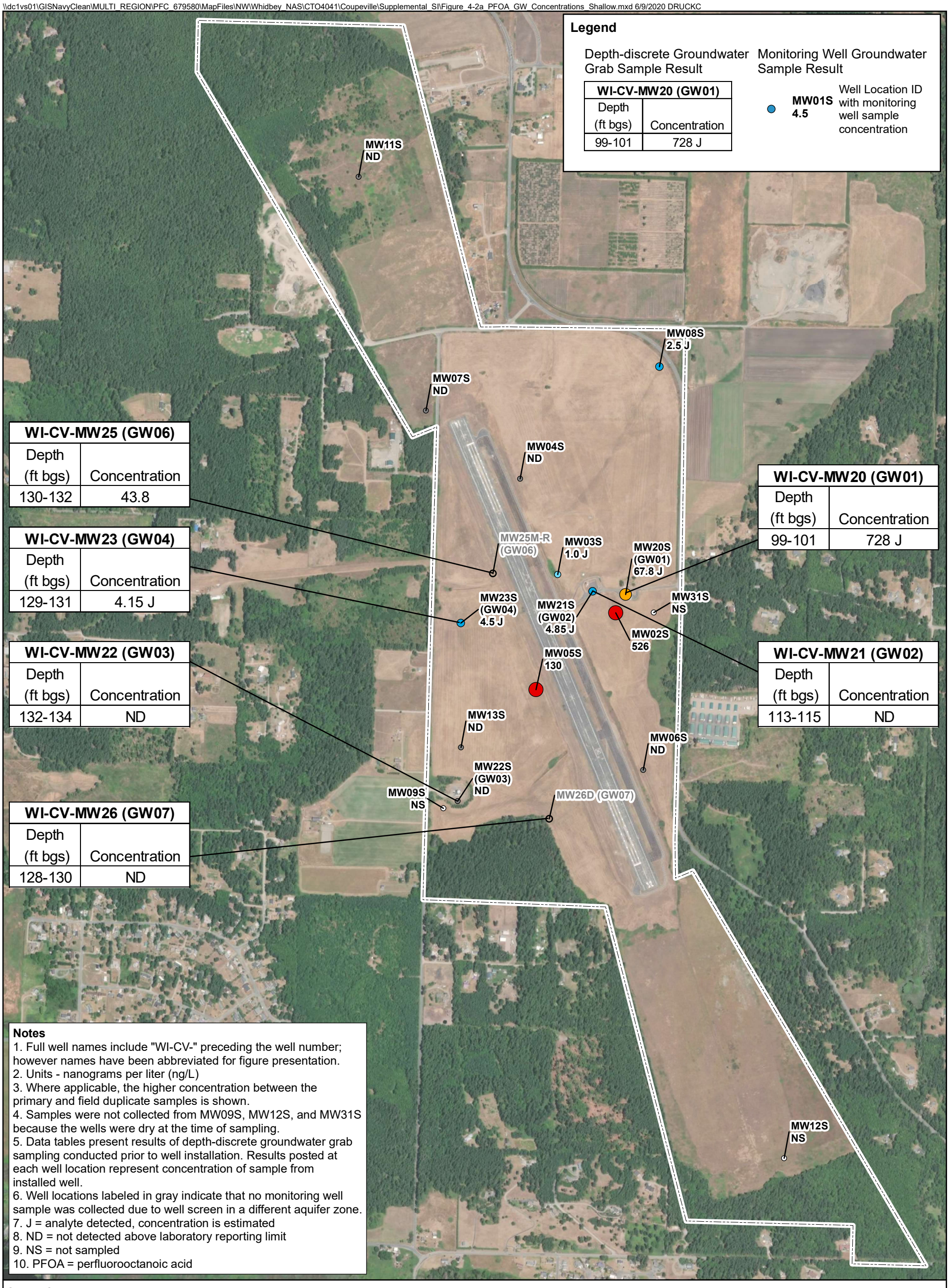

Legend

Base Boundary

PFOA concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-2a
PFOA Concentrations in Groundwater - Shallow Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

MW11M 0.65 J

MW08M ND

MW17M ND

MW15M 5.35

MW04M 1.19 J

MW16M 181

MW15S 102

MW16S 212

MW14M 68.6

MW01M 0.93 J

MW03M ND

MW20S (GW01)

MW25M-R (GW06) 174

MW21S (GW02)

MW31M ND

MW02M ND

MW23S (GW04)

MW28M 55.8

MW05M 357

MW30M ND

MW29M 65.2

MW06M ND

MW22S (GW03)

MW26D (GW07)

MW10M ND

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
154-156	182

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
146-148	ND
167-169	ND

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
163-165	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
167-169	32.6 J

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
140-142	ND

WI-CV-MW21 (GW02)	
Depth (ft bgs)	Concentration
159-161	ND

Notes

1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFOA = perfluorooctanoic acid

Legend

Base Boundary

PFOA concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-2b
PFOA Concentrations in Groundwater - Intermediate Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
206-208	ND

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
195-197	ND

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
179-181	ND
192-194	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
192-194	45.6 J

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
190-192	13.1 J

MW07M 0.71 J
MW25M-R (GW06)
MW01D ND
MW03D ND
MW23S (GW04)
MW20S (GW01)
MW13M 23.6
MW22S (GW03)
MW26D (GW07) 33.4
MW09M 1.76 J
MW10D ND
MW12D ND

Notes
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFOA = perfluorooctanoic acid

Legend

Base Boundary

PFOA concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-2c
PFOA Concentrations in Groundwater - Deep Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

MW11S 1.27 J

MW08S ND

MW07S ND

MW04S 0.89 J

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
130-132	13.4

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
129-131	ND

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
132-134	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
128-130	ND

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	380 J

WI-CV-MW21 (GW02)	
Depth (ft bgs)	Concentration
113-115	4.55 J

MW25M-R (GW06)

MW03S ND

MW20S (GW01) 30.4

MW21S (GW02) 165 J

MW31S NS

MW23S (GW04) 213 J

MW02S 97.3 J

MW05S 3.47 J

MW13S 1.82 J

MW06S ND

MW22S (GW03) ND

MW09S NS

MW26D (GW07)

MW12S NS

Notes
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.
5. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
6. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
7. J = analyte detected, concentration is estimated
8. ND = not detected above laboratory reporting limit
9. NS = not sampled
10. PFOS = perfluorooctane sulfonate

Legend

Base Boundary

PFOS concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-3a
PFOS Concentrations in Groundwater - Shallow Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

MW11M 0.77 J

MW08M 1.77 J

MW17M ND

MW04M ND

MW15M ND

MW15S 0.61 J

MW16M 4.93

MW16S 2.79 J

MW14M 0.48 J

MW01M ND

MW03M ND

MW20S (GW01)

MW25M-R (GW06) ND

MW21S (GW02)

MW31M ND

MW02M ND

MW23S (GW04)

MW28M 2.05 J

MW05M 1.39 J

MW30M ND

MW29M 0.46 J

MW06M ND

MW22S (GW03)

MW26D (GW07)

MW10M ND

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
154-156	4.02 J

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
140-142	4.11 J

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
146-148	ND
167-169	ND

WI-CV-MW21 (GW02)	
Depth (ft bgs)	Concentration
159-161	0.38 J

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
163-165	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
167-169	ND

Notes

1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFOS = perfluorooctane sulfonate

Legend

Base Boundary

PFOS concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-3b
PFOS Concentrations in Groundwater - Intermediate Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

MW07M
ND

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
206-208	2.0 J

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
195-197	ND

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
179-181	ND
192-194	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
192-194	0.72 J

MW25M-R (GW06)
MW03D ND
MW01D 0.44 J
MW20S (GW01)
MW23S (GW04)
MW13M ND
MW22S (GW03)
MW26D (GW07) ND
MW09M ND
MW10D ND
MW12D ND

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
190-192	18.5 J

Notes
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFOS = perfluorooctane sulfonate

Legend

Base Boundary

PFOS concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-3c
PFOS Concentrations in Groundwater - Deep Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

MW11S ND

MW08S 0.71 J

MW07S 0.31 J

MW04S ND

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
130-132	12.6

MW25M-R (GW06)

MW03S 50.0

MW20S (GW01) 12.4

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	107 J

MW31S NS

MW21S (GW02) 24.2 J

MW02S 184

WI-CV-MW21 (GW02)	
Depth (ft bgs)	Concentration
113-115	16.4 J

MW05S 169 J

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
132-134	ND

MW13S 2.61 J

MW06S ND

MW22S (GW03) 0.2 J

MW09S NS

MW26D (GW07)

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
128-130	0.27 J

MW12S NS

Notes

1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Samples were not collected from MW09S, MW12S, and MW31S because the wells were dry at the time of sampling.
5. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
6. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
7. J = analyte detected, concentration is estimated
8. ND = not detected above laboratory reporting limit
9. NS = not sampled
10. PFBS = perfluorobutanesulfonic acid

Legend

Base Boundary

PFBS concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-4a
PFBS Concentrations in Groundwater - Shallow Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
154-156	36.0

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
129-131	12.6
146-148	0.16 J
167-169	0.2 J

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
163-165	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
167-169	24.5 J

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
140-142	1.41 J

WI-CV-MW21 (GW02)	
Depth (ft bgs)	Concentration
159-161	0.4 J

MW11M ND
MW08M 1.45 J
MW17M 1.12 J
MW04M ND
MW15M 8.12
MW16M 24.1
MW15S 16.3
KHW 18.7
MW16S 18.9
MW14M 32.3
MW01M ND
MW21S (GW02)
MW20S (GW01)
MW03M 0.14 J
MW25M-R (GW06) 26.8
MW02M ND
MW31M ND
MW23S (GW04) 2.21 J
MW05M 215
MW28M 75.5
MW30M ND
MW29M 25.6
MW06M ND
MW22S (GW03)
MW26D (GW07)
MW10M 3.04 J

Notes
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFBS = perfluorobutanesulfonic acid

Legend
- Keystone Well
- Base Boundary

PFBS concentration of monitoring well groundwater sample
- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-4b
PFBS Concentrations in Groundwater - Intermediate Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_4-4c_PFBS_GW_Concentrations_Deep.mxd 6/10/2020 DRUCKC

Legend

Depth-discrete Groundwater Grab Sample Result

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
99-101	728 J

Monitoring Well Groundwater Sample Result

MW01S 4.5 Well Location ID with monitoring well sample concentration

WI-CV-MW25 (GW06)	
Depth (ft bgs)	Concentration
206-208	1.33 J

WI-CV-MW23 (GW04)	
Depth (ft bgs)	Concentration
195-197	ND

WI-CV-MW22 (GW03)	
Depth (ft bgs)	Concentration
179-181	9.63
192-194	ND

WI-CV-MW26 (GW07)	
Depth (ft bgs)	Concentration
192-194	8.37 J

WI-CV-MW20 (GW01)	
Depth (ft bgs)	Concentration
190-192	ND

MW07M ND
MW25M-R (GW06)
MW01D ND
MW03D ND
MW23S (GW04)
MW20S (GW01)
MW13M 88.6
MW22S (GW03)
MW26D (GW07) 6.2
MW09M 10.3
MW10D ND
MW12D ND

Notes
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. Units - nanograms per liter (ng/L)
3. Where applicable, the higher concentration between the primary and field duplicate samples is shown.
4. Data tables present results of depth-discrete groundwater grab sampling conducted prior to well installation. Results posted at each well location represent concentration of sample from installed well.
5. Well locations labeled in gray indicate that no monitoring well sample was collected due to well screen in a different aquifer zone.
6. J = analyte detected, concentration is estimated
7. ND = not detected above laboratory reporting limit
8. PFBS = perfluorobutanesulfonic acid

Legend

Base Boundary

PFBS concentration of monitoring well groundwater sample

- Not Sampled
- Not Detected
- <2.0
- 2.1 - 5.0
- 5.1 - 10.0
- 10.1 - 40.0
- 40.1 - 70.0
- 70.1 - 100.0
- >100.1

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-4c
PFBS Concentrations in Groundwater - Deep Aquifer Zone
Supplemental Site Inspection Report
Naval Air Station Whidbey Island
Outlying Landing Field
Coupeville, Washington

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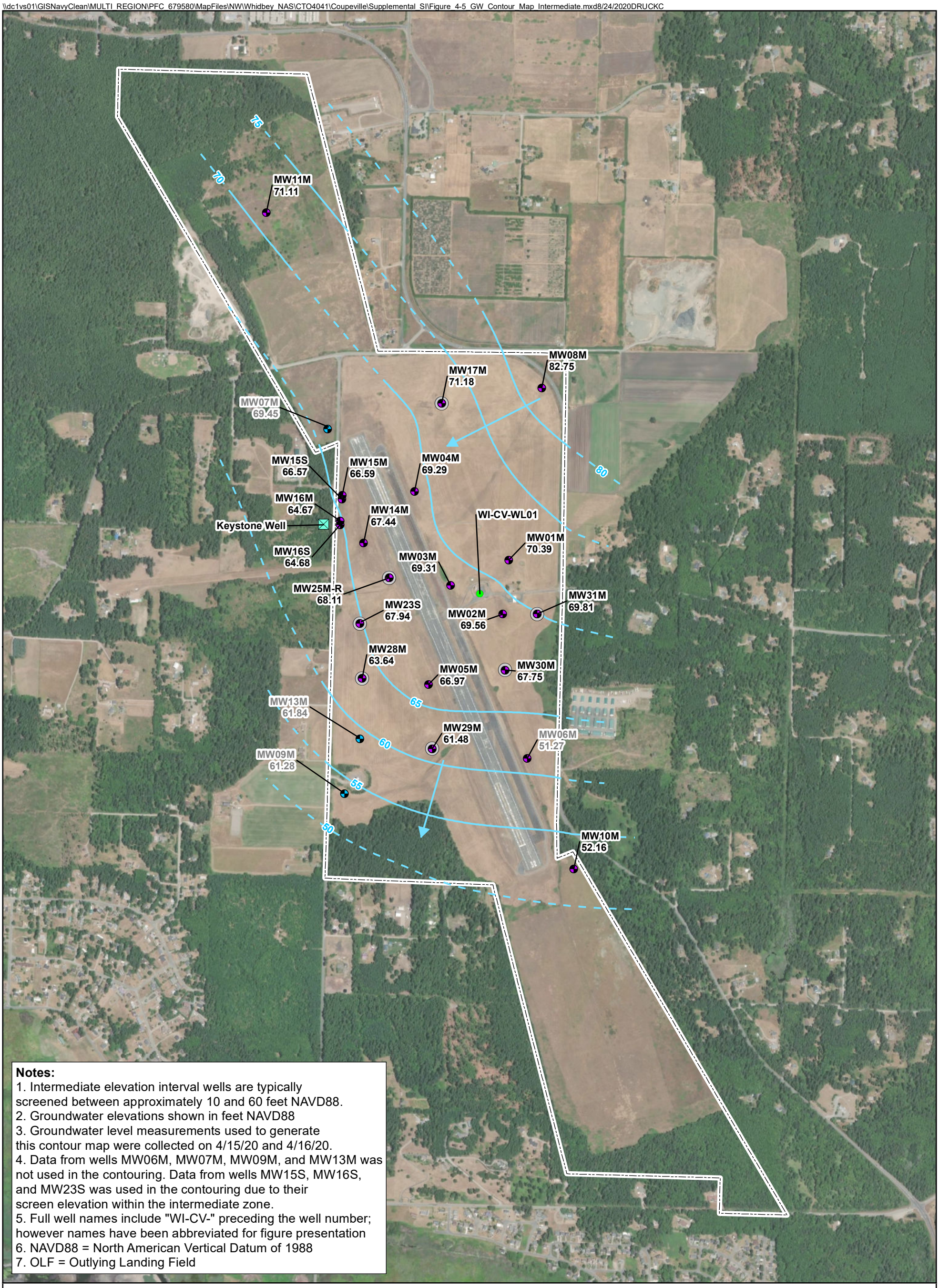
\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_4-5_GW_Contour_Map_Intermediate.mxd8/24/2020DRUCKC



Notes:
1. Intermediate elevation interval wells are typically screened between approximately 10 and 60 feet NAVD88.
2. Groundwater elevations shown in feet NAVD88
3. Groundwater level measurements used to generate this contour map were collected on 4/15/20 and 4/16/20.
4. Data from wells MW06M, MW07M, MW09M, and MW13M was not used in the contouring. Data from wells MW15S, MW16S, and MW23S was used in the contouring due to their screen elevation within the intermediate zone.
5. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation
6. NAVD88 = North American Vertical Datum of 1988
7. OLF = Outlying Landing Field

Legend
- 5-foot Contour Interval (dashed where inferred)
- Direction of Intermediate-Screened Interval Groundwater Flow
- Keystone Well
- Middle Elevation Interval Monitoring Well
- Deep Elevation Interval Monitoring Well
- Base Supply Well
- Supplemental Site Investigation Monitoring Well Installation
- Base Boundary

N

0 0.1 0.2 Miles

1 inch = 0.2 mile

Imagery Source: Esri

Figure 4-5
Groundwater Elevation Contour Map
Intermediate Elevation Interval
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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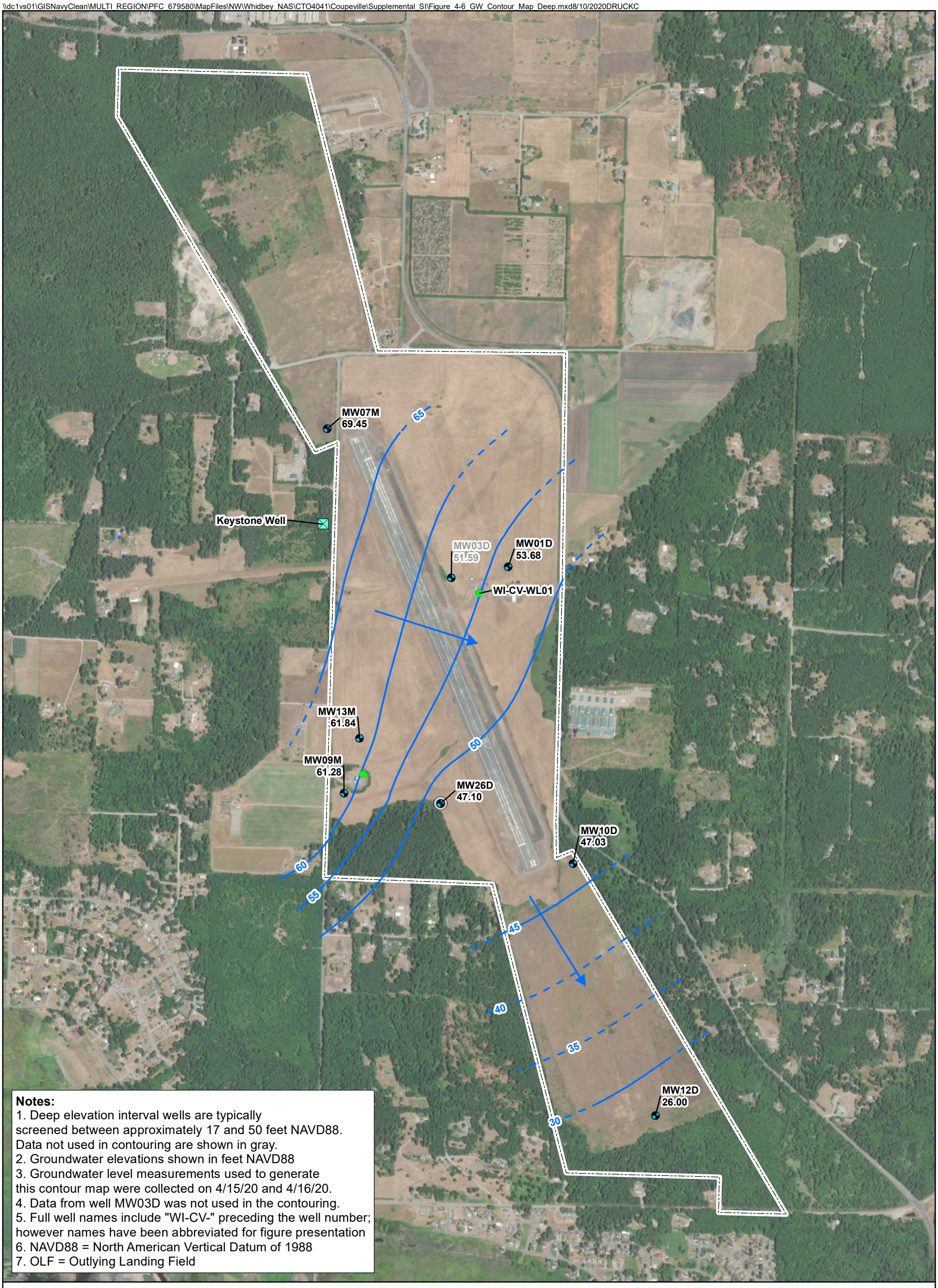
\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_4-6_GW_Contour_Map_Deep.mxd8/10/2020DRUCKC



Notes:
1. Deep elevation interval wells are typically screened between approximately 17 and 50 feet NAVD88. Data not used in contouring are shown in gray.
2. Groundwater elevations shown in feet NAVD88
3. Groundwater level measurements used to generate this contour map were collected on 4/15/20 and 4/16/20.
4. Data from well MW03D was not used in the contouring.
5. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation
6. NAVD88 = North American Vertical Datum of 1988
7. OLF = Outlying Landing Field

Legend
- 5-foot Contour Interval (dashed where inferred)
- Direction of Deep-Screened Interval Groundwater Flow
- Deep Elevation Interval Monitoring Well
- Keystone Well
- Base Supply Well
- Supplemental Site Investigation Monitoring Well Installation
- Base Boundary

N

0 0.1 0.2 Miles

1 inch = 0.2 mile

Imagery Source: Esri

Figure 4-6
Groundwater Elevation Contour Map
Deep Elevation Interval
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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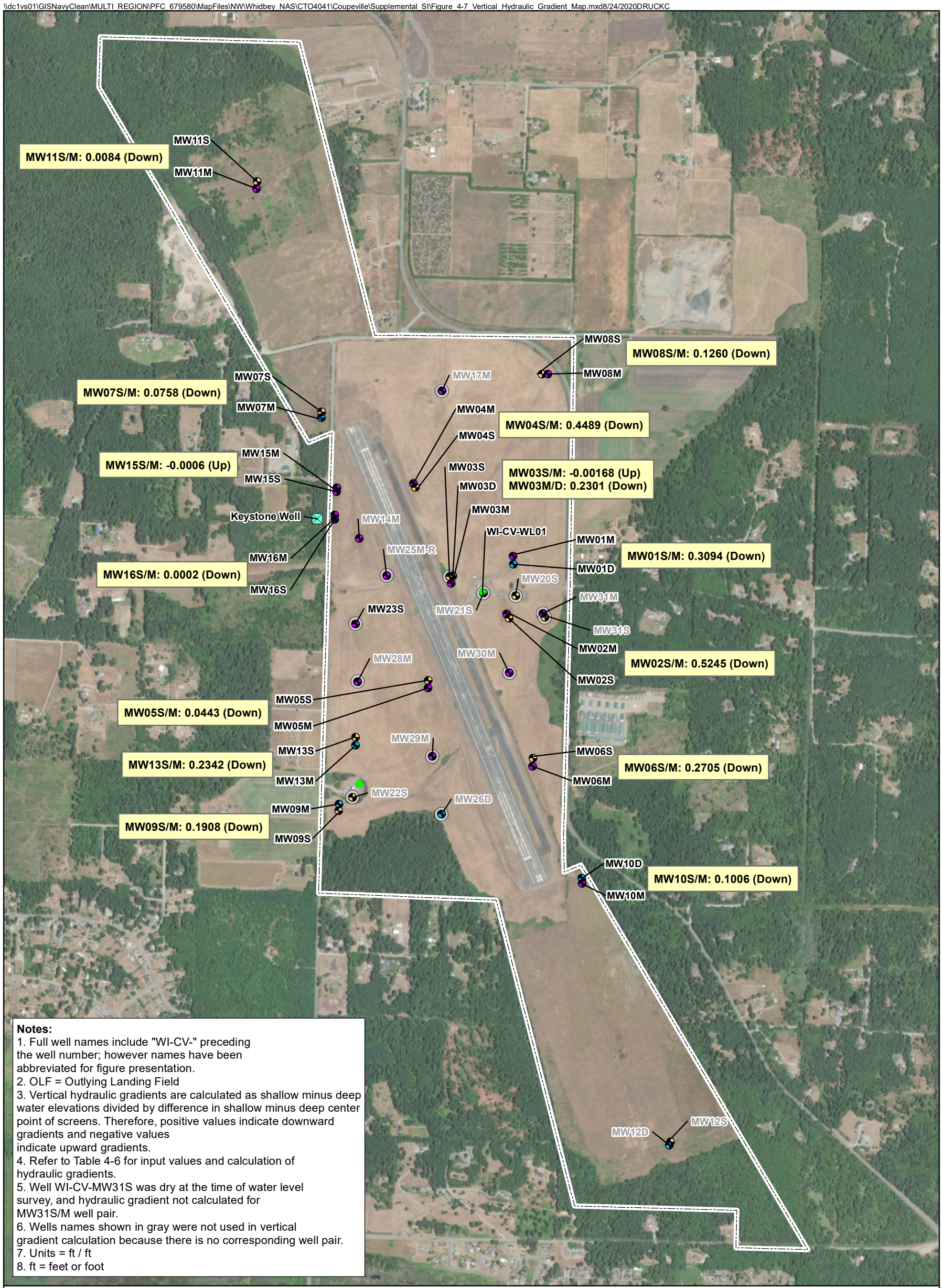
\\dc1vs01\GISNavyClean\MULTI_REGION\PFC_679580\MapFiles\NW\Whidbey_NAS\CTO4041\Coupeville\Supplemental_SI\Figure_4-7_Vertical_Hydraulic_Gradient_Map.mxd8/24/2020DRUCKC



Notes:
1. Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
2. OLF = Outlying Landing Field
3. Vertical hydraulic gradients are calculated as shallow minus deep water elevations divided by difference in shallow minus deep center point of screens. Therefore, positive values indicate downward gradients and negative values indicate upward gradients.
4. Refer to Table 4-6 for input values and calculation of hydraulic gradients.
5. Well WI-CV-MW31S was dry at the time of water level survey, and hydraulic gradient not calculated for MW31S/M well pair.
6. Wells names shown in gray were not used in vertical gradient calculation because there is no corresponding well pair.
7. Units = ft / ft
8. ft = feet or foot

Legend
- Shallow Elevation Interval Monitoring Well
- Middle Elevation Interval Monitoring Well
- Deep Elevation Interval Monitoring Well
- Keystone Well
- Base Supply Well
- Supplemental Site Investigation Monitoring Well Installation
- Base Boundary

N

0 500 1,000 Feet

1 inch = 1,000 feet

Imagery Source: Esri

Figure 4-7
Vertical Hydraulic Gradient Map
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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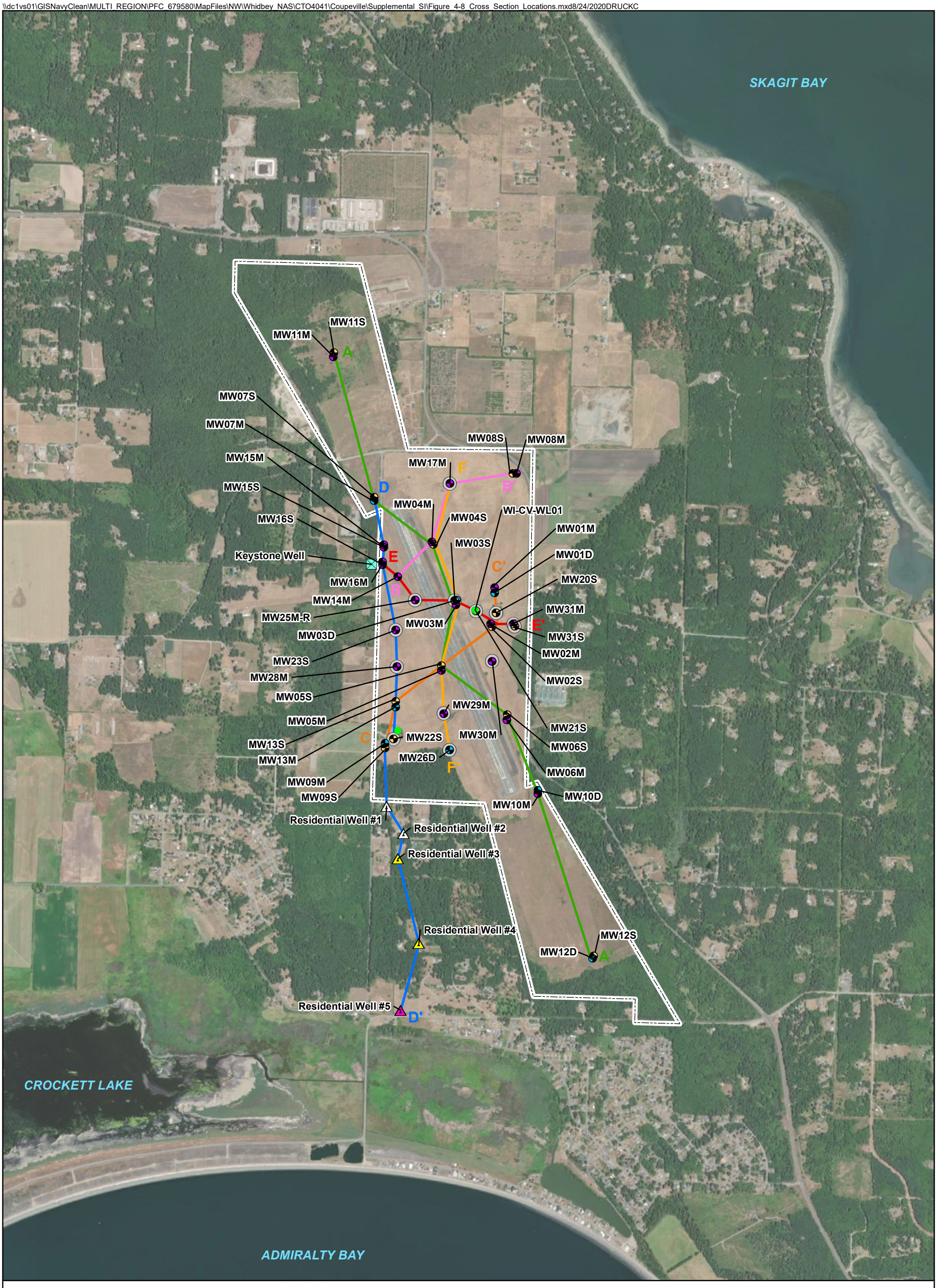

Legend

- Shallow Elevation Interval Monitoring Well
- Middle Elevation Interval Monitoring Well
- Deep Elevation Interval Monitoring Well
- Keystone Well
- Base Supply Well
- Supplemental Site Investigation Monitoring Well Installation

Well Depths

- < 60 ft bgs
- 151 - 200 ft bgs
- >201 ft bgs
- Base Boundary

Cross Sections

- A-A'
- B-B'
- C-C'
- D-D'
- E-E'
- F-F'

Note:
Full well names include "WI-CV-" preceding the well number; however names have been abbreviated for figure presentation.
OLF = Outlying Landing Field

N

0 0.15 0.3 Miles

1 inch = 0.3 mile

Imagery Source: Esri

Figure 4-8
Cross Section Locations
Supplemental Site Inspection Report
Naval Air Station Whidbey Island - Outlying Landing Field
Coupeville, Washington

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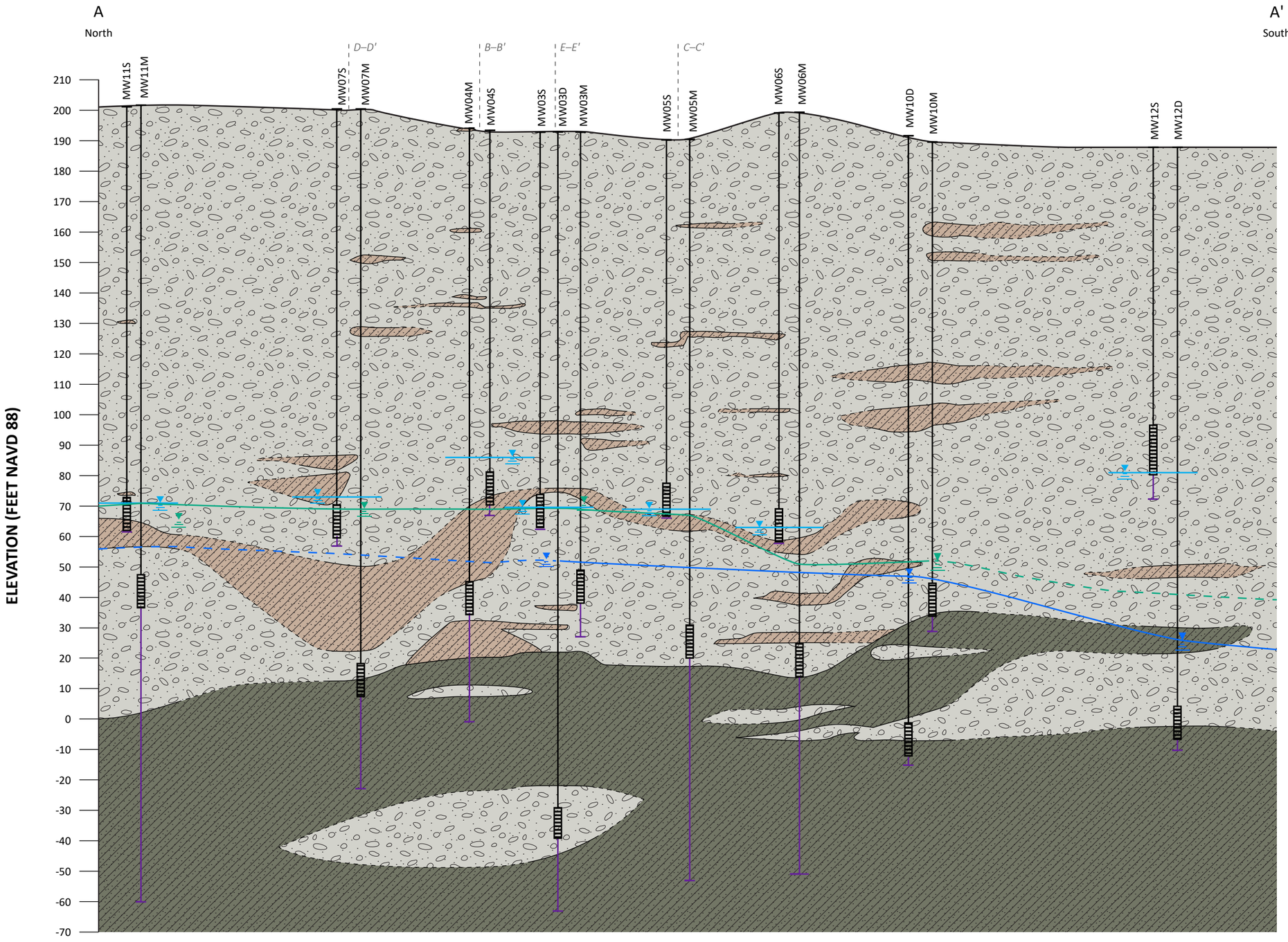


LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)
- Potentiometric Surface Deep-Screened Interval (April 2020)

Wells

MW00X
- Boring Identification Number
- Permanent Monitoring Well
- Well Screen
- Portion of Boring Completed for Lithology Only

0 .25 .5

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.
2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.
3. Geologic contacts are dashed where inferred.
4. Shallow water elevations are presumed to be noncontinuous, perched water tables.
5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.
6. NAVD 88 = North American Vertical Datum of 1988

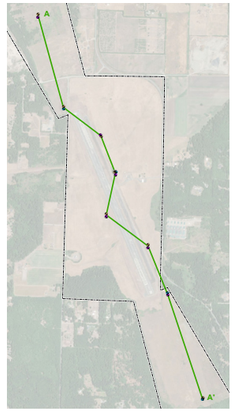
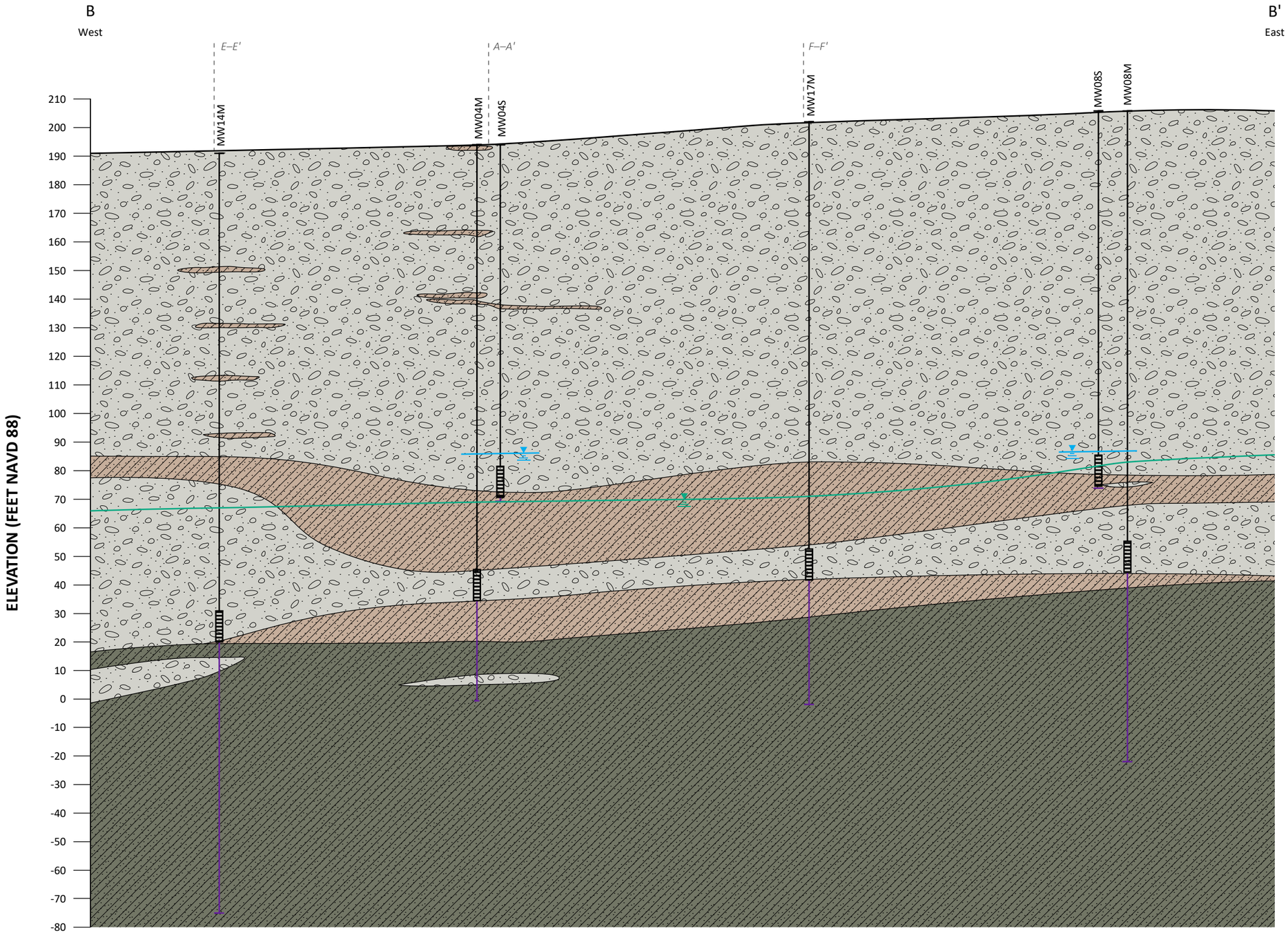


Figure 4-9
Geologic Cross Section A–A'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .0625 .125

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.
2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.
3. Geologic contacts are dashed where inferred.
4. Shallow water elevations are presumed to be noncontinuous, perched water tables.
5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.
6. NAVD 88 = North American Vertical Datum of 1988

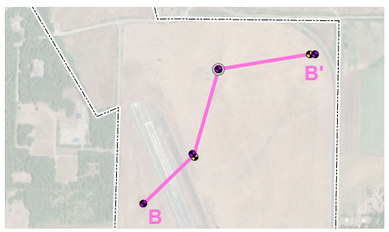
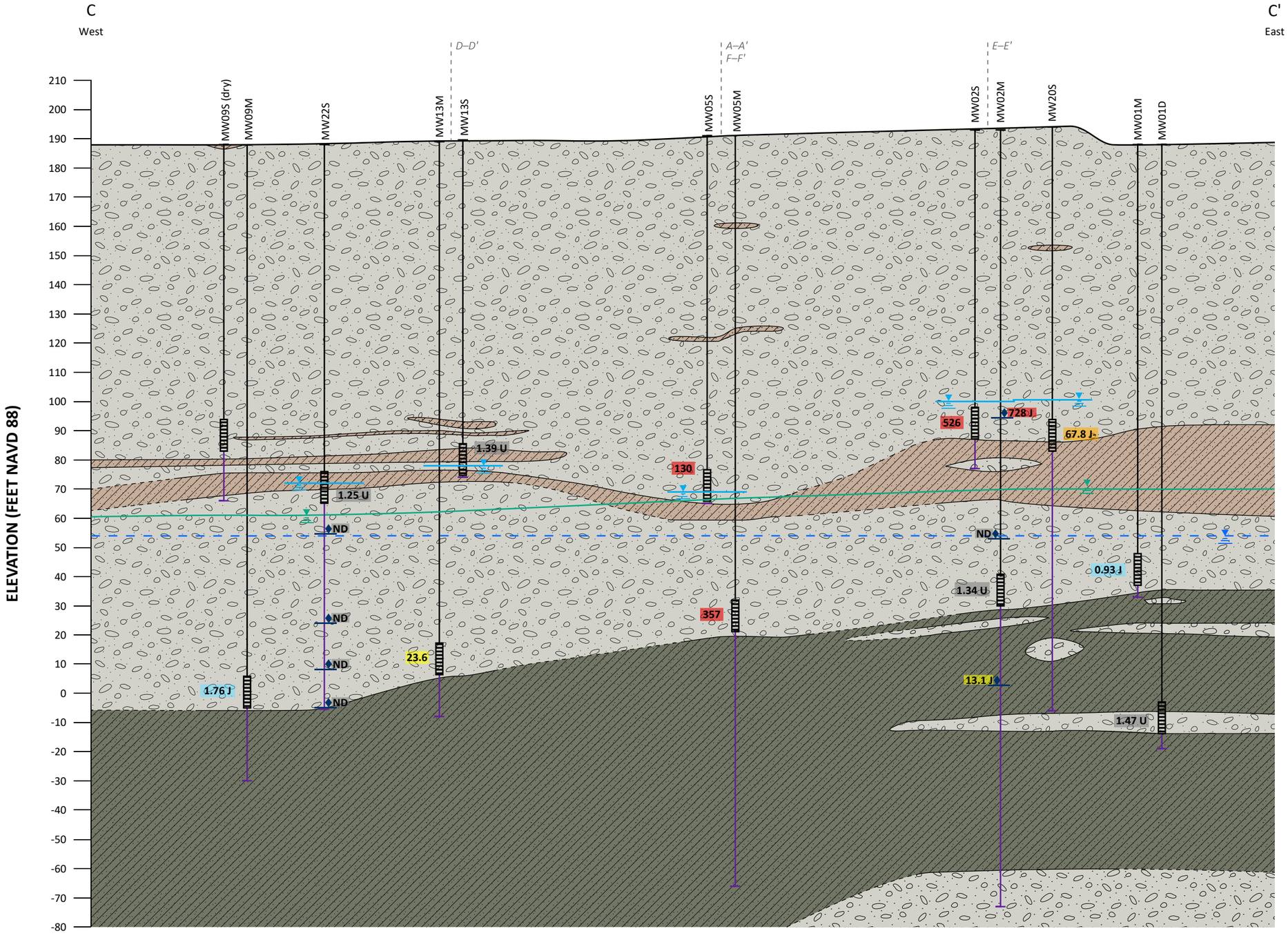


Figure 4-10
Geologic Cross Section B–B'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)
- Potentiometric Surface Deep-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .0625 .125

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.
2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.
3. Geologic contacts are dashed where inferred.
4. Shallow water elevations are presumed to be noncontinuous, perched water tables.
5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.
6. NAVD 88 = North American Vertical Datum of 1988

PFOA Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

J- Analyte present. Value may be biased low. Value may be higher.

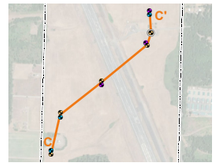


Figure 4-11
PFOA – Geologic Cross Section C–C'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington

C

West

C'

East

D–D'

A–A'
F–F'

E–E'

MW09S (dry)
MW09M
MW22S
MW13M
MW13S
MW05S
MW05M
MW02S
MW02M
MW20S
MW01M
MW01D

ELEVATION (FEET NAVD 88)

210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80

0.85 U
ND
ND
ND
ND
0.83 U
1.82 J
0.98 U
3.47 J
1.39 J
4.11 J
0.89 U
18.5 J
97.3 J
380 J
30.4
0.98 U
0.44 J

LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)
- Potentiometric Surface Deep-Screened Interval (April 2020)

Wells

MW00X
- Boring Identification Number
- Permanent Monitoring Well
- Well Screen
- Portion of Boring Completed for Lithology Only

0 .0625 .125

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.

2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

3. Geologic contacts are dashed where inferred.

4. Shallow water elevations are presumed to be noncontinuous, perched water tables.

5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.

6. NAVD 88 = North American Vertical Datum of 1988

PFOS Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

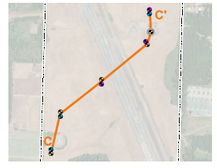
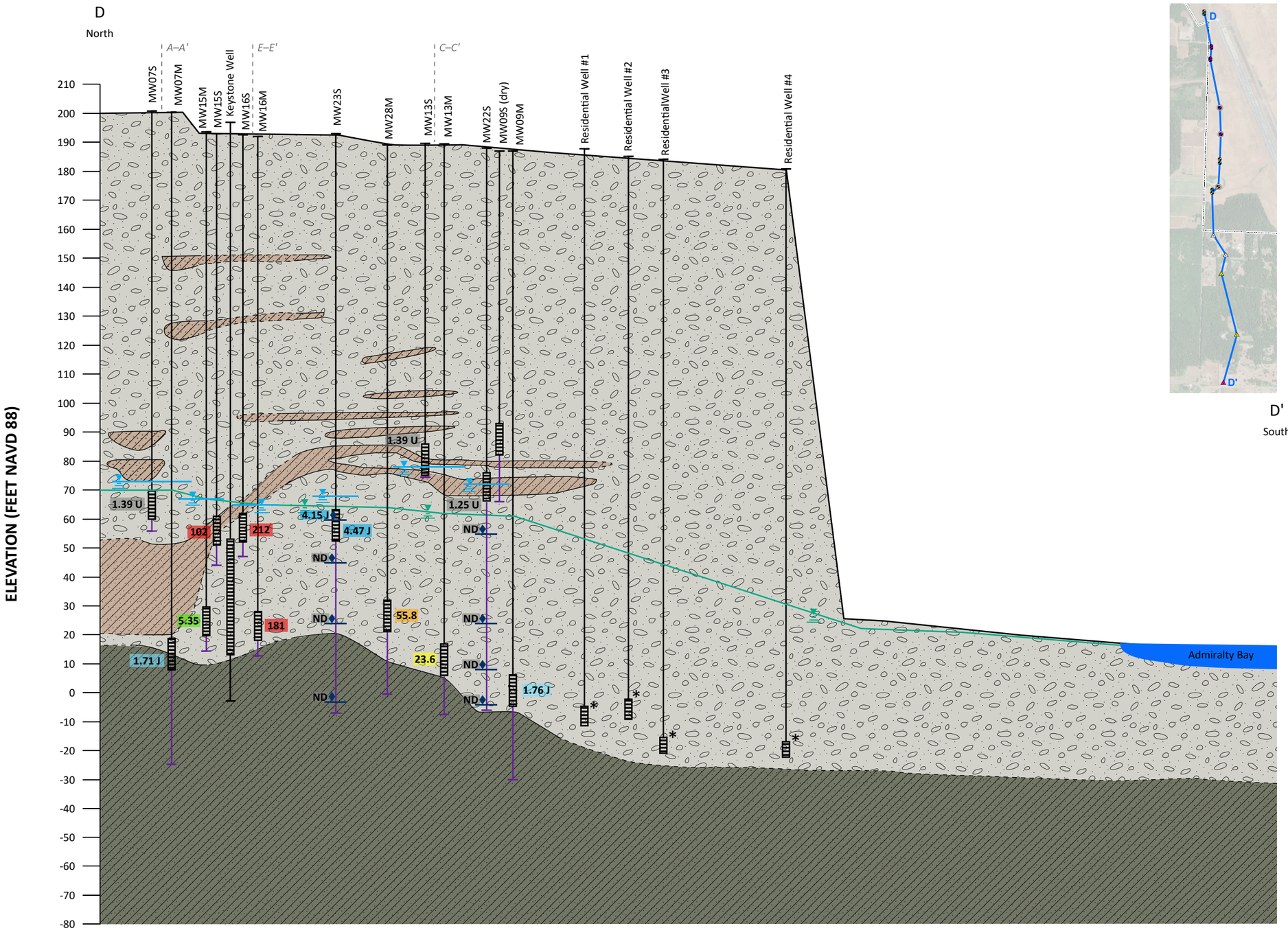


Figure 4-12
PFOS – Geologic Cross Section C–C'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



D'
South

LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .125 .25

Approximate horizontal scale in miles

Notes:

* Only well bottom depth known-screen interval.

1. Cross section is vertically exaggerated for visualization purposes.

2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

3. Geologic contacts are dashed where inferred.

4. Shallow water elevations are presumed to be noncontinuous, perched water tables.

5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.

6. NAVD 88 = North American Vertical Datum of 1988

PFOA Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

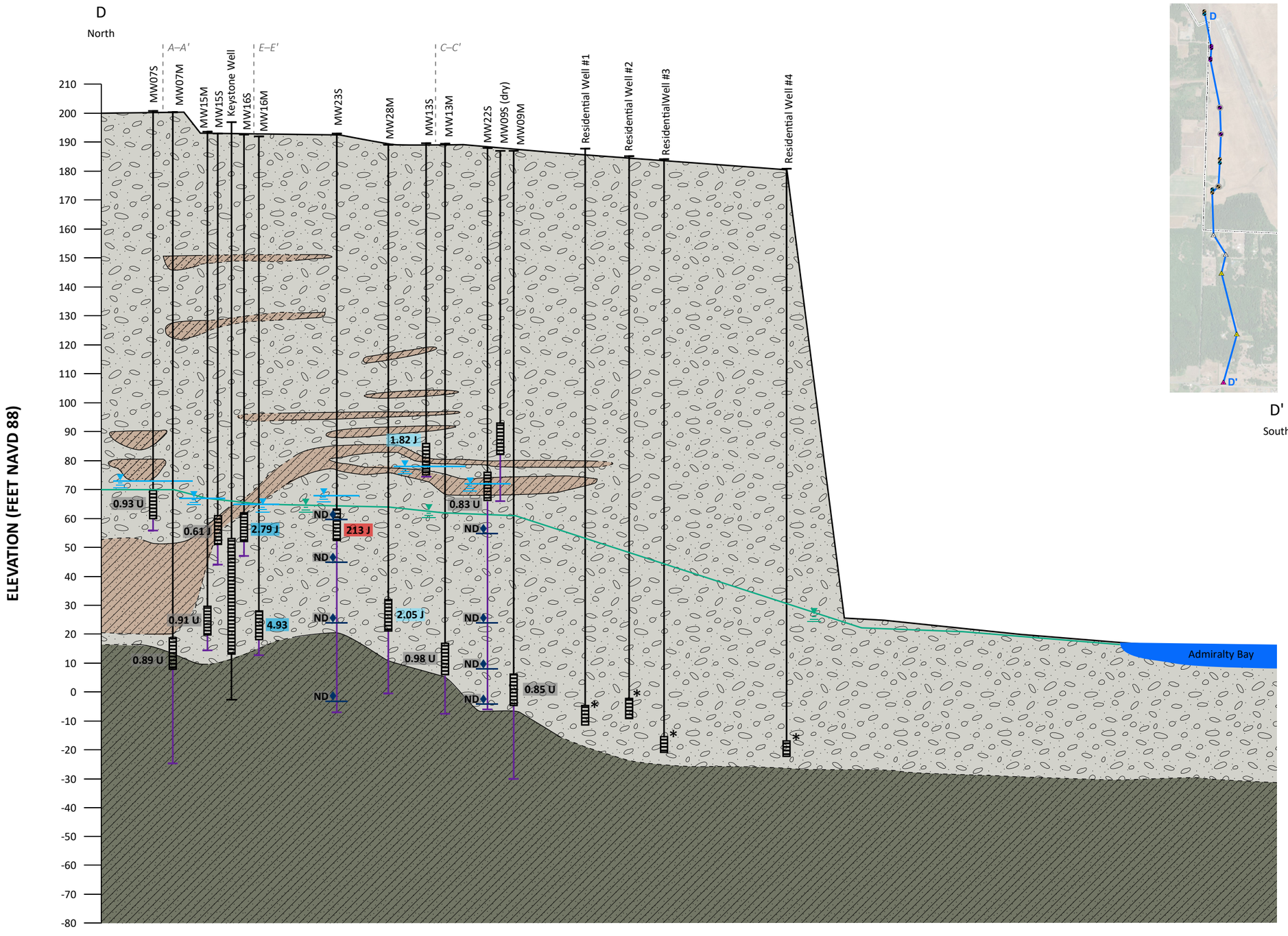
U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

Figure 4-13
PFOA – Geologic Cross Section D–D'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington

D

North



D'

South

LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .125 .25

Approximate horizontal scale in miles

Notes:

* Only well bottom depth known-screen interval.

1. Cross section is vertically exaggerated for visualization purposes.

2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

3. Geologic contacts are dashed where inferred.

4. Shallow water elevations are presumed to be noncontinuous, perched water tables.

5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.

6. NAVD 88 = North American Vertical Datum of 1988

PFOS Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

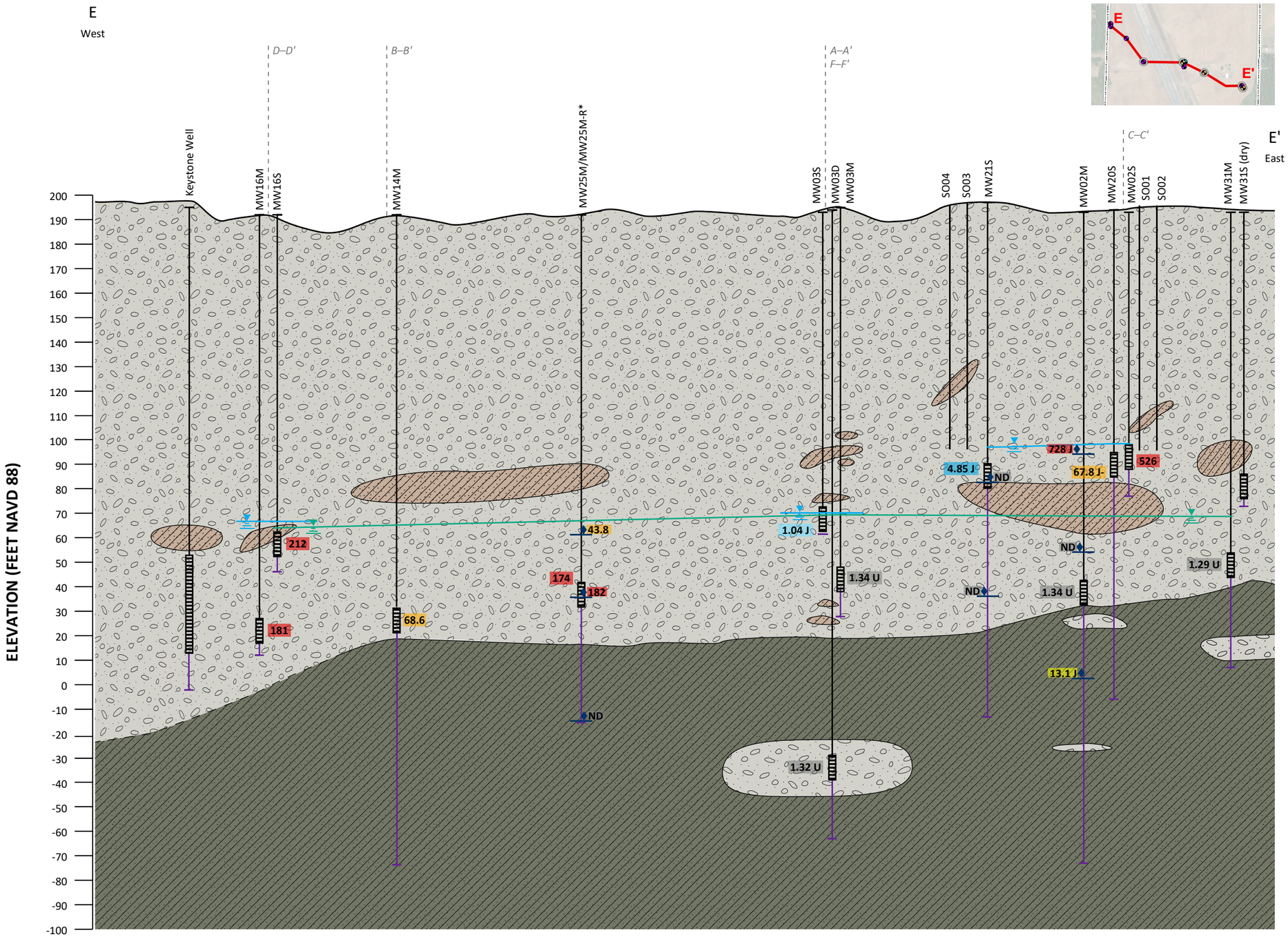
U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

Figure 4-14

PFOS – Geologic Cross Section D–D'

Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .0625 .125

Approximate horizontal scale in miles

Notes:

***** Well WI-CV-MW25M-R drilled as replacement well for WI-CV-MW25M, which was damaged following construction. Well WI-CV-MW25M-R was advanced to the screen depth of 162 ft bgs; however the soil boring it replaced was advanced to 208 ft bgs. Known lithology and collection of groundwater grab samples is depicted to this depth for the collocated borings.

1. Cross section is vertically exaggerated for visualization purposes.

2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

3. Geologic contacts are dashed where inferred.

4. Shallow water elevations are presumed to be noncontinuous, perched water tables.

5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.

6. NAVD 88 = North American Vertical Datum of 1988

PFOA Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

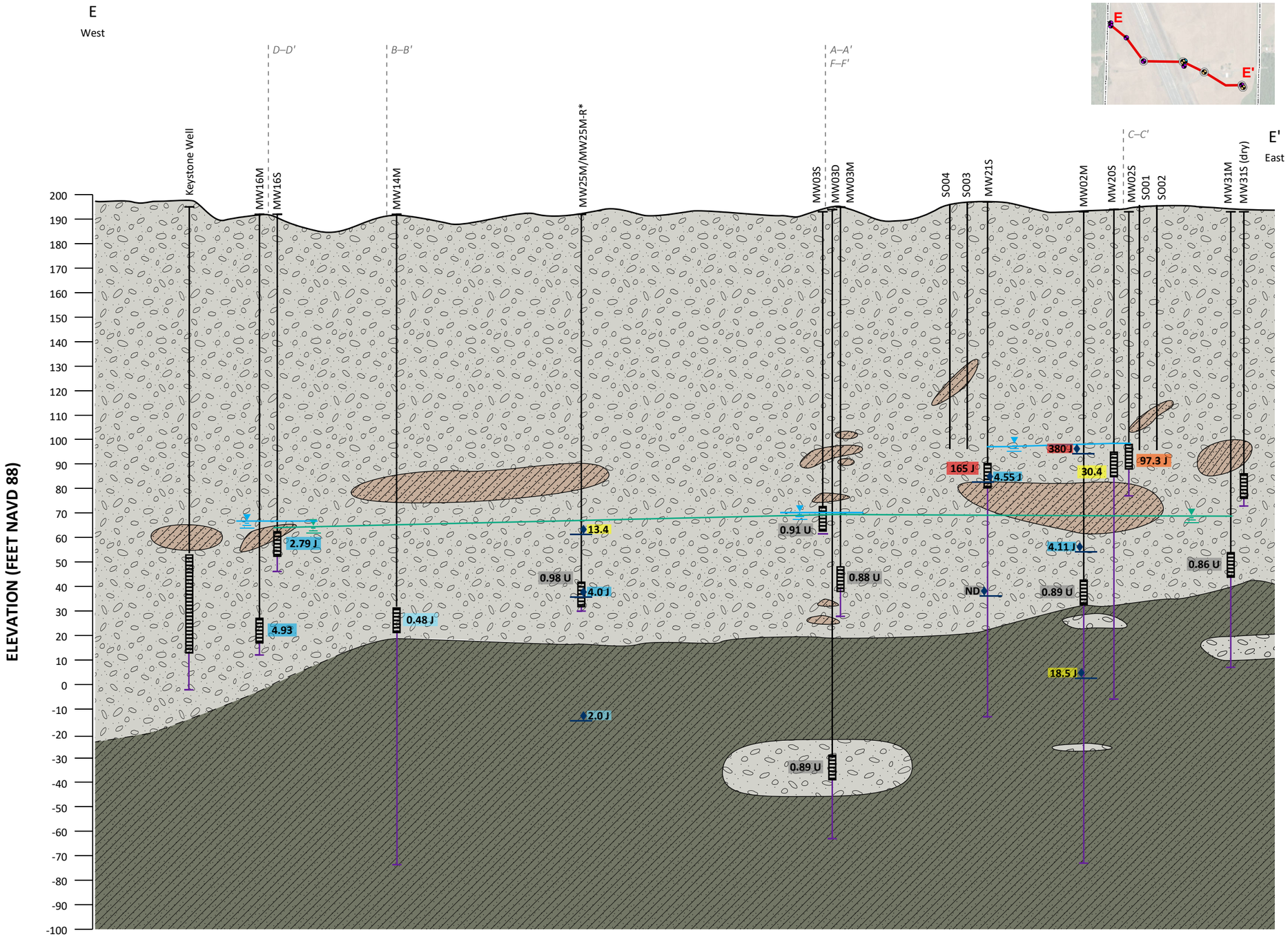
U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

J- Analyte present. Value may be biased low. Value may be higher.

Figure 4-15
PFOA – Geologic Cross Section E–E'

Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)

Wells

- MW00X ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .0625 .125

Approximate horizontal scale in miles

Notes:

***** Well WI-CV-MW25M-R drilled as replacement well for WI-CV-MW25M, which was damaged following construction. Well WI-CV-MW25M-R was advanced to the screen depth of 162 ft bgs; however the soil boring it replaced was advanced to 208 ft bgs. Known lithology and collection of groundwater grab samples is depicted to this depth for the collocated borings.

1. Cross section is vertically exaggerated for visualization purposes.

2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

3. Geologic contacts are dashed where inferred.

4. Shallow water elevations are presumed to be noncontinuous, perched water tables.

5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.

6. NAVD 88 = North American Vertical Datum of 1988

PFOA Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

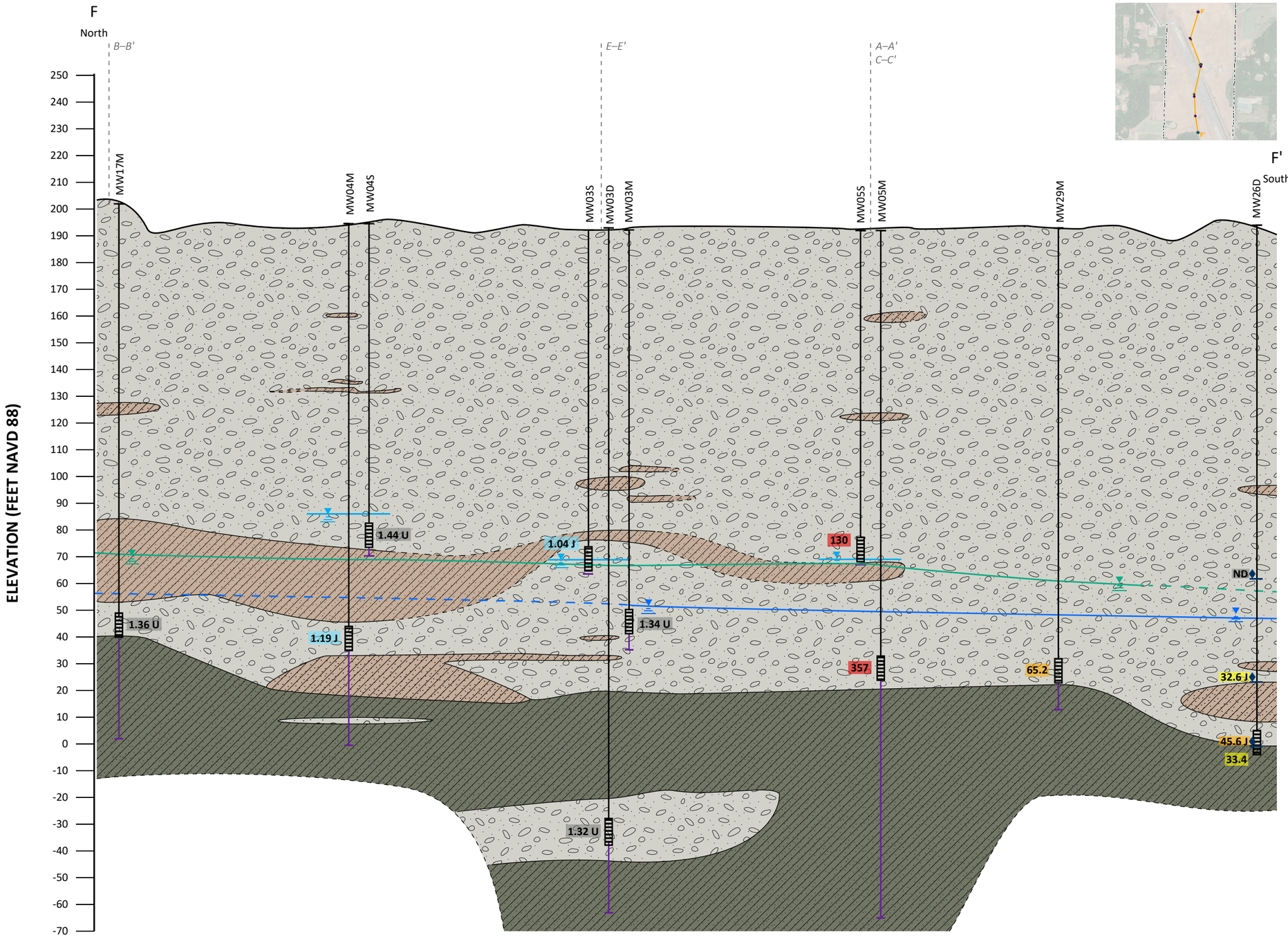
XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

Figure 4-16
PFOS – Geologic Cross Section E–E'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)
- Potentiometric Surface Deep-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .125 .25

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.
2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.
3. Geologic contacts are dashed where inferred.
4. Shallow water elevations are presumed to be noncontinuous, perched water tables.
5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.
6. NAVD 88 = North American Vertical Datum of 1988

PFOA Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

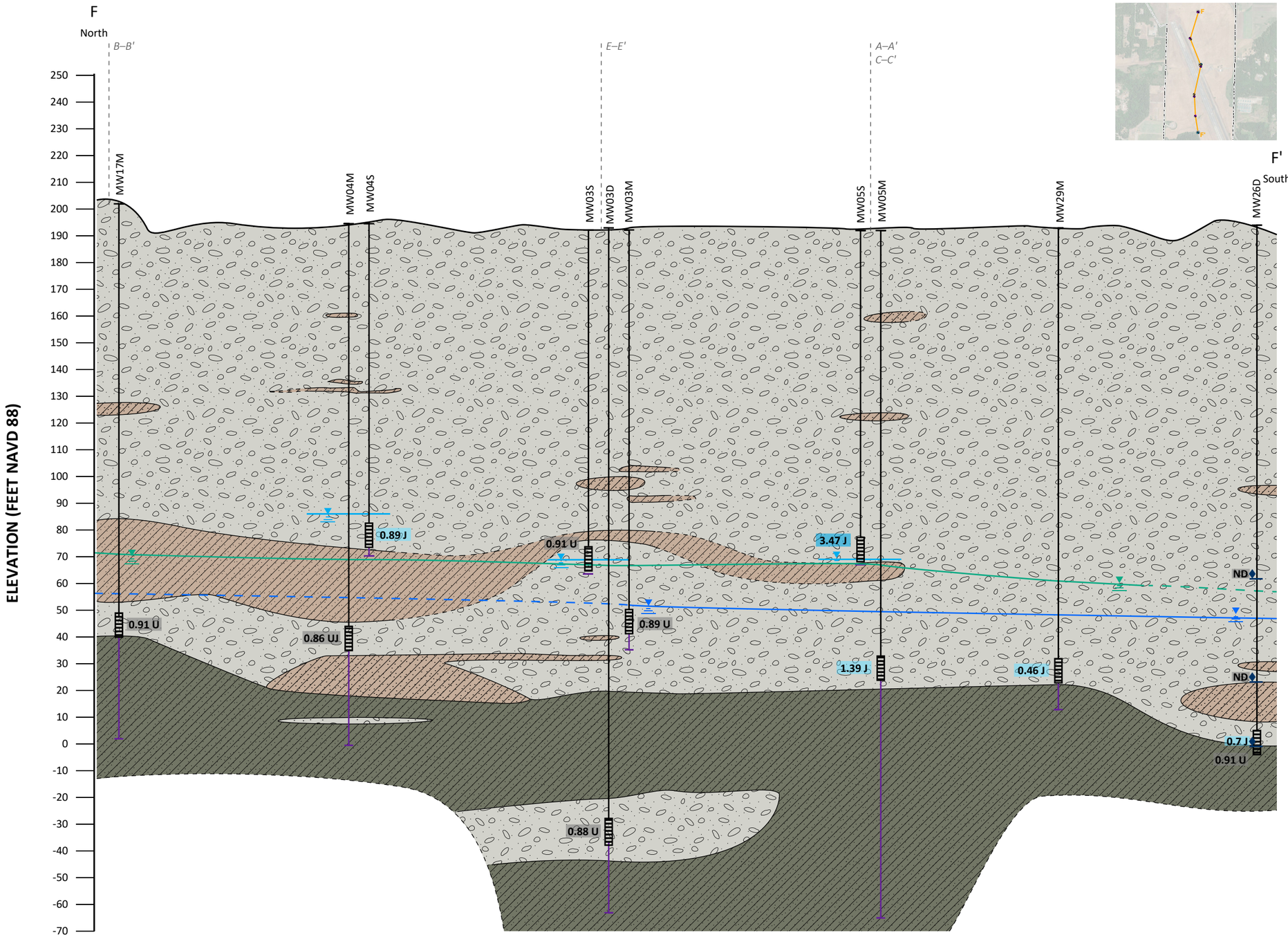
XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

Figure 4-17
PFOA – Geologic Cross Section F–F'
Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington



LEGEND

- Sand and Gravel, Some Silt and Clay
- Clay and Silt
- Clay/Silt, Claystone, Some Organics and Peat
- Water Table Shallow-Screened Interval (April 2020)
- Potentiometric Surface Intermediate-Screened Interval (April 2020)
- Potentiometric Surface Deep-Screened Interval (April 2020)

Wells

MW00X
- ← Boring Identification Number
- ← Permanent Monitoring Well
- ← Well Screen
- ← Portion of Boring Completed for Lithology Only

0 .125 .25

Approximate horizontal scale in miles

Notes:

1. Cross section is vertically exaggerated for visualization purposes.
2. Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.
3. Geologic contacts are dashed where inferred.
4. Shallow water elevations are presumed to be noncontinuous, perched water tables.
5. Some wells are associated with other cross-sections. Intersections of this cross-section with other cross-sections are noted above the well labels as applicable.
6. NAVD 88 = North American Vertical Datum of 1988

PFOS Analytical Results:

XX.XX	≤ 2.0	XX.XX	40.1–70.0
XX.XX	2.1–5.0	XX.XX	70.1–100.0
XX.XX	5.1–10.0	XX.XX	≥ 100.1
XX.XX	10.1–40.0	XX.XX	Not detected

XX.XX Groundwater Grab Sample

All results in nanogram(s) per liter (ng/L)

U Material was analyzed for but not detected.

J Analyte present. Value may not be accurate or precise.

UJ Analyte not detected; quantitation limit may be inaccurate.

Figure 4-18

PFOS – Geologic Cross Section F–F'

Supplemental Site Investigation Report
Naval Air Station Whidbey Island –
Outlying Landing Field Coupeville
Coupeville, Washington

SECTION 5

Conclusions and Recommendations

This section summarizes the primary conclusions of the Supplemental SI conducted at OLF Coupeville. This section also presents recommendations to further assess and address the PFAS contamination at the installation.

5.1 Conclusions

5.1.1 Groundwater Hydraulics

Based on the results of the Supplemental SI, the following conclusions were made regarding the groundwater hydraulics at OLF Coupeville:

- The intermediate zone groundwater mound previously believed to be centered in the north central area of the Base is likely centered further to the northeast, potentially mostly off the northeast corner of the Base.
- Groundwater flow in the intermediate zone is generally to the southwest and does not have a significant easterly component in any areas on-Base.
- West of the runway, groundwater flow in the intermediate zone is toward the west, at least in part due to pumping at the Keystone Well.
- Groundwater in the deep zone generally flows south-southeast.
- Low-permeability soils are discontinuous and do not provide a consistent confining layer across the site. As a result, groundwater in the shallow, intermediate, and deep zones is likely hydraulically connected.
- Vertical gradients between shallow, intermediate, and deep zones are generally downward with the highest gradients near Building 2709 and Facilities 1, 2, and 11, which may facilitate migration of PFAS from the shallow zone to the intermediate and deep zones.

Additional groundwater hydraulic data will be reported in the forthcoming SSI Report Addendum, which will document aquifer testing and update of a numerical groundwater flow and solute transport model.

5.1.2 Contaminant Distribution

Based on the results of the Supplemental SI, the following conclusions were made regarding the distribution of PFAS contamination at OLF Coupeville:

- PFOA and PFOS are present in soil above PALs near Building 2709 and Facilities 1, 2, and 11. These areas are confirmed as PFAS source areas to the vadose zone.
- PFOA and PFOS are present above PALs in shallow zone groundwater near the confirmed source areas.
- PFOA is present above the PAL in groundwater in the shallow and intermediate zones west of the runway near the Keystone Well. These concentrations may represent a separate source area near the northwest end of the runway that may also be the source of PFOA contamination in the Keystone Well.
- PFOA is present above the PAL in groundwater in the shallow and intermediate zones southwest of the confirmed source areas associated with Building 2709 and Facilities 1, 2, and 11. Inferred groundwater flow direction (**Figure 4-5**) would suggest this contamination emanated from these shallow source areas and migrated vertically deeper in the aquifer system as groundwater flowed downgradient. Groundwater flow conditions prior to the installation of the Keystone Well are not well understood; however, prior to the installation of the Keystone Well in 2008, the main hydraulic stress may have been pumping to the southwest (Fort Casey wellfield) which may have augmented groundwater flow in a southerly direction.
- PFOS is present above the PAL in shallow groundwater west of the confirmed source areas; however, the connection between these concentrations and a source area cannot be made at this time.

- PFOA and PFOS contaminants have migrated from the shallow zone to the intermediate and deep aquifer zones.

5.2 Proposed Actions

Additional data are needed to further refine the understanding of hydraulic characteristics to establish the fate and transport of PFAS at OLF Coupeville. The following actions are planned to be conducted beginning in May 2020 and will be discussed in the SSI Report Addendum, documenting the aquifer testing and groundwater modeling:

1. Perform aquifer testing at newly installed monitoring wells MW29M and MW31M to define hydraulic characteristics of the aquifer.
2. Update the OLF Coupeville groundwater flow model with newly acquired groundwater elevations and data from aquifer testing.
3. Use the updated groundwater flow model to approximate what hydraulic flow conditions may have been before pumping began at the Keystone Well.
4. Incorporate solute transport capabilities into the numerical model and perform simulations to evaluate potential migration of PFAS constituents from current higher concentration locations.

In addition, the following activities are recommended for the forthcoming remedial investigation phase:

1. Initiate full delineation of soil and groundwater PFAS impacts associated with the confirmed source areas.
2. Perform additional characterization and delineation at the suspected source area near the northwest end of the runway by the Keystone Well. Investigation will include soil sampling and installation of additional monitoring wells.
3. Drill and install monitoring well(s) between on-Base wells in west-southwest section of OLF (wells WI-CV-MW09M/S, WI-CV-MW22S, and WI-CV-MW26D) and the Base boundary to fill data gap(s) between on-Base monitoring wells and off-Base drinking water wells with concentrations of PFOA above the lifetime health advisory.
4. Drill and install monitoring wells(s) between the Base boundary and off-Base wells with concentrations of PFOA above the lifetime health advisory.
5. Use the contaminant transport capability of the groundwater model to run predictive simulations for fate and transport of PFAS from the on-Base locations to off-Base areas.
6. Perform a Human Health Risk Screening and if USEPA or Department of Defense screening values become available, an ecological risk screening to further evaluate risks to human health associated with exposure to PFAS detected in groundwater.

SECTION 6

References

CH2M Hill, Inc (CH2M). 2018a. *Final Technical Memorandum: Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater, Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Coupeville, Washington*. Draft. May.

CH2M. 2018b. *Aquifer Test, Groundwater Sampling, and Drinking Water Sampling Data Evaluation and Groundwater Modeling Report, Per- and Polyfluoroalkyl Substances (PFAS), Outlying Landing Field Coupeville, Naval Air Station Whidbey Island Oak Harbor and Coupeville, Washington*. September.

CH2M. 2018c. *Preliminary Assessment for Per- and Polyfluoroalkyl Substances (PFAS), Outlying Landing Field Coupeville, Naval Air Station Whidbey Island Oak Harbor and Coupeville, Washington*. November.

CH2M. 2019. *Final Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville Naval Air Station Whidbey Island Oak Harbor, Washington*. August.

CH2M. 2020. *Draft Sampling and Analysis Plan Addendum Supplemental Site Inspection Outlying Landing Field Coupeville Naval Air Station Whidbey Island Oak Harbor, Washington*. April.

Deputy Assistant Secretary of the Navy (DASN). 2014. *Energy, Installations & Environment [EI&E]) Policy Memo, 21 Oct 2014*. October.

Department of Defense (DoD). 2019. *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program.* October.

Island County. 2005. *Island County Water Resource Management Plan.* 2514 Watershed Planning. Adopted by the Board of Island County Commissioners. June 20.

Landau Associates. 1984. *Navy Assessment and Control of Installation Pollutants: Initial Assessment Summary of UIC: N00620*. September.

Department of the Navy (Navy). 1994. Final Remedial Investigation Report for Operable Unit 3, Naval Air Station *Whidbey Island*. Prepared for Engineering Field Activity Northwest, Naval Facilities Engineering Command by URS Consultants Under Contract No. N62474-89-D-9295, CTO 0074. January.

Navy. 2016. *Environmental Impact Statement for EA-18G "Growler" Airfield Operations at Naval Air Station Whidbey Island Complex. Vol. 1 and 2*. November.

Navy. 2017. *PFAS Groundwater and Drinking Water Investigation.* https://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/northwest/about_us/northwest_documents/environmental-restoration/pfas-groundwater-and-drinking-water-investigation.html. Accessed December 20, 2017.

Polenz, M., S. Slaughter, and G. Thorsen. 2005. *Geologic Map of the Coupeville and Part of the Port Townsend North 7.5-minute Quadrangles, Island County, Washington*. June.

United States Environmental Protection Agency (USEPA). 2016a. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)*. EPA 822-R-16-005. Office of Water. May.

USEPA. 2016b. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)*. EPA 822-R-16-004. Office of Water. May.

USEPA. 2021. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Accessed June 1. http://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

United States Geological Survey (USGS). 1982. *Preliminary Survey of Ground-water Resources for Island County, Washington*.

USGS. 1988. *Ground-water Resources and Simulations of flow in Aquifers Containing Freshwater and Seawater, Island County, Washington*.

USGS. 2019. *Specific Conductance Chapter 6.3 of Section A, National Field Manual for the Collection of Water-Quality Data Book 9, Handbooks for Water-Resources Investigations*. Revised February 2019

Washington State Department of Health, Office of Drinking Water (WSDOH). 2017. https://fortress.wa.gov/doh/eh/portal/odw/si/FindWaterSystem.aspx. Accessed December 20, 2017.

Appendix A
Soil Boring Logs

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW03S	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439392.68 N, 1201753.55 E)

ELEVATION : 193.52 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 123 ft bgs
START : 8/11/2019
END : 8/12/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0	7	**(0'-9') Poorly Graded GRAVEL with Sandy Silt (GP-GM)**; dark grayish brown (10YR 4/2); dry		**8/11/2019** Begin drilling at 08:30 Hand auger to 3' bgs. Auger refusal on cobble.	2'x2' concrete pad, flush mount completion 2" Sch. 80 PVC casing
5						
9	9					
10		9.5	**(9'-22') Poorly Graded SAND with Gravel (SP)**; very dark grayish brown (10YR 3/2), dry, medium to coarse SAND; ~20% Gravel (12') A couple of silty zones			bentonite grout
15						
19	19					
20		9	**(22'-29') Poorly Graded SAND with Silt and Gravel (SP-SM)**; gray (10YR 5/1), dry, broken from drilling			
25						
29	29					
30		10	**(29'-37') Poorly Graded GRAVEL with Sand and Silt (GP-GM)**; gray (10YR 5/1), dry, 'powdery' from drilling			
35						
39	39		**(37'-50') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, fine SAND; weakly cemented silty layers in bottom of 5' run			
40		7				
45			(47'-49') Increased fine Gravel			
49	49					
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW03S	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439392.68 N, 1201753.55 E)

ELEVATION : 193.52 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 123 ft bgs
START : 8/11/2019
END : 8/12/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		8	**(50'-56') Poorly Graded SAND (SP)**; grayish Brown (10YR 4/2), moist, fine to medium SAND; a couple of silty zones			
			(56'-57') Poorly Graded GRAVEL (GP)			
	59		**(57'-62') Poorly Graded SAND (SP)**			
60						
			(62'-63') Poorly Graded GRAVEL (GP)			
		9	**(63'-66') Poorly Graded SAND (SP)**			
65						
			(66'-67') Silty GRAVEL (GM)			
			(67'-68') Poorly Graded SAND (SP)			
	69		**(68'-70.5) Silty SAND (SM)**; very dark grayish brown (10YR 3/2)			
70					Did not add water during run	
			(70.5'-77') Poorly Graded SAND (SM); brown (10YR 4/3), dry, fine SAND			
		9				
75						
			(76.5') Change to very fine SAND			
	79		**(77'-78.5') Lean CLAY (CL)**; dark grayish brown (10YR 4/2), dry, stiff CLAY; gradational contact with overlying Sand			
80			**(78.5'-100') Poorly Graded SAND (SP)**; brown, dry, fine SAND; occasional zones of silty SAND		Plastic clay layer 1' thick	
		10				
85						
	89					
90			(89') Dry at bottom of run			
95		10				
100			(98.5') Silty SAND layer ~3" thick			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW03S	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439392.68 N, 1201753.55 E)

ELEVATION : 193.52 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 123 ft bgs
START : 8/11/2019
END : 8/12/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	100		**(100'-103') Silty CLAY (CL-ML)**; brown, dry, very stiff CLAY		Drill 10' to see water is encountered 100'-103' 'confining layer'	
105		9	**(103'-112.5') Poorly Graded SAND with Silt (SP-SM)**; brownish gray, dry, fine SAND			
110	110					
			(112.5'-115') Silty SAND (SM); ground up rocks			3/8" bentonite chips
115		8	**(115'-116') Poorly Graded SAND (SP)**			
			(116'-117') Silt with SAND (ML); brown, dry			
			(117'-117.5') Well Graded SAND (SW)			
			(117.5'-119') Silt with SAND (ML); brown, slightly moist; fine Sand		Dry	12/20 sand
120	120		**(119'-125') Silty Gravel with Sand (GM)**; broken up			
					WL = 123' bgs at 18:50	
125		7			Fell out - redrill; caved to 126; Drill to 129' Stop at 19:00	2" Sch. 80 PVC 0.010" slot screen
			(125'-130') Poorly Graded Sand (SP); gray-brown, wet, fine to medium grained SAND		**8/12/2019** Resume drilling at 08:00 Clean out hole; run casing down to 130' bgs	
130	130					
			Bottom of Boring at 130.00 ft bgs on 8/12/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW17M	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (441502.92 N, 1201653.23 E)

ELEVATION : 202.41 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 130 ft bgs — START : 8/16/2019 — END : 8/18/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-2') TOPSOIL** (1') Transition to Silt		**8/16/2019** Start at 15:45	2'x2' concrete pad, flush mount completion
5		8	**(2'-14') Poorly Graded GRAVEL with Sand (GP)**; dark yellowish brown (10YR 3/4), dry, dense, rounded, GRAVEL up to 4"		Hand auger refusal at 2.1' on cobbles Collect soil sample at 0.5'-1' (Soil 1) for PIGE	2" sch. 80 PVC casing
	9		(8'-9') Broken up			
10						bentonite grout
15		9	**(14'-15') Well Graded SAND (SW)**; brown			
			(15'-18') Poorly Graded GRAVEL with Sand (GP); dark yellowish brown (10YR 3/4), dry, dense, GRAVEL up to 4", rounded			
	19		**(18'-19') Clayey GRAVEL (GC)**			
20			**(19'-25') Poorly Graded GRAVEL with Silt and Sand (GP-GM)**; dark grayish brown (10YR 4/2), dry, GRAVEL up to 2", rounded; some silty GRAVEL zones			
25		9	**(25'-29') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, fine to medium SAND (mostly fine)		Wet from drilling Collect soil sample at Gravel-Sand transition 25'-26' (Soil 2)	
	29					
30			**(29'-36') Poorly Graded GRAVEL with Sand (GP)**; very dark gray (10YR 3/1), rounded; trace Silt		Wet from drilling	
35		9				
			(36'-39') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), dry, fine SAND			
	39					
40			**(39'-40') Poorly Graded GRAVEL with Sand (GP)**		Pulverized; Wet/washed out upper few feet	
			(40'-49') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), dry, fine SAND; occasional Gravel			
45		7.5	(45.5') 1" Silty SAND seam			
	49					
50			**(49'-58') Poorly Graded SAND (SP)**			

PROJECT NUMBER: 9000NVT1	BORING NUMBER: WI-CV-MW17M	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (441502.92 N, 1201653.23 E)

ELEVATION : 202.41 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 130 ft bgs — START : 8/16/2019 — END : 8/18/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		10			17:50 collect soil sample from 52'-52.5' No lithology changes	
	59		**(58'-59') Poorly Graded GRAVEL (GP)**; dry			
60			**(59'-66') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry		Stop drilling at 59' **8/17/2019**	
65		8	(65'-66') Silty lenses			
	69		**(66'-77.5') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, fine SAND			
70			(70') Cemented SILT seam (71') Gravel lens			
75		10				
	79		**(77'-81') Sandy SILT (ML)**; dark gray (10YR 4/1), very fine Sandy SILT, low dry strength		09:10 collect soil sample at Sand-Silt contact (Soil 4)	
80			**(81'-88') Poorly Graded SAND (SP)**; dark gray brown (10YR 4/2), dry, fine SAND, medium density			
85		9				
	89		**(88'-94') Silty SAND (SM)**; silty sand lenses, dry			
90					Wet from drilling	
95		6	**(94'-97.5') Well Graded SAND (SW)**			
	99		**(97.4'-114') Poorly Graded SAND with Silt (SP-SM)**; dark grayish brown (10YR 4/2), dry, weakly cemented layers		Collect soil sample (Soil 5)	
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW17M	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (441502.92 N, 1201653.23 E)

ELEVATION : 202.41 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 130 ft bgs
START : 8/16/2019
END : 8/18/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
105		9			Wet from drilling	
	109		(108') Weakly cemented Silt seam			
110						
		6	**(114'-118') Poorly Graded GRAVEL (GP)**; gray, dry, dense		Broken/pulverized	
115						
	119		**(118'-120') Poorly Graded SAND (SP)**; brown, wet, fine to very fine SAND			
120			**(120'-122') Silty CLAY (CL-ML)**; brown, moist, low plasticity CLAY; trace very fine Sand		Picked up bottom of last run	
		12	**(122'-128') SILT (ML)**; very dark gray (GLEY1 3/N), dry to slightly moist, non-plastic SILT		Transition to gray	
125						
	129		**(128'-129') Sandy SILT (ML)**; SILT with very fine Sand			
130			**(129'-134') SILT (ML)**; gray, moist, slightly plastic SILT			
		11				
135			**(134'-135') Lean CLAY (CL)**; dark gray, low plasticity CLAY			
			(135'-138') Silty SAD (SM); dark gray, moist, very fine Sand			
	139		**(138'-144') Lean CLAY (CL)**; very dark gray (GLEY1 3/N), moist, very stiff CLAY, low plasticity			
140					Core swelled; diamicton (till)	3/8" bentonite chips
		12				
145			**(144'-150') Gravelly SILT with Sand (ML)**; very dark gray (GLEY1 3/N), moist; ~20% fine to medium Sand; 20% fine Gravel; trace Clay, slightly plastic			
	149					
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW17M	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (441502.92 N, 1201653.23 E)

ELEVATION : 202.41 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 130 ft bgs — START : 8/16/2019 — END : 8/18/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
155		9.5	**(150'-158') Poorly Graded SAND (SP)**; dark greenish gray (GLEY1 4/1), wet, fine to medium SAND, medium density			12/20 sand 2" Sch. 80 PVC 0.020" slot screen
	159		**(158'-159') SILT (ML)**; greenish black, moist			
160			**(159'-161') Poorly Graded SAND (SP)**; gray, wet, fine SAND			
		11	**(161'-165.5') SILT (ML)**; dark greenish gray, moist, very low plasticity SILT			
165			**(165.5'-185') Lean CLAY (CL)**; very dark greenish gray (GLEY1 3/1), dry, hard			
	169					
170			(171'-172') Silty CLAY layer			
175		12				
	179					
180					Drill to 179'; run casing to 179' 08:10 Stop for the day **8/18/2019** 08:00 resume drilling	bentonite chips
			(182'-182.5') Silty layer			
185		12	**(185'-189') SILT (ML)**; very dark greenish gray (GLEY1 3/1), moist; Sandy seams			
	189					
190			**(189'-195') Lean CLAY (CL)**; very dark greenish gray (GLEY1 3/1), moist, very stiff CLAY, plastic			
195		13	**(195'-197') SILT (ML)**; very dark greenish gray (GLEY1 3/1), moist, very fine Sandy clastic dike			
			(197'-200') Lean CLAY (CL); very dark greenish gray (GLEY1 3/1), moist, very stiff CLAY, plastic			
200	200					
			Bottom of Boring at 200.00 ft bgs on 8/18/2019			

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 1 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs
START : 10/22/2019
END : 10/25/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0			**(0'-10') Poorly Graded GRAVEL with Sand and Silt (GP-GM)**		**10/22/2019** 16:45 begin drilling; hand clear with hand auger to 5' 6" core barrel; 7" casing *Collecting soil samples for PFAS and PIGE in upper 100' of boring	2'x2' concrete pad, flush mount completion
5	5						2" Sch. 80 PVC casing
10		10.5		**(10'-15') Poorly Graded SAND (SP)**; very dark grayish brown (10YR 3/2), dry, fine SAND			bentonite grout
15	15			**(15'-25') Poorly Graded GRAVEL with Sand and Silt (GP-GM)**; dark grayish brown (10YR 4/2), dry, GRAVEL up to 4", rounded; Silty Sand matrix, weakly stratified			
20		12				20' run	
25	25			**(25'-25.5') Poorly Graded SAND (SP)**		Collect soil sample at 24' WI-CV-BH20-24-1019	
				(25.5'-41') Poorly Graded GRAVEL with Sand (GP); dark grayish brown (10YR 4/2), dry, medium density, GRAVEL up to 2"; fine to coarse sandy matrix			
30							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 2 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs
START : 10/22/2019
END : 10/25/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
35	35						
				(38') Minor FeO stain			
40		9				11' run	
				(41'-42') Poorly Graded SAND (SP); grayish brown, dry, fine SAND			
				(42'-42.5') Lean CLAY (CL) ; brown, moist, very stiff CLAY		Collect soil sample at 42' WI-CV-BH20-42-1019	
				(43.5'-50') Poorly Graded SAND (SP); very dark grayish brown (10YR 3/2), dry, fine SAND			
45	46						
				(46') Silty SAND lense, cemented		17:45 finish drilling for day; stop at 46'	
		4				**10/23/2019** 08:30 resume drilling from 46'	
50	50						
				(50'-66') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), dry, fine SAND			
55							
		13					
				(59') Cemented Clay balls			
60							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 3 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs — START : 10/22/2019 — END : 10/25/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
65	65			(61.5'-63.5') wet Gravel sluff		Sluff (out of place) Slow drilling Break to fix 6"-7" sub	
				(66'-90') Poorly Graded SAND (SP); dark gray (10YR 4/1), dry, dense, fine SAND; very weakly cemented zones			
70		9.5					
75	75						
80		10		(80'-82') layers of cemented SAND with Silt		Collect soil sample at 80' WI-CV-BH20-80-1019	
85	85			(84') Weakly cemented			
90							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 4 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs
START : 10/22/2019
END : 10/25/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
		9		**(90'-105') Poorly Graded SAND with Silt (SP-SM)**; very dark grayish brown (10YR 4/2), moist, very fine SAND; Silt/SAND seams, dilatent			
95	95					Collect soil sample at 95' WI-CV-BH20-95-1019	3/8" bentonite chips
				(99') Increasing moisture and dilatency			
100		10				Collect GW sample at 100' using drive ahead sampler WI-CV-GW20-100-1019	12/20 sand
							2" Sch. 80 PVC 0.020" slot well screen
105	105			**(105'-110') Poorly Graded SAND (SP)**; brown with salt and pepper, slightly moist, fine to medium SAND (106') Color change to greenish gray		Looks wet throughout 95'-105' run	
110				**(110'-112.5') Silty CLAY (CL-ML)**; very dark greenish gray (GLEY1 3/1), moist, very stiff CLAY, low to high variable plasticity		Sample fell out while retrieving; looks like wet loose sand; run down hole with a flapper bit to try to retrieve soil	
		13		**(112.5'-116.5') Lean CLAY (CL)**; very dark greenish gray (GLEY1 3/1), moist, very stiff CLAY, low to high variable plasticity			
115							bentonite chips
				(116.5'-120') SILT (ML); very dark greenish gray (GLEY1 3/1), moist, very stiff SILT, low plasticity			
120							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 5 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs
START : 10/22/2019
END : 10/25/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	120			**(120'-130') Lean CLAY (CL)**; dark greenish gray, moist, stiff CLAY, medium plasticity, stiffness and plasticity vary; occasional silty lenses		Run 7" casing down to 120 to clean hole. 17:30 SPT 120'-121.5' 17:70 Finish drilling for day **10/24/2019** 08:00 resume drilling; continue with 6" casing, 4" core barrel	
125		17	4-4-9 (13)				
130				**(130'-133') Lean CLAY with Gravel (CL)l**; dark greenish gray, moist, stiff CLAY, medium plasticity, stiffness and plasticity vary; Gravel clasts			
135	135			**(133'-155') Poorly Graded SAND with Gravel (SP)**; dark gray (10YR 4/1), wet, fine to medium SAND; 2" Gravel, rounded		Attempt to use drive ahead sampler to sample GW in sand below clay; sand heave in casing; no sample collected	
140		10		(141') Gravel decreases, sand fine grained, wet; a couple of 6" layers of medium SAND		11:10 Collect GW sample at 141' using drive ahead sampler WI-CV-GW20-141-1019 DTW = 131' Bottom of hole = 140' (5' heave) Drive ahead sampler was set in sand	
145	145						
150							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 6 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs START : 10/22/2019 END : 10/25/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
		10					
155	155			**(155'-159') Poorly Graded SAND (SP)**; salt and pepper, medium to coarse SAND (155.5') Turns gray		Gray at 155.5'	
		7					
160	160			**(159'-160') Lean CLAY (CL)**; very dark greenish gray (GLEY1 4/1), moist, very stiff CLAY, plastic			
				(160'-166.5') Poorly Graded SAND (SP); dark greenish gray (GLEY1 4/1), wet, fine to medium Sand			
		8					
165							
	168			**(166.5'-175') SILT (ML)**; dark greenish gray (GLEY1 4/1), wet, dilatant, stiff SILT			
				(168') Cobbles		Driller Notes bit "stopped" at 168 due to rock (cobble)	
170							
				(172') SILT with very fine Sand, dilatant			
175		15		**(175'-175.7') CLAYSTONE**; dark greenish gray (GLEY1 4/1)			
				(175.7'-180') SILT (ML); very dark greenish gray (GLEY1 3/1), moist; few fine Sand seams			
180							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW20S SHEET 7 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439263.77 N, 1202453.93 E)

ELEVATION : 194.40 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 93 ft bgs START : 10/22/2019 END : 10/25/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	182			**(180'-180.5') CLAYSTONE**; very, dark greenish gray (GLEY1 3/1)			
				(180.5'-185') SILT (ML); very dark greenish gray (GLEY1 3/1), wet, stiff SILT		Drill to 182 to get sample - fell out so pushed back down to retrieve.	
		2					
185	185			**(185'-190') Poorly Graded SAND (SP)**; greenish gray, wet, fine to medium SAND, dense		15:50 SPT 185-186.5 in silt	
190		9	2-10-37 (47)	**(190'-190.5') Clayey GRAVEL (GC)**; GRAVEL with stiff Clay			
				(190.5'-191') Well Graded SAND (SW); fine to coarse SAND			
				(191'-195') Clayey SAND with Gravel (SC); gray, moist, fine to coarse SAND, weakly cemented; stiff Clay		GW collected sample using drive ahead sampler WI-CV-GW20-192-1019 sample collected on 10/25/2019 at 11:15	
195	195			**(195'-195.5') CLAYSTONE**; with Gravel			
				(195.5'-199') Clayey SAND (SC); gray, moist, fine to coarse SAND, weakly cemented; stiff Clay			
		5				Reach TD on 10/24/2019 at 17:20	
				(199'-200') SILT (ML); hard, cemented		TD = 200'	
200	200			Bottom of Boring at 200.00 ft bgs on 10/25/2019			

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW21S SHEET 1 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439283.74 N, 1202097.83 E)

ELEVATION : 196.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 99 ft bgs
START : 9/6/2019
END : 9/12/2019
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0	5		**(0'-0.3') ASPHALT** **(0.3'-5') Silty GRAVEL with Sand (GM)**; GRAVEL with very fine to very coarse Sand (2.3'-5') Cobbles		**9/6/2019** 07:45 Begin drilling Hand auger to 5' Collected soil sample at 3.5' WI-CV-BH21-3.5-0919	2'x2' concrete pad, flush mount completion
5	5						
		4		**(5'-12') Well Graded SAND with Silt and Gravel (SW-SM)**; dark grayish brown (10YR 4/2), dry, very fine to very coarse SAND, well graded; non-plastic Silt; trace Cobbles		PID = 0.0 ppm	2" Sch. 80 PVC casing
	9						
10							bentonite grout
		9.8		**(12'-13') Silty CLAY with Sand (CL-ML)**; greenish gray (GLEY1 6/1), dry, hard, medium plasticity CLAY, crumbly, becomes slick when wet; trace Gravel **(13'-25') Well Graded SAND with Silt and Gravel (SW-SM)**; dark grayish brown (10YR 4/2), dry, very fine to very coarse SAND, well graded; trace Cobbles		PID = 0.0 ppm	
15							
	19						
20							
		10				PID = 0.0 ppm	
25				**(25'-31') Poorly Graded GRAVEL with Sand (GP)**; mottled brown, white, and green GRAVEL, dry, poorly graded; medium to very coarse Sand, poorly graded; <5% fines; trace Cobbles		Collected soil sample at 25' WI-CV-BH21-25-0919	
	29						
30							
		10		**(31'-37') Well Graded SAND (SW)**; olive gray (5Y 4/2), very fine to medium SAND, well graded; trace Gravel and Cobbles; trace fines			
35							
	39			**(37'-39') Well Graded SAND with Silt and Gravel (SW-SM)**; dark grayish brown (10YR 4/2), dry, very fine to very coarse SAND; trace fines, Gravel, and Cobbles		PID = 0.0 ppm	
40				**(39'-42') Silty GRAVEL with Sand (GM)**; dark greenish gray (GLEY1 4/1), dry; ~15% fines; trace Cobbles		PID = 0.0 ppm	
		10.3		**(42'-45') Well Graded SAND with Silt and Gravel (SW-SM)**; dark grayish brown (10YR 4/2), very fine to coarse SAND, well graded; some Gravel and Cobbles			
45				**(45'-64') Silty SAND (SM)**; dark grayish brown (2.5Y 4/2), dry, very fine to fine SAND, poorly graded; >15% fines			
	49						
50							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW21S SHEET 2 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (439283.74 N, 1202097.83 E)

ELEVATION : 196.73 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 99 ft bgs — START : 9/6/2019 — END : 9/12/2019 — LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		8.5		(50') increase in Silt causing soil to compact, harden, and stiffen		Collected soil sample at 50' WI-CV-BH21-50-0919	
	59			(58') increased hardness of Silt		PID = 0.0 ppm	
60				(59'-64') damp			
						PID = 0.0 ppm	
65		10		**(64'-67') SILT (ML)**; dark grayish brown (2.5Y 4/2), damp, medium plasticity SILT			
	69			**(67'-71') Silty SAND (SM)**; dark grayish brown (2.5Y 4/2), damp, very fine to fine SAND, poorly graded; >15% fines			
70							
				(71'-72') Sandy Fat CLAY (CH); moist, very firm, high plasticity CLAY		Collected soil sample at 71' WI-CV-BH21-71-0919	
75		9.4		**(72'-79') Silty SAND (SM)**; moist, poorly graded, dense SAND, firm			
	79						
80				**(79'-81') Silty SAND (SM)**; dark greenish gray (GLEY2 4/1), moist, very fine SAND, poorly graded			
				(81'-105') Silty SAND (SM); dark grayish brown (10YR 4/2), moist, very fine to fine SAND, poorly graded; >15% fines, reduced silt content compared to above			
85		9				PID = 0.0 ppm	
	89						
90							
95		7.2				PID = 0.0 ppm	
				(97'-99') higher Silt content making for stiffer soil		Collected soil sample at 97' WI-CV-BH21-97-0919	
	99						
100						Groundwater at 99'	

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW21S SHEET 3 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439283.74 N, 1202097.83 E)

ELEVATION : 196.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 99 ft bgs
START : 9/6/2019
END : 9/12/2019
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
105		10.5		(102') color change to dark bluish gray (GLEY2 4/1)			3/8" bentonite chips
	109			**(105'-117') Silt with SAND (ML)**; dark bluish gray (GLEY2 4/1), moist, very fine SAND; trace lean Clay		PID = 0.0 ppm	
110						PID = 0.0 ppm	12/20 sand
115		11.8				Collected groundwater sample at 115' WI-CV-GW21-115-0919	2" Sch. 80 PVC 0.020" slot screen
	119			**(117'-125') SILT (ML)**; dark bluish gray (GLEY2 4/1), moist, very stiff SILT, moderate plasticity; decrease in Sand compared to above; trace Clay			
120						Penetration test performed and soil sleeve sample collected 119'-120.5' WI-CV-BH21-120-0919	
125		9.8	5-12-15 (27)	**(125'-129') Well Graded SAND with Silt (SW-SM)**; dark greenish gray (GLEY1 4/1), very fine to coarse SAND, well graded; transition from Silt is gradual from 125'-127'			bentonite backfill
	129					PID = 0.0 ppm	
130				**(129'-172') Poorly Graded SAND (SP)**; olive gray (5Y 4/2), moist, very fine to medium SAND, poorly graded			
135		8				PID = 0.0 ppm	grout backfill
	139						
140		5	2-3-12 (15)			Penetration test performed and soil sleeve sample collected 139'-140.5' WI-CV-BH21-140-0919	
	144						
145						*When pulling 139'-149', bottom 5' lost; logged 139'-144'; then pulled 144'-154' with 9/10 recovery	
150		9					

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW21S SHEET 4 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439283.74 N, 1202097.83 E)

ELEVATION : 196.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 99 ft bgs
START : 9/6/2019
END : 9/12/2019
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	154					PID = 0.0 ppm	
155		5					
	159					PID = 0.0 ppm	
160		7.8				Collected groundwater sample at 160' WI-CV-GW21-160-0919 Screen interval 158'-160.5' *Aimed for 169', but bottom 2' was lost. That soil still on bottom of hole.	
165	167						
		7.5		(167') color change to dark bluish gray (GLEY2 4/1)			
170	174			**(172'-173') Well Graded GRAVEL (GW)**; dark bluish gray (GLEY2 4/1), well graded GRAVEL; <15% Sand		PID = 0.0 ppm	
175		12		**(173'-191') SILT (ML)**; dark bluish gray (GLEY2 4/1), very stiff SILT, high plasticity; trace clay (175.5'-176') 6" lens of Gravelly SILT, saturated		Gravelly silt does not contain appreciable amound of sand; this zone predominantly gravel with silt. PID = 0.0 ppm	
180	184						
185		13				PID = 0.0 ppm	
190	194			**(191'-194') Silty CLAY (CL-ML)**; dark bluish gray (GLEY2 4/1), moist, high plasticity CLAY; increase in clay content compared to above (75% CLAY, 25% Silt)		Highly plastic out of the hole	
195		6.3		**(194'-199') SILT (ML)**; dark bluish gray (GLEY2 4/1), very stiff SILT, high plasticity; trace clay		PID = 0.0 ppm	
	199						
200							

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW21S SHEET 5 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439283.74 N, 1202097.83 E)

ELEVATION : 196.73 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 99 ft bgs START : 9/6/2019 END : 9/12/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SPT RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
205	209	11		**(199'-209') Fat CLAY (CH)**; dark bluish gray (GLEY2 4/1), moist, high plasticity CLAY; 75% Clay; 25% Silt			
				Bottom of Boring at 209.00 ft bgs on 9/12/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs
START : 8/27/2019
END : 9/3/2019
LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-0.2) GRASS**		**8/27/2019** Begin at 15:00 Hand auger to 5 ft bgs. Had to do multiple step outs due to septic leach field (see notes). Relocated ~40 ft south of original location	2'x2' concrete pad, flush mount completion
			(02'-3.5') SILT with Sand (ML); very dark brown (7.5YR 2.5/2), dry, non-plastic SILT, very soft; fine Sand			
			(3.5'-5.5') Poorly Graded SAND (SP); dark brown (7.5YR 3/3), dry, loose, fine SAND			
5		8.4			18:00 finish drilling for day	2" Sch. 80 PVC casing
			(5.5'-6') Silty SAND (SM); very dark brown (7.5YR 2.5/3), damp, loose, fine SAND		**8/28/2019** PID = 0.0 ppm	
			(6'-7.7') Silty SAND with Gravel (SM); dark brown (7.5YR 3/3), damp, fine to coarse SAND, poorly graded; fine to coarse Gravel; low plasicity Silt		08:55 begin drilling, 8" casing, 7" core barrel	
	9		**(7'-13') Poorly Graded SAND (SP)**; brown (7.5YR 4/4), damp, loose, fine SAND			
10						bentonite grout
			(13'-17') Well Graded SAND with Gravel (SW); very dark gray (10YR 3/1), moist, fine SAND; coarse Gravel; trace Cobbles, loose, subrounded to rounded			
		10				
15					PID = 0.0 ppm	
			(17'-22.6') Poorly Graded SAND (SP); brown (7.5YR 4/2), damp, loose, fine SAND			
	19					
20						
			(22.6'-32.4') Well Graded GRAVEL with Sand (GW); very dark gray (7.5YR 3/1), moist, loose GRAVEL, rounded to subrounded; fine Sand			
		9				
25					PID = 0.0 ppm	
			(25.6') Cobble lens			
	29					
30						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs
START : 8/27/2019
END : 9/3/2019
LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
		8.5	**(32.4'-34.6') Well Graded SAND with Gravel (SW)**; very dark gray (7.5YR 3/1), dry, loose, fine SAND; fine Gravel, subounded to rounded			
35			**(34.6'-42.3') Well Graded GRAVEL with Sand (GW)**; very dark gray (7.5YR 3/1), moist, loose GRAVEL; fine Sand; Cobbles, rounded to subrounded		PID: VOC = 0.3 ppm; CO = 7 5ppm; H2S = 0.7 ppm	
	39					
40					Soil in bag is hot (29'-39' run)	
			(42.3'-50') Poorly Graded SAND (SP); brown (7.5YR 4/2), dry, loose, fine SAND			
		8.6				
45					PID = 0.1 ppm	
	49					
					Soil in bag is hot (39'-49'). Drilled 39'-49' using some water	
50			**(50'-66.8') Poorly Graded SAND (SP)**; brown (7.5YR 4/2), wet, loose, fine SAND			
		7				
55					PID = 0.1 ppm	
	59					
60						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs — START : 8/27/2019 — END : 9/3/2019 — LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
65		8.9			PID = 0.1 ppm	
	69		**(66.8'-71') Poorly Graded SAND (SP)**; gray (7.5YR 5/1), dry, medium dense to dense, fine SAND; blocky structure (pulverized by drilling, possibly cohesive at depth)		Cores very hot (59'-69' run)	
70						
			(71'-80') Poorly Graded SAND (SP); gray (7.5YR 5/1), dry, medium density to dense, fine SAND; blocky structure (less blocky than above, but more prevalent with depth)			
75		10			PID = 0.0 ppm	
	79				Core is very hot (69'-79')	
80			**(80'-89') Poorly Graded S (SPAND)**; brown (7.5YR 4/2), wet, loose, fine SAND			
85		10			PID = 0.0 ppm	
	89					
90			**(89'-99') Poorly Graded SAND (SP)**; brown (7.5YR 4/2), moist, loose, fine SAND		Core is hot (79'-89')	

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 4 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs
START : 8/27/2019
END : 9/3/2019
LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
95		10	(94.7') Silty Sand lens		PID: VOC = 0.0 ppm; CO = 50 ppm; H2S = 0.7 ppm Breathing Zone = normal gases	
	99					
100			**(99'-107.1') Poorly Graded SAND (SP)**; brown (7.5YR 4/2), moist, loose, fine SAND		Lost bottom 5' of 89'-99' run; retrieved on 2nd attempt.	
105		6.3			PID = 0.0 ppm	
	109		**(107.1'-112') Silt with SAND (ML)**; brown (7.5YR 4/3), moist, firm, low plastic, low toughness; fine SAND		Lost bottom of 99'-109' run.	3/8" bentonite chips
110		8.2				
			(112'-113.2') Poorly Graded SAND (SP); dark brown (7.5YR 3/3), moist, loose, fine SAND			12/20 sand
	114		**(113.2'-114') SILT (ML)**; brown (7.5YR 4/2), damp, low plasticity SILT, low toughness; trace fine Sand			
115			**(114'-115.6') Silty SAND (SM)**; dark gray (GLEY1 4/N), wet, medium density, fine SAND; non-plastic Silt		18:00 stop drilling for day. Casing to 110', core to 114'.	
		7.3	**(115.6'-117.8') Lean CLAY (CL)**; dark gray (GLEY1 4/N), damp, plastic CLAY, firm, medium toughness, no dilatency		**8/29/2019** 07:50 resume drilling Probable water bearing zone (114'-114.6') but had to advance past; unable to sample with drive ahead sampler. PID = 0.0 ppm	2" Sch. 80 PVC 0.020" slot screen
	119		**(117.8'-119') Sandy Lean CLAY with Gravel (CL)**; dark gray (GLEY1 4/N), damp, medium plasticity CLAY, hard, medium toughness, no dilatency; fine Sand; Coarse gravel; trace Cobbles			
120						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs — START : 8/27/2019 — END : 9/3/2019 — LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
		6	**(119'-122.2') Poorly Graded SAND (SP)**; brown (7.5YR 4/2), moist, loose, fine SAND			
	124		**(122.2'-124') Sandy Lean CLAY with Gravel (CL)**; dark gray (GLEY 1 4/N), damp, non-plastic CLAY, soft, low toughness, slow dilatency; fine Sand; coarse Gravel			
125		7.2	**(124'-128.1') Silty SAND with Gravel (SM)**; gray (GLEY1 5/N), wet, fine SAND; fine Gravel, well graded, subangular to subrounded; non-plastic Silt		PID = 0.0 ppm	bentonite backfill
	129		**(128.1'-129') Silty SAND with Gravel (SM)**; gray (GLEY1 4/N), damp, fine SAND, well graded; Cobbles, subangular to rounded; non-plastic Silt			
130			**(129'-131') Well Graded SAND with Gravel (SW)**; very dark gray (7.5YR 3/1), wet, loose, fine SAND; coarse Gravel, subrounded to rounded			
		7.2	**(131'-134') Well Graded SAND with Silt and Gravel (SW-SM)**; dark gray (7.5YR 4/1), moist, fine SAND; fine to coarse Gravel, gap graded, subrounded to rounded; non-plastic Silt, medium density			
	134				Collect WI-CV-GW22-133-0819 at 13:45 from 131.5'-133.5' with drive ahead sampler.	
135			**(134'-139') Well Graded SAND with Silt and Gravel (SW-SM)**; dark gray (7.5YR 4/1), wet, fine SAND; fine to coarse Gravel, gap graded, subrounded to rounded; non-plastic Silt, medium density; trace Cobbles		PID = 0.1 ppm	grout backfill
		7.2				
	139					
140			**(139'-149') Well Graded SAND with Silt and Gravel (SW-SM)**; dark gray (7.5YR 4/1), wet, fine SAND; fine to coarse Gravel, gap graded, subrounded to rounded; non-plastic Silt, medium density; trace Cobbles but less than 134'-149'		Set 8" isolation casing at 140'; used bentonite to seal 138'-140' (1 bag). Drilled from 139' using 4" core barrel and 6" casing	
		10.7				
145					PID = 0.0 ppm	
	149					
150			**(149'-163') Poorly Graded SAND (SP)**; dark gray (10YR 4/1), moist, loose, fine sand, trace medium and coarse SAND		Possibly seeing fewer cobbles due to 4" core barrel	

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs — START : 8/27/2019 — END : 9/3/2019 — LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
155		9			PID = 0.0 ppm	
	159					
160		4.6			18:00 finish driilling for day at 159'. **8/30/2019** 07:25 resume drilling from 159'. PID = 0.0 ppm	
	164		**(163'-179') Poorly Graded SAND (SP)**; dark gray (10YR 4/1), wet, loose, fine SAND, trace medium and coars SAND; trace fine Gravel			
165		5.2			PID = 0.0 ppm	
	169					
170						
		9.3				
175					PID = 0.0 ppm Drillers lost core barrel bit at ~170' while pulling 169'-179' run. Will attempt retrieval	
		4			18:00 finish drilling for day at 179'. D. Butler ends logging. E. Storkerson will resume on 9/3/2019.	
	179					
180			**(179'-187') Poorly Graded SAND (SP)**; dark gray (GLEY1 4/N), mosit, loose; trace non-plastic fines		**9/3/2019**	

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW22S	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437065.13 N, 1200698.29 E)

ELEVATION : 188.27 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs
START : 8/27/2019
END : 9/3/2019
LOGGER : D. Butler/E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	182	4			PID = 0.0 ppm Drop screen for GW sampling at 181' 1' sand heave raised sample depth	
185		10			PID = 0.0 ppm 3/4 of missing drill shoe was recovered at 185'. Soil isolation casing driven to depth to assist in shoe retrieval.	
190	190		**(187'-192') Poorly Graded SAND with Silt (SP-SM)**; dark gray (GLEY1 4/N), moist, loose; several lenses of hard sediment			
			(192'-194') Silty CLAY (CL-ML); dark gray (GLEY1 4/N), moist, very dense CLAY, low plasticity		PID = 0.0 ppm GW sample point 192'-194' bgs.	
			Bottom of Boring at 194.00 ft bgs on 9/3/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW23S	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438959.83 N, 1200713.43 E)

ELEVATION : 192.94 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 8/23/2019
END : 8/10/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0					2'x2' concrete pad, flush mount completion
5	0 - 9	5	**(0'-11.5') Poorly Graded SAND with Gravel (SP)**; dark yellowish brown (10YR 3/6), dry; ~15-20% fine GRAVEL, rounded		**8/5/2019** 16:15 Begin drilling 4" core barrel, 6" casing	2" Sch. 80 PVC well casing
9						
10	9 - 19	10	**(11.5'-16') Poorly Graded SAND (SP)**; very dark grayish brown (10YR 3/2), moist, fine SAND			bentonite grout
15						
			(16'-20') Poorly Graded SAND with Gravel (SP); grayish brown (10YR 5/2), moist; rounded Gravel up to 2"			
19					Drill to 19', stop for the day.	
20	19 - 29	10	(19') Silty		**8/7/2019** 08:45 Resume drilling Drill casing down to 19'	
			(20'-29') Poorly Graded GRAVEL with Sand (SP); very dark grayish brown (10YR 3/2), dry to moist, GRAVEL up to3", rounded			
25						
29						
30	29 - 39	9.5	**(29'-47') Poorly Graded Gravel with Silt and Sand (GP-GM)**; gray, dry, dense GRAVEL, weakly cemented		Harder drilling	
35					1/2 of sample dropped out - redrill to recover	
39						
40	39 - 49	8	(40') GRAVEL is ground up from redrilling		Hard drilling - add water	
45						
			(47'-54') Poorly Graded SAND with Gravel (SP); grayish brown, (10YR 5/2), moist			
49						
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW23S	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (438959.83 N, 1200713.43 E)

ELEVATION : 192.94 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs — START : 8/23/2019 — END : 8/10/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		7	**(54'-57') Silty SAND (SM)**; very dark grayish brown (10YR 3/2), moist, weakly cemented SAND; Silt is stiff			
	59		**(57'-79') Poorly Graded SAND (SP)**; brown (10YR, 4/3), dry, fine SAND			
60						
			(62') Silty SAND lens			
65		8				
	69		(68') Silty SAND lens			
70						
			(72') Silty SAND lens			
75		10				
	79		(77') Silty SAND lens			
80			**(79'-84') Poorly Graded SAND with Silt (SP-SM)**; dark grayish brown (10YR 4/2), moist, dense, very fine SAND; 10% Silt			
85		10	**(84'-86') Lean CLAY (CL)**; dark grayish brown (10YR 4/2), dry, low plasticity CLAY			
			(86'-94') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), dry, loose SAND; silty SAND lenses			
	89					
90						
95		10	**(94'-97') Lean CLAY (CL)**; grayish brown (10YR 5/2), moist, low plasticity CLAY			
			(97'-108') Poorly Graded SAND with Silt (SP-SM); dark grayish brown (10YR 4/2), moist to wet, very fine to fine SAND; dilatent Silt			
	99					
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW23S	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438959.83 N, 1200713.43 E)

ELEVATION : 192.94 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 8/23/2019
END : 8/10/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
105		10			Sand wet, did not run, added water, probably perched on tight gray clay layer	
	109		**(108'-112') Lean CLAY (CL)**; dark greenish gray (GLEY1 3/10Y), moist, stiff to very stiff CLAY, plastic			
110					Clay swelled Casing 110' in clay	
		11	**(112'-117') Silty CLAY (CL-ML)**; dark greenish gray (GLEY1 3/10Y), moist, low plasticity CLAY			
115						
	119		**(117'-118') Lean CLAY (CL)**; dark greenish gray (GLEY1 3/10Y), medium plasticity CLAY			
120			**(118'-123') Poorly Graded SAND with Gravel (SP)**; dark grayish brown (10YR 4/2), dry, fine to medium SAND; ~20% fine Gravel, rounded			
		10	**(123'-133.5') Poorly Graded SAND (SP)**; brown, moist, fine to medium SAND			
125					Drill to 129', cave to 120'. 17:15 stop drilling	3/8" bentonite chips
			(127') dark yellowish brown (10YR 3/6) mottled zone		**8/8/2019** 08:30 Resume drilling Hole caved to 116', SWL = 115'. Clean out hole with core barrel to get GW sample. Push drive ahead sampler to 131' 11:00 Collect GW sample using drive ahead sampler WI-CV-GW04-130-0819	
	129					
130						12/20 sand
			(131') color change to very dark greenish gray (GLEY1 3/10Y)			
		10	**(133.5'-134.5') SILT with Sand (ML)**; gray			
135			**(134.5'-197') Poorly Graded SAND (SP)**; very dark greenish gray (GLEY1 3/10Y), wet, loose, medium SAND (135') a few 1" gravels			2" Sch. 80 PVC 0.020" slot screen
	139					
140						
		10				
145					144'-149' run fell out, had to redrill to get it; advance to 159 for GW sample. Caved to 140', push to 147' for GW sample	
	149					bentonite chips
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW23S	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438959.83 N, 1200713.43 E)

ELEVATION : 192.94 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 8/23/2019
END : 8/10/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
155		9	(150'-159') a couple of Silt seams, a few Gravel clasts		Collect GW sample using drive ahead sampler WI-CV-GW04-148-0819 collected on 8/9/2019 at 09:20	
	159					
160					17:40 Stop for the day (8/8/2019)	
			(160'-169') a couple of fine SAND/Silt lenses		**8/9/2019** Resume drilling. Run casing down to 160'	
165		10				
	169				12:45 Run drive ahead sampler down to 169' 13:15 collect GW sample from drive ahead sampler after bailing WI-CV-GW04-168-0819	
170						
175		7.5				
	179					
180					Run casing to 180'	
185		10				
	189				Stop drilling at 189'; will driill to 199' and take GW sample in the morning	
190					**8/10/2019**	
195		10			Drill to 199'; hole caved to 182'. Push drive ahead sampler to 197' 12:05 Collect GW sample from drive ahead sampler WI-CV-GW04-196-0819	
			(197'-200') Silty CLAY (CL-ML); very dark greenish gray (GLEY1 3/10Y), moist, stiff CLAY, low plasticity			
200	200					
			Bottom of Boring at 200.00 ft bgs on 8/10/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW25M	SHEET 1 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : NA START : 9/17/2019 END : 10/19/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0	9	**(0'-15') Poorly Graded SAND (SP)**; dark yellowish brown (10YR 4/4)		**9/17/2019** 14:30 Start drilling 7" core barrel 8" casing	Damaged well abandoned 12/5/2020 with bentonite grout
5						2" Sch. 80 PVC well casing
	9		(7') Gravelly layer, dry, fine SAND			
10		10	(10') Gravelly layer, dry, fine SAND			bentonite grout
15			**(15'-30') Poorly Graded GRAVEL with Sand (GP)**; dark grayish brown (10YR 4/2), dry, dense, 3"-4" GRAVEL, rounded; fine to coarse Sand matrix; a couple of thin Silty seams			
	19				17:40 Stop at 19' for the day	
20		9			**9/18/2019** 07:45 Resume drilling	
25						
	29					
30		10	(29') some Silty matrix, weak cementation			
			(30'-50') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), dry, medium density, fine SAND, uniform; no fines			
35						
	39					
40		9	(40'-41') weakly cemented Silty SAND		"Beach sand"	
45			(45'-46') weakly cemented Silty SAND			
	49					
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW25M	SHEET 2 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/17/2019 END : 10/19/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		7	**(50'-76') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, very fine SAND; occasional seams of weakly cemented Silty SAND			
	59					
60						
65		9				
	69					
70						
75		7				
	79		**(76'-87') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, loose, fine SAND; no fines		Bottom 2' fell out of 69'-79' run	
80						
85		9				
	89		**(87'-102') Silty SAND (SM)**; Dark grayish brown (10YR 4/2), moist; clean SANDY seams alternating with dense Silty SAND layers; a few thin Clay seams; 1 small GRAVEL clast		
90						
95		10				
	99					
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW25M	SHEET 3 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/17/2019 END : 10/19/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
105		10	**(102'-105') Silty CLAY (CL-ML)**; brown (10YR 5/3), moist, low plasticity CLAY			
	109		**(105'-110') Silty CLAY (CL-ML)**; dark gray (GLEY1 4/N), moist, stiff to very stiff CLAY, low to medium plasticity, massive			
110			**(110'-119') Poorly Graded SAND (SP)**; dark greenish gray (GLEY1 4/10Y), wet, loose		Drill to 110'; drive 8" casing in clay to 110'. Stop for the day **9/20/2019** 13:30 Resume drilling Drill to 119', sample fell out; redrill, sample falls out again. A lot of dilling water in hole	
115		3				
	119					
120		6	**(119'-120') Poorly Graded GRAVEL with Silt and Sand (GP-GM)**; dark greenish gray (GLEY1 4/10Y), moist, very dense GRAVEL, weakly cemented		disturbed sample (110'-119')	
	124		**(120'-123') Poorly Graded SAND (SP)**; brownish gray, wet, fine SAND (123') 3" cemented Silty SAND lens			
125		4	**(123'-127') Well Graded SAND with Gravel (SW)**; grayish brown, wet, medium to coarse SAND; fine Gravel		Drill 5', refusal. Vibe out core and lost sample down hole. Stop for day at 124'. Tag hole at 118'	
	129		**(127'-129') Poorly Graded SAND (SP)**; grayish brown, wet, fine SAND		**9/21/2019** 09:00 Resume drilling Sand fell out overnight and got saturated. Drill to 129', casing to 129' Collect GW sample from drive ahead sampler AT 130'-132' WI-CV-GW25-131-0919	
130			**(129'-131') Well Graded SAND (SW)**; medium to coarse SAND			
135		9	**(131'-138') Poorly Graded SAND (SP)**; fine SAND; trace Silt			
	139		**(138'-141') Well Graded SAND (SW)**; grayish brown, wet, medium to coarse SAND; occasional Gravel			
140						
145		9	**(141'-160') Poorly Graded SAND (SP)**; very dark grayish brown (10YR 3/2), wet, fine SAND			3/8" bentonite chips
	149					
150						

PROJECT NUMBER: 9000NVT1	BORING NUMBER: WI-CV-MW25M	SHEET 4 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/17/2019 END : 10/19/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
155	159	7	(151') 2" SANDY Clay seam; color change to dark gray (2.5Y 4/1), wet, fine SAND, non-stratified		Collect GW sample from drive ahead sampler at 154'-156' WI-CV-GW25-155-0919	12/20 sand 2" Sch. 80 PVC 0.020" slot screen
160	166	6	**(160'-166') Poorly Graded SAND (SP)**; very dark greenish gray (GLEY1 3/10Y), wet, fine to medium SAND, non stratified		Stop at 159'. Push casing to 160' End of shift **10/19/2019** 09:30 Resume drilling	
170	176	10	**(166'-174') Silty CLAY (CL-ML)**; dark gray (GLEY 4/N), moist, stiff CLAY, very low plasticity; Silt and CLAY mix			
175	176		**(174'-177') Lean CLAY (CL)**; dark gray (GLEY1 4/N), very stiff CLAY, medium to high plasticity		GW sample not taken because of clay	
180	181	5	**(177'-206') Silty CLAY (CL-ML)**; dark gray (GLEY1 4/N), moist, very stiff CLAY, low plasticity, massive; a couple of very fine Sand/Silt lenses, dark gray, moist		Try a 5' run to see if we hit sand. Very tight silt/clay at 181'; drill to 186' - still silt/clay. Drill to 196'	
185	186	5				bentonite chips
190	196	10	(194'-195') brownish Silt layer			
195			(197') color change to very dark gray (5Y 3/1)		No sand encountered, no GW sample taken, continue drilling	
200						

PROJECT NUMBER: 9000NVT1	BORING NUMBER: WI-CV-MW25M	SHEET 5 OF 5

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/17/2019 END : 10/19/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
205		10	(200') brownish mottling		16:00 Collect GW sample from drive ahead sampler at 206'-208' WI-CV-GW25-207-1019	
	208		**(206'-208') Clayey GRAVEL with Sand (GC)**; dark gray, wet, gravel up to 2", rounded; Sand/Silt; Clay matrix			
			Bottom of Boring at 208.00 ft bgs on 10/19/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW25M (R)	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439503.02 N, 1201047.61 E)

ELEVATION : 192.61 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 12/3/2019
END : 12/4/2019
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-5.5') Well Graded SAND with Gravel (SW)**; olive brown (2.5Y 4/3), slightly damp; 85% fine to coarse SAND, subangular; 15% fine to coarse Gravel, subrounded		**12/3/2019** 0'-5' hand cleared with hand auger **12/4/2019** 08:00 Begin drilling; 4" core barrel, 6" casing	2'x2' concrete pad, flush mount completion
5	5					
	6	1	**(5.5'-28') Poorly Graded SAND with Gravel (SP)**; olive gray (5Y 5/2), damp; 85% medium SAND, poorly graded, subangular; 15% fine to medium Gravel, subrounded			2" Sch. 80 PVC well screen
10		4			(6'-16') DR: Possible large rock encountered; core is very warm	bentonite grout
15	16					
20						
25		8				
30			**(28'-34') Well Graded GRAVEL with Sand (GW)**; olive brown (2.5Y 4/4), dry to damp; 85% fine to coarse GRAVEL, well graded, subangular to subrounded; 15% fine to medium Sand, well graded, subangular			
35	36		**(34'-41.5') Poorly Graded SAND with Gravel (SP)**; olive gray (5Y 5/2), damp; 85% medium SAND, poorly graded, subangular; 15% fine to medium Gravel, subrounded		(16'-36') Core is hot	
40		8				
			(41.5'-43') Poorly Graded SAND with Silt (SP-SM); olive brown (2.5Y 4/4), damp; 90% fine to medium SAND, subangular; 10% Silt			
45	46		**(43'-99.5') Poorly Graded SAND (SP)**; grayish brown (2.5Y 5/2), damp, medium SAND, subangular, some blocky structures		(36'-46') Core is hot	
50						

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW25M (R) SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439503.02 N, 1201047.61 E)

ELEVATION : 192.61 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs START : 12/3/2019 END : 12/4/2019 LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55	56	6	(56'-66') SAND density increases to medium density		(46'-56') Warm core	
60		6				
65	66		(66') density changes to loose, no blocky structures			
70		8				
75	76					
80		8.5				
85	86					
90		7			PID = 0.0 ppm	
95	96		(93') lens of fine to medium SAND (95') lens of fine to medium SAND			
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW25M (R)	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439503.02 N, 1201047.61 E)

ELEVATION : 192.61 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 12/3/2019
END : 12/4/2019
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
105	106	10	**(99.5'-105.5') SILT with Sand (ML)**; olive gray (5Y 5/2), damp; 85% low plasticity SILT; 15% fine Sand			
110		11	**(105.5'-112') Lean CLAY (CL)**; gray (GLEY1 5/N), damp, stiff CLAY, no dilatency; trace fine Sand			
115	116		**(112'-114.5') Well Graded SAND with Gravel (SW)**; olive gray (5Y 5/2), damp; 70% fine to coarse SAND, subangular; 30% fine to coarse Gravel, subrounded **(114'-125') Poorly Graded SAND (SP)**; olive gray (5Y 5/2), damp; 90% medium SAND, subangular; 10% fine to medium Gravel, subrounded			
120		10.5				
125	126		**(125'-125.5') Silty SAND (SM)**; olive gray (5Y 5/2), damp; 80% fine to medium SAND, subangular, medium density; 20% low plastic Silt, no dilatency **(125.5'-160') Poorly Graded SAND (SP)**; olive gray (5Y 5/2), moist to wet, very loose, medium sand			
130		10				
135	136					
140		11.5				
145	146		(143'-146') trace coarse Gravel			3/8" bentonite chips
150						

PROJECT NUMBER:	BORING NUMBER:
9000NVT1	WI-CV-MW25M (R) SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439503.02 N, 1201047.61 E)

ELEVATION : 192.61 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs START : 12/3/2019 END : 12/4/2019 LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
155	156	10				12/20 sand 2" Sch. 80 PVC 0.020" slot screen
160	162	6			15:15 Finish drilling	
			Bottom of Boring at 162.00 ft bgs on 12/4/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW26D	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (436874.04 N, 1201650.35 E)

ELEVATION : 191.30 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 144 ft bgs — START : 8/2/2019 — END : 8/5/2019 — LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0	4	**(0'-6.5') Well Graded SAND with Gravel (SW)**; yellowish brown (10YR 5/4), dry, fine to coarse SAND		**8/2/2019** 08:00 Begin drilling; 4" core barrel, 6" casing	2'x2' concrete pad, flush mount completion
5						2" Sch. 80 PVC well casing
	8.5		**(6.5'-9') Poorly Graded SAND (SP)**; brown, dry, fine SAND			
10		9.5	**(9'-23.5') Poorly Graded GRAVEL with Sand (GP)**; brown, dry, GRAVEL up to 3"; well graded Sand matrix			bentonite grout
15			(13.5') color change to very dark grayish brown (10YR 3/2)			
	18.5		(17'-17.5') Sand lens			
20		9				
25			**(23.5'-28') Poorly Graded SAND with Gravel (SP)**; dark grayish brown (10YR 4/2), dry, fine to coarse SAND; fine Gravel			
	28.5					
30		8.5	**(28'-58.5') Poorly Graded GRAVEL with Silt and Sand (GP-GM)**; gray (2.5Y 5/1), dry, very dense GRAVEL, weakly cemented		Hard drilling Dense till	
35					PID = 0.0 ppm	
	38.5					
40		5			Core sample fell out during core barrel retrieval; had to redrill and recover disturbed sample	
45						
	48.5					
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW26D	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (436874.04 N, 1201650.35 E)

ELEVATION : 191.30 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 144 ft bgs
START : 8/2/2019
END : 8/5/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		8	(52') dry, gray silt/rock flour		Slow, hard drilling; sample fell out and had to trip down to recover at 58' Drilling broke up rocks into dust	
	59		**(58.5'-74') Poorly Graded SAND (SP)**; gray (5Y 5/1), dry, loose; occasional fine Gravel		Start adding water during drilling Smoother drilling Wet from driilling water	
60						
65		9	(63') lens of Gravelly Silt			
	69					
70						
75		5.5	**(74'-82') Silty GRAVEL with Sand (GM)**; gray (5Y 5/1), dry, hard, dense GRAVEL, weakly cemented		Slower drilling - rig chatter at 74' Gravel broken up by drilling	
	79					
80						
85		10	**(82'-99.5') Poorly Graded SAND (SP)**; grayish brown (10YR 4/2), dry, fine to medium SAND, medium dense; occasional lenses of cemented Silt/Clay 1/2" to 1" thick		Faster drilling through sand	
	89					
90						
95		8				
	99					
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW26D	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (436874.04 N, 1201650.35 E)

ELEVATION : 191.30 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 144 ft bgs
START : 8/2/2019
END : 8/5/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
			(99.5'-100') Lean CLAY (CL); yellowish brown (10YR 5/4)			
			(100'-102') Silty SAND (SM); brown, dry, fine SAND			
105		8	**(102'-117') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, fine SAND, medium density; occasional Silt/Clay lenses			
	109					
110			(110') black organic Clay layer			
115		10			PID = 0.0 ppm	
	119		**(117'-123') Poorly Graded SAND with Silt (SP-SM)**; dark grayish brown (10YR 4/2), moist; Silt occurs in lenses			
120					Stop drilling at 119' **8/3/2019** 08:30 Resume drilling	
125		9.5	**(123'-126') Well Graded GRAVEL with Silt and Sand (GW-GM)**		Check for water - Dry TD - 117' (2" of sluff) Rock flour broken by drilling	
			(126'-132') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), wet, fine SAND			
	129		(128.5') Sandy Clay lenses		Bottom of run (~128'129') wet - attempt GW sample Bail out sand, 1 gal SWL = ~80' drill water = 9 gal x 3 = 27 Collect GW sample at 129'-131' WI-CV-GW26-130-0819	
130						
135		7	**(132'-135') Silty SAND (SP-SM)**; dry, cemented Silty SAND; Silt lenses			
			(135'-156') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), moist, fine to medium SAND; no fines		14:51 Resume drilling	
	139					
140						
145		9				
	149					
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW26D	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (436874.04 N, 1201650.35 E)

ELEVATION : 191.30 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 144 ft bgs
START : 8/2/2019
END : 8/5/2019
LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
			(150') change to dark gray (10YR 4/1), wet		17:30 Stop drilling for day at 149'	
155		10			**8/4/2019** 07:46 Resume drilling	
			(156'-159') Poorly Graded SAND with Silty Clay (SP-SC); greenish black (GLEY2 2.5/10G), increasing Silty and Clayey lenses			
	159					
160			**(159'-161.5') Poorly Graded SAND with Gravel (SP)**		Drill to 159' to take GW sample - hole caved and heaved to 146', so have to run casing down to 159	
			(161.5'-162.5') Poorly Graded SAND (SP); wet, fine SAND		PID = 0.0 ppm	
			(162.5'-165.5') SILT (ML); greenish gray, stiff SILT			
165		10				
			(165') Clay			
			(165.5'-168.5') Poorly Graded SAND (SP); gray, wet, dense, fine SAND, weakly cemented			
	169					
170			**(168.5'-174') Lean CLAY (CL)**; greenish black (GLEY1 2.5/10Y), dry, very stiff CLAY, low plasticity		Insert drive ahead sampler to 169', retract to expose screen DTW = 154.7' TD = 169' Bail 5 gal, let recharge 13:00 Collect GW sample from drive ahead sampler at 167'-169' WI-CV-GW26-169-0819 13:10 Resume drilling	
		10				
175			**(174'-177') SILT (ML)**; dark greenish gray (GLEY1 4/10Y), moist, stiff SILT			
			(177'-185') Lean CLAY (CL); greenish black, moist, very stiff CLAY, low plasticity			
	179					
180						
		10				3/8" bentonite chips
185						
			(185'-191') Poorly Graded SAND (SP); greenish black, wet, fine SAND		Attempt GW sample; Cave to 186'; will attempt GW sample in A.M. Push into hole at 192'-194' DTW = 173'	
			(187') Clay lens			12/20 sand
	189					
190					**8/5/2019**	
			(190'-191') Gravel			
			(191'-194') Poorly Graded SAND (SP); gray, wet, fine to medium SAND		11:05 Collect GW sample from drive ahead sampler AT 191'-193' WI-CV-GW26-192-0819	
195		10	**(194'-196') Lean CLAY (CL)**; gray, dry, stiff CLAY			2" Sch. 80 PVC 0.020" slot screen
			(196'-198') Poorly Graded SAND (SP); gray, wet, fine SAND			
			(198'-200') Lean CLAY (CL); gray, dry, stiff CLAY			
200	200					
			Bottom of Boring at 200.00 ft bgs on 8/5/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW28M	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (438316.32 N, 1200737.93 E)

ELEVATION : 189.35 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs — START : 3/11/2020 — END : 3/13/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0		**(0'-14') Well Graded SAND with Gravel (GW)**; dark yellowish brown (10YR 3/4), moist to wet, fine to coarse SAND, subangular; fine to coarse Gravel, rounded; trace rounded Cobbles up to 4"		**3/11/2020** 10:38 start drilling 6"x8" Hand cleared 0'-5'	2'x2' concrete pad, flush mount completion
5		6			PID = 0.0 ppm	2" Sch. 80 PVC casing
10	10					bentonite grout
			(12') color change to dark grayish brown (10YR 4/2)			
15		8.7	**(14'-20') Poorly Graded SAND with Gravel (SP)**; dark grayish brown (10YR 4/2), damp, loose; rounded Gravel		PID = 0.0 ppm	
20	20		**(20'-24.5') Well Graded SAND with Silt and Gravel (SW-SM)**; dark brown (10YR 3/3), moist, loose; 5-10% fines; rounded Gravel; Cobbles up to 4"			
25		10.5	**(24.5'-37') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry to slightly damp, loose; rounded Gravel		PID = 0.0 ppm	
30	30		(30'-37') pockets of dampness, some trace fines			
35		10			PID = 0.0 ppm	
			(37'-42') Well Graded GRAVEL with Sand (GW); dark grayish brown (10YR 4/2), dry, loose, rounded GRAVEL; ~30% well graded Sand, fine to coarse; some large Cobbles up to 6"			
40	40		(40'-42') no Cobbles			
			(42'-68') Poorly Graded SAND (SP); dark gray (10YR 4/1), dry, loose, fine to medium SAND, very trace rounded Gravel			
45		9	(45'-46') some dense blocky structures		PID = 0.0 ppm	
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW28M	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (438316.32 N, 1200737.93 E)

ELEVATION : 189.35 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs — START : 3/11/2020 — END : 3/13/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	50		(50'-68') some damp to moist zones, mostly loose, some medium density clumps			
55		7			PID = 0.0 ppm	
60	60		(60'-68') slightly damp (61'-62') trace rounded Gravel			
65		9			PID = 0.0 ppm	
70	70		**(68'-69.5') SILT with Sand (ML)**; light olive brown (2.5Y 5/3), damp, medium stiff SILT, medium plastic **(69.5'-70') Poorly Graded SAND (SP)**; dark gray (10YR 4/1), dry, loose, fine to medium SAND, very trace rounded Gravel **(70'-75') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), damp, loose, fine SAND; ~10-15% fines			
75		8.7	**(75'-76.5') SILT (ML)**; grayish brown (2.5Y 5/2), damp, stiff SILT, medium plasticity; trace fine Sand **(76.5'-79.5') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), damp, loose; fine SAND		PID = 0.0 ppm	
80	80		**(79.5'-80') Silty SAND (SM)** **(80'-81') Poorly Graded SAND (SP-SM)**; grayish brown (2.5Y 5/2), damp, loose; fine SAND **(81'-86') Poorly Graded SAND (SP)**; grayish brown (2.5Y 5/2), slightly moist, loose, fine to medium SAND			
85		10	**(86'-88.5') SILT with Sand (ML)**; olive gray (5Y 5/2), damp, stiff SILT, non-plastic		PID = 0.0 ppm	
90	90		**(88.5'-101') Poorly Graded SAND with Silt (SP-SM)**; olive gray (5Y 5/2), damp, loose, fine to medium SAND; ~10% fines			
95		8.5			PID = 0.0 ppm	
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW28M	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (438316.32 N, 1200737.93 E)

ELEVATION : 189.35 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs — START : 3/11/2020 — END : 3/13/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	100					
			(101'-102.5') SILT (ML); olive gray (5Y 5/2), slightly damp, very stiff SILT, non-plastic			
			(102.5'-103.5') Lean CLAY (CL); gray (GLEY1 5/N), damp to dry, very stiff CLAY, medium plasticity			
105		9.5	**(103.5'-104') Sandy SILT (ML)**; olive gray (5Y 5/2), soft SILT		PID = 0.0 ppm	
			(104'-130') Poorly Graded SAND with Gravel (SP); olive gray (5Y 5/2), loose, fine to medium SAND; fine to coarse Gravel, subrounded			
110	110					
			(110'-115') dry, some dense clumps		Slow down to 5-ft runs to see if we hit more silt or saturated conditions for setting 8-in casing PID = 0.0 ppm 18:05 stop drilling; TD = 115'	
		5				
115	115					
			(115'-120') no dense clumps, Gravel is well graded, decreasing Gravel with depth		**3/12/2020** 08:25 resume drilling with 5-ft runs PID = 0.0 ppm	
		4.5				
120	120					
			(120'-125') much less Gravel, damp to moist			
		4.5			PID = 0.0 ppm	
125	125		(124') moist			
			(125'-130') moist to wet, no Gravel			
		4.5			PID = 0.0 ppm	
130	130					
			(130'-150') Poorly Graded SAND (SP); dark gray (GLEY1 4/N), wet, very loose, fine to medium SAND		Change to drilling 4"x6"; leave 8" casing in place without sealing	
135		9			PID = 0.0 ppm	
140	140					
			(140'-150') dark greenish gray (GLEY1 4/10Y)			
145		8			PID = 0.0 ppm	
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW28M	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438316.32 N, 1200737.93 E)

ELEVATION : 189.35 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 3/11/2020
END : 3/13/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	150		**(150'-156.5') Poorly Graded SAND with Silt (SP-SM)**; dark gray (GLEY1 4/N), wet to saturated, fine to medium SAND; 5-10% fines			
155		8			PID = 0.0 ppm	3/8" bentonite chips
			(156.5'-160') Poorly Graded SAND (SP); same as 140'-150', wet; trace angular to subangular Gravel			
160	160					
			(160'-170') Poorly Graded SAND (SP); dark gray (GLEY1 4/N), saturated, very loose, fine to medium SAND; ~5% fines			
165		7.5			PID = 0.0 ppm	12/20 sand 2" Sch. 80 PVC 0.020" slot screen
170	170					
175		8.5			PID = 0.0 ppm	bentonite backfill
180	180					
			(180'-190') SILT with Sand (ML); dark bluish gray (GLEY2 4/10B), damp, medium stiff SILT, low plasticity; ~20% fine Sand		16:20 finish drilling DR: casing down to 180. Sand heaved up to 167'; unable to clean out with core barrel without water. **3/13/2020** Use water to clean out down to 180. PID = 0.0 ppm	
185		11.5				slough
190	190					
			Bottom of Boring at 190.00 ft bgs on 3/13/2020			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW29M	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437523.51 N, 1201553.16 E)

ELEVATION : 189.76 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 128 ft bgs
START : 2/28/2020
END : 3/9/2020
LOGGER : E. Storkerson, G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0	5	**(0'-2') TOPSOIL**; dark brown organic TOPSOIL with grass and roots		**2/18/2020** Hand augered 0'-4' bgs	3'x3' concrete pad, flush mount completion
			(2'-6') Silty SAND (SM); medium brown (2.5Y 4/3), moist, well graded SAND		**2/28/2020** Finished hand augering to 5' bgs 09:20 begin sonic drilling with 8"x10"	
5	5	4.7	**(6'-12') Well Graded GRAVEL with Sand (GW)**; medium brown (2.5Y 4/3), moist, fine to coarse GRAVEL; fine to coarse Sand		PID = 0.0 ppm	4" Sch 80. PVC casing
10	10	8	**(12'-18') Poorly Graded SAND (SP)**; dark gray (2.5Y 4/1), moist; no fines; trace coarse Gravel		PID = 0.0 ppm	bentonite grout
15						
20	20	9.5	**(18'-24') Well Graded GRAVEL with Sand (GW)**; dark gray (2.5Y 4/1), moist, fine to coarse GRAVEL; fine to coarse Sand			
25			**(24'-26') Silty SAND (SM)**; medium brown (2.5Y 4/3), moist, well graded SAND		PID = 0.0 ppm	
			(26'-55') Well Graded GRAVEL with Sand (GW); moist; no fines			
30	30	9.5				
35					PID = 0.0 ppm	
40	40	9.8				
45					PID = 0.0 ppm	
50						

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PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW29M	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437523.51 N, 1201553.16 E)

ELEVATION : 189.76 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 128 ft bgs
START : 2/28/2020
END : 3/9/2020
LOGGER : E. Storkerson, G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	50					
55		9.8	**(55'-65') Poorly Graded SAND (SP)**; medium brown (2.5Y 4/2), moist, very fine to fine SAND, trace medium SAND		PID = 0.0 ppm	
60	60		(60'-62') Some coarse Gravel			
		6				
65	65				PID = 0.0 ppm	
			(65'-77') Poorly Graded SAND (SP); medium brown (2.5Y 4/2), slightly moist, very fine to fine SAND; trace fines			
		2.5				
70	70					
75		8				
			(77'-80') Poorly Graded GRAVEL with Sand (GP); medium brown (2.5Y 4/2), slightly moist, fine GRAVEL; very fine to fine Sand; trace fines		PID = 0.0 ppm	
80	80		**(80'-90') Poorly Graded SAND (SP)**; medium brown (2.5Y 4/2), slightly moist, fine to medium SAND			
85		7.5			PID = 0.0 ppm	
90	90					
			(90'-100') Poorly Graded SAND with Silt (SP-SM); medium brown (2.5Y 4/2), becoming wet, fine to medium SAND; increased Silt content			
95		10.7			PID = 0.0 ppm	
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW29M	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437523.51 N, 1201553.16 E)

ELEVATION : 189.76 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 128 ft bgs
START : 2/28/2020
END : 3/9/2020
LOGGER : E. Storkerson, G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	100		**(100'-108') Poorly Graded SAND (SP)**; trace fines			
105		9.7			PID = 0.0 ppm	
			(108'-112') Poorly Graded SAND with Silt (SP-SM); very moist, very fine to fine SAND; increase in Silt			
110	110					
			(112'-125') Silty SAND (SM); moist to wet, very fine to fine SAND; high Silt content			
115		10				
120	120					
		4.4			17:30 stop drilling for the day at 120' bgs **2/29/2020** 07:45 resume drilling PID = 0.0 ppm	
125	125					
		2.5	**(125'-134') Poorly Graded SAND (SP)**; very fine to fine SAND; enough Silt to add some some stiffness, but much less stiff than above			
130	130					
		6			09:30 reach 130' with core barrel; will push 10" casing to 120' and continiue drilling with 6"x8"; no iso sealing on the 10" casing PID = 0.0 ppm	
135			**(134'-137') Poorly Graded SAND with Silt (SP-SM)**; saturated, very fine to fine SAND; stiff Silt			
	137					
			(137'-170') Poorly Graded SAND (SP); gray (GLEY1 3/10Y), saturated, very fine to fine SAND			
140						
		11.7				
145					PID = 0.0 ppm	
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW29M	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (437523.51 N, 1201553.16 E)

ELEVATION : 189.76 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 128 ft bgs
START : 2/28/2020
END : 3/9/2020
LOGGER : E. Storkerson, G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	150				12:00 stop drilling for the day; casing at 150' bgs; will resume after 7-day break	
155		9			PID = 0.0 ppm	3/8" bentonite chips
160	160		(160'-170') dark gray (10YR 4/1)		3/9/2020 13:30 resume drilling; clean out hole and advance casing to 160' bgs	
165		7			DR: heaving sands, need to do another cleanout run PID = 0.0 ppm	12/20 sand
			(168'-170') trace fines			4" Sch. 80 PVC 0.020" slot screen
170	170		**(170'-171') Silt with GRAVEL (ML)**; dark gray (GLEY1 4/N), wet; Cobbles up to 6"			
			(171'-180') SILT (ML); dark gray (GLEY1 4/N), dry to damp, medium plasticity SILT			
175		10			18:00 reach 180' ft bgs TD	bentonite backfill
			(178'-180') low plasticity			
180	180		Bottom of Boring at 180.00 ft bgs on 3/9/2020		PID = 0.0 ppm	

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-2')** dark brown organic TOPSOIL with grass and roots		**2/18/2020** Hand auger 0'-5' bgs 14:50 start sonic drilling with 7"x8"	2'x2' concrete pad, flush mount completion
			(2'-5') Silty SAND (SM); medium brown, slightly moist			
5		8	**(5'-36') Well Graded SAND with Gravel (SW)**; dark yellowish brown (10YR 4/4), slightly moist, loose; fine to coarse Gravel up to 3"; trace fines			2" Sch. 80 PVC casing
			(8'-36') olive gray (5Y 5/2); trace Cobbles, subrounded; rounded Gravel; 75% SAND; 25% Gravel			
10	10					bentonite grout
15		9.5				
20	20				PID = 0.0 ppm	
25		8.5				
30						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	30				16:30 stop drilling for the day at 30' bgs **2/19/2020** 11:00 resume drilling	
35		8.5			PID = 0.0 ppm	
			(36'-40') Well Graded GRAVEL with Sand (GW); brown (10YR 4/3), dry to damp, loose, fine to coarse GRAVEL, sugangular to subrounded; fine to medium Sand, poorly graded, subangular; 75% GRAVEL; 25% Sand			
40	40					
			(40'-45') Well Graded SAND (SW); olive gray (5Y 5/2), slightly damp, loose Sand; rounded gravel; trace subrounded Cobbles; trace fines		PID = 0.0 ppm	
45		7				
			(45'-52') Well Graded GRAVEL with Sand (GW); brown (10YR 4/3), dry, loose, fine to coarse GRAVEL, sugangular to subrounded; fine to medium Sand, poorly graded, subangular; 75% GRAVEL; 25% Sand			
50	50					
			(52'-108') Poorly Graded SAND (SP); dark grayish brown (10YR 4/2), damp, loose, fine to medium SAND, subangular			
55		6			PID = 0.0 ppm	
60						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	60		(60'-108') grayish brown (2.5Y 5/2), slightly damp		PID = 0.0 ppm	
65		10	(64'-64.7') increase in fine SAND			
70	70				PID = 0.0 ppm	
75		9				
80	80				PID = 0.0 ppm	
85		10				
90						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 4 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs — START : 2/18/2020 — END : 2/21/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	90				PID = 0.0 ppm	
95		10.5				
100	100				PID = 0.0 ppm 17:30 stop drilling for the day at 100' bgs 2/20/2020 07:45 resume drilling	
105		10.5				
			(107'-108') medium density **(108'-109.5') SILT with Sand (ML)**; olive gray (5Y 5/2), dry, stiff SILT, low plasticity; laminae of dark yellowish brown color (10YR 4/6); ~15% fine to medium Sand			
110	110		**(109.5'-114') Poorly Graded SAND with Silt (SP-SM)**; olive gray (5Y 5/2), slightly damp, medium dense, fine to medium SAND; low plasticity Silt		Slow down to 5-ft runs to see if silt/clay is encountered PID = 0.0 ppm	
		7				
115	115		**(114'-114.5') SILT with Sand (ML)**; olive gray (5Y 5/2), dry, stiff SILT, low plasticity; fine to medium Sand **(114.5'-119') Poorly Graded SAND with Silt (SP-SM)**; olive gray (5Y 5/2), slightly damp, medium dense, fine to medium SAND; low plasticity Silt		DR: water in core barrel not added by driller PID = 0.0 ppm	
		4				
120						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	120		**(119'-120') Poorly Graded SAND (SP)**; grayish brown (2.5Y 5/2), slightly damp, loose, fine to medium SAND, subangular (120') cobble		PID = 0.0 ppm	
		6	**(120'-122) Well Graded SAND with Gravel (SW)**; grayish brown (10YR 5/2), moist, fine to coarse SAND; fine to coarse Gravel, subrounded			
			(122'-176') Poorly Graded SAND (SP); dark gray (10YR 4/1), moist to wet, loose, fine to medium SAND, subangular			
125	125				Wet at bottom of 120'-125' run PID = 0.0 ppm	
		2.5	(125') wet (125'-130') trace gravel, subangular to subrounded			
130	130				Soil is falling out of core barrel; switch to using flapper bit PID = 0.0 ppm 8" casing is set at 130' bgs with no isolation sealing; continue with 4"x6" with 10-ft runs	
135		9				
140	140				PID = 0.0 ppm	
145		9.3				
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	150				PID = 0.0 ppm	
155		9	(155') trace rounded Gravel up to 1/2"			3/8" bentonite chips
160	160				PID = 0.0 ppm	
165		8.2				12/20 sand
170	170				PID = 0.0 ppm	2" Sch. 80 PVC 0.020" slot screen
175		8.4				
180			**(176'-180') Poorly Graded SAND with Silt (SP-SM)**; dark gray (5Y 4/1), wet to saturated, loose, fine to medium SAND, more fine than above; 10% Silt			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW30M	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (438435.55 N, 1202392.04 E)

ELEVATION : 194.05 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 125 ft bgs
START : 2/18/2020
END : 2/21/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	180		**(180'-181.7') SILT (ML)**; dark gray (GLEY1 4/N) with dark greenish gray mottling (GLEY1 4/10G), medium stiff SILT, medium plasticity		PID = 0.0 ppm 17:10 stop drilling for the day at 180' bgs	
			(181.7'-182.8') Well Graded GRAVEL with Silt and Sand (GP-GM); dark gray (GLEY1 4/N), wet, loose, fine GRAVEL, subangular to subrounded; ~15% medium to coarse Sand		**2/21/2020** 07:40 resume drilling	
			(182.8'-183.8') Poorly Graded SAND with Silt (SP-SM); dark gray (5Y 4/1), wet to saturated, loose, fine to medium SAND, more fine than above; 10% Silt			
185		9.5	**(183.8'-189.5') Sandy SILT (ML)**; dark gray (GLEY1 4/N), moist, medium stiff SILT, mediuum plasticity; ~30% fine to medium Sand			bentonite backfill
190	190		**(189.5'-193') Poorly Graded SAND with Silt (SP-SM)**; dark gray (5Y 4/1), wet to saturated, loose, fine to medium SAND, more fine than above; 10% Silt		DR: heaving sands	
			(193'-193.5') SILT (ML); dark gray (GLEY1 4/N), medium stiff SILT, medium plasticity			
195		10.5	**(193.5'-196') Poorly Graded SAND (SP)**; dark gray (10YR 4/1), moist, loose, fine to medium SAND			
			(196'-198') SILT with Sand (ML); dark gray (GLEY1 4/N), medium stiff SILT, medium plasticity; ~15% fine to medium SAND		09:45 reached target depth of 200' ft bgs	
			(198'-199') Lean CLAY with Sand (CL)' olive gray (5Y 5/2), dry, stiff CLAY, low plasticity			
200	200		**(199'-200') SILT with Sand (ML)**; dark gray (GLEY1 4/N), medium stiff SILT, medium plasticity, crumbly			
			Bottom of Boring at 200.00 ft bgs on 2/21/2020			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31M	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439026.82 N, 1202771.23 E)

ELEVATION : 193.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 120 ft bgs
START : 2/22/2020
END : 2/25/2020
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-2') TOPSOIL**; dark brown, moist, organic TOPSOIL with grass and roots, very fine to medium Sand		**2/18/2020** Hand auger to 5' bgs, no obstructions	3"x3" concrete pad, flush mount completion
			(0'-7') Silty SAND (SM); medium brown, moist, very fine to medium SAND		**2/22/2020** 09:48 begin drilling with 10"x8" for 4" monitoring well	
5		7				2" Sch. 80 PVC casing
			(7'-8') Well Graded GRAVEL with Sand (GW); medium brown (10YR 4/3), moist; very fine to medium Sand			
10	10		**(8'-11') Well Graded SAND with Gravel (SW)**; same as above but loss of most Gravel, increase in Silt		PID = 0.0 ppm	bentonite grout
			(11'-17') Poorly Graded GRAVEL (GP); grayish brown (2.5YR 3/1), moist, mostly fine GRAVEL; trace fines			
15		7				
			(17'-22') Well Graded GRAVEL with Sand (GW); grayish brown (2.5Y 3/1), moist, increase in GRAVEL size; trace fines		PID = 0.0 ppm	
20	20					
			(22'-27') Well Graded GRAVEL with Silt and Sand (GW-GM); grayish brown (2.5Y 3/1), moist; increase in Silt; fine to medium Sand			
25		9				
			(27'-30') Poorly Graded SAND (SP); medium brown (2.5Y 3/1), moist; no Gravel; trace fines		PID = 0.0 ppm	
30	30					
			(30'-38') Well Graded GRAVEL with Silt (GW-GM); grayish brown (2.5Y 3/1), moist; very fine to medium Sand; trace Silt			
35		7				
			(38'-45') Well Graded SAND with Silt (SW-SM); grayish brown (2.5Y 3/1), drier than above; trace fines		PID = 0.0 ppm	
40	40					
		6			PID = 0.0 ppm	
45	45		(43'-45') reduction in Gravel content			
			(46'-50') Sandy SILT (ML); medium brown (2.5Y 4/2); abundant sands, fracturing			
50		5				

ch2m

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31M	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439026.82 N, 1202771.23 E)

ELEVATION : 193.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 120 ft bgs
START : 2/22/2020
END : 2/25/2020
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	54		**(50'-54') Poorly Graded SAND (SP)**; medium brown (2.5Y 4/2), very fine to fine SAND; trace fines		PID = 0.0 ppm	
55		7	**(54'-58') Well Graded SAND with Silt and Gravel (SW-SM)**			
60	60		**(58'-88') Poorly Graded SAND (SP)**; very fine to fine SAND; trace Silt		PID = 0.0 ppm	
65		9			PID = 0.0 ppm	
70	70					
75		9.5			PID = 0.0 ppm	
80	80					
85		10			PID = 0.0 ppm	
90	90		**(88'-95') Silty SAND (SM)**; medium brown (2.5Y 4/2), moist, very fine to fine SAND, fracturing; low plasticity Silt		PID = 0.0 ppm	
95		9.5	**(95'-104') Elastic SILT (MH)**; gray (GLEY1 4/N), seems to hold water, high plasticity SILT; perhaps some Clay			
100						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31M	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (439026.82 N, 1202771.23 E)

ELEVATION : 193.73 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 120 ft bgs — START : 2/22/2020 — END : 2/25/2020 — LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	100				Reached a good confining layer in which to set isolation casing 15:45 stop drilling for the day	
			(102'-104') color change to brown (5Y 5/2)		**2/24/2020**	
105		11	**(104'-110') SILT with Gravel (ML)**; moist; Sand; Gravel and Cobbles mixed throughout		07:45 resume drilling 10" isolation set at 100' bgs Continue drilling with 6"x8"	
					PID = 0.0 ppm	
110	110					
		6	**(110'-113') Well Graded GRAVEL with Sand (GW)**; dark gray (2.5Y 4/1); no silt			
			(113'-115') Poorly Graded SAND (SP); light olive gray (5Y 6/2), very fine to fine SAND; some coarse Gravel; no fines			
115	115				PID = 0.0 ppm	
		6.5	**(115'-119') Poorly Graded SAND (SP)**; dark grayish brown (2.5Y 4/2), wet, very fine to fine SAND; no Gravel; no fines			
					PID = 0.0 ppm	
120	120		(119'-120') some coarse Gravel			
			(120'-152') Poorly Graded SAND (SP); dark grayish brown (2.5Y 4/2), nearly saturated, very fine to fine SAND; no Gravel; no Cobbles			
125		8.7			PID = 0.0 ppm	
130	130					
135		8.7			PID = 0.0 ppm	3/8" bentonite chips
140	140					
			(140'-144') color change to gray (GLEY1 4/N)			
		4				
	144					12/20 sand
145						
		7.3			PID = 0.0 ppm	4" Sch. 80 PVC 0.020" slot screen
150						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31M	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439026.82 N, 1202771.23 E)

ELEVATION : 193.73 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 120 ft bgs
START : 2/22/2020
END : 2/25/2020
LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	150					
155		8	**(152'-166') Sandy SILT (ML)**; gray (GLEY1 4/N), wet, moderately stiff SILT, low plasticity; very fine to fine Sand			
160	160				PID = 0.0 ppm	
165		9				bentonite backfill
170	170		**(166'-170') SILT (ML)**; gray (GLEY 4/N), wet, stiff SILT; little to no Sand			
		5.5	**(170'-184') Poorly Graded SAND with Silt (SP-SM)**; saturated, very fine to fine SAND; high plastic Silt; perhaps some clay; Gravel mixed in		17:20 stop drillng for the day **2/25/2020** 07:45 resume drilling Difficult to collect 170'-176' sample; spent several runs trying to collect; rods getting stuck in silty material. Not a good, clean sample	
175	176					
180		8.8				slough
185	186		**(184'-186') SILT (ML)**; saturated, stiff SILT, low plasticity; little to no Sand; no Gravel			
			Bottom of Boring at 186.00 ft bgs on 2/25/2020			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31S	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA (439027.90 N, 1202746.19 E)

ELEVATION : 193.82 ft NAVD88 DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs START : 2/26/2020 END : 2/27/2020 LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-0.5')** organic TOPSOIL		**2/18/2020** Hand auger 0'-5' bgs	2'x2' concrete pad, flush mount completion
			(0.5'-4') Poorly Graded SAND (SP); dark yellowish brown (10YR 4/6), damp, loose, fine to medium SAND; trace fine Gravel, rounded		**2/26/2020** 13:55 begin sonic drilling with 4"x6"	
5		7.5	**(4'-10') Well Graded SAND with Gravel (SW)**; dark yellowish brown (10YR 4/6), moist to wet, loose, fine to coarse SAND; 30% fine to coarse Gravel, rounded; trace Cobbles			2" Sch. 80 PVC well casing
10	10		(10'-11.5') ~20% Gravel		PID = 0.0 ppm	bentonite grout
			(11.5'-15') Well Graded SAND (SW); dark brown (10YR 3/2), wet, loose, fine to coarse SAND, subangular to subrounded; trace Gravel, subrounded			
15		8.7	**(15'-18') Well Graded SAND (SW)**; dark brown (10YR 3/2), wet, lose, fine to coarse SAND, well graded; fine to coarse Gravel, subangular to subrounded			
			(18'-22') Well Graded SAND with Gravel (SW); dark yellowish brown (10YR 4/6), moist, loose, fine to coarse SAND; 30% fine to coarse Gravel, rounded; trace Cobbles			
20	20				PID = 0.0 ppm	
			(22'-24.5') Poorly Graded SAND with Silt and Gravel (SP-SM); dark yellowish brown (10YR 4/6), with very dark brown (10YR 2/2) motling, damp, fine to medium SAND; non-plastic Silt; rounded Gravel			
25		9.5	**(24.5'-26.5') Well Graded SAND with Gravel (SW)**; dark yellowish brown (10YR 4/6), damp to dry, loose, fine to coarse SAND; 30% fine to coarse Gravel, rounded; trace Cobbles			
			(26.5'-30') Poorly Graded SAND (SP); brown (10YR 5/3), damp, loose, fine to medium SAND			
30						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31S	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI
LOCATION : Coupeville, WA (439027.90 N, 1202746.19 E)

ELEVATION : 193.82 ft NAVD88
DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs
START : 2/26/2020
END : 2/27/2020
LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	30		**(30'-43.5') Poorly Graded SAND with Gravel (SP)**; brown (10YR 5/3), dry to damp, loose, fine to medium SAND; intermittent zones of high Gravel content (~30% Gravel), Gravels up to 3" (30'-30.5') yellow mottling (10YR 7/8)		PID = 0.0 ppm	
35		9.2				
			(38') dry			
40	40				PID = 0.0 ppm	
			(43.5'-46.5') Poorly Graded SAND with Silt and Gravel (SP-SM); brown (10YR 5/3), moist, loose, fine to medium SAND; Gravel up to 3", subangular to subrounded			
45		9.7	**(46.5'-49') Well Graded SAND with Gravel (SW)**; brown (10YR 5/3), dry, loose, fine to coarse SAND; fine to coarse Gravel			
			(49'-50') Poorly Graded SANAD (SP); brown (10YR 5/3), loose, blocky structures			
50	50		**(50'-54.5') Well Graded SAND with Gravel (SW)**; brown (10YR 5/3), slightly damp, loose, fine to coarse SAND; fine to coarse Gravel		PID = 0.0 ppm	
55		9.7	**(54.5'-60') Poorly Graded SAND (SP)**; grayish brown (10YR 5/2), slightly damp, loose, fine to medium SAND, some dense blocky structures			
60						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31S	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (439027.90 N, 1202746.19 E)

ELEVATION : 193.82 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs — START : 2/26/2020 — END : 2/27/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	60		**(60'-62') Poorly Graded SAND with Silt (SP-SM)**; brown (10YR 5/2), damp, medium dense SAND		PID = 0.0 ppm	
			(62'-62.5') Well Graded SAND with Silt and Gravel (SW-SM); brown (10YR 5/3), moist, loose, fine to medium SAND; Gravel up to 3", subangular to subrounded			
			(62.5'-63') Silty SAND (SM); black (10YR 2/1), moist			
65		9.7	**(63'-97') Poorly Graded SAND (SP)**; grayish brown (10YR 5/2), dry, loose, fine to medium SAND, some dense blocky structures			
70	70		(70'-72') trace fine Gravel, rounded		PID = 0.0 ppm	
			(72'-90') dry, some damp zones; no Gravel			
		9.3	(72'-75.5') dense blocky structures			
75						
	78					
			(78'-80') wet from drilling water		PID = 0.0 ppm	
		2.5				
80	80					
85		9.7	(85'-90') trace Silt (5-10%)			
90						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-MW31S	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI — LOCATION : Coupeville, WA (439027.90 N, 1202746.19 E)

ELEVATION : 193.82 ft NAVD88 — DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 114 ft bgs — START : 2/26/2020 — END : 2/27/2020 — LOGGER : G. Gardner

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	90		**(90'-97') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (10YR 5/2), dry, loose, fine to medium SAND, some dense blocky structures; 15-20% Silt		PID = 0.0 ppm	
			(93'-93.5') Silt lens			
95		10.5				
			(97'-98') SILT (ML); olive gray (5Y 5/2), damp, moderately stiff SILT, medium plastic			
			(98'-104.5') Lean CLAY (CL); dark gray (GLEY1 4/N), damp, stiff CLAY, medium plastic			
100	100				17:10 stop drilling for the day **2/27/2020** 07:35 resume drilling	
			(101.7'-102') Gravelly lean CLAY; Gravel up to 2"			3/8" bentonite chips
105		11.2	**(104.5'-105') SILT (ML)**; olive gray (5Y 5/2), damp, moderately stiff SILT, medium plastic			
			(105'-106') Poorly Graded SAND with Silt (SP-SM); olive gray (5Y 5/2), moist; trace fine Gravel, subrounded			
			(106'-107.5') SILT with Sand (ML); olive gray (5Y 5/2), damp, moderately stiff SILT, medium plastic; trace fine to medium Sand			
			(107.5'-110') Poorly Graded SAND with Silt and Gravel (SP-SM); olive gray (5Y 5/2), very moist			
110	110		(109.5') no Silt			
			(110'-112') Poorly Graded SAND with Silt and Gravel (SP-SM); same as 107.5'-110'		PID = 0.0 ppm	12/20 sand
		6	**(112'-115') Poorly Graded SAND with Gravel (SP)**; olive gray (5Y 5/2), dry			
			(114'-114.5') wet			2" Sch. 80 PVC 0.020" slot screen
115	115					
			(115'-120') Poorly Graded SAND (SP); same as above but no Gravel, mostly dry		Bottom 5 ft of 110'-120' run fell out, will go back down to retrieve. DR: water in bottom of hole	
		5	(116'-118') moist zone			
					PID = 0.0 ppm	
120	120		(119.5'-120') moist zone, fine SAND and trace Silt			
			Bottom of Boring at 120.00 ft bgs on 2/27/2020			

*Water level based on saturation conditions in the core samples. Completed well was dry at time of development and sampling.

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO01	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : NA START : 9/15/2019 END : 9/15/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-1') ASPHALT**; Gravel subgrade		**9/15/2019** 08:00 Begin drilling 08:35 Collect soil sample at 1' WI-CV-SO01-1-0919	Monitoring well not installed
			(1'-13') Well Graded GRAVEL with Sand (GW); light olive brown (2.5Y 5/3), saturated, mostly fine GRAVEL, some coarse; coarse Sand; trace Cobbles			
5	5					grout backfill
		4.8			PID = 0.0 ppm	
10	10					
			(13'-15') Poorly Graded SAND with Silt (SP-SM); wet, very fine to fine SAND; <15% fines; no Gravel		16:20 Collect soil sample at 13' WI-CV-SO01-13-0919	
15		9.7	**(15'-19') Poorly Graded GRAVEL with Silt and Sand (GP-GM)**; gray (5Y 5/1), saturated; medium to coarse SAND			
	19				PID = 0.0 ppm	
20			**(19'-22') Poorly Graded SAND with Silt (SP-SM)**; moist, fine to medium SAND; ~10% fines; <15% Gravel			
			(22'-29') Poorly Graded SAND with Silt and Gravel (SP-SM); grayish brown (2.5Y 5/2), moist; >15% Gravel, increase in coarse Gravel content; decrease in Silt			
25		9			PID = 0.0 ppm	
	29					
30			**(29'-32') Poorly Graded SAND (SP)**; mottled, fine to medium SAND, trace coarse SAND; trace fine Gravel; no apparent Silt			
			(32'-39') Poorly Graded SAND with Gravel (SP); grayish brown (2.5Y 5/2), moist, fine to medium SAND, increase in coarse SAND compared to above; >15% Gravel			
35		6.6			PID = 0.0 ppm	
	39					
40			**(39'-47.5') Poorly Graded SAND with Silt and Gravel (SP-SM)**; moist; <15% Gravel; ~10% fines		16:30 Collect soil sample at 39' WI-CV-SO01-39-0919	
45		8.1				
			(47') 6" layer of clean coarse SAND, mottled brown			
	49		**(47.5'-49') Silty SAND (SM)**; dark grayish brown (2.5Y 4/2), moist, loose, poorly graded SAND; >15% fines, non-plastic Silt			
50						

PROJECT NUMBER: 9000NVT1	BORING NUMBER: WI-CV-SO01	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/15/2019 END : 9/15/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		5.8	**(49'-56') Poorly Graded SAND (SP)**; grayish brown (2.5Y 5/2), fine SAND; <5% Silt		PID = 0.0 ppm	
	59		**(56'-71') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), moist, very fine to fine SAND; ~10% fines, a few Silty chunks interspersed			
60						
65		7.9			PID = 0.0 ppm	
	69					
70						
			(71'-77') Poorly Graded SAND (SP); grayish brown (2.5Y 5/2), moist, very fine to fine SAND		16:40 Collect soil sample at 71' WI-CV-SO01-71-0919	
75		7.2			PID = 0.0 ppm	
	79		**(77'-81') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), moist, very fine to fine SAND; ~10% fines, a few silty chunks interspersed			
80						
			(81'-84') Poorly Graded SAND (SP); moist, very fine to fine SAND			
85		8	**(84'-89') SILT with Sand (ML)**; moist, dense, non-plastic SILT; silt fractures; very fine to fine Sand		PID = 0.0 ppm	
	89					
90			**(89'-93') Poorly Graded SAND (SP)**; wet, fine SAND; trace Silt			
95		8.5	**(93'-100') SILT with Sand (ML)**; wet, non-plastic SILT, medium density; silt fractures; very fine to fine Sand		16:50 Collect soil sample at 93' WI-CV-SO01-93-0919 PID = 0.0 ppm	
100	100				16:00 Finish drilling	
			Bottom of Boring at 100.00 ft bgs on 9/15/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO02	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : NA START : 8/15/2019 END : 8/16/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0		**(0'-2') SILT (ML)**; brownish tan, dry		**8/15/2019** Hand auger to 30", refusal on gravels	Monitoring well not installed
5	0 - 9	7	**(2'-11') Poorly Graded GRAVEL with Clay and Sand (GP-GC)**; brown (10YR 4/3), dry, dense, GRAVEL up to 3", rounded; Sandy matrix with Clay lenses		12:40 Collect soil sample at 0.5'-1' WI-CV-SO02-0.5-0819 14:40 Begin sonic drilling	grout backfill
10	9					
15	9 - 19	10	**(11'-15') Poorly Graded GRAVEL with Silt and Sand (GP-GM)**; dark brown (10YR 3/3), moist, rounded GRAVEL; Silty Sand matrix			
			(15'-29') Poorly Graded GRAVEL with Sand (GP); dark gray (10YR 4/1), dry; fine to coarse Sand matrix		Pulverized gravels	
20	19					
25	19 - 29	9			15:54 Collect soil sample at 24'-25' WI-CV-SO02-24-0819	
30	29		**(29'-31') Poorly Graded GRAVEL with Clay and Sand (GP-GC)**; very dark gray (10YR 3/1), slightly moist			
			(31'-37') Poorly Graded GRAVEL with Sand (GP); gray (10YR 5/1), dry, fine GRAVEL, rounded			
35	29 - 39	10			Pulverized gravels	
			(37'-44') Poorly Graded SAND (SP); gray (10YR 5/1), dry, medium SAND; occasional Gravels			
40	39					
45	39 - 49	7.5	**(44'-59') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (10YR 5/2), dry; Silty SAND lenses			
50	49				17:40 Collect soil sample at 48'-49' WI-CV-SO02-48-0819	

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO02	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 8/15/2019 END : 8/16/2019 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		6.5			Driller notes that over drilled casing and washed out sample 49'-51'	
	59				Stop for day at 59'	
60			**(59'-73') Poorly Graded SAND (SP)**; dark grayish brown (10YR 4/2), dry, loose, fine to medium SAND		**8/16/2019** 08:00 Resume drilling	
65		8	(65') lens of fine SAND/Silt			
	69					
70						
75		8.5	**(73'-75') Poorly Graded SAND with Silt (SP-SM)**; SAND with Sandy Silt lenses		09:10 Collect soil sample at 73'-75' WI-CV-SO02-73-0819	
			(75'-81') Poorly Graded SAND (SP); brown, dry, fine SAND			
	79					
80						
			(81'-84') SILT (ML); brown, moist, very low plasticity SILT			
85		9	**(84'-100') Poorly Graded SAND (SP)**; brown, dry, fine SAND			
	89					
90						
95		3			Collect soil sample at 92'-93' WI-CV-SO02-92-0819 Bottom ~7' fell out. Hole caved to 89'	
100	100					
			Bottom of Boring at 100.00 ft bgs on 8/16/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO03	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : NA START : 9/12/2019 END : 9/13/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
	0		**(0'-2') ASPHALT**; with Silty Sand and Gravel subgrade		**9/12/2019** 12:15 Start drilling	Monitoring well not installed
		5	**(2'-5') Silty SAND with Gravel (SM)**; very dark brown (7.5YR 2.5/3), very fine to fine SAND; trace Gravel		Bedding = 1" or less - import fill Collect soil soil at 1' WI-CV-SO03-1-0919	
5	5		**(5'-9') Well Graded GRAVEL (GW)**; brown (10YR 4/4), dry; <15% very fine to coarse Sand; trace Silt; Cobbles		Collect soil sample at 3' WI-CV-SO03-3-0919	grout backfill
		3.7			PID = 0.0 ppm	
	9					
10			**(9'-21') Well Graded GRAVEL with Silt and Sand (GW-GM)**; very dark grayish brown (2.5Y 3/2), dry; >15% well graded Sand; trace Cobbles			
		9				
15					PID = 0.0 ppm	
	19					
20			**(21'-27') Well Graded SAND (SW)**; olive gray (5Y 5/2), very fine to medium SAND, well graded; <5% fines			
		6				
25					PID = 0.0 ppm	
			(27'-34') Well Graded SAND with Silt (SW-SM); very dark grayish brown (2.5Y 3/2), dry; some Gravel		Collect soil sample at 27' WI-CV-SO03-27-0919	
	29					
30						
		6.8				
35			**(34'-38') Poorly Graded SAND (SP)**; olive gray (5Y 4/2), mottled, moist, fine to medium SAND		PID = 0.0 ppm	
	39		**(38'-44') Poorly Graded SAND with Silt (SP-SM)**; very dark grayish brown (2.5Y 3/2), dry, fine to medium SAND; <15% Gravel; trace Cobbles (39') color change to Light olive brown (2.5Y 5/3)			
40						
		10				
45			**(44'-58') Silty SAND (SM)**; light olive brown (2.5Y 5/3), very fine to fine SAND, poorly graded; >15% fines, high Silt content, stiff, non-plastic; trace Gravel		PID = 0.0 ppm	
	49					
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO03	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/12/2019 END : 9/13/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55	56	4.9			Lost bottom 3' of run 49'-59' run PID = 0.0 ppm	
60		9.2	**(58'-61') SILT (ML)**; light olive brown (2.5Y 5/3), moist, stiff SILT, non-plastic; no visible Sand **(61'-73') Silty SAND (SM)**; light olive brown (2.5Y 5/3), very fine to fine SAND, poorly graded; >15% fines, high Silt content, stiff, non-plastic; trace Gravel		Collect soil sample at 58' WI-CV-SO03-58-0919 PID = 0.0 ppm	
65	69					
70		9.7	**(73'-82') Poorly Graded SAND (SP)**; very dark grayish brown (2.5Y 3/2), mottled, moist, fine SAND; no appreciable Silt		Collect soil sample at 73' WI-CV-SO03-73-0919 PID = 0.0 ppm	
75	79					
80		6.6	**(82'-92') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), moist, very fine to fine SAND		PID = 0.0 ppm	
85	89					
90		11.3	**(92'-100') SILT with Sand (ML)**; grayish brown (2.5Y 5/2), wet to saturated, stiff SILT		Collect soil sample at 92' WI-CV-SO03-92-0919 PID = 0.0 ppm At or near water table	
95						
100	100					
			Bottom of Boring at 100.00 ft bgs on 9/13/2019			

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO04	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : NA START : 9/13/2019 END : 9/14/2019 LOGGER : E. Storkerson

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
0	0 5	5	**(0'-5') Well Graded SAND with Silt and Gravel (SW-SM)**; dark brown (7.5YR 3/2); some Cobbles		**9/13/2019** Collect soil sample at 1' WI-CV-SO04-1-0919	Monitoring well not installed
5	5 9	4	**(5'-12') Well Graded GRAVEL with Sand (GW)**; dark brown (7.5YR 3/3), mottled, damp; >15% Sand, <5% fines		PID = 0.0 ppm	grout backfill
10						
15	19	8.2	**(12'-40') Poorly Graded SAND with Silt and Gravel (SP-SM)**; dark brown (7.5YR 3/2), moist, fine to medium SAND; >15% coarse Gravel; ~10% Silt; trace Cobbles		Collect soil sample at 12' WI-CV-SO04-12-0919 PID = 0.0 ppm	
20						
25	29	9.6			PID = 0.0 ppm	
30						
35	39	8.5			PID = 0.0 ppm	
40			**(40'-59') Poorly Graded SAND (SP)**; olive gray (5Y 4/2), mottled, very fine to fine SAND		Collect soil sample at 40' WI-CV-SO04-40-0919	
45	49	8.6			PID = 0.0 ppm	
50						

PROJECT NUMBER:	BORING NUMBER:	
9000NVT1	WI-CV-SO04	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAS Whidbey Island OLF Coupeville Supplemental SI LOCATION : Coupeville, WA

ELEVATION : NA DRILLING CONTRACTOR : Yellow Jacket

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ft bgs START : 9/13/2019 END : 9/14/2019 LOGGER : E. Storkerson

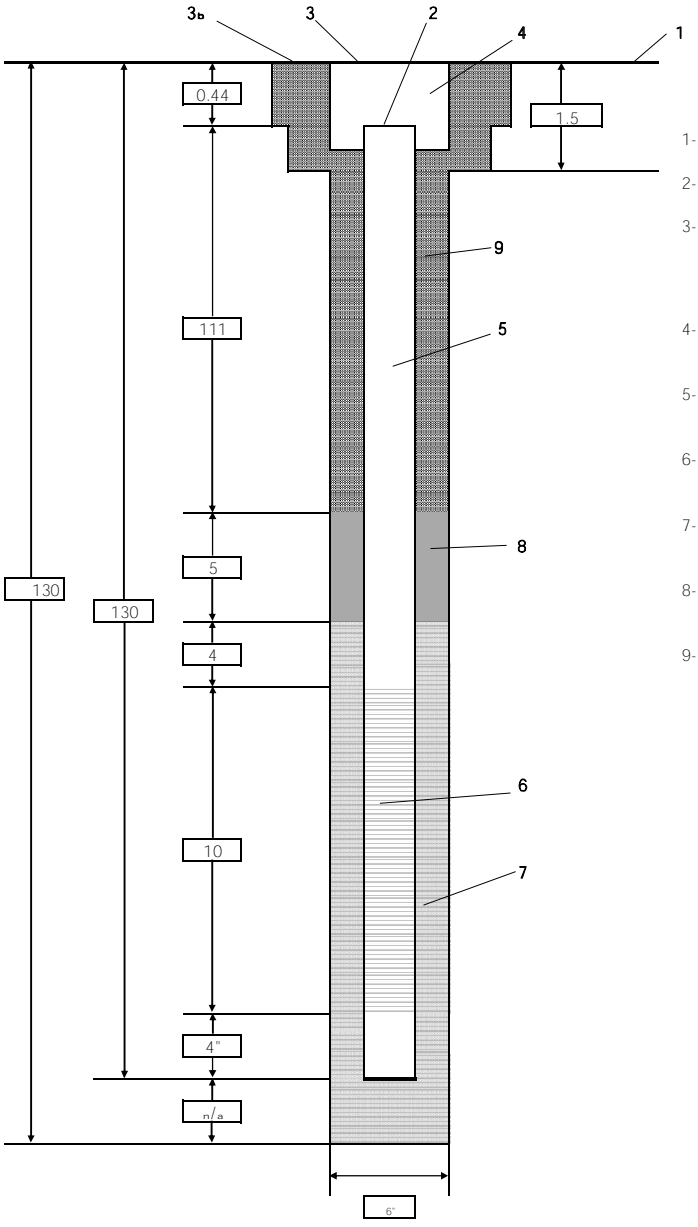
DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS	WELL DIAGRAM
55		9			PID = 0.0 ppm	
	59		(57') some Silty chunks observed, grayish brown (2.5Y 5/2), moist, stiff, non-plastic			
60			**(59'-63') Poorly Graded SAND with Silt (SP-SM)**; medium brown, moist, very fine to fine SAND, poorly graded			
65		8.5	**(63'-64') SILT (ML)**; medium brown, moist, stiff SILT, non-plastic; trace very fine Sand **(64'-66') Poorly Graded SAND (SP)**; olive gray (5Y 4/2), mottled, very fine to fine SAND		Collect soil sample at 63' WI-CV-SO04-63-0919 PID = 0.0 ppm	
	69		**(66'-69') SILT (ML)**; moist, stiff SILT, medium plasticity; no visible Sand		Good confining layer	
70			**(69'-73') Sandy SILT (ML)**; moist, firm, non-plastic SILT; fine Sand, poorly graded			
75		9.5	**(73'-79') SILT (ML)**; grayish brown (2.5Y 5/2), moist, stiff SILT, non-plastic, easily fractured; reduced Sand content		PID = 0.0 ppm	
	79					
80			**(79'-100') Poorly Graded SAND with Silt (SP-SM)**; grayish brown (2.5Y 5/2), mottled, moist, very fine to fine SAND, poorly graded; ~10% Silt		Collect soil sample at 79' WI-CV-SO04-79-0919	
85		6			PID = 0.0 ppm	
	89					
90			(89') increased water content to wet			
95		8.8			PID = 0.0 ppm	
100	100					
			Bottom of Boring at 100.00 ft bgs on 9/14/2019			

Appendix B
Monitoring Well Completion Diagrams and Development Logs

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW03S	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 8/12/2019 **END :** 8/14/2019 **LOGGER :** GREG WARREN



1- Ground elevation at well	193.52
2- Top of casing elevation	193.08
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	N/A
b) concrete pad dimensions	2' X 2'
depth of surface concrete	1.5'
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 40 PVC
6- Type/slot/size of screen	2" 0.010" SLOT
7- Type screen filter	12-20 SAND
quantity used	250 lbs
8- Type of seal	HOLEPLUG
quantity used	100 lbs
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	PUMP/TREMIE
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~150 GAL
Development method	PUMP AND SURGE
Development time	2:16
Estimated purge volume	17 GAL

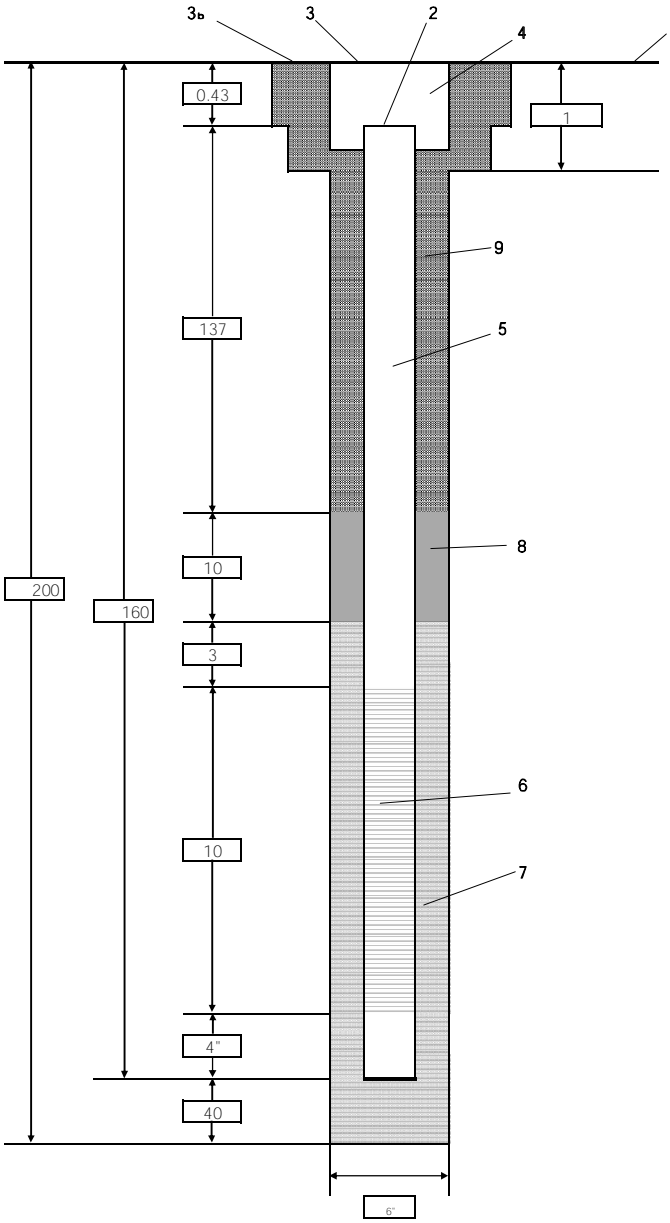
Comments

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW17M	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 8/18/2019 **END :** 8/19/2019 **LOGGER :** GREG WARREN



1- Ground elevation at well	202.41
2- Top of casing elevation	201.98
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	N/A
b) concrete pad dimensions	2' X 2'
depth of surface concrete	4"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	2" 0.020" SLOT SCH 80 PVC
7- Type screen filter	12-20 SAND
quantity used	250 lbs
8- Type of seal	HOLE PLUG
quantity used	100 lbs
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	PUMP/TREMIE
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~150 GAL
Development method	PUMP AND SURGE
Development time	1:03
Estimated purge volume	54 GAL

Comments CENTRALIZERS AT BOTTOM AND TOP OF SCREEN THEN EVERY 50FT OF CASING

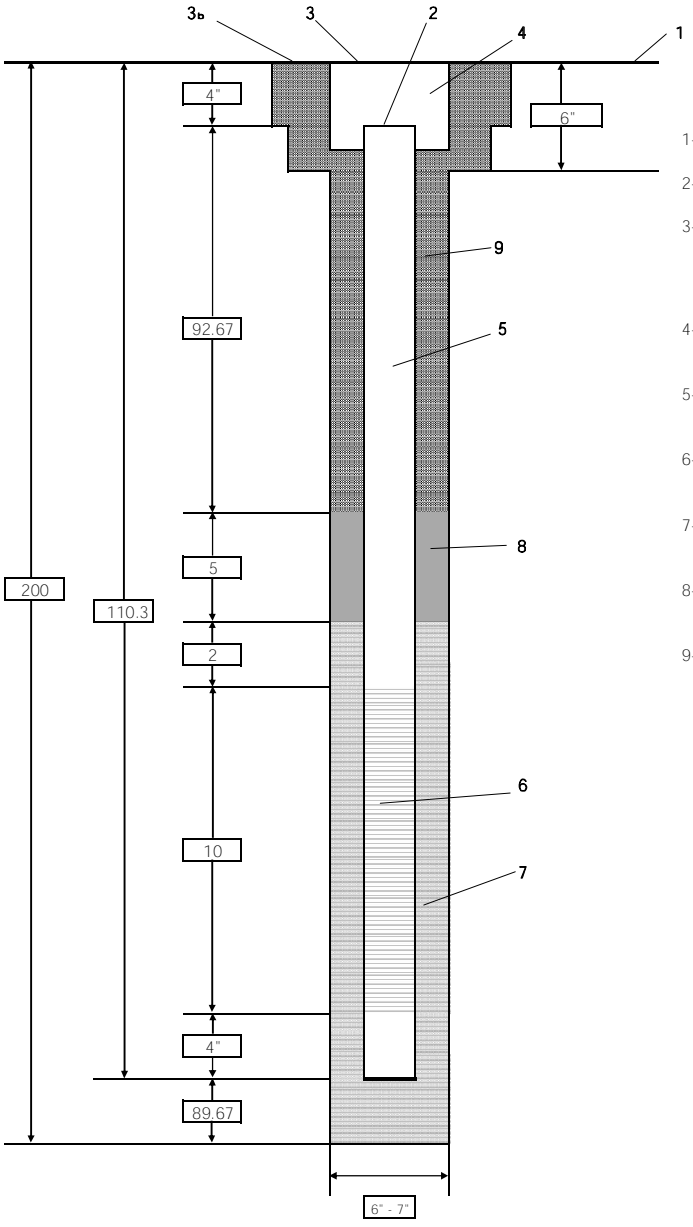
1 FOOT OF SAND AT BOTTOM OF WELL, THEN HOLE PLUG TO BOTTOM OF HOLE.

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW20S	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 11/4/2019 13:55 **END :** 11/5/2019 **LOGGER :** DAVID BUTLER



1- Ground elevation at well: 194.40

2- Top of casing elevation: 194.00

3- Wellhead protection cover type: FLUSH MOUNT
- a) drain tube? YES/NO: NO
- b) concrete pad dimensions: 2' X 2'
- depth of surface concrete: 6"

4- Dia./type surface casing: 8" STEEL

5- Dia./type of well casing: 2" SCH 80 PVC

6- Type/slot/size of screen: 20 SLOT

7- Type screen filter: 12/20 SAND
- quantity used: 5 BAGS

8- Type of seal: 3/8 BENTONITE HOLE PLUG
- quantity used: 2 BAGS

9- Grout
- a) Grout mix used: QUICK GROUT
- b) Method of placement: TREMIE
- c) Vol.of surface casing grout: 10 BAGS OF CHIPS
- d) Vol. of well casing grout: 650 GAL

Development method: PUMP AND SURGE

Development time: 0:35

Estimated purge volume: 35 GAL

Comments: NO SUMP, 4" END CAP ONLY. CENTRALIZERS AT 50, 100, 110. CHIPS TO BACKFILL TO 112FT (19 BAGS), SAND FROM 112 TO 98FT.

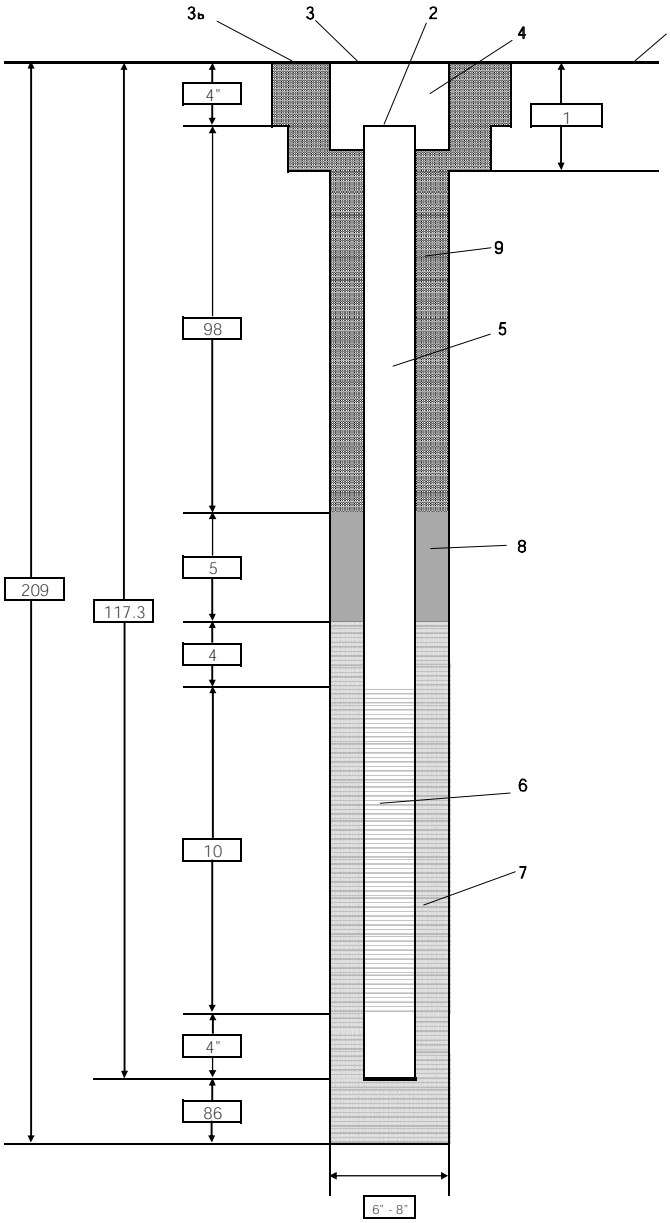
7" CASING TO 120FT, 6" CASING FROM 120-200 FT

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW21S (GW02)	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 9/19/2019 **END :** 9/20/2019 **LOGGER :** GREG WARREN



1- Ground elevation at well	196.73
2- Top of casing elevation	196.25
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	N/A
b) concrete pad dimensions	2' X 2'
depth of surface concrete	4"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	2" - 0.020" SLOT SCH 80 PVC
7- Type screen filter	12-20 SAND
quantity used	~250 lbs
8- Type of seal	HOLE PLUG
quantity used	100 lbs
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	TREMIE/PUMP
c) Vol.of surface casing grout	
d) Vol. of well casing grout	650 GAL
Development method	PUMP AND SURGE
Development time	1:19
Estimated purge volume	3.05 GAL

Comments
117.3 - 123 = SAND
123-203 HOLE PLUG

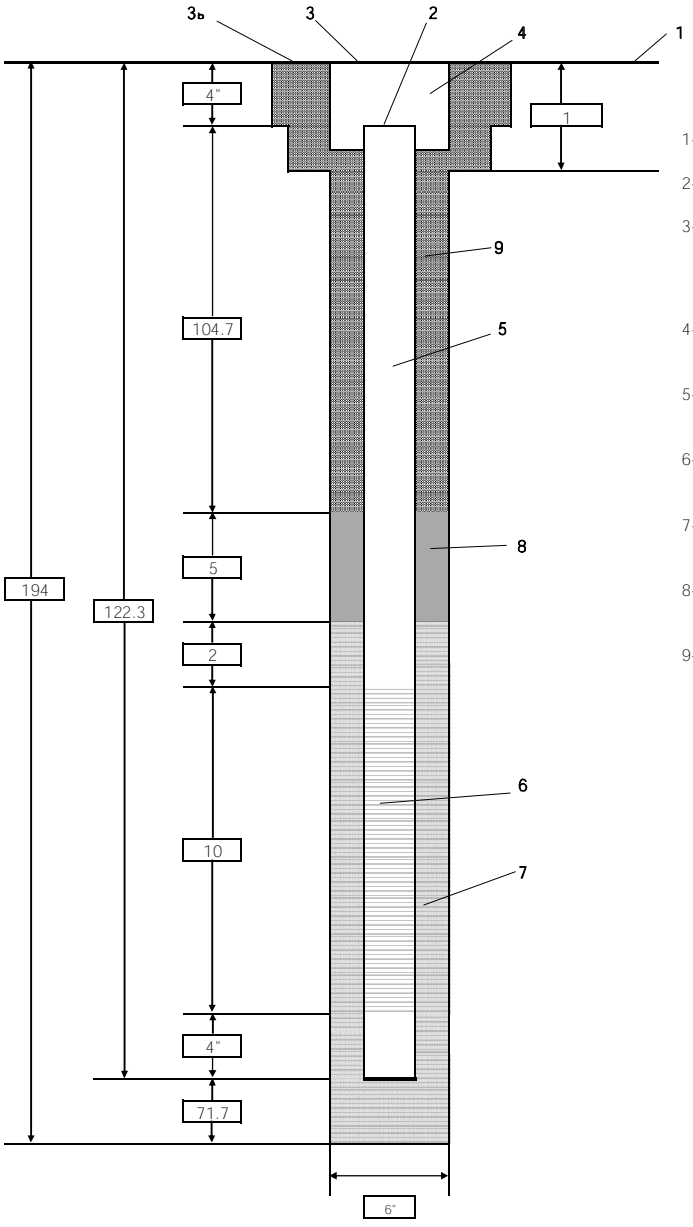
0 - 130 = 8" CASING
130 - 209 = 6" CASING

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW22S	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 10/21/2019 **END :** 10/22/2019 **LOGGER :** GREG WARREN



1- Ground elevation at well	188.27
2- Top of casing elevation	188.03
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	N/A
b) concrete pad dimensions	2' X 2'
depth of surface concrete	4"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	2" 0.020 SLOT
7- Type screen filter	12-20 SILICA SAND
quantity used	~750 lbs
8- Type of seal	HOLE PLUG 3/8 BENT. CHIP
quantity used	3 BAGS (~150 lbs)
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	TREMIE/PUMP
c) Vol.of surface casing grout	N/A
d) Vol. of well casing grout	~500 GAL
Development method	PUMP AND SURGE
Development time	4:17
Estimated purge volume	10 GAL

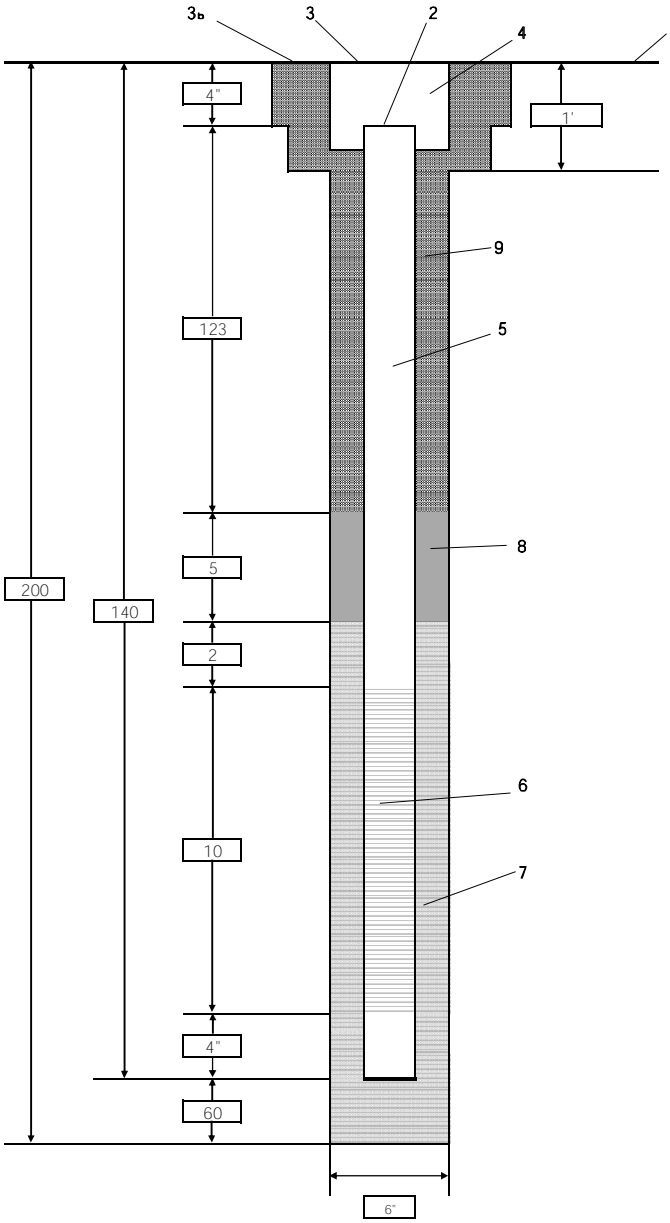
Comments
4" SUMP 122 - 122.3
124 - 194 HOLE PLUG

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW23S	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 9/7/2019 **END :** 9/7/2019 **LOGGER :** ERIC STORKERSON



1- Ground elevation at well	192.94
2- Top of casing elevation	192.62
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	N/A
b) concrete pad dimensions	2' X 2'
depth of surface concrete	4"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	2" 0.020 SLOT SCH 80 PVC
7- Type screen filter	12-20 SAND
quantity used	~250 lbs
8- Type of seal	HOLE PLUG
quantity used	BENTONITE CHIPS
9- Grout	
a) Grout mix used	BENTONITE/GROUT SLURRY
b) Method of placement	TREMIE/PUMP
c) Vol.of surface casing grout	N/A
d) Vol. of well casing grout	~500 GAL
Development method	PUMP AND SURGE
Development time	~1:30
Estimated purge volume	8 GAL

Comments

CENTRALIZER EVERY 30' OF CASING AND TOP & BOTTOM OF SCREEN.

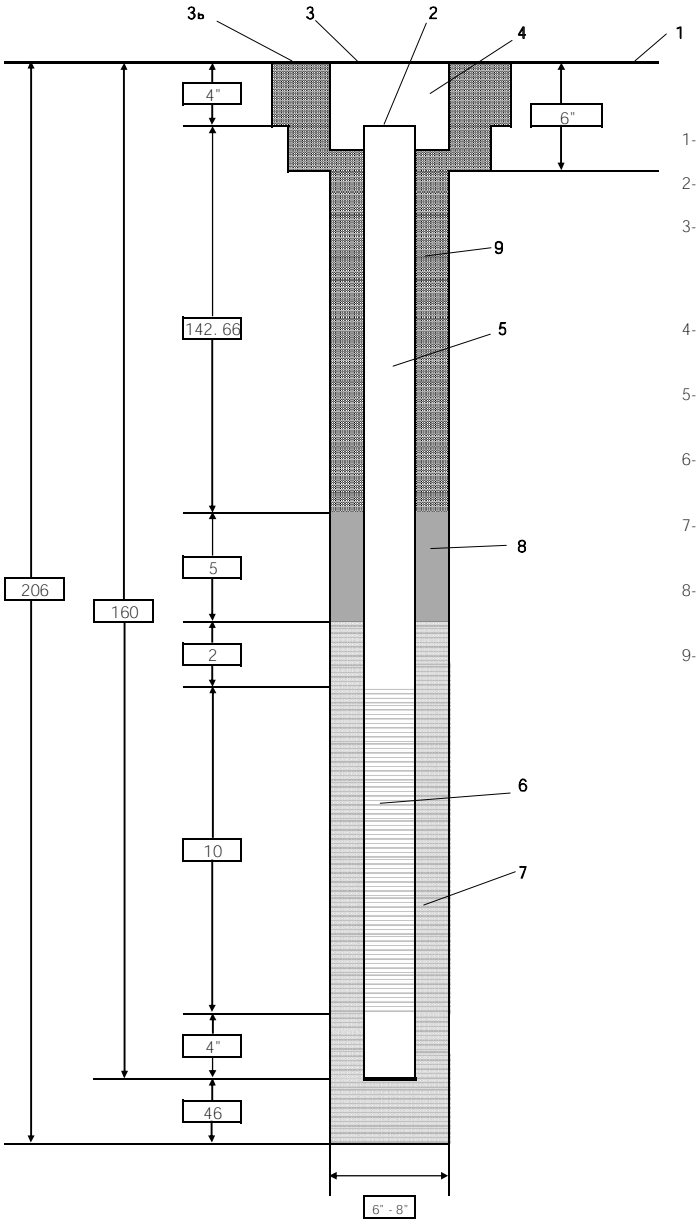
1' SAND BELOW WELL. 59' BENTONITE CHIPS HOLE PLUG.

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW25M	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 10/25/19 1500 **END :** 11/4/19 1120 **LOGGER :** GREG WARREN



1- Ground elevation at well: NA

2- Top of casing elevation: NA

3- Wellhead protection cover type: FLUSH MOUNT
a) drain tube? YES/NO: N/A
b) concrete pad dimensions: 2' X 2'
depth of surface concrete: 6" (4 bags quickcrete)

4- Dia./type surface casing: 8" STEEL

5- Dia./type of well casing: 2" SCH 80 PVC

6- Type/slot/size of screen: 20 SLOT

7- Type screen filter: 12/20 SAND
quantity used: 5 BAGS

8- Type of seal: 3/8 HOLE PLUG
quantity used: 2 BAGS

9- Grout
a) Grout mix used: QUIK GROUT
b) Method of placement: TREMIE
c) Vol.of surface casing grout: 21 BAGS CHIPS
d) Vol. of well casing grout: 700 GAL

Development method: Not developed

Development time: N/A

Estimated purge volume: N/A

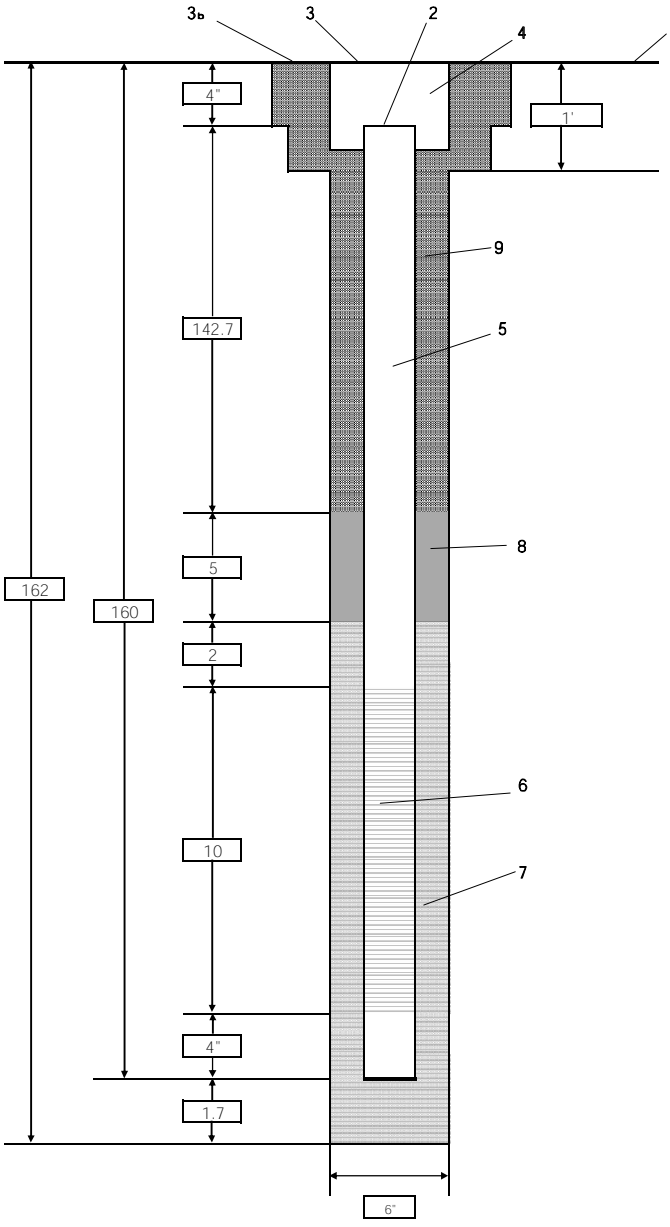
Comments: NO SUMP, 4" END CAP
SCREEN 150-160 FT
CENTRALIZERS AT 159, 150, AND 70
ECOLOGY # BLX-949
CHIPS TO BACKFILL TO 162 (6.5 BAGS), SAND 148 - 162 FT, 8" CASING TO 130 FT, 6" CASING TO 206 FT

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW25M-R	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 12/5/2019 **END :** 12/6/2019 **LOGGER :** GERRIT GARDNER



1- Ground elevation at well: 192.61

2- Top of casing elevation: 192.33

3- Wellhead protection cover type: FLUSH MOUNT
- a) drain tube? YES/NO: N/A
- b) concrete pad dimensions: 2' X 2'
- depth of surface concrete: 4"

4- Dia./type surface casing: 8" STEEL

5- Dia./type of well casing: 2" SCH 80 PVC

6- Type/slot/size of screen: 2" 0.020" SLOT SCH 80 PVC

7- Type screen filter: 12-20 SILICA SAND
- quantity used: 6 (50 lb BAGS)

8- Type of seal: 3/8" HOLE PLUG
- quantity used: 2 (50 lb BAGS)

9- Grout
- a) Grout mix used: QUIK GROUT
- b) Method of placement: TREMIE/PUMP
- c) Vol.of surface casing grout: N/A
- d) Vol. of well casing grout: ~500 GAL

Development method: PUMP AND SURGE

Development time: 3:05

Estimated purge volume: 142 GAL

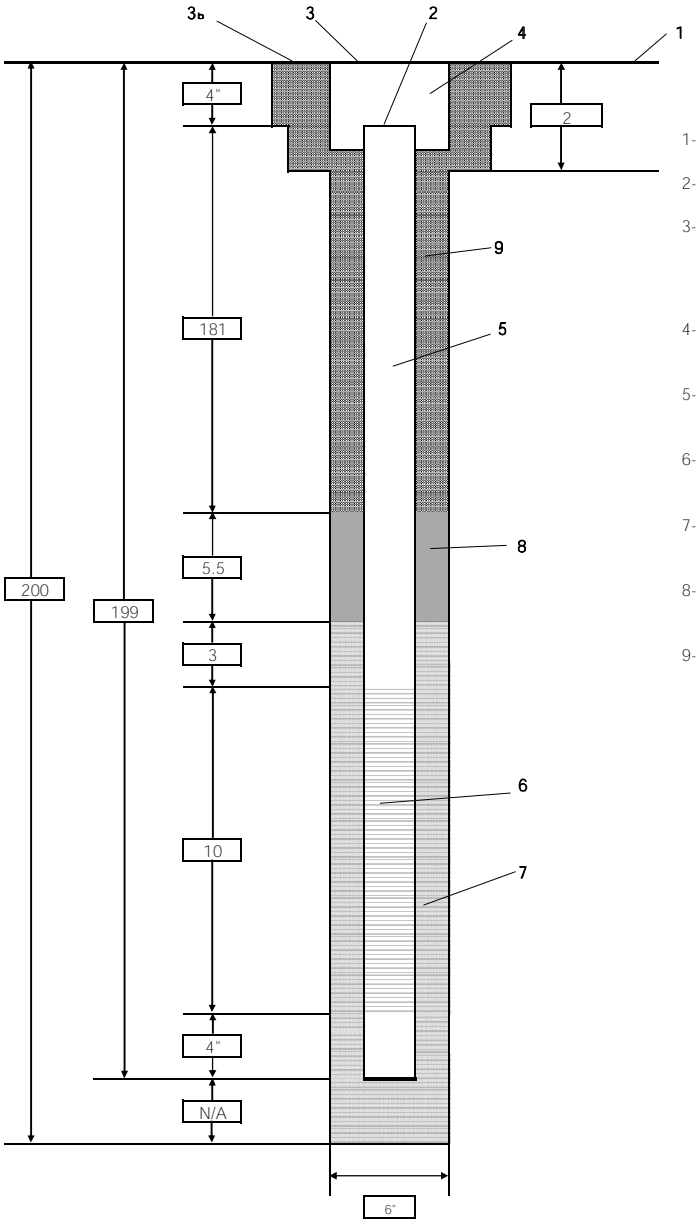
Comments: NO SUMP, 4" END CAP ONLY
CENTRALIZERS AT 50', 100', AND AT TOP & BOTTOM OF SCREEN

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW26D	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : 136.5 BGS **START :** 8/14/2019 **END :** 8/15/2019 **LOGGER :** GREG WARREN



1- Ground elevation at well: 191.30

2- Top of casing elevation: 190.96

3- Wellhead protection cover type: FLUSH MOUNT
a) drain tube? YES/NO: N/A
b) concrete pad dimensions: 2' X 2'
depth of surface concrete: 4"

4- Dia./type surface casing: 8" STEEL

5- Dia./type of well casing: 2" SCH 80 PVC

6- Type/slot/size of screen: 2" 0.020" SLOT SCH 80 PVC

7- Type screen filter: 12-20 SAND
quantity used:

8- Type of seal: HOLE PLUG
quantity used:

9- Grout
a) Grout mix used: QUICK GROUT
b) Method of placement: TREMIE/PUMP
c) Vol.of surface casing grout:
d) Vol. of well casing grout:

Development method: PUMP AND SURGE

Development time: 1:00

Estimated purge volume: 105.6 GAL

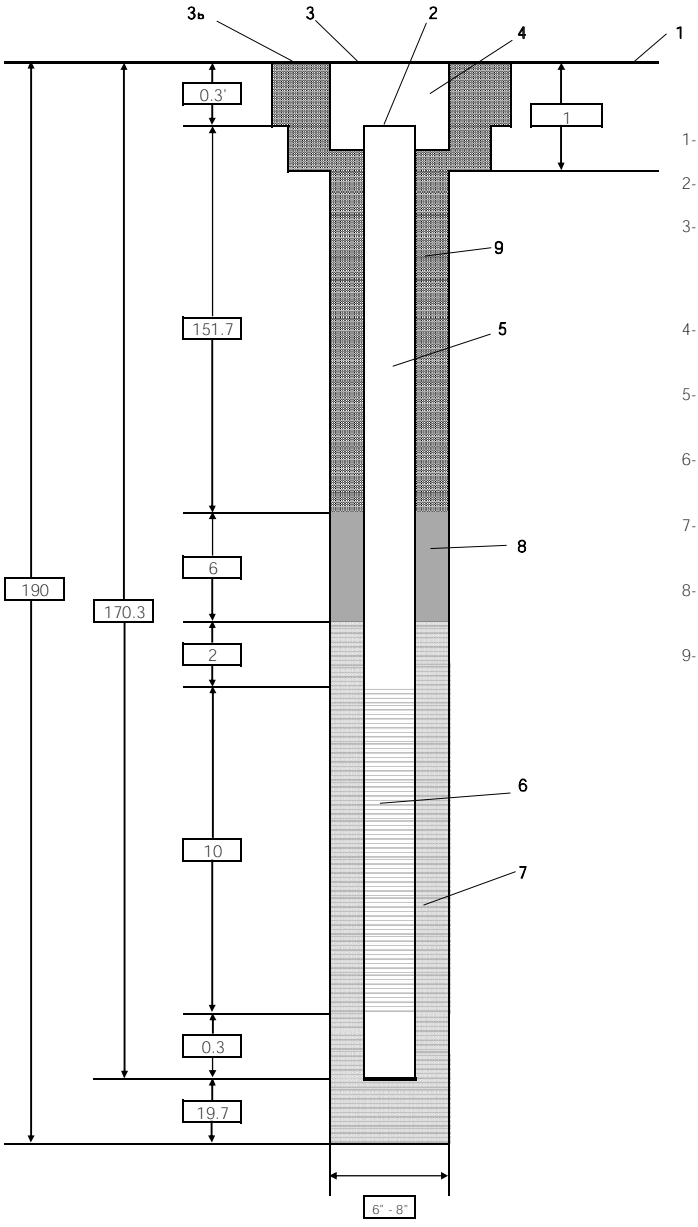
Comments: CENTRALIZERS AT BOTTOM & TOP OF SCREEN, THEN EVERY 50 FT OF CASING

Illustration not to scale.

	PROJECT NUMBER	WELL NUMBER	
ch2m.	9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW28M	SHEET 1 OF 1

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 3/11/2020 **END :** 3/13/2020 **LOGGER :** GERRIT GARDNER



1- Ground elevation at well	189.35
2- Top of casing elevation	189.08
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	NO
b) concrete pad dimensions	2' X 2'
depth of surface concrete	6"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	2" SCH 80 PVC, 0.020" SLOT
7- Type screen filter	12/20 SILICA SAND
quantity used	5 50lb BAGS
8- Type of seal	3/8" BENTONITE CHIPS
quantity used	2 50 lb BAGS
9- Grout	
a) Grout mix used	QUIK GROUT
b) Method of placement	TREMIE PUMP
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~300 GAL
Development method	PUMP AND SURGE
Development time	2:20
Estimated purge volume	200 GAL

Comments NO SUMP, CENTRALIZERS AT 160, 100, 50 FT BGS.

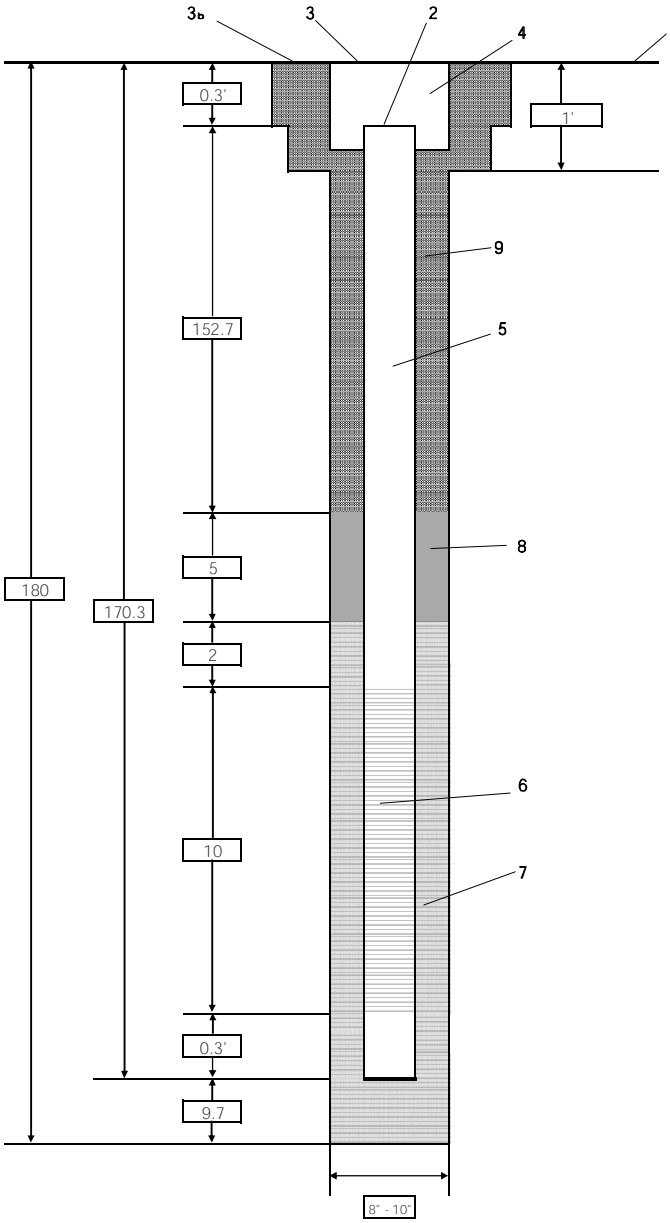
BENTONITE BACKFILL 179-172 (2 50 lb BAGS)
HEAVING SAND/SLUFF 190-179
8" CASING 0-130, 6" CASING 130-190

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW29M	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 2/28/2020 **END :** 3/10/2020 **LOGGER :** ERIC STORKERSON / GERRIT GARDNER



1- Ground elevation at well	189.76
2- Top of casing elevation	189.56
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	NO
b) concrete pad dimensions	3' X 3'
depth of surface concrete	6"
4- Dia./type surface casing	10" STEEL
5- Dia./type of well casing	4" SCH 80 PVC
6- Type/slot/size of screen	0.020", 4" PVC
7- Type screen filter	12/20 SILICA SAND
quantity used	7 BAGS
8- Type of seal	3/8" BENTONITE CHIPS
quantity used	3 BAGS
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	TREMIE PUMP
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~400 GAL
Development method	PUMP AND SURGE
Development time	3:05
Estimated purge volume	140 GAL

Comments NO SUMP, 4" END CAP ONLY
CENTRALIZERS AT 160', 100', AND 50'

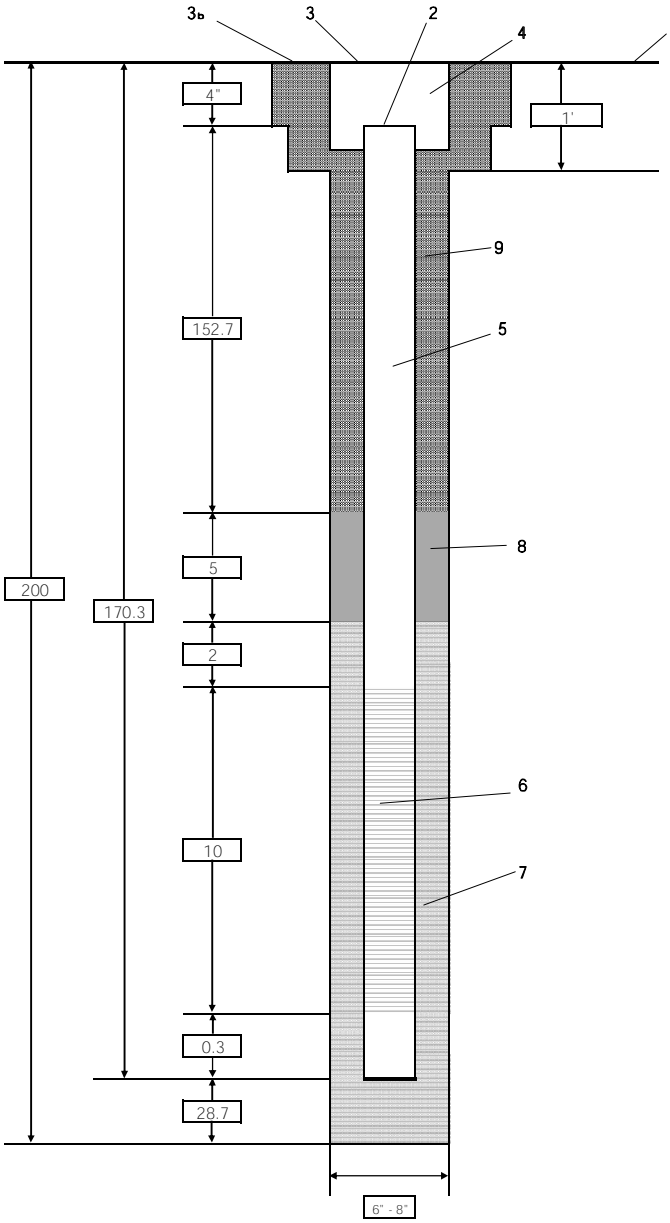
BENTONITE BACKFILL 180-172.3 (3 50 lb BAGS)
2' of sand below well screen (172.3' to 170.3')
10" CASING TO 130'
8" CASING TO 180"

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW30M	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 2/18/2020 **END :** 2/21/2020 **LOGGER :** GERRIT GARDNER



1- Ground elevation at well	194.05
2- Top of casing elevation	193.72
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	NO
b) concrete pad dimensions	2' X 2'
depth of surface concrete	6"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	0.020" SLOT, 4" DIA.
7- Type screen filter	12/20 SILICA SAND
quantity used	4 50 lb BAGS
8- Type of seal	3/8" BENTONITE CHIPS
quantity used	2 50 lb BAGS
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	TREMIE PIPE
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~450 GAL
Development method	PUMP AND SURGE
Development time	2:05
Estimated purge volume	75 GAL

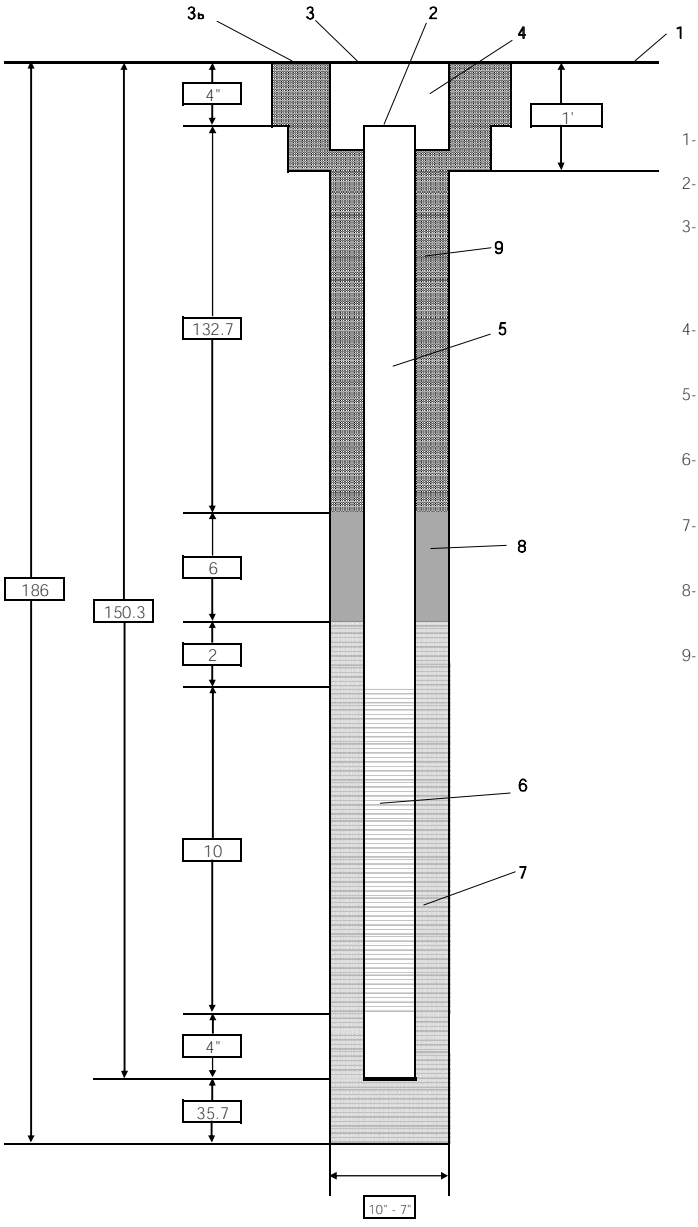
Comments NO SUMP, 4" END CAP ONLY
CENTRALIZERS AT 50', 100', AND TOP & BOTTOM OF SCREEN.
BENTONITE BACKFILL 200-171.3 (7 50 lb BAGS)
Sand below well screen from 171.3 to 170.3
8" CASING TO 130', 6" CASING TO 200'

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW31M	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 2/22/2020 **END :** 2/25/2020 **LOGGER :** ERIC STORKERSON



1- Ground elevation at well	193.73
2- Top of casing elevation	193.33
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	NA
b) concrete pad dimensions	3' X 3'
depth of surface concrete	6"
4- Dia./type surface casing	10" STEEL
5- Dia./type of well casing	4" SCH 80 PVC
6- Type/slot/size of screen	0.020" SLOT, 4" DIA.
7- Type screen filter	12/20 SILICA SAND
quantity used	5 50 lb BAGS
8- Type of seal	3/8" BENTONITE CHIPS
quantity used	3 50 lb BAGS
9- Grout	
a) Grout mix used	QUICK GROUT
b) Method of placement	TREMIE PIPE
c) Vol.of surface casing grout	
d) Vol. of well casing grout	~300 GAL
Development method	PUMP AND SURGE
Development time	3:35
Estimated purge volume	178.5 GAL

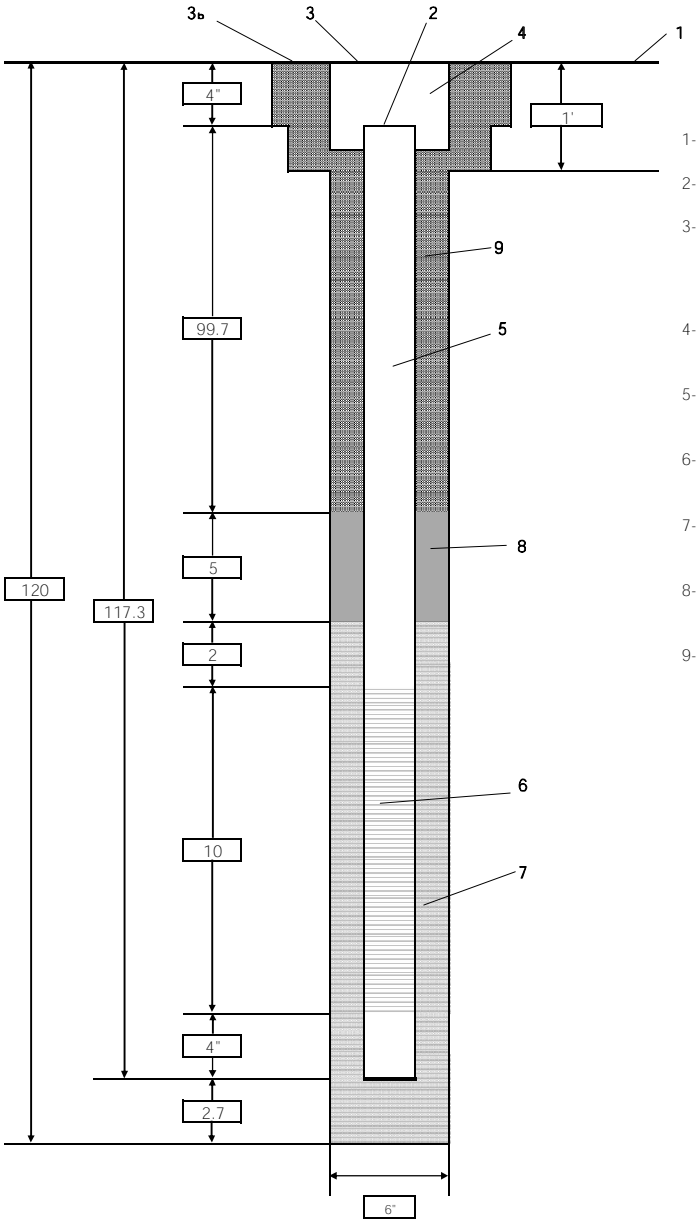
Comments NO SUMP, 4" END CAP ONLY.
CENTRALIZERS AT 140, 100, AND 50 FT BGS.
BENTONITE BACKFILL 186-151.3 (sluff 186 - 179)(7 50 lb BAGS CHIPS)
10" CASING 0 - 100, 8" CASING 100 - 170
7" CORE BARREL 170 - 186 (NOT CASED)
179-186 SLUFFED IN

Illustration not to scale.

PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
9000NVT1.A.PN.EV.03.FI-WI	WI-CV-MW31S	

GROUND WATER MONITORING WELL COMPLETION DIAGRAM

PROJECT : NASWI OLF Coupeville Site Inspection Monitoring Well Installation
LOCATION : Coupeville, WA
ELEVATION:
DRILLING CONTRACTOR : Yellow Jacket
DRILLING METHOD AND EQUIPMENT USED: Rotosonic
WATER LEVELS : -- **START :** 2/26/2020 **END :** 2/27/2020 **LOGGER :** GERRIT GARDNER



1- Ground elevation at well	193.82
2- Top of casing elevation	193.34
3- Wellhead protection cover type	FLUSH MOUNT
a) drain tube? YES/NO	NO
b) concrete pad dimensions	2' X 2'
depth of surface concrete	6"
4- Dia./type surface casing	8" STEEL
5- Dia./type of well casing	2" SCH 80 PVC
6- Type/slot/size of screen	0.020" SLOT, 2" DIAMETER
7- Type screen filter	12/20 SILICA SAND
quantity used	4 50 lb BAGS
8- Type of seal	3/8" BENTONITE CHIPS
quantity used	3 50 lb BAGS
9- Grout	
a) Grout mix used	QUIK GROUT
b) Method of placement	TREMIE PIPE
c) Vol.of surface casing gro	200 GAL
d) Vol. of well casing grout	1
Development method	N/A (DRY AT DEVELOPMENT)
Development time	N/A
Estimated purge volume	N/A

Comments NO SUMP, 4" END CAP ONLY
CENTRALIZERS SET AT 107, 100, AND 50 FT BGS.

1' of sand below well screen (118.3 - 117.3)
BENTONITE BACKFILL 120-118.3 (1 50 lb BAG)

Illustration not to scale.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11-6-19
Weather: Clear, 50°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW035
Sample ID: NA
Sampling Team: L. Baumann
B. Lugo

	Before	After	
Total Depth:	130.70	130.70	FT.(BTOC)
Depth to water:	(-) 122.95	124.75	FT.(BTOC)
Water Column:	7.75	5.95	FT.
0.163/ft	(x) 0.163	~~0.97~~	GAL/FT.
Well Volume:	1.26	0.97	GAL.
Total Purge Vol.:	17 gal	17.0	GAL.

Measuring Device: Horiba, WL Meter (Heron Water tape)
Date and Time: 11-6-19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

x 7.75 ft = 1.26 12.65

Purge Device: Mega Monsoon Pump

Air Monitoring Equipment: PID, MultiRAE #1570 Model 6228

Was well surged and bailed in 2-3 foot intervals along entire screen? No, ~~8~~ 8' for 15 min

Surge and bail equipment: Surge block/swab, bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
									Hard Bottom
10:03	After Bail Purge	11.81	0.540	9.22	5.44	224	>1000	123.09	Light Milky Brown
10:54	5 gal	12.96	0.469	8.19	7.56	73	647	124.61	
10:57	8 gal	12.71	0.461	8.74	7.47	73	63.5	124.65	PID = No change
11:01	12 gal	12.92	0.484	9.22	7.41	81	67.1	124.70	
11:06	17 gal	12.65	0.464	7.95	7.50	80	17.4	124.75	PID = No change
Final	17 gal	12.65	0.464	7.95	7.50	80	17.4	124.75	

Observations/Notes:
08:50-09:10 initial Bail
09:10:05 end Swab + Bail

Purge Start Time: 10:49

Purge Rate: 1 gal/minute

Purge Rate 1 gal/min

Air Monitoring:
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s): ZK Baumann

ch2m

WELL DEVELOPMENT DATA SHEET

nt: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11-6-19
Weather: Clear, 53°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 17M
Sample ID: NA
Sampling Team: L. Bannon
B. Lugo

	Before	After	
Total Depth:	159.89	159.90	FT.(BTOC)
Depth to water:	(-) 130.08	131.4	FT.(BTOC)
Water Column:	29.81	28.5	FT.
	(x) 0.163		GAL/FT.
Well Volume:	4.86	4.65	GAL.
Total Purge Vol.:	48.6	48.6	GAL.

Measuring Device: Horiba, WL meter
Date and Time: 11-6-19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mega Monsoon pump

Air Monitoring Equipment: MultiRAE 6228

Was well surged and bailed in 2-3 foot intervals along entire screen? Y

Surge and bail equipment: Surge block/swab, Bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1500	5gal	14.74	0.553	32.83	7.84	123	71000	131.03	PID=0.0
			Pump failed. - Hose came off						
1526		RESTART	Pump						
1529	15	14.17	0.550	20.05	7.83	104	71000	131.04	PID=0.0
1533	19.8	13.09	0.556	5.97	7.94	36	71000	131.04	
1538	25.1	12.56	0.407	8.01	7.76	-33	526	131.04	
1543	30.7	12.52	0.584	2.86	7.84	-44	514	131.04	
1548	36.3	12.43	0.551	2.56	7.82	-42	456	131.04	
1553	41.3	12.34	0.594	2.27	7.87	-44	391	131.05	PID=0.0
1558	47.4	12.23	0.480	2.62	7.81	-29	334	131.04	
1603	53.3	12.26	0.602	3.43	7.90	-44	344	131.03	
		END	PURGE						
Final	54	12.26	0.602	3.43	7.90	-44	344	131.03	

Observations/Notes: Purge Start Time: 15:00 Purge Rate: 1.125

Purge Rate 1.125 gal/min
Initial PID readings of 0.0 to 0.4 VOC with PID during Bailing, None during pumping

Air Monitoring:
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s): [signature]

ch2m:

WELL DEVELOPMENT DATA SHEET

nt: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: ~~9/11/19~~ 11-9-19
Weather: rain, 50's

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 20S / GW01
Sample ID: NA
Sampling Team: Eric (CH2M) & Bryce (YJ)

	Before bailing	After bailing	
Total Depth:	107.7	109.9	FT.(BTOC)
Depth to water:	(-) 93.05	93.3	FT.(BTOC)
Water Column:	14.65	16.6	FT.
	(x) ~~2.39~~ .163		GAL/FT.
Well Volume:	2.39	2.7	GAL.
Total Purge Vol.:	35 ~~72.9~~	~~37~~ 33	GAL.

Measuring Device: Heron Water Tape
Date and Time: 11/9/19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: bailer & mega monsoon pump

Air Monitoring Equipment: multirae

Was well surged and bailed in 2-3 foot intervals along entire screen? Y

Surge and bail equipment: hand bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
abilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1305	0	11.65	0.709	9.36	7.85	82	>1000	93.12	very cloudy
1315	10	12.13	0.782	4.00	7.67	-5	1600		
1320	15	12.30	0.783	3.65	7.58	-14	362	94.68	
1325	20	12.34	0.787	3.48	7.55	3.17	267		
1330	25	12.36	0.801	2.79	7.49	-18	150	94.68	
1335	30	12.40	0.806	2.00	7.48	-15	86.1		
1340	35	12.35	0.810	1.87	7.46	-17	33.7	94.75	clear water
Final									

Observations/Notes: Purge Start Time: 1305 Purge Rate: 1 gal/min

* Surpassed min 10 WV. Stopped purging. 12.7 WV purged.

Air Monitoring:
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s):

ch2m:

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11-10-19
Weather: Cloudy, 51°

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 21 / GW02/5006
Sample ID: NA
Sampling Team: L. Baumann
B. Lugo

	Before	After	
Total Depth:	~~10~~ 16.96	117.2	FT.(BTOC)
Depth to water:	(-) 95.98	109.00	FT.(BTOC)
Water Column:	20.98	8.2	FT.
	(x) 0.163		GAL/FT.
Well Volume:	3.42	1.34	GAL.
Total Purge Vol.:	~~34~~ 20	13.4	GAL.

Measuring Device: Heron Water Tape
Date and Time: 11-10-19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: bailer + Mega monsoon pump

Air Monitoring Equipment: MultiRae

Was well surged and bailed in 2-3 foot intervals along entire screen? yes

Surge and bail equipment: bailer + surge block

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW ft	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1310		13.34	0.885	10.47	7.55	-80	71000	>115	Initial
1313	~1.75	Water Dropped Below pump intake - water						in tubing fell	back in well
1334								111.6	Pump Removed
1354								111.43	Recharge Study
~~1056~~			Nov 11, 2019						
1036								101.00	Initial DTW
1059								98.53	DTW with pump
1106		PUMP	ON						
1112		12.96	0.809	7.36	9.01	-93	>1000	~~Below Pump~~	YKS 11-11-19
1117		13.00	0.724	8.32	9.37	-114	>1000		
1123		13.17	0.584	5.90	9.23	-139	>1000		Sounder can't Reach WATER
1127		13.35	0.614	5.94	9.74	-135	>1000		
1130	3.05	DRY		DRY					END Pump
	~~3.75~~ YKS 11-11-19							111.21	Pump Removed
Final									

Observations/Notes: Screen= 107-117 BGS Purge Start Time: 1302 Purge Rate: 0.15

well purged dry after 11 minutes at 0.15 g/min, ~1.75 gallons purge, ~1.5 gallons baled

Air Monitoring:
VOC (ppm) = 0/0
H2S (ppm) = 0/0
LEL (%) = 0/0
CO (ppm) = 0/0
O2 (%) = 20.9/20.9

Signature(s):

34 02/60 SPC

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11-7-19
Weather: 50° some clouds

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 22S
Sample ID: NA
Sampling Team: L. Baumann, B. Lugo

	Before	After	
Total Depth:	122.00		FT.(BTOC)
Depth to water:	(-) 114.00		FT.(BTOC)
Water Column:	8.0'		FT.
	(x) 0.163		GAL/FT.
Well Volume:	1.304		GAL.
Total Purge Vol.:	13.04		GAL.

Measuring Device: Heron Water tape
Date and Time: 11-7-19 1000

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mega Monsoon Pump
Air Monitoring Equipment: MultiRae 6228
Was well surged and bailed in 2-3 foot intervals along entire screen? ✓
Surge and bail equipment: Surge Block/Swab

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1035								120.9	After Swab + Bail
1322								117.50	After Recharge
Final									

Observations/Notes:
Purge Start Time: 1113
Purge Rate: NA

Start bailing @ 9:05AM, STOP @ 9:20 - 5 gallons
Start Swab @ 927 AM
Bail @ 1035
Begin purge @ 1113, pumped dark gray water, ~2 gallons. Water level dropped to below pump. Very low recharge. Let recharge for 40 minutes. No water.
END development

Air Monitoring:
VOC (ppm) = 0.0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s):

10 well vol. 54.4

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11/9/19
Weather: rain, 50's

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 225 / GW03
Sample ID: NA
Sampling Team: Eric (CH2M) + Bryce (YT)

	Before	After	
Total Depth:	125.05		FT.(BTOC)
Depth to water:	(-) 114.95		FT.(BTOC)
Water Column:	10.1		FT.
	(x) 0.163		GAL/FT.
Well Volume:	1.65		GAL.
Total Purge Vol.:			GAL.

Measuring Device: Heron Water Tape
Date and Time: 11/9/19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: bailer + mega monsoon

Air Monitoring Equipment: multirae

Was well surged and bailed in 2-3 foot intervals along entire screen? NA

Surge and bail equipment: NA

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1310	0.5	12.37	0.808	9.29	6.89	111	>1000	119'	grey cloudy
1340	3.0	12.92	0.800	14.31	7.19	64	>1000	dry	grey cloudy
Final									

Observations/Notes: Purge Start Time: 1300 Purge Rate: 0.13 gpm

* Well was previously surged + bailed on earlier day. Well went dry. Allowed to recharge. Cont. purging today w/ slow pump rate.
* Stopped purging when well went dry.

Air Monitoring: 0
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s):

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11/8/19 & 11/9/19
Weather: partly cloudy, 50's

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-23S GW04
Sample ID: NA
Sampling Team: Eric (EH) & Bryce (YJ)

	Before	After	
Total Depth:	139.79		FT.(BTOC)
Depth to water:	(-) 124.40		FT.(BTOC)
Water Column:	15.39		FT.
	(x) 0.163		GAL/FT.
Well Volume:	2.5		GAL.
Total Purge Vol.:			GAL.

Measuring Device: Heron Water tape
Date and Time: 11/8/19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: bailer & Mega monsoon pump

Air Monitoring Equipment: multiRae

Was well surged and bailed in 2-3 foot intervals along entire screen? Y

Surge and bail equipment: hand bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1000	4 gal	9.88	0.650	16.92	6.74	-65	>1000	134.65	11/8, bailed to dry.
1530	4	11.12	0.476	4.25	8.52	-64	>1000	124.65	11/9 @ top of Screen
1550	4	11.53	0.507	1.15	9.28	-175	>1000	–	" @ bottom of Screen
1555	5	11.90	0.475	2.59	9.12	-143	>1000	–	
1600	6	12.20	0.482	2.97	9.24	-133	>1000	–	
Final									

Observations/Notes: Purge Start Time: 1530 Purge Rate: 0.2 gpm

bail: no appreciable solids during bailing. Water cloudy. Baled to dry, slow recharge.

Purge: (next day) Top of Screen purge went dry quickly. After 2 gal of purge, well went dry @ bottom of Screen

Air Monitoring:
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s):

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11-10-19
Weather: Cloudy.

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW~~05M~~/GW06/MW25M (2Kis)
Sample ID: NA
Sampling Team: L. Baumann, B. Lugo

	Before	After	
Total Depth:	146.4 (very soft)		FT.(BTOC)
Depth to water:	(-) 108.91		FT.(BTOC)
Water Column:			FT.
	(x)		GAL/FT.
Well Volume:			GAL.
Total Purge Vol.:			GAL.

Measuring Device: Heron Water Tape
Date and Time: 11-10-19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: ZKB 11-10-19 NA Bailer

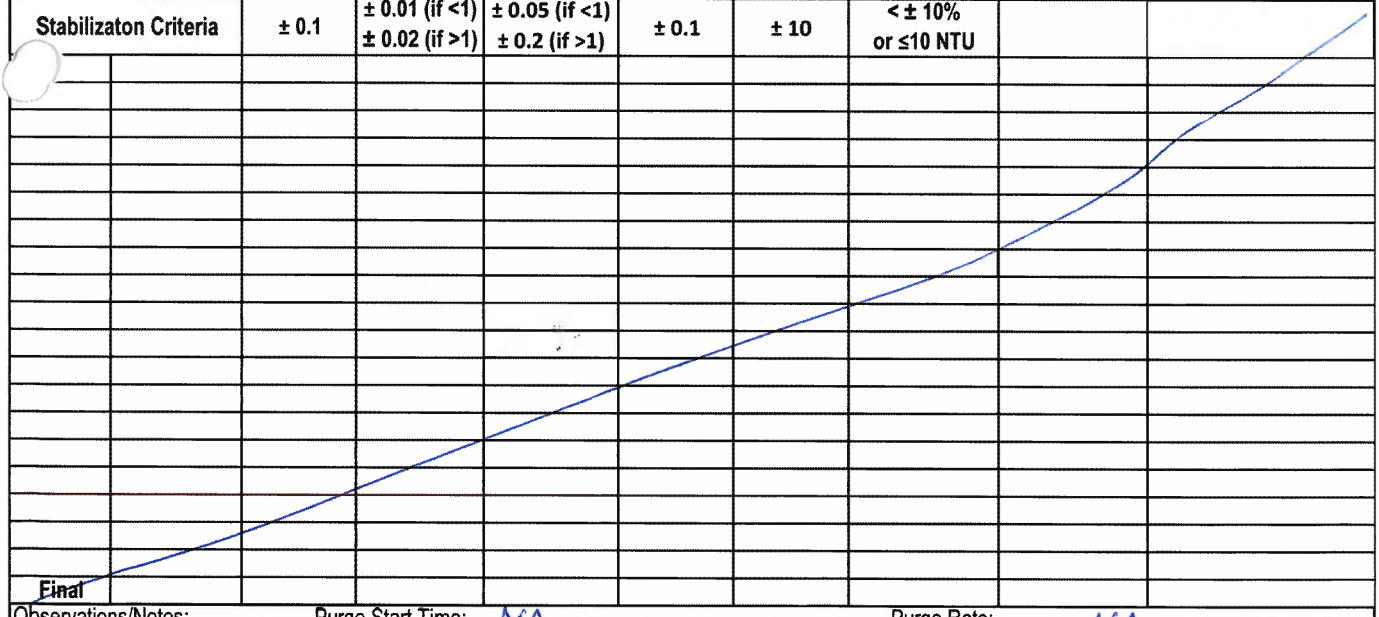
Air Monitoring Equipment: MultiRae

Was well surged and bailed in 2-3 foot intervals along entire screen? NA

Surge and bail equipment: Bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
Final									



Observations/Notes: Purge Start Time: NA Purge Rate: NA

After initial TD the water level probe came up covered in fine, gray clay.
DTW @ 0915 = 123.8'
TD @ 0915 = 142.5' (2Kis)
2.43 gal purged
Screened interval was constructed at 160-150' bgs. Screened interval covered ~ 0910 bentonite started coming up in bailer, little water. Bentonite thick with some chunks. After calling Mark Evdo, well judged to be broken.

Air Monitoring: 0 | 0
VOC (ppm) = 0 | 0
H2S (ppm) = 0 | 0
LEL (%) = 0 | 0
CO (ppm) = 0 | 0
O2 (%) = 20.9 | 20.9

Signature(s): ZKB

ch2m.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 12/6/19
Weather: 40's Overcast / Rain

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW – MW-25-M
Sample ID: NA
Sampling Team: T. Chalmers
Bo Owens

Measuring Device: Horiba: Pine # 21290 Solinst: Pine # 12726
Date and Time: 12/6/19 0810

	Before	After	
Total Depth:	162.50	162.50	FT.(BTOC)
Depth to water:	(-) 123.41	124.34	FT.(BTOC)
Water Column:	39.09	38.16	FT.
	(x) 0.163	0.163	GAL/FT.
Well Volume:	6.37	6.22	GAL.
Total Purge Vol.:	63.7		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mega Monsoon pump

Air Monitoring Equipment: Multi RAE Pine: 43639

Was well surged and bailed in 2-3 foot intervals along entire screen? 2 - 5 ft intervals

Surge and bail equipment: Steel & rubber surge block / 5 ft steel bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other:	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
0810	Bailing	begins	w/ 5 ft	steel	bailer				
0820	1	10.72	0.180	8.32	6.65	355	685		Murky / No odor
0825	Surging	begins.							
0900	Bailing	resumes							
0905	2	10.37	0.140	9.77	7.15	262	MAX		Murky / No Odor
1000	Purge	begins	at 2	gal/min					
1005	12	11.37	0.144	11.07	8.20	28	125		cleardy / No odor
1016	32	11.84	0.161	7.93	8.21	-24	56.5		clear / No Odor
1025	52	11.77	0.202	7.38	8.18	-86	22.3		"
1035	72	11.89	0.243	6.56	8.13	-127	18.8		"
1045	92	11.97	0.281	9.37	8.15	-149	14.9		"
1055	112	12.03	0.314	0.60	8.09	-164	10.5		"
1105	122	12.46	0.345	0.00	8.16	-170	~~10.79.5~~		"
1115	142	12.35	0.351	0.00	8.28	-179	8.4		"
Final	142	12.35	0.351	0.00	8.28				clear / No Odor

Observations/Notes:

Purge Start Time: 1000

Purge Rate: 2 gal/min

Air Monitoring:	BZ	WH
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 11/8/19 & 11/9/19
Weather: rain, 50's

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW 26 D / GW07
Sample ID: NA
Sampling Team: Eric (ch2m) & Bryce (JJ)

	Before	After	
Total Depth:	199.79		FT.(BTOC)
Depth to water:	(-) 143.96	144.35	FT.(BTOC)
Water Column:	55.63		FT.
	(x) 0.163		GAL/FT.
Well Volume:	9.07		GAL.
Total Purge Vol.:	105.6 ~~70.7~~		GAL.

Measuring Device: Heron Water Tape
Date and Time: 11/9/19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: bailer & mega monsoon pump
Air Monitoring Equipment: multi rae
Was well surged and bailed in 2-3 foot intervals along entire screen? Y
Surge and bail equipment: hand bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Commen
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
805	0	11.22	0.391	8.08	6.53	154	>1000	144.72	
815	17.6 ~~26.4~~	11.82	0.360	1.32	7.35	12	901		
820	26.4	12.08	0.369	0.85	7.70	-27	820		
825	35.2	12.07	0.357	0.77	7.85	-55	814		
830	44	12.26	0.356	0.68	7.94	-76	280		
835	52.8	12.28	0.354	0.70	7.93	-84	385		
840	61.6	12.35	0.356	0.72	7.96	-89	233		
845	70.4	12.39	0.356	0.43	7.99	-96	138		
850	79.2	12.39	0.357	0.08	8.03	-101	106		
855	88	12.44	0.357	0.05	8.05	-100	82.5		
900	96.8	12.48	0.357	0.01	8.04	-103	38.0		
905	105.6	12.53	0.357	0.00	8.04	-102	19.3	144.35	
Final									

Observations/Notes: Purge Start Time: 805 Purge Rate: 1.76 gpm

* Surge & bail occurred on 11/8 & purge on 11/9. Bailed ~2.0 gallons of water.

Air Monitoring:
VOC (ppm) = 0
H2S (ppm) = 0
LEL (%) = 0
CO (ppm) = 0
O2 (%) = 20.9

Signature(s):

ch2m:

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 3/14/20
Weather: 40s overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW - 28M
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:	170.50		FT.(BTOC)
Depth to water:	(-) 125.25	125.47	FT.(BTOC) @ 1433
Water Column:	45.25		FT.
	(x) 0.163		GAL/FT.
Well Volume:	7.38		GAL.
Total Purge Vol.: (x10)	73.8		GAL.

Measuring Device: Solinst WL meter, Model 101
TC ~~Date and Time~~: Pine # 039724

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

WQ Meter:
Horiba U-52
S/N: SLSY9HWX
Pine # 21361

Purge Device: Mega Monsoon Submersible Pump
Air Monitoring Equipment: MultiRAE Pine #38079

Was well surged and bailed in 2-3 foot intervals along entire screen? No, Along Entire 10 ft screen
Surge and bail equipment: Surge block / steel bailer / smeal

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: WL	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1200	Begin	Surge							
1215	Begin	bail							
1245	Begin	Purge							
1300	30	12.07	0.242	0.00	6.26	57	759	126.52	Murky / No Odor
1310	50	12.41	0.161	0.00	7.65	-92	363	126.52	Milky / No odor
1320	70	12.71	0.187	0.00	8.38	-168	180	"	"
1330	80	12.65	0.214	0.00	8.53	-199	146	"	Clearing / No Odor
1340	100	12.17	0.240	7.71	8.51	-190	125	"	"
1350	130	12.74	0.257	8.45	8.52	-207	119	"	"
1400	150	12.53	0.282	0.00	8.50	-206	145	"	"
1410	170	12.41	0.294	0.00	8.52	-202	97.1	"	"
1420	200	12.23	0.301	0.00	8.45	-179	150	"	"
Final	200	12.23	0.301	0.00	8.45	-179	150	126.52	Slightly Turbid / No odor

Observations/Notes: Purge Start Time: 1245 Purge Rate: ~2 gal/min

Purged for > 1.5 hours & surpassed 10 x well volume.

Air Monitoring:	WH	BZ
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

ch2m.

WELL DEVELOPMENT DATA SHEET

TC

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 7/13/20
Weather: 70's overcast

Project Number: 0000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-28M MW-29M
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:	169.28		FT.(BTOC)
Depth to water:	(-) 113.53	131.61	FT.(BTOC) @ 1127
Water Column:	55.75		FT.
Well Volume:	(X) 2.663		GAL/FT.
Total Purge Vol: (3 x)	148.5		GAL.
	445.5		GAL.

Measuring Device: Solinst WL Meter, Model 101
(2) Date and Time: Fine #039754

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

WQ Meter:
Horiba U-52
S/N: SLSY9HWX
Fine #: 21361

Purge Device: Mega Monsoon Submersible Pump
Air Monitoring Equipment: MultiRAE Fine # 58079
Was well surged and bailed in 2-3 foot intervals along entire screen? No, Along Entire 10 ft screen
Surge and bail equipment: Surge block / steel bailer / SM&I

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: WL	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
0900		→ Begin Surge							
0830		→ Begin bail							
0905		→ Begin Purge							
0920	30	11.23	0.463	7.50	7.47	-34	MAX	165.80	Murky / No Odor
0930		→ Adjust flow to 0.75 gal/min							
0935	37.50	11.90	0.748	0.00	7.58	-95	MAX	163.65	Murky / No Odor
0945	43.50	12.76	0.619	0.00	8.27	-175	452	161.25	"
0955	51.25	12.90	0.555	0.00	8.28	-181	366	159.40	"
1000		→ Increase flow to 1.0 gal/min							
1005	60	12.90	0.490	0.00	8.27	-187	209	158.35	Clearing / slight odor
1010		→ Increase flow to 1.25 gal/min							
1015	71.25	12.88	0.461	0.00	8.25	-176	136	159.00	"
1023	83.75	12.80	0.439	0.00	8.22	-187	123	159.80	"
1027		→ Increase flow to 1.75 gal/min						(2) ~~163.00~~	
1035	100.25	12.71	0.416	0.00	8.22	-190	140	163.00	Slightly Milky / No odor
1045	117.75	12.62	0.400	0.00	8.19	-171	149	165.10	"
1055	135.50	12.62	0.390	0.00	8.31	-173	115	155.69	"
1105	140.00	12.21	0.389	0.00	8.34	-175	40.5	150.85	"
Final									

Observations/Notes: Purge Start Time: 0905 Initial Purge Rate: 2 gal/min

Initial WL detected bentonite at bottom of well.
Bailed an additional 10 mins (25 mins total) to remove bentonite.
Purge complete after 2 hrs of purging.

Air Monitoring:	WH	BZ
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 3/12/20
Weather: 40's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-30M
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:	168.25		FT.(BTOC)
Depth to water:	(-) 126.26	126.10	FT.(BTOC) @ 1630
Water Column:	41.99		FT.
	(x) 0.163		GAL/FT.
Well Volume:	6.84		GAL.
Total Purge Vol.: (x10)	68.4		GAL.

Measuring Device: Solinst WL meter Model 101
~~Date and Time~~: Pine # 039754

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

WQ Meter: Horiba
Model: U-52 S/N: SL5Y4HK
Pine # 21361

Purge Device: Mega Monsoon Submersible Pump

Air Monitoring Equipment: MultiRAE Pine # 38079

Was well surged and bailed in 2-3 foot intervals along entire screen? No, Along entire 10 ft screen

Surge and bail equipment: Surge block / steel bailer / SMeal

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: WL	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1405 → Begin Surge									
1425 → Begin bail									
1505 → Begin Purge									
1510	6.25	11.99	0.430	0.00	6.57	-59	585	142.20	Milky / No Odor
1520	18.75	11.98	0.379	0.00	7.24	-113	70.8	142.61	Slightly cloudy / No odor
1530	31.25	12.29	0.389	0.00	7.69	-154	28.5	142.77	"
1540	43.75	12.12	0.382	0.00	7.84	-165	15.5	142.75	clear / No Odor
1550	50.00	12.32	0.373	3.04	7.92	-169	12.3	142.70	"
1600	62.50	12.64	0.387	0.00	7.95	-158	12.6	142.66	"
1610	75.00	12.33	0.386	0.00	8.02	-160	12.2	142.61	"
Final	75.00	12.33	0.386	0.00	8.02	-160	12.2	142.61	Clear / No Odor

Observations/Notes: Purge Start Time: 1505 Initial Purge Rate: 1.25 gal/min

Development complete after 10 times well volume had been purged and 1 hour of purging had occurred. Final NTU's 12.2

Air Monitoring:	WH	BZ
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s): T. Chalmers

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 3/12/20
Weather: 40's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-31M
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:	151.24		FT.(BTOC)
Depth to water:	(-) 123.29	123.47	FT.(BTOC) @ 1328
Water Column:	27.95		FT.
	(x) 0.653		GAL/FT.
Well Volume:	18.25		GAL.
Total Purge Vol.:	(x10) 182.50		GAL.

Measuring Device: ~~Solinst Water Level~~ @
Date and Time: ~~Proc # 3552~~
Solinst Water Level meter Model 102 S/N: 308727

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

WQ Meter: Horiba Model: U-52 S/N: SLSY9HWX Pine #: 21361

Purge Device: Mega Monsoon Submersible pump

Air Monitoring Equipment: MultiRAE Pine # 380799

Was well surged and bailed in 2-3 foot intervals along entire screen? No, Along entire 10 ft screen

Surge and bail equipment: Surge block / Smeal / Steel bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: WL	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1009			10 → Take WL						
0935			→ Begin Surge						
0950			→ Finish surge						
1015			→ Begin to bail						
1105			→ Begin Purge						
1110	6.75	12.49	1.36	4.17	8.77	-170	MAX	129.65	Milky / No odor
1115	→ Adjusted to 0.5 gal/min								
1120	16	12.43	1.14	0.62	8.65	-180	MAX	127.40	Milky / No Odor
1130	18.5	12.33	1.05	0.23	8.36	-168	MAX	127.05	"
1140	21	12.72	0.983	0.00	8.25	-156	787	127.05	"
1145	→ Adjusted to 1.0 gal/min								
1150	28.5	12.86	0.939	0.00	8.19	-157	755	128.20	Clearing slightly / No Odor
1155	→ Adjust to 1.5 gal/min								
1200	41	12.72	0.915	0.00	8.18	-172	810	130.55	"
1205	→ Adjust to 2.0 gal/min, MAX out flow of Pump								
1210	58.5	12.29	0.872	0.00	8.15	-134	876	133.05	"
1220	78.5	12.34	0.851	0.00	8.14	-138	310	132.95	"
1230	98.5	12.48	0.824	0.00	8.04	-133	197	133.00	"
1240	118.5	12.47	0.819	0.00	8.02	-123	180	133.00	Clearing / No odor
1250 ~~Final~~	138.5	12.85	0.817	0.00	8.00	-139	100	133.00	"

Observations/Notes: Purge Start Time: 1105 Initial Purge Rate: 1.35 gal/min

WQ meter arrived without calibration solution. Parameters are taken on the warehouse calibration.

Air Monitoring:	WH	BZ
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

ch2m.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well development
Date: 3/12/20
Weather: 40's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-31M
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:			FT.(BTOC)
Depth to water:	(-)		FT.(BTOC)
Water Column:			FT.
	(x)		GAL/FT. See Page 1 TC
Well Volume:			GAL.
Total Purge Vol.:			GAL.

Measuring Device:
Date and Time:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device:

Air Monitoring Equipment:

Was well surged and bailed in 2-3 foot intervals along entire screen?

Surge and bail equipment:

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: WL	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
1300	158.5	12.92	0.799	0.00	8.01	-136	81.2	133.00	Slightly Murky/No Odor
1310	178.5	12.66	0.800	0.00	8.00	-120	73.2	133.00	"
Final	178.5	12.66	0.800	0.00	8.00	-120	73.2	133.00	Slightly Murky/No Odor

Observations/Notes: Purge Start Time: Purge Rate:

Developed for 2hrs as apposed to 1hr as stated in the project instructions due to the fact that we were seeing active decrease in NTU's.

Air Monitoring:
VOC (ppm) =
H2S (ppm) =
LEL (%) =
CO (ppm) =
O2 (%) =

See Page 1 TC

Signature(s):

ch2m.

WELL DEVELOPMENT DATA SHEET

[redacted]nt: NAVFAC
[redacted]tion: OLF Coupeville
[redacted]ent: Well development
Date: 3/12/20
Weather: 40's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WI
Well ID: WI-CV-MW-31-S
Sample ID: NA
Sampling Team: T. Chalmers
Jon Davis (YJ)

	Before	After	
Total Depth:	116.30		FT.(BTOC)
Depth to water:	(-) DRY		FT.(BTOC)
Water Column:			FT.
Well Volume:	(x)		GAL/FT.
Total Purge Vol.:			GAL.
			GAL.

Measuring Device: Solinst Water Level
Date and Time: Pine# 3552, 3/12/20 0830

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device:

Air Monitoring Equipment: MultiRAE Pine# 38079

Was well surged and bailed in 2-3 foot intervals along entire screen?

Surge and bail equipment:

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other:	Color / Odor / Comments
Stabilizaton Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤10 NTU		
0820		Take WL							
0830		well is dry	TD = 116.30						
Final									

Observations/Notes: Purge Start Time: Purge Rate:

Initial water level reading determines that the well is dry.
Confirmed dry well with a second WL meter.

Air Monitoring:	WH	BZ
VOC (ppm) =	0.0	
H2S (ppm) =	0.0	
LEL (%) =	0	
CO (ppm) =	0	
O2 (%) =	20.9	

Signature(s):

Appendix C
Groundwater Sampling Data Sheets

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: 50's, overcast, windy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 010
Sample ID: WI-CV- GW 010 - ~~1020~~ 1019
Sampling Team: D. Butler, J. Peery-Lemon, A. Voigt, T. Chambers

Total Depth: ~~217~~ 217 FT.(BTOC)
Depth to water: (-) 140.97 FT.(BTOC)
Water Column: 76.03 FT.
(x) 1.63 GAL/FT.
Well Volume: 123.92 GAL.
Total Purge Vol.: GAL.

Purge Device: QED - 8738 (pine)

Measuring Device: WL - 029633
Horiba - 21361 (pine)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1300	600	12.21	0.349	4.88	7.70	83	19.6	141.53	Clear / No odor
1303	1200	12.11	0.352	3.43	7.93	31	19.6	"	"
1306	1806	12.03	0.355	3.55	8.04	4	18.0	"	"
1309	2406	12.01	0.356	2.04	8.17	-37	11.4	"	"
1312	3000	11.98	0.358	1.17	8.24	-50	8.1	141.55	"
1315	3600	11.95	0.359	1.10	8.30	-76	5.8	"	"
1318	4200	11.97	0.359	.56	8.33	-95	5.2	"	"
1321	4800	11.95	0.360	.30	8.36	-105	3.7	141.56	"
1324	5400	11.98	0.360	.31	8.38	-112	3.1	"	"
1327	6000	11.96	0.360	0.00	8.39	-119	3.0	"	"
1330	6600	11.94	0.360	0.00	8.39	-125	2.6	141.59	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Pump Start Time: 1248
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 10
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 20
Final Discharge Time: 10
Final Control Setting(Hz): NA

Purge Rate: 200 mL/min

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=		
CO (ppm)=	0	0
O2 (%)=	0	0
	20.9	20.9

Pump Depth: 207

Sample /Time: 1335

MS/MSD NA

Duplicate ID: NA

Signature(s): Jordan Peery Lemon

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: 50's, Overcast, windy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 010
Sample ID: WI-CV-GW010-1019
Sampling Team: D. Butler, J. Perry-Lemon, A Vogt, T. Chames

Total Depth: 217 FT.(BTOC)
Depth to water: (-) 140.97 FT.(BTOC)
Water Column: 76.03 FT.
(x) 1.63 GAL/FT.
Well Volume: 123.92 GAL.
Total Purge Vol.: GAL.

Purge Device: QED - 8738 (Pine)

Measuring Device: WL - 09633
Horiba - ~~216~~ 21361 (Pine)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1333	7200	11.92	0.361	0.00	8.42	-129	2.7	11	11

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Pump Start Time: 1248
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 10

Submersible Initial Control Setting(Hz): NA

Final Fill Time: 20
Final Discharge Time: 10

Final Control Setting(Hz): NA

Purge Rate: 200 mL/min

Air Monitoring:

	132	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 207

Sample /Time: 1335

MS/MSD NA

Duplicate ID: NA

Signature(s): Jordan Perry Lemon

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 57°F / OVERCAST / WINDY

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-01M
Sample ID: WI-CV-GW01M-1019
Sampling Team: PERRY LEMON, J / BUTLER, D / VOGT, A CHALMERS, T.

Total Depth: 163 FT.(BTOC)
Depth to water: (-) 123.36 FT.(BTOC)
Water Column: 39.64 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.46 GAL.
Total Purge Vol.: 1500 mL ~~GAL.~~ OD

Measuring Device: 029633
Horiba 2136J

Purge Device: QED, Sample Pro 1.75" ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~ OD	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1617	300	12.58	0.478	5.30	8.39	82	9.7	123.40	CLEAR/NO O.
1620	600	12.49	0.520	0.05	8.40	81	8.0	123.38	"
1623	900	12.36	0.557	0.00	8.42	77	7.8	123.37	"
1626	1200	12.36	0.556	0.00	8.42	73	6.9	123.38	"
1629	1500	12.29	0.569	0.00	8.42	70	7.1	123.40	"
~~1632~~	~~18~~ OD								
~~1635~~	OD								
~~1638~~	OD								
~~1641~~	OD								
~~1644~~	OD								
~~1647~~	OD								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: BZ | VH
VOC (ppm)= 0 | 0
H2S (ppm) 0 | 0
LEL (%)= 0 | 0
CO (ppm)= 0 | 0
O2 (%)= 20.99 | 20.17

Pump Start Time: 1554
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): NA
Purge Rate: 100 mL/min

Pump Depth: 153 ft BTOC

Sample /Time: 1635

MS/MSD NA

Duplicate ID: WI-CV-GW01MD-1019 @ 1645

Signature(s): David Butler

h2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10-15-19
Weather: Cloudy, 50°F, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 02M
Sample ID: WI-CV- GW02M-1019
Sampling Team: D. Butler, A. Vogt, R. Chalmers, J. Reey-Lamar

Measuring Device: WLM: Pine # 29633
Horiba: Pine # 21361

Total Depth: 167.5 FT.(BTOC)
Depth to water: (-) 122.76 FT.(BTOC)
Water Column: 44.74 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.29 GAL.
Total Purge Vol.: 6000 ~~GAL~~ mL

Purge Device: QED: Pine # 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1642	Initial	13.03	0.536	0.60	9.48	85	59.0	122.75	Clear/No odor
1645	300	13.01	0.566	0.00	10.13	77	58.5	122.74	"
1648	600	12.97	0.592	0.00	10.52	64	49.8	122.74	"
~~1700~~	900	12.85	0.597	0.00	10.70	52	45.0	122.74	"
1654	1200	12.86	0.605	0.00	10.93	29	39.2	122.74	"
1657	1500	12.69	0.610	0.00	11.25	0	49.5	122.74	"
1700	1800	12.65	0.610	0.00	11.37	-11	37.7	122.74	"
1703	2100	12.62	0.608	0.00	11.45	-19	28.8	122.74	"
1706	2400	12.61	0.607	0.00	11.52	-24	25.1	122.74	"
1709	2700	12.78	0.604	0.00	11.45	-32	18.5	122.74	"
1712	3000	12.92	0.603	0.00	10.84	-35	17.3	122.74	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Pump Start Time: 1600
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30

Final Control Setting(Hz): NA

Purge Rate: 100 mL per min

Air Monitoring: BZ | WH
VOC (ppm)= 0.0 | 0.0
H2S (ppm) 0.0 | 0.0
LEL (%)= 0 | 0
CO (ppm)= 0.0 | 0.0
O2 (%)= 20.9 | 20.9

Pump Depth: 157 ft btoc

Sample /Time: 1750
MS/MSD NA
Duplicate ID: NA
Signature(s): David Butler

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/15/19
Weather: Cloudy, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 02M
Sample ID: WI-CV-GW02M-1019
Sampling Team: D. Butler, J. Peery-Lemon

Measuring Device: See pg 1

Total Depth:	167.5	FT.(BTOC)
Depth to water:	(-) 122.76	FT.(BTOC)
Water Column:	44.74	FT.
	(x) 0.163	GAL/FT.
Well Volume:	7.29	GAL.
Total Purge Vol.:	6000	~~GAL.~~ mL

Purge Device: See pg 1

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1715	3300	12.93	0.603	0.00	10.61	-40	15.1	122.74	
1718	3600	12.93	0.602	0.00	10.92	-44	11.8	122.74	
1721	3900	12.87	0.605	0.00	11.43	-50	10.1	122.74	
1724	4200	12.85	0.606	0.00	11.69	-52	9.5	122.74	
1727	4500	12.83	0.608	0.00	11.95	-56	8.2	122.74	
1730	4800	12.89	0.609	0.00	12.07	-59	7.0	122.74	
1833	5100	12.91	0.612	0.00	12.26	-65	6.0	122.74	
1836	5400	12.89	0.613	0.00	12.33	-67	5.7	122.74	
1839	5700	12.86	0.616	0.00	12.41	-67	4475.6	122.74	
1842	6000	12.81	0.618	0.00	12.41	-69	5.7	122.74	
~~1845~~	6300								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: BZ / WH
VOC (ppm)= 0.0 / 0.0
H2S (ppm) 0.0 / 0.0
LEL (%)= 0 / 0
CO (ppm)= 0.0 / 0.0
O2 (%)= 20.9 / 20.9

Pump Start Time:
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): NA
Purge Rate: 100 mL/min

Pump Depth: 157 ft btoc

Sample /Time: 1750
MS/MSD NA
Duplicate ID: NA
Signature(s): Denet Butler

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/15/19
Weather: cloudy, 50's, breeze

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 025
Sample ID: WI-CV- GW025-1019
Sampling Team: D. Butler, A. Vogt, T. Chalmers, J. Peery-Lemon

Measuring Device: WLM: Pine # 8791
Horiba: Pine #

Total Depth:	110	FT.(BTOC)
Depth to water:	(-) 93.55	FT.(BTOC)
Water Column:	16.45	FT.
	(x) 0.163	GAL/FT.
Well Volume:	2.68	GAL.
Total Purge Vol.:	11750	GAL.

SI = 95-105

Purge Device: Monsoon; Pine # 22530

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Pg. 1 of 2

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. L ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1444	initial	13.35	0.582	3.90	7.80	214	109	95.79	clear, no odor
1447	750	13.21	0.582	2.76	8.07	208	82.0	95.74	"
1450	1500	13.96	0.584	1.83	8.28	199	43.6	95.76	"
1453	2250	14.23	0.586	1.32	8.40	183	31.2	95.76	"
1456	3000	14.36	0.592	0.91	8.49	165	23.6	95.75	"
1459	3750	14.44	0.597	0.57	8.60	145	21.0	95.63	"
1502	4500	14.50	0.601	0.21	8.64	121	15.0	95.72	"
(SP) 1505	5250	14.68	0.604	0.00	8.67	99	14.7	95.78	"
1508	6000	14.66	0.606	0.00	8.78	74	13.7	95.86	"
1511	6750	14.68	0.606	0.00	8.74	66	12.2	95.86	"
1514	7500	14.74	0.607	~~0.00~~ 0.00 (DUP)	8.54	46	9.3	95.86	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1440
Bladder Initial Fill Time(FT; sec): NA
Bladder Initial Discharge Time(DT; sec): NA
Submersible Initial Control Setting(Hz): ~~14~~ (SP) 20.9

Final Fill Time: NA
Final Discharge Time: NA
Final Control Setting(Hz): 20.9
Purge Rate: 250 mL/min

Pump Depth: 100 ft btoc

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Sample /Time: 1534
MS/MSD WI-CV-GW025-1019-MS/SD
Duplicate ID:
Signature(s): Jordan Peery-Lemon

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10-15-19
Weather: Cloudy 50's breeze

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW
Sample ID: WI-CV-
Sampling Team: D. Butler, A. Vogt, R. Chalmers, J. Peery-Lemon

Measuring Device: WLM : Pine # 8791
Hori bar : Pine #

Total Depth: 110 FT.(BTOC)
Depth to water: (-) 93.55 FT.(BTOC)
Water Column: 16.45 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.68 GAL.
Total Purge Vol.: 11250 GAL.

Purge Device: Mosoon : Pine # 22530

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Pg. 2 of 2

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
~~1517~~	8250	14.73	0.605	0.00	8.72	37	8.6	95.89	"
1520	9000	14.78	0.608	0.00	8.70	28	7.8	95.89	"
1523	9750	14.79	0.609	0.00	8.71	22	7.4	95.90	"
1526	10250	14.82	0.610	0.00	8.71	12	6.1	95.86	"
1529	11000	14.82	0.610	0.00	8.68	9	6.0	95.86	"
1532	11750	14.83	0.611	0.00	8.62	4	5.2	95.89	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: B2 / WH
VOC (ppm)= 0.0 / 0.0
H2S (ppm) 0.0 / 0.0
LEL (%)= 0 / 0
CO (ppm)= 0.0 / 0.0
O2 (%)= 20.9 / 20.9

Pump Start Time: 1440
Bladder Initial Fill Time(FT; sec): NA
Bladder Initial Discharge Time(DT; sec): NA
Submersible Initial Control Setting(Hz): 20.9

Final Fill Time: NA
Final Discharge Time: NA
Final Control Setting(Hz): 20.9
Purge Rate: 250 mL/min

Pump Depth: 100 ft btoc

Sample /Time: 1534 WI-CV-GW025-1019-MS/SD
MS/MSD
Duplicate ID:
Signature(s): Jordan Peery-Lemon

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10-19-19
Weather: high 40's, overcast, light rain showers

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 030
Sample ID: WI-CV- GW 030-1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 237 FT.(BTOC)
Depth to water: (-) 142.54 FT.(BTOC)
Water Column: 94.46 FT.
(x) .136 GAL/FT.
Well Volume: 15.396 GAL.
Total Purge Vol.: GAL.

Purge Device: QED - ~~0333713~~ 8738 (Pine) (2)

Measuring Device: water level - ~~04~~ (2) 029633
Horiba - 21361 (Pink)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0950	600	11.77	0.568	9.34	7.21	-31	87.8	143.05	Clear/no odor
0953	1200	11.86	0.570	4.31	7.53	-110	96.3	143.04	some particles
0956	1800	11.78	0.569	1.81	7.66	-137	76.9	143.04	"
0959	2400	11.78	0.567	0.33	7.71	-146	60.8	143.04	"
1002	3000	11.79	0.567	0.00	7.73	-150	60.7	143.04	"
1006	3800	11.77	0.566	0.00	7.74	-151	21.8	143.04	"
1009	4400	11.85	0.565	0.00	7.77	-154	27.2	143.04	"
1012	5000	11.82	0.562	0.00	7.79	-155	17.3	143.03	"
1015	5600	11.82	0.556	0.00	7.81	-156	15.4	143.03	"
1018	6200	11.80	0.551	0.00	7.83	-157	15.8	143.01	"
1021	6800	11.80	0.547	0.00	7.84	-158	14.7	143.01	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes: 1004 - changed cylinder 1006 - started new

Pump Start Time: 0937
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 10
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 20
Final Discharge Time: 10
Final Control Setting(Hz): NA
Purge Rate: 200 mL/min

Pump Depth:

Sample /Time: 1025
MS/MSD NA
Duplicate ID: NA
Signature(s): Jocelyn Peery-Lemon

Air Monitoring:	BZ	BH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: High 40°s, overcast,

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 03M
Sample ID: WI-CV- GW 03M - 1019
Sampling Team: D. Butler, Jordan Peary - Lemon

Total Depth: 160 FT.(BTOC)
Depth to water: (-) 122.93 FT.(BTOC)
Water Column: 37.07 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.042 GAL.
Total Purge Vol.: 3000 mL ~~GAL.~~

Purge Device: QED-8738 (2.ne)

Measuring Device: Water level - 029633
Horiba - 21361 (2.ne)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1209	300	11.42	0.397	0.00	8.06	29	7.2	122.95	no odor / no color
1212	600	11.69	0.400	0.00	8.35	-23	6.3	122.95	"
1215	900	11.76	0.403	0.00	8.46	-46	6.2	122.95	"
1218	1200	11.77	0.404	0.00	8.55	-69	8.4	122.95	"
1221	1500	11.77	0.405	0.00	8.60	-83	7.0	122.97	"
1224	1800	11.77	0.405	0.00	8.63	-92	8.1	"	"
1227	2100	11.77	0.405	0.00	8.64	-99	6.8	"	"
1230	2400	11.72	0.405	0.00	8.66	-106	7.0	"	"
1233	2700	11.73	0.405	0.00	8.68	-111	5.3	"	"
1236	3000	11.74	0.405	0.00	8.70	-115	5.3	"	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Pump Start Time: 1148
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 10
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 10
Final Discharge Time: 20
Final Control Setting(Hz): NA
Purge Rate: @1209 - 100mL/min

Pump Depth: 149

Sample /Time: 1240
MS/MSD NA
Duplicate ID: NA
Signature(s): Dave Butler

Air Monitoring:	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m SM

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Samping
Date: 11-8-19
Weather: 44°F, clouds

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-035
Sample ID: WI-CV-~~035~~ GW-035
Sampling Team: L. Baumann
A. Vogt

Total Depth: 130.7 FT.(BTOC)
Depth to water: (-) 122.99 FT.(BTOC)
Water Column: 7.71 FT.
(x) 0.163 GAL/FT.
Well Volume: 1.26 GAL.
Total Purge Vol.: 2.00 GAL.

Purge Device: QED 1.75" SAMPLE PRO #10228

Measuring Device: HORIBA 21358/18454
SOLONIST 29633

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

720

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
10:19	0.8	11.24	0.496	4.15	6.75	141	20.1	122.99	PID - OK
10:24	1.0	11.31	0.494	3.88	6.91	124	9.3	" "	
10:29	1.1	11.37	0.493	3.75	7.00	115	6.3	" "	
10:34	1.15	11.47	0.493	3.66	7.08	109	5.7	" "	
10:39	1.3	11.45	0.492	3.65	7.12	105	4.9	" "	Sun out
10:44	1.5	11.55	0.492	3.67	7.16	99	4.5	" "	
10:49	1.6	11.61	0.492	3.69	7.20	99	4.0	" "	
10:54	1.65	11.64	0.491	3.74	7.21	98	3.8	" "	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤6°C	250 ml HDPE	2

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9

Pump Start Time:
Initial Fill Time(FT; sec): 30
Initial Discharge Time(DT; sec): 30

Final Fill Time: 10
Final Discharge Time: 20

Purge Rate: 150 ml/min

Pump Depth: 125

Sample /Time: 1100

MS/MSD NA

Duplicate ID: NA

Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: 40's / Rain / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW-04M
Sample ID: WI-CV-GW04M-1019
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 160 FT.(BTOC)
Depth to water: (-)121.27 FT.(BTOC)
Water Column: 38.73 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.313 GAL.
Total Purge Vol.: 1.43 GAL.

Measuring Device: 8791
Horiba 21114

Purge Device: QED Sample Pro 1.75"
ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1041	1800	10.88	0.001	12.30	4.92	248	134	124.22	Yellow/Dusty
1044	2025	10.76	0.800	1.76	5.17	-61	4.2	124.14	slight organic
1047	2250	10.74	1.16	0.97	6.02	-109	6.8	124.16	odor.
1050	2475	11.07	1.17	0.54	6.69	-122	15.3	124.33	"
1053	2700	11.20	1.17	0.06	6.97	-127	13.8	124.51	"
1056	2925	11.32	1.17	0.00	7.18	-130	11.7	124.59	"
1059	3150	11.31	1.17	0.00	7.25	-133	12.8	124.63	"
1102	3375	11.33	1.17	0.00	7.44	-135	7.9	124.64	"
1105	3600	11.42	1.17	0.00	7.55	-136	20.8	124.69	"
1108	3825	11.43	1.17	0.00	7.59	-138	21.8	124.68	"
1111	4050	11.47	1.18	0.00	7.64	-142	18.9	124.76	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSMv5.1	Table B-15	≤6°C	250 mL	2

Observations/Notes:

Pump Start Time: 1032
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): N/A

Final Fill Time: 40
Final Discharge Time: 20
Final Control Setting(Hz): N/A

Purge Rate: 75 ml/min

Pump Depth: 155

Sample /Time: 1135
MS/MSD NA
Duplicate ID: NA
Signature(s):

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0.0
H2S (ppm)	0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: 40°F / Rain / Wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW-04M
Sample ID: WI-CV-GW04M-1019
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 160 FT.(BTOC)
Depth to water: (-) 121.27 FT.(BTOC)
Water Column: 38.73 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.313 GAL.
Total Purge Vol.: 1.43 GAL.

Measuring Device: 8791
Horiba 21114

Purge Device: QED, Sample Pro, 1.75" ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1114	4275	11.47	1.17	0.00	7.71	-152	38.9	124.72	Yellow/Dusty
1117	4500	11.44	1.17	0.00	7.75	-159	45.2	124.72	slight
1120	4725	11.43	1.17	0.00	7.80	-167	60.0	124.73	organic
1123	4950	11.40	1.17	0.00	7.86	-177	65.1	124.73	odor
1126	5175	11.39	1.16	0.00	7.92	-185	65.6	124.75	"
1129	5400	11.45	1.15	0.00	7.97	-191	67.5	124.75	"
1132									
1135									
1138			TC	10/19/19					
1141									
1144									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v5.1.1 - Table B-15	≤6°C	250 mL	2

Observations/Notes:

Pump Start Time: 1032
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): N/A

Final Fill Time: 40
Final Discharge Time: 20
Final Control Setting(Hz): N/A
Purge Rate: 75 mL/min

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth:
Sample /Time: 1135
MS/MSD N/A
Duplicate ID: N/A
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: 40's / Rain / Wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-045
Sample ID: WI-CV- GW045-1019
Sampling Team: A. Vogt, T. Chalvers

Total Depth: 127 FT.(BTOC)
Depth to water: (-) 106.22 FT.(BTOC)
Water Column: 20.78 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.39 GAL.
Total Purge Vol.: 1.5 GAL.

Purge Device: QED, Sample Pro, 1.75" ID: 27877

Measuring Device: 8791 Horiba 2114

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1340		10.85	1.72	6.89	7.43	179	16.5	110.24	CLEAR / NO ODOR
1343		10.95	1.72	6.12	7.42	173	14.2	110.33	"
1346		11.00	1.73	6.24	7.41	169	16.6	110.42	"
1349		11.02	1.74	5.60	7.40	168	14.1	110.52	"
1352		11.16	1.74	5.32	7.38	167	12.5	110.67	"
1355		11.26	1.74	5.67	7.37	167	13.7	110.83	"
1358		11.24	1.74	5.16	7.37	167	12.3	110.85	"
1401		11.32	1.75	5.69	7.37	168	9.8	110.94	"
1404		11.33	1.74	5.63	7.37	167	10.8	110.99	"
1407		11.35	1.75	5.64	7.36	168	9.8	110.08	"
1410					TD	10/19/19			

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSMv 5.1d Table B-15	≤ 6° C	250 mL	2

Observations/Notes:

Pump Start Time: 1258
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): N/A

Final Fill Time: 56
Final Discharge Time: 4
Final Control Setting(Hz): N/A
Purge Rate: 40 ml/min

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 117
Sample Time: 1410
MS/MSD N/A
Duplicate ID: WI-CV-GW045P-1019
Signature(s): T. Chalvers

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: 50's / overcast / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW ~~06~~ TC 10/20 05M
Sample ID: WI-CV- GW05M - 1019
Sampling Team: A. Vogt, T. Chalmers

Measuring Device: 8791
Horiba 21114

Total Depth:	TC 10/20 175 ~~179~~	FT.(BTOC)
Depth to water:	(-) 123.22	FT.(BTOC)
Water Column:	51.78	FT.
	(x) 0.163	GAL/FT.
Well Volume:	8.44	GAL.
Total Purge Vol.:	1.98	GAL.

Purge Device: QED, Sample Pro, 1.75" LD: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ ml	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1020	2000ml	11.36	0.304	8.83	6.51	80	488	123.54	CLOUDY/NO ODOR
1023	2285	11.43	0.303	7.92	6.86	76	312	123.48	"
1026	2570	11.54	0.305	8.01	7.10	67	176	123.48	"
1029	2855	11.52	0.304	6.69	7.27	67	127	123.48	"
1032	3140	11.64	0.303	7.39	7.45	68	87.3	123.48	"
1035	3425	11.66	0.303	6.94	7.54	71	62.4	123.48	"
1038	3710	11.62	0.303	6.16	7.57	78	42.2	123.48	"
1041	3995	11.68	0.303	6.66	7.66	85	32.8	123.48	"
1044	4280	11.72	0.305	6.46	7.71	88	27.2	123.48	"
1047	4565	11.74	0.304	6.48	7.75	89	23.8	123.48	"
1050	4850	11.76	0.304	6.41	7.78	92	19.2	123.48	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤6°C	250 ml HDPE	2

Observations/Notes: Switched MS/MSD from MW05S due to production volume

Pump Start Time: 0946
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): —

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): —
Purge Rate: 95 ml/min

Pump Depth: TC 10/20 ~~179~~ 165 ft BTOC

Sample /Time: 1105
MS/MSD 1105 / WI-CV-GW05M-1019-MS/MSD
Signature(s):

Duplicate ID: NA

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: 50's / OVERCAST / WINDY

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 05M
Sample ID: WI-CV- GW05M -1019
Sampling Team: A. VOGT, T. CHALMERS

Total Depth: 175 FT.(BTOC)
Depth to water: (-) 123.22 FT.(BTOC)
Water Column: 51.78 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.44 GAL.
Total Purge Vol.: 1.98 GAL.

Measuring Device: 8791 HORIBA 2114

Purge Device: QED, SAMPLE PRO 1.75"
ID: 278 77

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1053	5135	11.77	0.304	6.80	7.82	94	15.4	123.48	"
1056	5420	11.75	0.304	6.69	7.84	97	15.8	123.48	"
1059	5705	11.75	0.304	6.52	7.86	99	14.1	123.48	"
1102	5990	11.73	0.304	6.49	7.87	101	15.2	123.48	"
1105	~~6275~~								
1108	~~6560~~								
1111	~~6845~~								
1114	~~7130~~								
1117	~~7415~~								
1120	~~7700~~								
1123	~~7985~~								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 • Table B-15	≤6°C	250 ml HDPE	2

Observations/Notes: Switched MS/MSD from MW05S due to production volume.

Pump Start Time: 0946
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): —

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): —

Purge Rate: 95 ml/min

Pump Depth: 165 ft BTOC

Air Monitoring: BZ | WH
VOC (ppm)= 0 | 0
H2S (ppm) 0 | 0
LEL (%)= 0 | 0
CO (ppm)= 0 | 0
O2 (%)= 20.9 | 20.9

Sample /Time: 1105
MS/MSD 1105 / WI-CV-GW05M-1019-MS/MSD Duplicate ID: NA
Signature(s): ~~A. Vogt~~ ~~T. Chalmers~~

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: cloudy, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 055
Sample ID: WI-CV- CW 055 ~~1070~~ 1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 124 FT.(BTOC) SI: 114-124
Depth to water: (-) 120.55 FT.(BTOC)
Water Column: 3.45 FT.
Well Volume: (x) 0.163 GAL/FT. = 0.56 GAL.
Total Purge Vol.: ____ GAL.

Measuring Device: Water level - 029633
Horiba - 23B2 (pink)

Purge Device: QED-8738 (pink)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
935	150	11.38	0.354	8.89	6.45	242	0.2	121.28	clear HC odor
938	300	11.62	0.351	5.05	7.51	216	0.2	121.35	"
941	450	11.63	0.350	4.77	7.65	206	0.2	"	"
944	600	11.61	0.350	4.25	7.66	204	0.2	121.35	"
949	900	11.65	0.351	3.41	7.79	189	0.2	121.35	"
957	1300	11.48	0.352	2.41	7.73	173	0.2	121.40	"
1002	1800	11.52	0.350	2.51	7.74	158	0.2	121.40	"
1010	2000	11.42	0.353	1.94	7.75	135	9.8	121.41	"
1018	2400	11.39	0.355	1.95	7.77	107	7.4	121.43	"
1024 ~~1026~~	2700	11.41	0.357	1.95	7.78	86	8.3	121.43	"
1030	3000	11.45	0.365	1.40	7.76	45	11.4	121.43	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes: Tagged TD = 124.10 ft btoc / NTU was recorded as 8.8 NTU

Pump Start Time: 0914
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time:
Final Discharge Time:
Final Control Setting(Hz): NA

Purge Rate: @1002 50 mL/min
stabilizing purge rate before 1002

Pump Depth: 122.5

Air Monitoring:	D2	W17
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.4	20.9

Sample /Time:
MS/MSD NA
Duplicate ID: NA
Signature(s): Jordan Peery-Lemon

move MS/MSD to MW05M

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/20/19
Weather: Cloudy / 50's / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 05S
Sample ID: WI-CV- GW 05S - ~~1020~~ 1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 124 FT.(BTOC)
Depth to water: (-) 120.55 FT.(BTOC)
Water Column: 3.45 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.56 GAL.
Total Purge Vol.: _____ GAL.

Purge Device: BED - 8738 (Pump)

Measuring Device: Water Level - 029633
Horiba - 21361 (Pace)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1036	3300	11.45	0.371	6.95	7.77	16	22.4	121.45	"
1042	3600	11.43	0.374	6.93	7.79	-7	17.0	"	"
1048	3900	11.36	0.377	0.94	7.79	-10	17.1	"	"
1054	4200	11.38	0.377	0.99	7.81	-9	16.8	"	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Pump Start Time: 0914
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz): NA

Final Fill Time: 90
Final Discharge Time: 21

Final Control Setting(Hz): NA

Purge Rate: 50 mL/min

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 122.5

Sample /Time: 1100

MS/MSD NA

Duplicate ID: NA

Signature(s): Jordan Peery-Lemon

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: 50's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 06m
Sample ID: WI-CV- GW 06m - 1019
Sampling Team: D. Butler, J. Perry-Lemon

Total Depth: ~~179~~ 189 FT.(BTOC)
Depth to water: (-) ~~146.30~~ FT.(BTOC) 146.30
Water Column: ~~32.7~~ FT. 42.7
(x) 0.163 GAL/FT.
Well Volume: ~~5.33~~ GAL. 6.96
Total Purge Vol.: 1500 GAL.

Purge Device: QED - 8738 (Pink)

Measuring Device: Water level - ~~89~~ 029633
Horiba - 21361 (Pink)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1523	300	11.93	0.581	3.61	8.39	-35	52.3	146.33	clear/no odor
1526	600	11.87	0.598	0.00	8.24	-73	74.4	146.33	"
1529	900	11.82	0.598	0.00	8.19	-82	45.5	146.33	"
1532	1200	11.89	0.596	0.00	8.18	-86	48.6	146.33	"
1535	1500	11.99	0.592	0.00	8.17	-89	44.0	146.37	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.6

Pump Start Time: 1432
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 36
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 20
Final Discharge Time: 50
Final Control Setting(Hz): NA
Purge Rate: 100mL/min

Pump Depth: 179
Sample /Time: 1540
MS/MSD NA
Duplicate ID: WI-CV-GW06MP-1019 @ 1550
Signature(s): Jordan Perry-Lemon

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/19/19
Weather: 40° / overcast / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 065
Sample ID: WI-CV- GW06S - 1019
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 140 FT.(BTOC)
Depth to water: (-) 134.69 FT.(BTOC)
Water Column: 5.31 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.865 GAL.
Total Purge Vol.: 2.5 GAL.

Measuring Device: 8791 Horiba 21114

Purge Device: QED, Sample Pro, 1.75" ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1614		11.57	1.81	6.11	7.48	129	0.5	134.69	CLEAR
1617		11.57	1.81	5.36	7.45	134	0.0	134.70	"
1620		11.52	1.81	4.74	7.44	137	0.0	134.69	"
1623		11.47	1.81	4.49	7.43	139	0.0	134.69	"
1626		11.41	1.80	4.32	7.43	141	0.0	134.69	"
1629		11.43	1.80	4.10	7.43	144	0.0	134.70	"
1632		11.40	1.80	3.90	7.42	145	0.0	134.71	"
1635		11.43	1.80	3.81	7.42	146	0.0	134.70	"
1638		11.46	1.81	3.78	7.43	147	0.0	134.70	"
1641		11.48	1.79	3.73	7.43	148	0.0	134.70	"
1644									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤6	250 ml HDPE	2

Observations/Notes:

Pump Start Time: 1551
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): N/A

Final Fill Time: 15
Final Discharge Time: 15
Final Control Setting(Hz): N/A
Purge Rate: 125 ml/min

Pump Depth: TC 10/19 135 138

Sample /Time: 1645
MS/MSD NA
Duplicate ID: NA
Signature(s):

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: 50s / Sunny / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 07M
Sample ID: WI-CV- GW 07M - 1019
Sampling Team: A. Vogt, T. Chalmers

Measuring Device: 8791
Horiba 21114

Total Depth: 193 FT.(BTOC)
Depth to water: (-) 128.90 FT.(BTOC)
Water Column: 64.1 FT.
(x) 0.163 GAL/FT.
Well Volume: 10.45 GAL.
Total Purge Vol.: 1.96 GAL.

Purge Device: QED, Sample Pro, 1.75" LD: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0936	4050	13.21	0415	2.00	6.79	-129	0.4	132.85	CLEAR/organic
0939	42 60	13.32	0.414	1.68	6.94	-130	0.6	132.89	"Plastic y"
0942	4470	13.32	0.416	1.21	7.19	-132	2.0	133.07	"
0945	4680	13.26	0.417	1.04	7.29	-133	1.05	133.23	"
0948	4890	15.38	0.414	0.72	7.40	-133	4.3	133.36	"
0951	5100	13.39	0.416	0.56	7.45	-133	3.7	133.47	"
0954	5310	13.41	0.417	0.36	7.50	-133	5.2	133.51	"
0957	5520	13.46	0.417	0.24	7.54	-133	≤.4	133.83	"
1000	5730	13.79	0.411	0.16	7.59	-134	6.3	133.65	"
1003	5940	13.97	0.412	0.13	7.60	-133	7.3	133.70	"
1006	6150	14.04	0.412	0.03	7.61	-133	8.0	133.63	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v5.1.1 Table B-15	≤ 6°C	250 ml HDPE	2

Observations/Notes:

Pump Start Time: 0854
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 50
Submersible Initial Control Setting(Hz):

Final Fill Time: 25
Final Discharge Time: 35
Final Control Setting(Hz):
Purge Rate: 70 ml

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 183 ft BTOC

Sample /Time: 1035 Duplicate ID: NA
MS/MSD NA
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: 50s/Sunny/WINDY

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 07M
Sample ID: WI-CV- GW 07M-1019
Sampling Team: A. VOGT / T. CHALMERS

Total Depth: 193 FT.(BTOC)
Depth to water: (-) 128.90 FT.(BTOC)
Water Column: 64.1 FT.
(x) 0.163 GAL/FT.
Well Volume: 10.45 GAL.
Total Purge Vol.: 1.96 GAL.

Measuring Device: 8791
HORIBA 21114

Purge Device: QED, SAMPLE PRO, 1.75"
ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1009	6360	13.90	0.415	0.00	7.67	-137	9.3	133.64	"
1012	6570	13.95	0.413	0.00	7.64	-132	9.7	133.66	"
1015	6780	14.65	0.414	0.00	7.65	-133	9.2	133.71	"
1018	6990	14.55	0.411	0.00	7.66	-134	9.5	133.71	"
1021	7200	14.57	0.413	0.00	7.67	-134	7.1	133.79	"
1024	7410	14.56	0.411	0.00	7.68	-135	8.8	133.82	"
~~1027~~	~~7620~~								
~~1030~~									
~~1033~~									
1036									
1039									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM x 5.1.1 Table B-15	≤ 6°C	250ml HDPE	2

Observations/Notes:

Pump Start Time: 0854
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 50

Submersible Initial Control Setting(Hz):

Final Fill Time: 25
Final Discharge Time: 35

Final Control Setting(Hz):

Purge Rate: 70 ml

Pump Depth: 183 ft BTOC

Sample /Time: 1035
MS/MSD
Signature(s):

Duplicate ID:

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: 50's / WINDY / SUNNY

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 07S
Sample ID: WI-CV- GW07S-1017
Sampling Team: A. VOGT / T. CHALMERS

Total Depth: 145 FT.(BTOC)
Depth to water: (-)126.41 FT.(BTOC)
Water Column: 18.59 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.03 GAL.
Total Purge Vol.: 2.06 GAL.

Purge Device: QED, SAMPLE PRO, 1.75" ID: 27877

Measuring Device: 8791 HORIBA ZIIU

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1207	1700	16.38	0.508	7.29	7.64	179	0.0	127.55	CLEAR/NO ODOR
1212	2050	15.72	0.514	6.24	7.69	175	0.0	127.57	"
1217	2400	15.43	0.513	5.15	7.72	174	0.0	127.62	"
1222	2750	15.10	0.547	4.54	7.70	174	0.0	127.47	"
1227	3100	14.40	0.581	3.63	7.68	173	0.0	127.45	"
1232	3456	14.25	0.606	2.97	7.68	170	0.0	127.45	"
1237	3800	14.22	0.624	2.97	7.71	162	0.0	127.45	"
1242	4150	14.23	0.625	2.11	7.72	158	0.0	127.45	"
1247	4500	14.16	0.628	1.55	7.74	136	0.0	127.44	"
1252	4850	14.23	0.630	1.40	7.74	109	0.0	127.45	"
1257	5200	14.62	0.628	1.01	7.74	64	0.0	127.30	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250 ml HDPE	2

Observations/Notes:

Pump Start Time: 1144
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz):

Final Fill Time: 50
Final Discharge Time: 10

Final Control Setting(Hz):

Purge Rate: 70 ml/min

Pump Depth: 135 ft BTOC

Air Monitoring:

	BZ	VH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Sample /Time: 1335
Duplicate ID: NA
MS/MSD NA
Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: 50's / windy / sunny

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 2 of 2
Well ID: WI-CV-MW 075
Sample ID: WI-CV- GW 075 - 1019
Sampling Team: A. VOGT / T. CHALMERS

Total Depth: 145 FT.(BTOC)
Depth to water: (-) 126.41 FT.(BTOC)
Water Column: 18.59 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.03 GAL.
Total Purge Vol.: 2.06 GAL.

Purge Device: QED, SAMPLE PRO, 1.75" ID: 278 77

Measuring Device: 8791 HORIBA 21114

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1302	5500	14.64	0.628	0.90	7.75	57	0.0	127.30	"
1307	5900	14.56	0.628	0.84	7.75	48	0.0	127.26	"
1312	6250	14.46	0.629	0.91	7.77	38	0.0	127.30	"
1317	6600	14.41	0.627	0.83	7.78	34	0.0	127.30	"
1322	6950	14.36	0.628	0.83	7.78	31	0.0	127.33	"
1327	7300	14.36	0.630	0.78	7.77	27	0.0	127.30	"
~~1332~~	~~7650~~								
~~1337~~	~~8000~~								
~~1342~~	~~8350~~								
~~1347~~	~~8700~~								
~~1352~~	~~9050~~								

Sample information: method, container number, size, and type; preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250 ml HDPE	2

Observations/Notes:

Pump Start Time: 1144
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz):

Final Fill Time: 50
Final Discharge Time: 10

Final Control Setting(Hz):

Purge Rate: 20 ml / min

Air Monitoring:
VOC (ppm)=
H2S (ppm)
LEL (%)=
CO (ppm)=
O2 (%)=

Pump Depth: 135 ft BTOC

Sample /Time: 1335 Duplicate ID: NA
MS/MSD NA
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/18 19 (SD)
Weather: 50's, Cloudy/drizzly

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 08M
Sample ID: WI-CV- GW 08M - 1019
Sampling Team: David Butler, Jordan Peary-Lemon

Total Depth: (SD) 165 FT.(BTOC) SI: 150-160
Depth to water: (-) 121.88 FT.(BTOC)
Water Column: 43.12 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.03 GAL.
Total Purge Vol.: 5100 ~~GAL.~~ mL (DA)
Purge Device: QED - 8738

Measuring Device: WLM - 029633
Horiba - 21361

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~mL~~ (gals) (DA)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
~~1328~~ 1323	300	13.69	0.474	14.52	8.34	-103	287	123.30	Slightly cloudy/ brown
1323	600	13.60	0.483	14.50	8.33	-112	238	123.50	"
1326	900	13.47	0.491	16.41	8.28	-121	208	123.68	"
1329	1200	13.50	0.491	13.41	8.26	-131	156	123.90	"
1332	1500	13.43	0.489	17.74	8.33	-136	83.7	123.99	"
1336	1800	13.39	0.488	11.16	8.39	-140	59.4	(SD) ~~123.15~~ 124.15	"
(SD) 1339	2100	13.29	0.485	17.05	8.39	-142	48.2	124.25	"
1342	~~2352~~ 2400	13.27	0.485	6.17	8.48	-143	38.9	124.18	"
(SD) ~~1332~~ 1345	2625	13.15	0.485	5.00	8.51	-144	33.1	124.15	"
1348	2850	13.17	0.485	4.33	8.54	-144	30.2	124.15	"
(SD) 1351	~~3144~~ 3075	13.17	0.485	3.30	8.56	-144	32.5		"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1329 (SD)
Bladder Initial Fill Time(FT; sec): ~~25~~ 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz): NA

Pump Depth: 155

Sample /Time: 1425

Final Fill Time:
Final Discharge Time:

Final Control Setting(Hz): NA

Purge Rate: 100 mL/min
1345: 75 mL/min

Air Monitoring: BZ | WH
VOC (ppm)= 0 | 0
H2S (ppm) 0.0 | 0.0
LEL (%)= 0 | 0
CO (ppm)=0 | 0
O2 (%)= 20.9 | 20.9

MS/MSD NA
Duplicate ID: NA
Signature(s): Jordan Peary-Lemon

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 50's cloudy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 08m
Sample ID: WI-CV- GW 08m - 1019
Sampling Team: David Butler, Jordan Peery - Lemon

Total Depth: 165 FT.(BTOC)
Depth to water: (-) 121.88 FT.(BTOC)
Water Column: 43.12 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.03 GAL.
Total Purge Vol.: 5100 mL ~~GAL.~~ (B)

Purge Device: QED - 8738

Measuring Device: WLM - 029633
Horiba - 21361

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1354	3300	13.17	0.485	3.30	8.56	-144	25.4	~~125.17~~ 124.12 (B)	"
1357	3525	13.15	0.485	3.17	8.56	-143	23.1	~~125.10~~ 124.10 (B)	"
1400	3750	13.09	0.486	2.60	8.56	-143	19.2	124.10	"
1403	3975	13.16	0.485	2.33	8.56	-143	20.6	124.1	"
1406	4200	13.09	0.485	2.35	8.57	-143	17.10	124.1	"
1409	4425	12.97	0.487	1.98	8.57	-143	14.9	124.1	"
1412	4650	13.02	0.486	1.54	8.58	-143	14.2	124.1	"
1415	4875	12.97	0.487	1.55	8.59	-143	15.0	124.1	"
1418	5100	13.04	0.488	1.40	8.58	-143	14.0	124.1	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: BZ | WH
VOC (ppm)= 0 | 0
H2S (ppm) 0.0 | 0.0
LEL (%)= 0 | 0
CO (ppm)= 0 | 0
O2 (%)= 20.9 | 20.9

Pump Start Time: 1229
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz): NA

Final Fill Time:
Final Discharge Time:

Final Control Setting(Hz): NA

Purge Rate: 100 mL/min
1345 : 75 mL/min

Pump Depth: 155

Sample /Time: ~~1455~~ (B) 1425

MS/MSD NA
Duplicate ID: NA

Signature(s): Jordan Peery - Lemon

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 50's / overcast / windy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW-08S
Sample ID: WI-CV-
Sampling Team: A. Vogt, T. Chalmers

Measuring Device: 8791
Horiba 21106

Total Depth:	130	FT.(BTOC)
Depth to water:	(-) 118.07	FT.(BTOC)
Water Column:	11.93	FT.
	(x) 0.163	GAL/FT.
Well Volume:	1.94	GAL.
Total Purge Vol.:		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: QED, Sample Pro, 1.75", ID:27877

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1256		13.02	0.469	9.13	7.59	168	98.7	118.27	CLEAR/NO ODOR
1259		12.95	0.467	9.21	7.59	170	87.6	118.21	"
1302		12.90	0.466	9.20	7.58	173	97.6	118.23	"
1305		12.96	0.466	8.49	7.56	176	98.6	118.29	"
1308		12.87	0471	8.55	7.58	178	35.5	118.24	"
1311		12.83	0.476	8.76	7.57	180	24.4	118.28	"
1314		12.89	0.480	8.59	7.56	182	20.0	118.18	"
1317		12.88	0.484	8.10	7.53	186	16.3	118.19	"
1320		12.78	0.489	~~8.57~~	7.57	184	13.6	118.17	"
1323		12.77	0.492	9.04	7.57	188	11.4	118.17	"
1326		12.72	0.494	8.55	7.56	190	29.4	118.26	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Matrix	Preservative	Container requirements	No. of containers
QSMv5.1.1 – Table B15	water	≤ 6° C	~~2 x~~ 250 mL	2

Observations/Notes:

Pump Start Time: 1227
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz):

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz):

Purge Rate: 65 mL/min

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 125

Sample /Time: 1340
MS/MSD NA
Duplicate ID: NA
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date:
Weather:

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW
Sample ID: WI-CV-
Sampling Team:

Measuring Device:

Total Depth: ____ FT.(BTOC)
Depth to water: (-) ____ FT.(BTOC)
Water Column: ____ FT.
(x) ____ GAL/FT.
Well Volume: ____ GAL.
Total Purge Vol.: ____ GAL.

Purge Device:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1329		12.79	0.497	8.52	7.55	189	8.4	118.27	"
1332		12.82	0.498	8.45	7.57	194	7.4	118.27	"
1335		12.79	0.500	8.50	7.51	193	6.5	118.27	"
1338									
1341									
1344									
1347									
1350									
1353									
1356									
1359									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Air Monitoring:
VOC (ppm)=
H2S (ppm)
LEL (%)=
CO (ppm)=
O2 (%)=

Pump Start Time:
Bladder Initial Fill Time(FT; sec):
Bladder Initial Discharge Time(DT; sec):
Final Fill Time:
Final Discharge Time:

Submersible Initial Control Setting(Hz):
Final Control Setting(Hz):

Purge Rate:

Pump Depth:

Sample /Time: 1340
MS/MSD NA
Duplicate ID: NA
Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/18/19
Weather: 50's / overcast / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-09M
Sample ID: WI-CV-GW09M-1019
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 197 FT.(BTOC)
Depth to water: (-) 125.72 FT.(BTOC)
Water Column: 71.28 FT.
(x) 0.163 GAL/FT.
Well Volume: 11.62 GAL.
Total Purge Vol.: 4200 mL ~~GAL.~~

Measuring Device: 8791
Horiba 2114

Purge Device: QED, Sample Pro 1.75" ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1325	525	11.98	0.375	3.03	7.75	-146	10.0	126.03	clear / odorless
1328	1050	11.98	0.374	1.93	7.90	-154	7.6	125.98	"
1331	1575	12.06	0.374	1.39	7.97	-156	8.2	125.86	"
1334	2100	12.14	0.375	0.72	7.99	-156	6.5	125.95	"
1337	2625	12.18	0.375	0.56	8.03	-156	6.5	125.84	"
1340	3150	12.16	0.375	0.40	8.04	-155	5.5	125.91	"
1343	3675	12.20	0.375	0.29	8.10	-156	4.8	125.82	"
1346	4200	12.13	0.376	0.22	8.10	-156	5.4	125.88	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSMv5.1.1 — Table B15	≤ 6°C	250 mL	2

Observations/Notes: Slight odor observed during sample collection.

Pump Start Time: 1305
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz):

Final Fill Time: 50
Final Discharge Time: 10
Final Control Setting(Hz):

Purge Rate: 175

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth:
Sample /Time: 1350
MS/MSD
Duplicate ID: WI-CV-GW09M-1019P
Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/18/19
Weather: 50°F / overcast / wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-095
Sample ID: WI-CV-
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 109 FT.(BTOC)
Depth to water: (-) DRY FT.(BTOC)
Water Column: — FT.
(x) — GAL/FT.
Well Volume: — GAL.
Total Purge Vol.: — GAL.

Measuring Device: 8791

Purge Device:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1240	WL taken, well is dry. Some water in sump, measured at 109.27 ft btoc								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Air Monitoring: WH | BZ
VOC (ppm)= 0.0 | 0.0
H2S (ppm) 0.0 | 0.0
LEL (%)= 0 | 0
CO (ppm)= 0 | 0
O2 (%)= 20.9 | 20.9

Pump Start Time: NA
Bladder Initial Fill Time(FT; sec):
Bladder Initial Discharge Time(DT; sec):
Submersible Initial Control Setting(Hz): NA

Final Fill Time: NA
Final Discharge Time:
Final Control Setting(Hz):

Purge Rate: NA

Pump Depth: NA
Sample /Time: NA

MS/MSD NA
Duplicate ID: NA

Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/18/19
Weather: 50/overcast/wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-10D
Sample ID: WI-CV-GW10D-1019
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 196 FT.(BTOC)
Depth to water: (-) 141.28 FT.(BTOC)
Water Column: 54.72 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.92 GAL.
Total Purge Vol.: 3000 mL ~~GAL.~~ DS

Purge Device: QED Sample pro 1.75" ID: 27877

Measuring Device: 8791 Horiba U-22

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~ DS	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1555	300	12.13	0.490	2.68	7.70	-68	9.6	141.57	
1558	600	12.01	0.491	2.09	7.65	-75	10.2	141.56	
1601	900	11.87	0.492	1.50	7.62	-81	10.6	141.57	
1604	1200	11.89	0.492	1.10	7.60	-84	8.5	141.60	
1607	1500	11.88	0.492	0.34	7.58	-87	7.9	141.54	
1610	1800	11.71	0.493	0.19	7.57	-89	10.7	141.57	
1613	2100	11.75	0.493	0.00	7.57	-91	7.5	141.45	
1616	2400	11.76	0.494	0.06	7.56	-91	7.2	141.35	
1619	2700	11.78	0.495	0.00	7.56	-91	7.9	141.35	
1622	3000	11.83	0.495	0.00	7.56	-92	7.8	141.51	
~~1625~~ DS									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤6	250 ml	2

Observations/Notes:

Pump Start Time: 1529
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Submersible Initial Control Setting(Hz): NA

Final Fill Time: 50
Final Discharge Time: 10

Final Control Setting(Hz): NA

Purge Rate: 100 ml/min

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Depth: 196

Sample /Time: 1625

MS/MSD NA

Duplicate ID: NA

Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/18/19
Weather: Cloudy, 50's, breeze

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 05
Sample ID: WI-CV- GW105-1019
Sampling Team: D. Butler / J. Peery-Lemon

Total Depth: 155 FT.(BTOC) SI: 140-150
Depth to water: (-) 135.91 FT.(BTOC)
Water Column: 19.09 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.11 GAL.
Total Purge Vol.: 5700 mL ~~GAL.~~

Purge Device: QED: Pine # 8738

Measuring Device: WLM: Pine # 029633
Horiba: Pine # 21361

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1355	300	12.30	0.597	21.68	7.80	7.90	299	135.92	Slightly cloudy / no odor
1358	600	12.20	0.604	10.59	7.94	7.94	296	135.92	"
1401	900	12.06	0.610	3.16	8.00	-65	342	135.92	"
1404	1200	11.96	0.609	3.01	8.01	-65	342	135.92	"
1407	1500	11.91	0.605	2.95	7.99	-61	332	135.92	"
1410	1800	11.88	0.604	2.95	7.98	-54	287	135.92	"
1413	2100	11.82	0.602	2.97	7.96	-47	(3D) ~~1227~~	135.92	"
1416	2400	11.81	0.601	3.05	7.95	-39	175	135.92	"
1419	2700	11.74	0.599	2.95	7.95	-30	136	135.92	"
1422	3000	11.73	0.599	2.93	7.93	-21	112	135.92	"
1425	3300	11.74	0.598	2.91	7.92	-13	102	135.92	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1334
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): NA
Purge Rate: 100 mL/min

Air Monitoring:

	B2	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Pump Depth: 145

Sample /Time: 1455 Duplicate ID: NA
MS/MSD NA
Signature(s): Jordan Peery-Lemon

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10-18-19
Weather: Cloudy, 50°s, breeze

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 105
Sample ID: WI-CV- GW 105 -1019
Sampling Team: D, Butler, J. Peery-Lemon

Total Depth: 155 FT.(BTOC)
Depth to water: (-) 135.91 FT.(BTOC)
Water Column: 19.09 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.4 GAL.
Total Purge Vol.: 5700 mL ~~GAL~~

Purge Device: QED Pine # 8738

Measuring Device: WLM Pine # 029633
Horiba Pine # 21361

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1429	3600	11.71	0.599	3.06	7.92	-4	82.9	135.92	"
1431	3900	11.94	0.599	2.97	7.92	6	78.0	135.92	"
1434	4200	11.74	0.599	2.94	7.92	12	71.4	135.92	"
1439	4500	11.72	0.599	3.14	7.91	17	67.7	135.92	"
1440	4800	11.70	0.599	3.19	7.91	26	59.2	135.92	"
1443	5100	11.71	0.600	3.23	7.92	33	53.4	135.92	"
1446	5400	11.72	0.601	3.30	7.92	36	50.8	135.92	"
1449	5700	11.71	0.601	3.30	7.92	37	50.9	135.92	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: BZ / DH

	BZ	DH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Pump Start Time:
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): NA
Purge Rate: 100 mL/min

Pump Depth: 145

Sample /Time: 1455
MS/MSD NA
Duplicate ID: NA
Signature(s): Jordan Peery-Lemon

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: Partly cloudy, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 11 M
Sample ID: WI-CV- GW11M-1019
Sampling Team: D. Butler, J. Beery-Lemon

Total Depth: 170 FT.(BTOC) SI: 155-165
Depth to water: (-) 130.93 FT.(BTOC)
Water Column: 39.07 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.36 GAL.
Total Purge Vol.: 3810 mL ~~GAL.~~

Purge Device: QED-8738 (Pine)

Measuring Device: water level- 029633
Horiba - 21361 (Pine)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0919	300	12.09	0.606	3.16	7.39	16	23.1	132.70	Clear, Small Sediments
0922	600	12.04	0.609	1.30	7.91	-64	15.0	132.74	no odor
0925	900	11.94	0.613	0.39	8.02	-103	14.8	132.80	"
0928	1200	12.00	0.613	0.28	8.06	-120	15.2	132.85	"
0931	1506	12.05	0.614	0.00	8.09	-135	16.9	132.85	"
0934	1910	12.05	0.615	0.00	8.11	-143	16.5	132.85	"
0939	2060	12.20	0.613	0.00	8.14	-150	17.0	132.80	"
0944	2416	12.35	0.615	0.00	8.21	-160	17.0	132.69	"
0949	2760	12.38	0.615	0.00	8.24	-162	16.2	132.50	"
0954	3110	12.44	0.615	0.00	8.27	-164	18.8	132.43	"
0959	3466	12.42	0.615	0.00	8.29	-164	19.8	132.35	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring: BZ / WH
VOC (ppm)= 0 / 0
H2S (ppm) 0 / 0
LEL (%)= 0 / 0
CO (ppm)= 0 / 0
O2 (%)= 20.9 / 20.9

Pump Start Time: 0858
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time: 60
Final Discharge Time: 30

Submersible Initial Control Setting(Hz): NA

Final Control Setting(Hz): NA

Purge Rate: 100 mL/min
0931 - 70 mL/min

Pump Depth: 160

Sample /Time: ~~0958~~ (DUP) 1010

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: Partly cloudy, 50's, Wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW 11M
Sample ID: WI-CV- GW11M - 1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 170 FT.(BTOC)
Depth to water: (-) 130.93 FT.(BTOC)
Water Column: 39.07 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.36 GAL.
Total Purge Vol.: 3810 mL ~~GAL~~

Purge Device: QED-8738 (Pine)

Measuring Device: Water level - 029633
Hor. oa - 21361 (Pine)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1004	3810	12.35	0.615	0.00	8.30	-164	19.6	132.35	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 0858
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 60
Final Discharge Time: 30
Final Control Setting(Hz): NA
Purge Rate: 70 mL/min

Air Monitoring:	BZ	BH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.4

Pump Depth: 160
Sample /Time: 1010
Duplicate ID: NA
MS/MSD NA
Signature(s): David Butler

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/22/19
Weather: Partly Cloudy, Sunny, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 21S
Sample ID: WI-CV- GW 21S - 1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 139.9 FT.(BTOC) ~~TOC~~ 139.9 - 139.9
Depth to water: (-) 130.54 FT.(BTOC) SF
Water Column: 9.36 FT.
(x) 0.163 GAL/FT.
Well Volume: 1.52 GAL.
Total Purge Vol.: 3450 ~~GAL~~ ML

Purge Device: QED - 8738 (Pump)

Measuring Device: Water level - 029633
Horiba - 21361 (pH)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals) ML	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1132	300	16.75	0.465	2.33	8.05	-84	24.4	131.7	Clear, no odor
1135	600	15.09	0.482	1.25	8.03	-114	25.5	131.85	"
1138	900	14.85	0.489	0.92	8.03	-118	23.2	131.90	"
1141	1200	14.57	0.488	6.42	8.03	-120	24.1	132.00	"
SW 1146 ~~1146~~	1550	14.42	0.488	0.03	8.03	-117	27.0	132.14	"
1151	1900	14.35	0.486	0.00	8.02	-112	28.4	132.25	"
1156	2250 ~~2250~~	14.39	0.479	0.00	8.01	-108	28.9	132.30	"
1202	2550	14.30	6.475	0.00	7.98	-100	28.8	132.40	"
1208	2850	14.32	0.470	0.00	7.97	-93	36.4	132.48	"
1214	3150	14.22	0.464	0.00	7.96	-89	35.5	132.48	"
1220	3450	14.20	0.466	0.00	7.95	-87	36.4	132.45	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1113
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time:
Final Discharge Time:
Final Control Setting(Hz): NA

Purge Rate: 100 mL/min
@ 1146 - 70 mL/min
@ 1156 - 50 mL/min

Pump Depth: 136

Sample /Time: 1230
MS/MSD NA
Duplicate ID: NA
Signature(s): Jordan Peery-Lemon

Air Monitoring:	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10-18-19
Weather: 50°s, overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 12D
Sample ID: WI-CV- GW 12D - 1019
Sampling Team: David Butler, Jordan Peery-Lemon

Total Depth: 198 FT.(BTOC) SI: 183-193
Depth to water: (-) 160.52 FT.(BTOC)
Water Column: 37.48 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.11 GAL.
Total Purge Vol.: 5400 mL ~~GAL.~~

Purge Device: Pump - 8738

Measuring Device: Pink WL - 029633
Horiba - 21361
Pink

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1046	600	11.25	0.457	0.01	6.86	63	21.0	(SP) 160.85	Clear / no odor
1049	1200	11.21	0.501	0.00	7.28	-65	24.0	160.64	"
1052	1800	11.17	0.513	0.00	7.45	-68	18.7	160.64	"
1055	2400	11.16	0.516	0.00	7.52	-88	12.4	160.64	"
1058	3000	11.14	0.517	0.00	7.57	-101	8.7	160.64	"
1101	3600	11.15	0.517	0.00	7.58	-105	7.6	160.64	"
1104	4200	11.09	0.518	0.00	7.61	-114	5.2	160.64	"
1107	4800	11.14	0.517	0.00	7.63	-117	4.5	160.64	"
~~1110~~ (SP)	5400	11.09	0.517	0.00	7.63	-119	4.5	160.64	"
~~1113~~ (SP)									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring:

	BZ	WH
VOC (ppm)=	0	0
H2S (ppm)	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Pump Start Time: 1034
Bladder Initial Fill Time(FT; sec): 20
Bladder Initial Discharge Time(DT; sec): 10
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 20
Final Discharge Time: 10
Final Control Setting(Hz): NA

Purge Rate: 200 mL/min

Pump Depth: 188 ft BTOC

Sample /Time: 1115
MS/MSD ~~Same~~ WI-CV-GW 12D-1019-18/MSD Duplicate ID: NA
Signature(s): ~~David~~ Butler

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/18/19
Weather: Cloudy, 50°, breeze

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 125
Sample ID: WI-CV- GW125-1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 107 FT.(BTOC) SI: 92 - 107
Depth to water: (-) 106.11 FT.(BTOC)
Water Column: — FT.
Well Volume: (x) 0.163 GAL/FT.
Total Purge Vol.: — GAL. DB

Measuring Device: WLM: Pine # 029633
Horiba: Pine # 21361

Purge Device: QED: Pine # 8738

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~ DB	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
						DB			

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes: Tagged TD at 106.5 ft btoc. Not enough water to sample (possibly sump water).

Pump Start Time:
Bladder Initial Fill Time(FT; sec): NA
Bladder Initial Discharge Time(DT; sec): NA
Submersible Initial Control Setting(Hz): NA

Final Fill Time: NA
Final Discharge Time: NA
Final Control Setting(Hz): NA
Purge Rate: NA

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Pump Depth: NA
Sample /Time: NA
MS/MSD NA
Duplicate ID: NA
Signature(s): David Butler

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 50's overcast

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 13M
Sample ID: WI-CV- GW 13M - 1019
Sampling Team: David Butler, Jordan Perry-Lemon

Total Depth: 187.5 FT.(BTOC) SI 172.5 - 182.5
Depth to water: (-) 126.48 FT.(BTOC)
Water Column: 61.02 FT.
(x) 0.163 GAL/FT.
Well Volume: 9.95 GAL.
Total Purge Vol.: 3000 GAL./mL

Measuring Device: water level meter 029633 Horiba - 21361

Purge Device: QED-8738

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1012	300	11.55	0.434	3.21	6.68	132	88	126.50	clear / no odor
1015	600	11.67	0.436	1.60	7.34	88	11.2	126.50	"
1018	900	11.71	0.437	0.91	7.64	68	11.7	126.50	"
1021	1200	11.71	0.444	0.0	7.94	46	13.7	126.50	"
1024	1500	11.71	0.448	0.0	8.06	37	12.4	126.50	"
1027	1800	11.72	0.450	0.0	8.15	32	10.9	126.50	"
1030	2100	11.72	0.451	0.0 ~~0.38~~	8.19	29	10.5	126.50	"
1033	2400	11.76	0.452	0.0	8.25	22	8.1	126.50	"
1036	2700	11.78	0.452	0.0	8.29	19	8.4	126.50	"
1039	3000	11.81	0.453	0.0	8.32	15	8.0	126.50	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes:

Air Monitoring: BZ ~~SP~~ WH
VOC (ppm)= 0 0
H2S (ppm) 0.0 0.0
LEL (%)= 0 0
CO (ppm)= 0 0
O2 (%)= 20.9 20.9

Pump Start Time: 0943
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time: 20
Final Discharge Time: 40

Submersible Initial Control Setting(Hz): NA

Final Control Setting(Hz): NA

Purge Rate: 100 mL/min

Pump Depth: 177.5

Sample /Time: 1045

MS/MSD NA
Duplicate ID: NA

Signature(s): Jordan Perry-Lemon

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 50's / overcast / windy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of
Well ID: WI-CV-MW-135
Sample ID: WI-CV-
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 114 FT.(BTOC)
Depth to water: (-) 110.58 FT.(BTOC)
Water Column: 3.42 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.56 GAL.
Total Purge Vol.: GAL.

Purge Device: QED, Sample Pro, 1.75", ~~ID~~: 27877

Measuring Device: 8791
Horiba 21106

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1029		11.58	0.547	7.22	7.37	172	7.0	111.63	
1040	+ Purging at ~ 170 mL/min, well drawing down at ~ 3.5 in/min.								
1053		11.59	0.535	4.75	7.52	156	7.0	117.60	
1056		11.61	0.539	3.94	7.53	154	4.6	114	
1458	Returned to well, WL @ 113.03, not enough recharg to sample.								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes: Getting draw down, adjusted controller settings - still drawing down. will lower pump to 114 & purge well dry 1030 / 10/17/19 TC.

Pump Start Time: 0947
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz):

Final Fill Time:
Final Discharge Time:
Final Control Setting(Hz):
Purge Rate:

Pump Depth: 112 ft btoc

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

Sample /Time:
MS/MSD
Duplicate ID:
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/17/19
Weather: 50's / overcast / windy

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-135
Sample ID: WI-CV-
Sampling Team: A. Vogt, T. Chalmers

Total Depth: 114 FT.(BTOC)
Depth to water: (-) 110.58 FT.(BTOC)
Water Column: 3.42 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.56 GAL.
Total Purge Vol.: GAL.

Measuring Device: 8791 Horiba 21106

Purge Device: QED, Sample Pro, 1.75", ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1029		11.58	0.547	7.22	7.37	172	7.0	111.63	
1040	– Purging at ~ 170 mL/min, well drawing down at ~ 3.5 in/min.								
1053		11.59	0.535	4.75	7.52	156	7.0	117.60	
1056		11.61	0.539	3.94	7.53	154	4.6	114	
1458	Returned to well, WL @ 113.03, not enough recharge to sample.								
10/18/19 0922	Returned to well, WL @ 110.77, enough recharge to sample								
1003		11.51	0.563	5.40	6.46	195	32	111.95	CLEAR/NO OD

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
DSM v5.1.1 Table B-15	6°C	250 ml	2

Observations/Notes: Getting draw down, adjusted controller settings – still drawing down. will lower pump to 114 & purge well dry 1030 / 10/17/19 TC.

Pump Start Time: 0947 10/18 0943 10/17 10/18
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz):

Final Fill Time: 55 (10/17 / 10/18)
Final Discharge Time: 5
Final Control Setting(Hz): 25

Purge Rate: 80 ml/min 10/18/19

Pump Depth: 112 ft btoc

Sample /Time: 1005
MS/MSD NA
Signature(s):

Duplicate ID: NA

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: cloudy, 50°, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 14M
Sample ID: WI-CV- GW14M - 10.19
Sampling Team: D. Butler, J. Perry-Lemon

Total Depth: 176 FT.(BTOC) SI: 161-171
Depth to water: (-) 122.55 FT.(BTOC)
Water Column: 53.45 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.71 GAL.
Total Purge Vol.: 25 GAL.

Purge Device: QED: Pine # 8738

Measuring Device: WLM: Pine # 29633
Horiba: Pine # 21361

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1040	1	—	—	—	—	—	—	123.12	clear, no odor; some sediment
1057	2	12.41	0.407	3.11	8.16	-167	60.8	123.3	"
1100	2.1	12.42	0.408	0.00	8.18	-169	14.9	123.13	"
1103	2.2	12.44	0.409	0.00	8.17	-172	19.7	123.3	"
1106	2.3	12.46	0.410	0.00	8.18	-175	13.7	123.3	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250mL HDPE	2

Observations/Notes: 0938 - first water discharges from tubing; 0940 - note Horiba display cracked (can't read), pause purge, 1005 - restart purge, will purge 1hr then collect params using other display

Pump Start Time: 0925
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time: 25
Final Discharge Time: 35

Submersible Initial Control Setting(Hz): NA

Final Control Setting(Hz): NA

Purge Rate: 100 mL/min

Pump Depth: 166 ft btoc

Sample /Time: 1110
MS/MSD NA
Duplicate ID: NA
Signature(s):

Air Monitoring:	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: 50° overcast, Wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-15M
Sample ID: WI-CV- GW15M-1019
Sampling Team: Aaron Vogt, Tom Chalmers

Total Depth: 179 FT.(BTOC)
Depth to water: (-) 124.52 FT.(BTOC)
Water Column: 54.48 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.88 GAL.
Total Purge Vol.: GAL.

Measuring Device: 8791

Purge Device: QED, Sample Pro, 1.75", ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
10:05	4/0	12.32	0.502	1.78	7.79	-136	8.5	124.36	
10:08	7/5	12.35	0.502	1.09	7.89	-155	8.4	124.36	
10:11	7/5	12.26	0.503	0.68	7.98	-164	9.3	124.35	
10:14	7/5	12.26	0.503	0.43	8.03	-170	8.9	124.35	
10:17	7/5	12.25	0.503	0.39	8.05	-176	8.04	124.40	
10:20	7/5	12.26	0.503	0.31	8.01	-175	7.6	124.43	
10:23	7/5	12.26	0.503	0.25	8.07	-182	9.4	124.93	
10:26	7/5	12.22	0.503	0.21	8.05	-183	7.6	125.15	
10:29	7/5	12.20	0.503	0.20	8.10	-185	6.9	125.22	
10:32	7/5	12.18	0.503	0.17	8.07	-186	6.0	125.27	
10:35		12.16	0.503	0.21	8.10	-188	6.2	125.26	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Pump Start Time: 0930
Bladder Initial Fill Time(FT; sec): 30 / 25
Bladder Initial Discharge Time(DT; sec): 30 / 25
Final Fill Time: 25
Final Discharge Time: 35
Submersible Initial Control Setting(Hz): NA
Final Control Setting(Hz):
Purge Rate: 7 5 ml/min

Air Monitoring:

	BZ	WH
VOC (ppm)=		0.0
H2S (ppm)		0.0
LEL (%)=		0
CO (ppm)=		0
O2 (%)=		20.9

Pump Depth: 169 ft BOC
Sample /Time: WI-CV - GW15M-1019 / 1040
MS/MSD
Duplicate ID:
Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: CLOUDY / WINDY / 50°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW15S
Sample ID: WI-CV- GW15S-1019
Sampling Team: TOM CHALMERS / AARON VOGT

Measuring Device: 8791

Total Depth: ~~125.01~~ 147 FT.(BTOC)
Depth to water: (-) 125.01 FT.(BTOC)
Water Column: 21.99 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.58 GAL.
Total Purge Vol.: _____ GAL.

Purge Device: QED, SAMPLE PRO, 1.75"
ID: 27877

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1207		12.87	0.463	7.86	7.60	118	46.8	125.01	clear / odorless
1210		12.58	0.461	7.57	7.61	125	43.4	125.02	"
1213		12.46	0.461	7.06	7.54	129	41.2	125.04	"
1216		12.41	0.463	6.98	7.58	132	29.3	125.02	"
1219		12.39	0.462	6.86	7.58	134	18.4	125.02	"
1222		12.36	0.461	6.62	7.57	133	15.7	125.05	"
1225		12.30	0.462	6.55	7.56	135	12.0	125.02	"
1228		12.27	0.462	6.50	7.55	137	10.5	125.04	"
1231		12.23	0.461	6.46	7.54	140	9.1	125.04	"
1234		12.25	0.461	6.43	7.59	140	9.3	125.04	"
1237		12.26	0.462	6.43	7.58	143	9.1	125.04	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Air Monitoring: BZ | VH
VOC (ppm)= 0.0 | 0.0
H2S (ppm) 0.0 | 0.0
LEL (%)= 0% | 0%
CO (ppm)= 0.0 | 0.0
O2 (%)= 20.9 | 20.9

Pump Start Time: 11:44
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time: 10
Final Discharge Time: 20

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Purge Rate:

Pump Depth: 137 ft BTOC

Sample /Time: 12:40

MS/MSD | Duplicate ID:

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: CLOUDY/WINDY/57°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 3
Well ID: WI-CV-MW 16A - ~~1019~~
Sample ID: WI-CV- GW16-1019
Sampling Team: TOM CHALMERS / AARON VOGT

Total Depth: 179 FT.(BTOC)
Depth to water: (-)126.12 FT.(BTOC)
Water Column: 52.88 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.62 GAL.
Total Purge Vol.: _____ GAL.

Purge Device: QED, SAMPLE PRO, 1.75" ID: 27877

Measuring Device: 8791

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1447		12.65	0.427	3.01	7.56	112	104	126.19	CLEAR/NO ODOR
1450		12.65	0.431	2.93	7.59	110	113	126.19	"
1453		12.65	0.437	2.33	7.63	107	103	126.18	"
1456		12.66	0.434	3.69	7.66	108	153	126.15	"
1459		12.57	0.438	5.16	7.67	111	85.7	126.16	"
1502		12.56	0.439	3.26	7.66	109	77.4	126.16	"
1505		12.54	0.440	2.54	7.61	96	64.4	126.15	"
1508		12.57	0.440	2.28	7.62	83	59.4	126.16	"
1511		12.63	0.440	2.05	7.66	53	141	126.17	"
1514		12.65	0.440	1.93	7.67	48	123	126.18	"
1517		12.67	0.441	1.80	7.64	47	120	126.18	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes: 75 ml/minute.

Pump Start Time: 1351/1434
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time:
Final Discharge Time:

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Purge Rate: 75 ml/min

Air Monitoring: BZ | WH
VOC (ppm)= 0 | 0
H2S (ppm) 0 | 0
LEL (%)= 0 | 0
CO (ppm)= 0 | 0
O2 (%)= 20.9% | 20.9%

Pump Depth: 169 ft. BTOC

Sample /Time: 1550

MS/MSD | Duplicate ID:

Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: CLOUDY / WINDY / 57°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW16M
Sample ID: WI-CV- GW16 - 1019
Sampling Team: TOM CHALMERS / AARON VOAT

Total Depth: 179 FT.(BTOC)
Depth to water: (-) 126.12 FT.(BTOC)
Water Column: 52.88 FT.
(x) 0.163 GAL/FT.
Well Volume: 8.62 GAL.
Total Purge Vol.: GAL.

Purge Device: QED, SAMPLE PRO, 1.75"
ID: 27877

Measuring Device: 8791

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1520									
1523		CLEANING		FLOW	THRU	FLOW	CELL		
1526									
1529		12.60	0.415	3.84	7.58	50	68.1		
1532		12.63	0.421	2.71	7.66	26	59.5	126.19	"
1535		12.69	0.426	2.55	7.67	25.4	53.5	126.18	"
1538		12.76	0.427	2.38	7.68	7	47.2	126.19	"
1541		12.82	0.430	2.36	7.67	4	43.5	126.19	"
1544		12.84	0.432	2.93	7.68	2	36.5	126.20	"
1547		12.87	0.434	2.63	7.68	2	41.8	126.19	"
1550		12.93	0.434	2.4	7.68	2	30.2	126.20	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes: Flow rate dropped to ~1.5 ml/minute. Had to have sample before well stopped producing.

Air Monitoring:
VOC (ppm)=
H2S (ppm)
LEL (%)=
CO (ppm)=
O2 (%)=

Pump Start Time:
Bladder Initial Fill Time(FT; sec):
Bladder Initial Discharge Time(DT; sec):
Submersible Initial Control Setting(Hz):

Final Fill Time:
Final Discharge Time:
Final Control Setting(Hz):
Purge Rate:

Pump Depth:
Sample /Time: 1550
MS/MSD
Duplicate ID:
Signature(s):

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: Cloudy, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW165
Sample ID: WI-CV-GW165-1019
Sampling Team: D. Butler, J. Peery-Lemon

Total Depth: 145 FT.(BTOC) SI: 130-140
Depth to water: (-) 125.75 FT.(BTOC)
Water Column: 19.25 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.14 GAL.
Total Purge Vol.: 7950 ~~GAL.~~ mL

Purge Device: QED: Pine# 0738

Measuring Device: WLM: Pine# 29633
Horiba: Pine# 21106

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1321	300	12.94	0.386	6.90	7.68	-5	353	125.80	Slightly cloudy/no odor
1324	600	12.87	0.387	4.59	7.67	-63	393	125.80	"
1327	900	12.72	0.388	3.63	7.68	-84	346	125.80	"
1330	1200	12.48	0.383	4.00	7.72	-88	283	125.80	"
1333	1650	12.39	0.379	4.14	7.72	-83	~~344~~ 241	125.80	"
1336	2100	12.34	0.377	4.24	7.73	-78	219	125.80	"
1339	2550	12.34	0.376	4.36	7.75	-70	204	125.80	"
1342	3000	12.34	0.375	4.24	7.72	-60	171	125.80	"
1345	3450	12.32	0.375	4.30	7.73	-56	164	125.80	"
(321) 1348 1350	3900	12.32	0.374	4.32	7.73	-42	129	125.80	"
1351	4350	12.31	0.374	4.41	7.75	-37	125	125.80	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Air Monitoring:

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Pump Start Time: 1305
Bladder Initial Fill Time(FT; sec): 25
Bladder Initial Discharge Time(DT; sec): 35
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 15
Final Discharge Time: 15
Final Control Setting(Hz): NA

Purge Rate: 100 mL/min
@ 1330 - Purge rate 150 mL/min

Pump Depth: 135 ft btoc

Sample /Time: 1415
Duplicate ID: NA
MS/MSD NA
Signature(s): [signature]

ch2m.

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 10/16/19
Weather: cloudy, 50's, wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW165
Sample ID: WI-CV-GW165-1019
Sampling Team: D. Butler, J. Berry-Lemon

Measuring Device: See page 1

Total Depth: 145 FT.(BTOC)
Depth to water: (-) 125.75 FT.(BTOC)
Water Column: 19.25 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.14 GAL.
Total Purge Vol.: 7950 ~~GAL.~~ mL

Purge Device: See page 1

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
(1321) 1354	4800	12.31	0.373	4.44	7.75	-26	113	125.80	"
1357	5250	12.29	0.373	4.46	7.73	-13	89.8	125.80	"
1400	5700	12.30	0.373	4.45	7.74	-7	84.5	125.80	"
(1403) 1403	6150	12.27	0.373	4.51	7.74	2	78.1	125.80	"
1406	6600	12.24	0.372	4.57	7.73	11	68.2	125.80	"
1409	7050	12.25	0.372	4.63	7.73	27	53.2	125.80	"
1412	7500	12.27	0.372	4.62	7.73	32	53.3	125.80	"
1415	7950	12.28	0.372	4.69	7.75	36	49.8	125.80	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	None	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1305
Bladder Initial Fill Time(FT; sec): 25
Bladder Initial Discharge Time(DT; sec): 35

Submersible Initial Control Setting(Hz): NA

Final Fill Time: 15
Final Discharge Time: 15

Final Control Setting(Hz): NA

Purge Rate: 150 mL/min

Pump Depth: 135 ft btoc

Air Monitoring: BZ / WH

	BZ	WH
VOC (ppm)=	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)=	0	0
CO (ppm)=	0.0	0.0
O2 (%)=	20.9	20.9

Sample /Time: 1415
MS/MSD NA
Duplicate ID: NA
Signature(s): David Butler

ch2m SM

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-5-19
Weather: CLOUDY - 40s - 50s

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW-17M
Sample ID: WI-CV- GW17M-1119
Sampling Team: L. Baumann
A. Vogt

Total Depth: 159.90 FT.(BTOC)
Depth to water: (-) 130.02 FT.(BTOC)
Water Column: 29.88 FT.
(x) 0.163 GAL/FT.
Well Volume: 4.87 GAL.
Total Purge Vol.: GAL.

Purge Device: QED 1.75" Sample Pro #10728

Measuring Device: Horiba 21358/18454 (USGS) Solonist 29633

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1418	0.50	12.19	0.496	3.43	7.65	87	969	130.75	CLOUDY
1423	0.62	12.16	0.495	0.54	7.93	90	935	130.06	"
1428	0.74	12.12	0.492	4.85	8.06	76	596	130.06	"
1433	0.86	12.08	0.490	5.08	8.12	56	358	130.05	"
1438	0.97	12.05	0.491	4.76	8.14	22	214	130.08	"
1443	1.1	12.01	0.493	4.56	8.15	9	190	130.06	"
1448	1.21	12.00	0.495	4.59	8.15	-13	148	130.05	"
1453	1.33	12.00	0.497	4.51	8.15	-23	129	130.08	"
1458	1.45	11.96	0.499	4.08	8.16	-33	122	130.05	"
1503	1.57	11.93	0.500	3.78	8.15	-40	112	130.07	
1508	1.69	11.91	0.503	3.47	8.15	-46	115	130.06	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤6°C	250ml HDPE	2

Observations/Notes:

Pump Start Time: 1300
Initial Fill Time(FT; sec): 10
Initial Discharge Time(DT; sec): 20
Final Fill Time: 30
Final Discharge Time: 30
Purge Rate: 90 ml/min

Pump Depth: 155 ft BTOC

Sample /Time: 1600

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9

MS/MSD NA
Duplicate ID: NA

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-8-19
Weather: CLOUDY - 40s/50s

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 2 of 2
Well ID: WI-CV-MW-17A
Sample ID: WI-CV- GW17A-1119
Sampling Team: L. BAUMANN
A. VOGT

Total Depth: 159.90 FT.(BTOC)
Depth to water: (-) 130.02 FT.(BTOC)
Water Column: 29.88 FT.
(x) 0.163 GAL/FT.
Well Volume: 4.87 GAL.
Total Purge Vol.: 2.64 GAL.

Measuring Device: HORIBA 21358/18454
SOLONIST 29637

Purge Device: QED 1.75" SAMPLE PRO #16229

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1513	1.80	11.88	0.504	3.25	8.15	-51	112	130.05	CLOUDY
1518	1.92	11.88	0.507	3.02	8.14	-55	106	130.05	"
1523	2.04	11.84	0.510	2.78	8.13	-57	80	130.08	"
1528	2.16	11.83	0.513	2.60	8.12	-60	71.2	130.07	"
1533	2.28	11.79	0.516	2.36	8.11	-62	77.0	130.06	"
1538	2.40	11.76	0.520	2.19	8.10	-64	79.9	130.05	PID = 0
1543	2.52	11.76	0.524	2.05	8.08	-68	78.6	130.05	
1548	2.64	11.72	0.527	1.96	8.07	-72	76.2	130.05	
1553		11.62	0.530	1.85	8.06	-75	75.3		

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v5.1.1 Table B-15	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Air Monitoring: 0
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9%

Pump Start Time: 1300
Initial Fill Time(FT; sec): 10
Initial Discharge Time(DT; sec): 20

Final Fill Time: 30
Final Discharge Time: 30

Purge Rate: 90 ml/min

Pump Depth: 155 ft BTOC

Sample /Time: 1600

MS/MSD NA

Duplicate ID: NA

Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11/11/19
Weather: 40's / OVERCAST

Project Number: 9000NVT1.A.PN.EV.03.FI-WS **Page:** 1 of 2
Well ID: WI-CV-MW 20S
Sample ID: WI-CV- GW20S-1119
Sampling Team: L. BAUMANN
A. VOGT

Total Depth: 200 FT.(BTOC)
Depth to water: (-) 93.04 FT.(BTOC)
Water Column: 106.96 FT.
(x) 0.163 GAL/FT.
Well Volume: 17.434 GAL.
Total Purge Vol.: 4.5 GAL.

Purge Device: QED SAMPLE PRO 1.75" 10228

Measuring Device: PID 045726
SOLINIST 029633
HORIBA 21358/18454

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1018	5700	12.31	0.832	1.51	6.57	104	156	93.06	Before purge
1021	5920	12.34	0.833	1.30	6.65	85	132	93.07	CLOUDY
1024	6140	12.36	0.835	1.18	6.70	73	121	93.07	"
1027	6360	12.39	0.836	1.08	6.73	63	96.0	93.08	"
1030	6580	12.39	0.836	1.05	6.80	61	91.8	93.08	"
1033	6800	12.41	0.836	1.02	6.84	57	82.3	93.07	"
1036	7020	12.41	0.838	1.01	6.86	55	76.2	93.08	"
1039	7240	12.41	0.839	1.06	6.88	54	69.9	93.07	CLEAR
1042	7460	12.39	0.839	1.07	6.90	52	60.7	93.07	"
1045	7680	12.39	0.840	1.05	6.92	51	54.8	93.08	"
1048	7900	12.35	0.840	1.06	6.93	50	49.8	93.08	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250 ml HDPE	6

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9%

Pump Start Time: 0936
Bladder **Initial Fill Time(FT; sec):** 30
Bladder **Initial Discharge Time(DT; sec):** 30
Final Fill Time: 15
Final Discharge Time: 15
Submersible **Initial Control Setting(Hz):**
Final Control Setting(Hz):
Purge Rate: 220 ml/min
Pump Depth: 105 ft BTOC
Sample /Time: 1120

MS/MSD 1120 **Duplicate ID:** NA

Signature(s):

WI-CV-EB01-1119 @ 0915

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11/11/19
Weather: 40's / OVER CAST

Project Number: 9000NVT1.A.PN.EV.03.FI-WS **Page:** 2 of 3
Well ID: WI-CV-MW 20S
Sample ID: WI-CV- GW20S-1119
Sampling Team: L. BAUMANN
A. VOGT

Total Depth: 200 FT.(BTOC)
Depth to water: (-) 93.04 FT.(BTOC)
Water Column: 106.96 FT.
(x) 0.163 GAL/FT.
Well Volume: 17.434 GAL.
Total Purge Vol.: 4.5 GAL.

Purge Device: QED SAMPLE PRO 1.75"
10228

Measuring Device: PID 045728
SLIM I ST 029633
HORIBA 21358/18454

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ L	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1051	8120	12.36	0.839	1.04	6.94	50	46.3	93.08	CLEAR
1054	8340	12.35	0.839	1.08	6.95	49	42.8	93.07	"
1057	8560	12.33	0.839	1.09	6.97	49	42.3	93.08	"
1100	8780	12.32	0.839	1.07	6.98	48	37.7	93.07	"
1103	9000	12.34	0.839	1.09	6.98	48	~~3~~35.0	93.08	"
1106	9220	12.34	0.838	1.08	6.99	47	33.9	93.07	"
1109	9440	12.35	0.839	1.08	6.99	48	32.2	93.08	"
~~1112~~	~~9660~~								
~~1115~~	~~9880~~								
~~1118~~	~~10100~~								
~~1121~~	~~10320~~								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
8260 w 5.1.1 TABLE B-15	≤ 6°C	250 ml HDPE	7 6

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9%

Pump Start Time: 0936
Bladder **Initial Fill Time(FT; sec):** 30
Bladder **Initial Discharge Time(DT; sec):** 30
Final Fill Time: 15
Final Discharge Time: 15
Submersible **Initial Control Setting(Hz):**
Final Control Setting(Hz):
Purge Rate: 220 ml/min
Pump Depth: 185 ft BTOC
Sample /Time: 1120

MS/MSD 1120
Duplicate ID: NA

Signature(s):

WI-CV-EB01-1119 @ 0945

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-13-19
Weather: Sun & Clouds

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW-21S
Sample ID: WI-CV-GW21S-1119-A
Sampling Team: L. Brunmeier
A. Vogt

96.56' DTW AFTER Deployment

Total Depth: 117 FT.(BTOC)
Depth to water: (-) 97.29 FT.(BTOC)
Water Column: 19.71 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.213 GAL.
Total Purge Vol.: GAL.

Measuring Device: HORIBA: 44530/21261
SOLONIST: 29633

Purge Device: QED SAMPLE PRO 1.75" #10228

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1510	0.1	13.87	0.731	2.66	9.60	-206	>1000	99.45	CLOUDY TAN
1513		13.80	0.729	1.98	9.62	-221	71000	99.98	"
1518	0.4	13.82	0.704	1.23	9.63	-226	71000	100.65	"
1523		13.86	0.689	1.24	9.61	-224	71000	101.07	"
1528	0.8	13.84	0.643	1.11	9.56	-216	71000	101.79	"
1533		13.83	0.624	0.82	9.46	-212	955	102.17	"
1538	1.0	13.82	0.596	0.56	9.38	-206	919	102.91	"
~~1545~~		Significant Drawdown. Took sample @ 1550 (+FD)							
~~1548~~		Lowered pump. Attempt to pump dry							
1655	4.0	End pumping.						110.65	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v5.1.1 Table B-15	≤ 6°C	250 HDPE	4

Observations/Notes: High PID readings upon opening the well inside well, high CO + some H2S + VOC + LEL. See notes on Right. CO highest concentrations decreased over Time. Breathing zone always unchanged, normal

Air Monitoring:
VOC (ppm)= 0/0/10.2/0/0
H2S (ppm)= 0/0/6.4/0.7/0
LEL (%)= 0/0/1.6%/0/0
CO (ppm)= 0/0/196/109/21
O2 (%)= 20.9/20.9/20.9/20.9/20.9
Background/Breathing zone/in opened well head/ Well head 6 minutes later/30 min later in well head

Pump Start Time: 1445
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Final Fill Time: 30 sec before Sampling
Final Discharge Time: 30
Submersible Initial Control Setting(Hz):
Final Control Setting(Hz):
Purge Rate: 105 ml/min
Pump Depth: 112.21
Sample /Time: 1550

MS/MSD
Duplicate ID: WI-CV-GW21SP-1119-A @ 1630

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11/14/19
Weather: 50's OVER CAST

Project Number: 9000NVT1.A.PN.EV.03.FI-WS **Page:** 1 of 1
Well ID: WI-CV-MW 21S
Sample ID: WI-CV- GW 21S - 1119
Sampling Team: A. VOGT
L. BAUMANN

Total Depth: 117.48 FT.(BTOC)
Depth to water: (-)104.17 FT.(BTOC)
Water Column: 13.31 FT.
(x)0.163 GAL/FT.
Well Volume: 2.169 GAL.
Total Purge Vol.: 0.36 GAL.

Purge Device: QED SAMPLE PRO 1.75" #10228

Measuring Device: HORIBA: 44530/21361
SOLONIST = 29633

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. ~~(gals)~~ mL	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1051	180	12.65	0.599	3.78	8.87	-170	>1000	107.50	CLOUDY TAN
1053	450	12.85	0.574	3.40	8.87	-171	71080	107.71	"
1058	900	12.99	0.548	3.20	8.86	-168	>1000	107.88	"
1103	1350	13.03	0.531	2.99	8.80	-165	934	107.99	"

RECHARGED 66% SINCE WELL WAS PURGED DRY ON 11/13/19
RECHARGE RATE OF 0.39 ft/hr.
SAMPLE WAS COLLECTED SINCE < REACH 80% RECHARGE WOULD EXCEED ALLOWABLE WORK HOURS ON SITE. (DAYLIGHT)

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250ml HDPE	4

Observations/Notes: HIGH POSITIVE PRESSURE IN WELL

Air Monitoring: WH | BZ
VOC (ppm)= 0 | 0
H2S (ppm) 0 | 0
LEL (%)= 6% | 0
CO (ppm)= 76 ppm | 0
O2 (%)= 20.9 | 20.9

Pump Start Time: 1016
Bladder **Initial Fill Time(FT; sec):** 30
Bladder **Initial Discharge Time(DT; sec):** 30

Final Fill Time: 30
Final Discharge Time: 30

Submersible **Initial Control Setting(Hz):**

Final Control Setting(Hz):

Purge Rate: 90 ml/min

Pump Depth: 112 ft BTOC

Sample /Time: 1100

MS/MSD NA

Duplicate ID: 1500

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client:	NAVFAC	**Project Number:**	9000NVT1.A.PN.EV.03.FI-WS **Page:** 1 of 1
Location:	OLF Coupeville	**Well ID:**	WI-CV-MW 22S
Event:	Phase 1- Discrete & MW Groundwater Sampling	**Sample ID:**	WI-CV- GW22S-1119
Date:	11/11/19	**Sampling Team:**	L. BAUMANN
Weather:	50's / OVERCAST		A. VOGT

Total Depth:	194	FT.(BTOC)	SCREEN 112-122
Depth to water:	(-) 114.32	FT.(BTOC)	
Water Column:	79.68	FT.	
	(x) 0.163	GAL/FT.	
Well Volume:	12.988	GAL.	
Total Purge Vol.:		GAL.	

Measuring Device: PID 045728
SOLINST 29633
HORIBA 21358/18454

Purge Device: GED SAMPLE PRO 1.75" 10228

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1422	0.23	13.59	0.820	4.42	7.48	140	299	114.78	CLOUDY
1427	0.24	13.01	0.828	2.59	7.44	141	294	114.85	"
1432	0.50	13.00	0.826	2.15	7.51	135	286	114.95	"
1437	0.80	12.95	0.829	1.93	7.50	133	241	115.05	"
1442	1.00	12.90	0.830	1.72	7.47	132	264	115.17	"
1447	1.18	12.89	0.831	1.54	7.45	131	235	115.34	"
1452	1.30	12.88	0.833	1.42	7.43	130	247	115.50	"
1457	1.43	12.87	0.834	1.32	7.43	128	234	115.62	"
1502	1.55	12.80	0.836	1.28	7.42	127	197	115.79	"
1507	1.67	12.79	0.838	1.32	7.43	126	217	115.95	"
1512	1.80	12.77	0.838	1.40	7.43	125	185	116.15	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
GSM v5.1.1 Table B-15	≤ 6°c	250 ml HDPE	2

Observations/Notes: Purged 1.8 gal then sampled. After words increased Purge rate to 150 ml/min. After 15 min discharge became dark gray-brn. After another 15 min. discharge became cloudy tan. Well dry and battery died. ~ 2.75 gal Purged

Pump Start Time: 1346

Bladder Initial Fill Time(FT; sec): 30 max

Bladder Initial Discharge Time(DT; sec): 30

Final Fill Time:

Final Discharge Time:

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Purge Rate: 100 ml/min

Pump Depth: 120 ft BTOC

Sample /Time: 1530

Air Monitoring:
VOC (ppm)= 0 ppm
H2S (ppm) 0 ppm
LEL (%)= 0 %
CO (ppm)= 0 ppm
O2 (%)= 20.9 %

MS/MSD NA

Duplicate ID: NA

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11/12/19
Weather: 40's / RAINY

Project Number: 9000NVT1.A.PN.EV.03.FI-WS **Page:** 1 of 1
Well ID: WI-CV-MW 22S
Sample ID: WI-CV- GW22S-1119
Sampling Team: L. BAUMANN
A. VOGT

Total Depth: 122.18 FT.(BTOC)
Depth to water: (-) 114.74 FT.(BTOC)
Water Column: 7.44 FT.
(x) 0.163 GAL/FT.
Well Volume: 1.212 GAL.
Total Purge Vol.: _____ GAL.

Purge Device: GED SAMPLE PRO "1.75"

Measuring Device: HORIBA: 15454/21356
PID: 45570
SOLONIST: 029

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0857		11.84	0.835	4.86	7.00	237	207	NOT SOLONIST WELL - NO SIGNAL WOULD TRY	CLOUDY TAN
0900		11.84	0.835	4.51	7.12	231	203		"
0903		11.67	0.833	4.68	7.20	226	160		"
0910	1gal SAMPLE								
0919		11.90	0.844	5.38	7.35	193	460		"
0922		11.96	0.844	6.73	7.37	183			
~~0925~~	CLEAN	FLOW	CELL						
0933		12.28	0.830	4.87	7.40	96			"
0936		12.29	0.834	4.55	7.42	100	1000 +		"
0939		12.25	0.837	4.54	7.44	104	878		"
0942	2.5		END	PURGE					

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v5.1.1 Table B-15	≤ 6°C	250 ml HDPE	2

Observations/Notes: As per verbal instructions, sampled after few readings, then ~~No~~ Attempted to purge past high turbidity zone. (couldn't continue past 0942 due to time constraints.

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9%

Pump Start Time: 0837

Bladder **Initial Fill Time(FT; sec):** 15
Final Fill Time: 15

Bladder **Initial Discharge Time(DT; sec):** 15
Final Discharge Time: 15

Submersible **Initial Control Setting(Hz):**
Final Control Setting(Hz):

Purge Rate: 150 ml/min

Pump Depth: 117 ft BTOC

Sample /Time: 0910

MS/MSD NA
Duplicate ID: NA

Signature(s):

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-13-19
Weather: Clouds

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 235
Sample ID: WI-CV- GW235 - 1119
Sampling Team: L. Baumann
A. Vogt

Total Depth: 139.69 FT.(BTOC)
Depth to water: (-) 124.54 FT.(BTOC)
Water Column: 15.15 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.469 GAL.
Total Purge Vol.: 1.2 GAL.

123.64' BGS After pump deployment

Purge Device: QED MP50 #033313
QED SAMPLE PRO 1.75" #10228

Measuring Device: Solinst, Model # 101 ~~#237314~~ 29633
PID: 45728

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1204		14.11	0.464	1.97	6.71	-20	156	127.64	Cloudy grey-Brown
1206		14.31	0.452	1.64	7.04	-46	155	128.18	
1208	0.5 gal	13.89	0.448	1.39	7.30	-65	147	128.91	
1210		14.05	0.443	1.11	7.55	-89	132	128.12	
1212		14.09	0.438	0.77	7.79	-117	129	128.28	
1214		13.80	0.440	0.68	7.87	-126	124	128.45	
1216	0.75	14.03	0.437	0.56	7.92	-134	122	128.59	
1218		13.70	0.439	0.40	8.01	-147	122	128.79	
1220		13.39	0.439	0.29	8.07	-154	133	128.95	
1222		13.47	0.439	0.18	8.13	-160	136	129.16	
1224	0.9	13.25	0.439	0.11	8.16	-163	139	129.31	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250 HDPE	4

Observations/Notes:

Air Monitoring: Well Head/BZ.
VOC (ppm)= 0/0
H2S (ppm) 0/0
LEL (%)= 0/0
CO (ppm)= 0/0
O2 (%)= 20.9/20.9

Pump Start Time: 1132
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Final Fill Time: 30
Final Discharge Time: 30

Submersible Initial Control Setting(Hz): –
Final Control Setting(Hz): –

Purge Rate: 85 mL/min

Pump Depth: 135' ~~BGS~~ pt BTOC

Sample /Time: 1235

MS/MSD NA
Duplicate ID: 1300

Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-13-19
Weather: Sun & clouds

Project Number: 9000NVT1.A.PN.EV.03.FI-WS **Page:** 2 of 2
Well ID: WI-CV-MW 23S
Sample ID: WI-CV- GW 23S-1119
Sampling Team: A. Vogt
L. Bowman

Total Depth: 139.69 FT.(BTOC)
Depth to water: (-)124.54 FT.(BTOC)
Water Column: 15.15 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.469 GAL.
Total Purge Vol.: 1.2 GAL.

Measuring Device: Solonist = 29633
PID: 45728

Purge Device: QED SAMPLE PRO 1.75" #10228
QED MP50 # 033313

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1226	0.9	13.04	0.440	0.03	8.19	-166	143	129.43	
1228		13.06	0.440	0.0	8.20	-169	139	129.56	
1235	01.20	Parameters stable. Sample						130.17	
—	—	Sample @ 1235							
1245	1.2	13.06	0.440	0.0	8.20	-169	139	130.62	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 Table B-15	≤ 6°C	250 HDPE	4

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9

Pump Start Time: 1132
Bladder **Initial Fill Time(FT; sec):** 30
Bladder **Initial Discharge Time(DT; sec):** 30
Final Fill Time: 30
Final Discharge Time: 30

Submersible **Initial Control Setting(Hz):** -
Final Control Setting(Hz): -

Purge Rate: 85 ml/min

Pump Depth: 135 ft BTOC

Sample /Time: 1235

MS/MSD NA
Duplicate ID: @1300 WI-CV-GW23S-1119P

Signature(s):

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 12/10/19
Weather: Cloudy, 40°, light wind

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 1
Well ID: WI-CV-MW 25M-R
Sample ID: WI-CV- GW 25M-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 160.3 FT.(BTOC)
Depth to water: (-) 123.63 FT.(BTOC)
Water Column: 36.67 FT.
(x) 0.163 GAL/FT.
Well Volume: 5.98 GAL.
Total Purge Vol.: 3750 mL ~~GAL~~

Purge Device: QED Sample Pro: Pine# 8238

Measuring Device: WLI: Solinst Pine#042265
Horiba: Pine# 21414
MultiRAE: Pine# 44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL ~~(gals)~~	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0936	0	9.17	0.424	2.61	5.86	142	23.7	123.45	Clear, no odor
0939	375	9.52	0.411	2.00	6.35	6	21.3	123.45	"
0942	750	9.57	0.409	1.37	6.61	-27	18.4	123.45	"
0945	1125	9.87	0.405	1.16	6.79	-49	15.6	123.45	"
0948	1500	9.99	0.404	0.98	6.92	-64	12.5	123.45	"
0951	1875	9.93	0.403	0.82	7.02	-75	12.3	123.45	"
0954	2250	9.90	0.402	0.63	7.08	-82	12.0	123.45	"
0957	2625	9.84	0.402	0.55	7.15	-88	11.4	123.45	"
1000	3000	10.06	0.399	0.50	7.16	-91	10.9	123.45	"
1003	3375	10.09	0.399	0.51	7.20	-95	10.6	123.45	"
1006	3750	10.15	0.399	0.52	7.24	-100	10.0	123.45	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250mL HDPE	2

Observations/Notes: All params stabilized

Pump Start Time: 0905
Bladder Initial Fill Time(FT; sec): 30
Bladder Initial Discharge Time(DT; sec): 30
Submersible Initial Control Setting(Hz): NA

Final Fill Time: 30
Final Discharge Time: 30
Final Control Setting(Hz): NA

Purge Rate: 100mL/min @ 0905
125mL/min @ 0936

Pump Depth: 155 ft btoc

Sample /Time: 1015

Air Monitoring:	WH	BZ
VOC (ppm)=	0	0
H2S (ppm) =	0	0
LEL (%)=	0	0
CO (ppm)=	0	0
O2 (%)=	20.9	20.9

MS/MSD NA
Duplicate ID: NA
Signature(s): David Butler

ch2m

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Phase 1- Discrete & MW Groundwater Sampling
Date: 11-12-19
Weather: Rain, 45°F

Project Number: 9000NVT1.A.PN.EV.03.FI-WS Page: 1 of 2
Well ID: WI-CV-MW 26 D
Sample ID: WI-CV- GW26D-1119
Sampling Team: L. Baumann
A. Vogt

Total Depth: ~~200.60~~ 200.60 FT.(BTOC) S
Depth to water: (-) 144.04 FT.(BTOC)
Water Column: 56 FT.
(x) 0.163 GAL/FT.
Well Volume: 9.219 GAL.
Total Purge Vol.: GAL.

Measuring Device: ~~Solinst~~ Solinst WLM, Model 101

Purge Device: 10228 - GED Sample Pro 1.75"

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1424	.25/.46	11.42	0.362	1.78	8.15	-50	1000	143.97	Slight Organic odor
1429	952	11.50	0.364	0.00*	8.05	-83	605	144.01	Tan/gray cloudy
1434	1702	11.49	0.362	0.00*	8.04	-96	408	144.01	
1439	2 452	11.49	0.365	0.00*	8.03	-105	257	144.01	
1442	2 902	11.48	0.366	0.00*	8.03	-110	234	144.01	
1445	3 352	11.49	0.367	0.00*	8.02	-113	195	144.01	
1448	3902	11.49	0.366	0.00*	8.02	-118	181	144.01	Attached New Probe after readings
1456	5002	11.59	0.366	1.51	7.81	-35	76.2	143.87	Now #21361
1459	5452	11.60	0.366	1.21	7.90	-51	71.9	143.45	
1502	5902	11.66	0.363	0.85	8.06	-75	63.5	143.55	
1503			Bubbles in tube - Pause - took Sample					WI-CV-GW26D-1119-A	

3785.41 ml/gal

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 table B-15	≤6 °C	250 HDPE	2X2 - SAMPLES A+B

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9

Pump Start Time: 1352
Bladder Initial Fill Time(FT; sec):
Bladder Initial Discharge Time(DT; sec):
Final Fill Time:
Final Discharge Time:
Submersible Initial Control Setting(Hz):
Final Control Setting(Hz):
Purge Rate:
Pump Depth:

Sample /Time: 1520 For ~~WI-CV-~~ Sample A, 1635 for Sample B

MS/MSD
Duplicate ID:

Signature(s):

* Mal functioning or Anoxic env.!

ch2m:

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC | **Project Number:** 9000NVT1.A.PN.EV.03.FI-WS | **Page:** 2 of 2

Location: OLF Coupeville | **Well ID:** WI-CV-MW 26D

Event: Phase 1- Discrete & MW Groundwater Sampling | **Sample ID:** WI-CV-

Date: 11-12-19 | **Sampling Team:** L. Baumann, A. Vogt

Weather: Rain, 45°F

Total Depth: 200.60 FT.(BTOC)

Depth to water: (-) 144.04 FT.(BTOC)

Water Column: 56 FT.

(x) GAL/FT.

Well Volume: 9.219 GAL.

Total Purge Vol.: GAL.

Measuring Device: Solinst = 29633
Horiba = 44530 + 21358

Purge Device: 10228 QED Sample Pro 1.75"

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
16:15	2.5	—	—	—	—	—	—	—	Resume pumping
16:24	2.75	11.15	0.353	0.000	8.27	-14	>1000	144.00	
16:27	—	11.21	0.353	0.000	8.28	-29	>1000	144.00	
16:30	—	11.27	0.358	0.000	8.21	-45	>1000	144.00	
16:33	3.0	11.40	0.359	0.000	8.10	-80	86.5	144.00	Controller kicked in, NOUT
		Took	SAMPLE	WI-CV-GW	26D-1119-B				

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
QSM v 5.1.1 table B-15	≤ 6°C	250 HDPE	2 x 2 — Samples A+B

Observations/Notes:

Air Monitoring:
VOC (ppm)= 0
H2S (ppm) 0
LEL (%)= 0
CO (ppm)= 0
O2 (%)= 20.9

Pump Start Time:

Bladder **Initial Fill Time(FT; sec):**

Bladder **Initial Discharge Time(DT; sec):**

Final Fill Time:

Final Discharge Time:

Submersible **Initial Control Setting(Hz):**

Final Control Setting(Hz):

Purge Rate:

Pump Depth:

Sample /Time:

MS/MSD | Duplicate ID:

Signature(s): JKB

Appendix D
Survey Reports

Jacobs

Set Monitoring Wells
Whidbey Island Naval Air Station - Outlying Landing Field
Coupeville, WA

Survey Date: December 2019

Point Id	Northing	Easting	Top of Metal Case Elev	Top of PVC Casing Elev
MW-03S	439392.68	1201753.55	193.520	193.078
MW-17M	441502.92	1201653.23	202.410	201.980
MW-20S	439263.77	1202453.93	194.403	194.001
MW-21S	439283.74	1202097.83	196.732	196.253
MW-22	437065.13	1200698.29	188.273	188.026
MW-23S	438959.83	1200713.43	192.936	192.619
MW-25M	439503.02	1201047.61	192.614	192.334
MW-26D	436874.04	1201650.35	191.296	190.961

Notes:

1. HORIZONTAL DATUM: NAD83/11, WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD83/11
WSDOT MONUMENT USED FOR THIS PROJECT
COUPEVILLE 3" BRASS DISK W/PUNCH IN CONC "USC&GS COUPEVILLE 1954"
J 328 3" BRASS DISK W/PUNCH IN CONC 0.40 ABOVE SURFACE "USC&GS J328 1952"

2. VERTICAL DATUM: NAVD88
BENCHMARKS USED (PER WASHDOT DATA SHEETS)
COUPEVILLE ELEV 199.347 *3" BRASS DISK W/PUNCH IN CONC "USC&GS COUPEVILLE 1954"
J328 ELEV 199.754 *3" BRASS DISK W/PUNCH IN CONC 0.40 ABOVE SURFACE "USC&GS J328 1952"

3. EQUIPMENT USED: LEICA GS15 GPS, LEICA DNA10 DIGITAL LEVEL

Jacobs

Set Additional Monitoring Wells
Whidbey Island Naval Air Station - Outlying Landing Field
Coupeville, WA

Survey Date: April 2020

Point Id	Northing	Easting	Top of Metal Case Elev	Top of PVC Casing Elev
MW28M	438316.32	1200737.93	189.349	189.077
MW29M	437523.51	1201553.16	189.755	189.563
MW30M	438435.55	1202392.04	194.051	193.724
MW31M	439026.82	1202771.23	193.733	193.328
MW31S	439027.90	1202764.19	193.816	193.336

Notes:

1. HORIZONTAL DATUM: NAD83/11, WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD83/11
WSDOT MONUMENT USED FOR THIS PROJECT
COUPEVILLE 3" BRASS DISK W/PUNCH IN CONC "USC&GS COUPEVILLE 1954"
J 328 3" BRASS DISK W/PUNCH IN CONC 0.40 ABOVE SURFACE "USC&GS J328 1952"

2. VERTICAL DATUM: NAVD88
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COUPEVILLE ELEV 199.347 *3" BRASS DISK W/PUNCH IN CONC "USC&GS COUPEVILLE 1954"
J328 ELEV 199.754 *3" BRASS DISK W/PUNCH IN CONC 0.40 ABOVE SURFACE "USC&GS J328 1952"

3. EQUIPMENT USED: LEICA GS15 GPS, LEICA DNA10 DIGITAL LEVEL

Appendix E
Investigation-Derived Waste Documentation

Profile Amendment Request Form

Sandy Haynick, Capitol Environmental Services hereby requests an amendment to WMI profile #: 132143OR
(Contact Name)

to include the following:

Amendment Type: ❑ One Time Only Request (Event) ☑ Permanent Addition to Profile (Base)

☑ Additional Analytical/MSDS to be added to profile (see attached)

☑ Volume Increase (specify volume) 25 ☑ Tons ❑ Cubic Yards ❑ Drums ❑ Gallons ❑ Other (specify) _____

❑ Constituent(s) to be added and/or modify current range in chemical composition:

Chemicals or constituents to be added/modify	Low	High	Units

☑ Change current ranges on profile (specify below)

pH Range 6 to 10 Free Liquid Range ____ to ____

☑ Other (specify) Add lab data for 2 additional rolloffs - Report J93593-1 (samples WI-CV-IDW-SO01-031820 and WI-CV-IDW-SO02-031820), Report 20-0415 (samples WI-CV-IDW-SO01-031820 and WI-CV-IDW-SO02-031820)

GENERATOR CERTIFICATION

By signing this form, the Generator hereby certifies:
The information provided in this document, the referenced Waste Management Generator's Waste Profile Sheet, and all other referenced documents contain true and accurate descriptions of the waste material. All information regarding known or suspected hazards in the possession of the Generator has been disclosed.

Generator/Customer Signature: DERISE.AMBER.K.1125884489 Digitally signed by DERISE.AMBER.K.1125884489 Date: 2020.05.11 09:40:35 -07'00' Date: 11 MAY 2020

Company Name: NAS WHIDBEY ISLAND, PWD

Name (Print): AMBER DERISE Title: HAZARDOUS WASTE PM

FOR WASTE MANAGEMENT USE ONLY

Submitted By: _____ (W.M. Initials) Date: _____ Time: _____

WM Approval: _____ Date: _____

Agency Approval Required: ❑ Yes ❑ No

❑ Profile Extension
Original Expiration Date _____
Requested Extension _____
New Expiration Date _____

❑ Analytical Extension
Analytical Due Date _____
Requested Extension _____
New Analytical Due Date _____

Conditions/Precautions: _____

National Account Customer

WASTE MANAGEMENT

EZ Profile™

Requested Facility: Columbia Ridge Landfill ☐ Unsure Profile Number: 132143OR

☐ Multiple Generator Locations (Attach Locations) ☑ Request Certificate of Disposal ☐ Renewal? Original Profile Number: _____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

1. Generator Name: US Navy Air Station Whidbey Island
2. Site Address: 18025 WA-20
   (City, State, ZIP) Coupeville WA 98239
3. County: Island
4. Contact Name: Amber Derise
5. Email: amber.k.derise@navy.mil
6. Phone: (360) 257-1008 7. Fax: _____
8. Generator EPA ID: _____ ☑ N/A
9. State ID: _____ ☑ N/A

B. BILLING INFORMATION ☐ SAME AS GENERATOR

1. Billing Name: Capitol Environmental Services, Inc.
2. Billing Address: 200 Biddle Ave, Suite 205
   (City, State, ZIP) Newark DE 19702
3. Contact Name: Terri Fort
4. Email: tfort@capitolenv.com
5. Phone: (540) 777-6547 6. Fax: (540) 777-6549
7. WM Hauled? ☑ Yes ☐ No
8. P.O. Number: ROAN-TFORT
9. Payment Method: ☑ Credit Account ☐ Cash ☐ Credit Card

C. MATERIAL INFORMATION

1. Common Name: OLF-SSI-SoilRolloffs
   Describe Process Generating Material: ☐ See Attached
   Drill cuttings from installation and sampling of monitoring wells onsite.
2. Material Composition and Contaminants: ☐ See Attached

1. Soil	99-100 %
2. PFOA	0-12.19 ppb
3. PFOS	1.25-107.50 ppb
4.	
Total comp. must be equal to or greater than 100%	≥100%

3. State Waste Codes: _____ ☑ N/A
4. Color: brown/black
5. Physical State at 70°F: ☑ Solid ☐ Liquid ☐ Other: _____
6. Free Liquid Range Percentage: _____ to _____ ☑ N/A
7. pH: 6 to 9 ☐ N/A
8. Strong Odor: ☐ Yes ☑ No Describe: _____
9. Flash Point: ☐ <140°F ☐ 140°–199°F ☑ ≥200° ☐ N/A

D. REGULATORY INFORMATION

1. EPA Hazardous Waste? ☐ Yes* ☑ No
   Code: _____
2. State Hazardous Waste? ☐ Yes ☑ No
   Code: _____
3. Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? ☐ Yes* ☑ No
4. Contains Underlying Hazardous Constituents? ☐ Yes* ☑ No
5. From an industry regulated under Benzene NESHAP? ☐ Yes* ☑ No
6. Facility remediation subject to 40 CFR 63 GGGGG? ☐ Yes* ☑ No
7. CERCLA or State-mandated clean-up? ☐ Yes* ☑ No
8. NRC or State-regulated radioactive or NORM waste? ☐ Yes* ☑ No

***If Yes, see Addendum (page 2) for additional questions and space.**

9. Contains PCBs? → If Yes, answer a, b and c. ☐ Yes ☑ No
   a. Regulated by 40 CFR 761? ☐ Yes ☐ No
   b. Remediation under 40 CFR 761.61 (a)? ☐ Yes ☐ No
   c. Were PCB imported into the US? ☐ Yes ☐ No
10. Regulated and/or Untreated Medical/Infectious Waste? ☐ Yes ☑ No
11. Contains Asbestos? ☐ Yes ☑ No
    → If Yes: ☐ Non-Friable ☐ Non-Friable – Regulated ☐ Friable

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

1. Analytical attached ☑ Yes
   Please identify applicable samples and/or lab reports:
   J90596 - samples WI-CV-IDW-SO01-110419; WI-CV-IDW-SO02-110419 J89466 & 19-0953 - samples WI-CV-IDW-SO01-092219; WI-CV-IDW-SO02-092219 J90597 - sample WI-CV-IDW-SO03-110519
2. Other information attached (such as MSDS)? ☐ Yes

F. SHIPPING AND DOT INFORMATION

1. ☐ One-Time Event ☑ Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: 40
   ☑ Tons ☐ Yards ☐ Drums ☐ Gallons ☐ Other: _____
3. Container Type and Size: 20CY rolloff
4. USDOT Proper Shipping Name: ☐ N/A
   NonRCRA, NonDOT regulated waste soil

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): Amber Derise Date: 17Dec19
Title: Environmental Protection Specialist
Company: NASWI Public Works

Certification Signature

THINK GREEN.®

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

Revised June 30, 2015

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
4. Waste Tracking Number: NASWIOLF041520

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: NRC Environmental Services, Inc.
U.S. EPA ID Number: CAR 000 030 114

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
US Ecology Idaho, Inc.
20400 Lemley Road, Grand View, ID 83624
Facility's Phone: 208 834-2275

**Waste to dropped at US Ecology Tacoma 10 day facility
5207 187th Street, East Building B, Tacoma, WA 98446
IDD 073 114 654

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non RCRA, Non DOT Regulated wastewater	003	TP	0775	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name:
Signature:
Month: Day: Year:

169-BLS-C 6 10497 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
4. Waste Tracking Number: NASWIOLF041520

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: NRC Environmental Services, Inc.
U.S. EPA ID Number: CAR 000 030 114

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
US Ecology Idaho, Inc.
20400 Lemley Road, Grand View, ID 83624
Facility's Phone: 208 834-2275

**Waste to dropped at US Ecology Tacoma 10 day facility
5207 187th Street, East Building B, Tacoma, WA 98446
U.S. EPA ID Number: IDD 073 114 654

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non RCRA, Non DOT Regulated wastewater	003	TP	0775	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

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Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name:
Signature:
Month: Day: Year:

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~~DESIGNATED FACILITY TO GENERATOR~~
DESIGNATED FACILITY'S COPY

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
4. Waste Tracking Number: NASWIOLF041520

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

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U.S. EPA ID Number: CAR 000 030 114

7. Transporter 2 Company Name:
U.S. EPA ID Number:

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US Ecology Idaho, Inc.
20400 Lemley Road, Grand View, ID 83624
Facility's Phone: 208 834-2275

**Waste to dropped at US Ecology Tacoma 10 day facility
5207 187th Street, East Building B, Tacoma, WA 98446
U.S. EPA ID Number: IDD 073 114 654

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1.	Non RCRA, Non DOT Regulated wastewater	003	TP	0775	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

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Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

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Printed/Typed Name:
Signature:
Month: Day: Year:

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~~DESIGNATED FACILITY TO GENERATOR~~
TRANSPORTER #1

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
4. Waste Tracking Number: NASWIOLF041520

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1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

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US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

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U.S. EPA ID Number: CAR 000 030 114

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U.S. EPA ID Number:

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2.						
3.						
4.						

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1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

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Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

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Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name:
Signature:
Month: Day: Year:

169-BLS-C 6 10497 (Rev. 9/09)

~~DESIGNATED FACILITY TO GENERATOR~~
TRANSPORTER #2

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
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1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
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Coupeville, WA 98239

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U.S. EPA ID Number: CAR 000 030 114

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2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

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Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name:
Signature:
Month: Day: Year:

169-BLS-C 6 10497 (Rev. 9/09)

~~DESIGNATED FACILITY TO GENERATOR~~
COPY

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~CESQG~~ To 4/13/20
2. Page 1 of: 1
3. Emergency Response Phone: 800-633-8253 contract# 8790
4. Waste Tracking Number: NASWIOLF041520

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington Street, Oak Harbor, WA 98278
Generator's Phone: 360 257-1008 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: NRC Environmental Services, Inc.
U.S. EPA ID Number: CAR 000 030 114

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
US Ecology Idaho, Inc.
20400 Lemley Road, Grand View, ID 83624
Facility's Phone: 208 834-2275

**Waste to dropped at US Ecology Tacoma 10 day facility
5207 187th Street, East Building B, Tacoma, WA 98446
IDD 073 114 654

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non RCRA, Non DOT Regulated wastewater	003	TP	0775	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. 50456-0 (water for solidification)
CESI Job# TFORT-
Emergency Response : Registered Party: Capitol Env. Svc. 800-633-8253 contract# 8790

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature:
Month: 04 Day: 15 Year: 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Courtney
Signature:
Month: 4 Day: 15 Year: 20

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name:
Signature:
Month: Day: Year:

169-BLS-C 6 10497 (Rev. 9/09)

~~DESIGNATED FACILITY TO GENERATOR~~
GENERATOR'S/SHIPPER'S INITIAL COPY

CERTIFICATE OF DISPOSAL

May 05,2020

US NAVY AIR STATION WHIDBEY ISLAND
18025 WA-20
COUPEVILLE, WA 98239

This is to certify that waste as defined on Waste Manifest number **NASW10LF041520** was received by U.S. Ecology, Inc., on **04/28/2020**.The waste(s) were subsequently treated, if required by 40 CFR Part 268 and U.S. Ecology's permits and disposed of on **05/01/2020** in accordance with permits and laws regulating this facility.

Customer Manifest#:	NASW10LF041520
State Manifest #:	
Page/Ln:	1/1
Material:	3 TOTE (BATCH WASTE)
Process:	Solidification
Management Code:	H132 Landfill or surface impoundment that will be closed as landfill
Facility:	US ECOLOGY IDAHO, INC. 20400 LEMLEY ROAD GRAND VIEW, ID 83624 EPA ID: IDD073114654
Waste Stream #:	50456-0
Waste Type:	NON HAZARDOUS WASTE
Customer:	CAPITOL ENVIRONMENTAL - DE
Printed Name:	CORIAN SCHMITZ
Signature:	Corian Schmitz
Title:	RECEIVING CLERK

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
Not Required VSQG	1	978-387-8171	OLF0116620A

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington St., Oak Harbor, WA 98277
Generator's Phone: 360-257-1008, 1115 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
19025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: R. Transport — U.S. EPA ID Number: Not Required

7. Transporter 2 Company Name: Union Pacific — U.S. EPA ID Number: NEB0[illegible]92910

8. Designated Facility Name and Site Address
Columbia Ridge Comercial Landfill
18177 Cedar Springs LN
Facility's Phone: 541 454-2030 Arlington, OR 97812
U.S. EPA ID Number: Not Required

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA, Non DOT Regulated Waste Soil	8763	CM	25,000	lbs P	None
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. App# 132143OR (OLF-SSI-soil) CESI -TFORT 6328
Emergency Contact: Rachel Clennon-978-387-8171 or Jennifer Madsen-360-888-0281

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Denise — Signature: [signature] — Month 01 Day 16 Year 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: R transport — Signature: [signature] — Month 1 Day 16 Year 20

Transporter 2 Printed/Typed Name: JR — Signature: [signature] — Month 1 Day 17 Year 20

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a

Printed/Typed Name: Tom Ames — Signature: [signature] — Month 1 Day 21 Year 20

169-BLS-C 6 10497 (Rev. 9/09)

DESIGNATED FACILITY'S COPY

Columbia Ridge
18177 Cedar Springs Lane
Arlington, OR, 97812
Ph: (541) 454-2030

Reprint
Ticket# 602763

Customer Name CAPITOL ENVIRONMENTAL SERVICE Carrier 8000
Ticket Date 01/21/2020 Vehicle# 8763 Volume
Payment Type Credit Account Container 8763
Manual Ticket# 971324 Billing # 0002601
Hauling Ticket# Manifest OLF011620A
Destination UP/R TRANSPORT PO ROAN-TFORT
Profile 132143OR (LF02 - OLF-SSI-SoilRolloffs)
Generator 168-US NAVY AIR STATION WHIDBY US NAVY AIR STATION WHIDBEY ISLAND 18025 WA-2

	Time	Scale	Operator	Inbound		
In	01/20/2020 12:32:17	Front Scale	tames1		Gross	64000 lb*
Out	01/21/2020 12:32:17		tames1		Tare	47520 lb*
			* Manual Weight		Net	16480 lb
					Tons	8.24

Comments DELIVERED 8/5/19 - 1/17/20 = 165 DAYS RENT.

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Spwaste Cover RGC-	100	8.24	Tons				WA-COUPEVI
2	DEL U RGC-DELIVERY	100	1.00	Each				WA-COUPEVI
3	LINER RGC-LINER UN	100	1.00	Each				WA-COUPEVI
4	LOC U RGC-LOCAL TR	100	1	Load				WA-COUPEVI
5	RAIL U RGC-RAIL UN	100	1	Load				WA-COUPEVI
6	RENT RGC DAILY-CAN	100	165.00	Each				WA-COUPEVI
7	CD RGC $35-Cert of	100	1.00	Each				WA-COUPEVI

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
Not Required VSQG	1	978-387-8171	OLF011620B

GENERATOR

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington St., Oak Harbor, WA 98277
Generator's Phone: 360-257-1008, 1115 Attn: Amber Denise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: R. Transport — U.S. EPA ID Number: Not Required

7. Transporter 2 Company Name: Waste Pacific — U.S. EPA ID Number: NED001797910

8. Designated Facility Name and Site Address
Columbia Ridge Comercial Landfill
18177 Cedar Springs LN
Facility's Phone: 541 454-2030 Arlington, OR 97812
U.S. EPA ID Number: Not Required

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA, Non DOT Regulated Waste Soil	8724	CM	25,000	P	None
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. App# 132143OR (OLF-SSI-soil) CESI -TFORT 6328

Emergency Contact: Rachel Clennon-978-387-8171 or Jennifer Madsen-360-888-0281

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Denise — Signature: [signature] — Month 10 Day 16 Year 20

INTL

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Andy Anderson — Signature: [signature] — Month 1 Day 29 Year 20

Transporter 2 Printed/Typed Name: Heather D. Male — Signature: [signature] — Month 1 Day 21 Year 19

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a

Printed/Typed Name: Toni Ames — Signature: [signature] — Month 1 Day 29 Year 20

169-BLS-C 6 10497 (Rev. 9/09)

DESIGNATED FACILITY'S COPY

Columbia Ridge
18177 Cedar Springs Lane
Arlington, OR, 97812
Ph: (541) 454-2030

Reprint
Ticket# 605087

Customer Name CAPITOL ENVIRONMENTAL SERVICE
Ticket Date 01/27/2020
Payment Type Credit Account
Manual Ticket# 971546
Hauling Ticket#
Destination UP/R TRANSPORT
Profile 132143OR (LF02 - OLF-SSI-SoilRolloffs)
Generator 168-US NAVY AIR STATION WHIDBY US NAVY AIR STATION WHIDBEY ISLAND 18025 WA-2

Carrier 8000
Vehicle# 8724
Container 8724
Billing # 0002601
Manifest OLF011620B
PO ROAN-TFORT

Volume

	Time	Scale	Operator	Inbound	Gross	72780 lb*
In	01/24/2020 10:57:52	Front Scale	tames1		Tare	48680 lb*
Out	01/27/2020 10:57:52		tames1		Net	24100 lb
			* Manual Weight		Tons	12.05

Comments DROP ONLY 8/29/19 - 1/21/20 = 145 DAYS RENT.

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Spwaste Cover RGC-	100	12.05	Tons				WA-COUPEVI
2	DEL U RGC-DELIVERY	100	1.00	Each				WA-COUPEVI
3	LINER RGC-LINER UN	100	1.00	Each				WA-COUPEVI
4	LOC U RGC-LOCAL TR	100	1	Load				WA-COUPEVI
5	RAIL U RGC-RAIL UN	100	1	Load				WA-COUPEVI
6	RENT RGC DAILY-CAN	100	145.00	Each				WA-COUPEVI
7	CD RGC $35-Cert of	100	1.00	Each				WA-COUPEVI

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
Not Required VSQG	1	978-387-8171	OLF0116 20C

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington St., Oak Harbor, WA 98277
Generator's Phone: 360-257-1008, 1115 Attn: Amber Derise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name
R. Transport
U.S. EPA ID Number: Not Required

7. Transporter 2 Company Name
Union Pacific
U.S. EPA ID Number: NED017729 10

8. Designated Facility Name and Site Address
Columbia Ridge Comercial Landfill
18177 Cedar Springs LN
Facility's Phone: 541 454-2030 Arlington, OR 97812
U.S. EPA ID Number: Not Required

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1. Non-RCRA, Non DOT Regulated Waste Soil	8796	CM	25,000	P	None
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information
1. Appd 132143OR (OLF-SSI-soil) CESI -TFORT 6328
Emergency Contact: Rachel Clennon-978-387-8171 or Jennifer Madsen-360-888-0281

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Denise — Signature: [signature] — Month: 01 Day: 16 Year: 20

INT'L
15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: 132143OR
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER
16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Andy Anderson — Signature: [signature] — Month: 1 Day: 20 Year: 20

Transporter 2 Printed/Typed Name: R-Transport Jason Stanat — Signature: [signature] — Month: 1 Day: 20 Year: 20

DESIGNATED FACILITY
17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Toni Ames — Signature: [signature] — Month: 1 Day: 24 Year: 20

169-BLS-C 6 10497 (Rev. 9/09)

DESIGNATED FACILITY'S COPY

Columbia Ridge
18177 Cedar Springs Lane
Arlington, OR, 97812
Ph: (541) 454-2030

Reprint
Ticket# 604656

Customer Name CAPITOL ENVIRONMENTAL SERVICE
Ticket Date 01/24/2020
Payment Type Credit Account
Manual Ticket# 971453
Hauling Ticket#
Destination UP/R TRANSPORT
Profile 132143OR (LF02 - OLF-SSI-SoilRolloffs)
Generator 168-US NAVY AIR STATION WHIDBY US NAVY AIR STATION WHIDBEY ISLAND 18025 WA-2

Carrier 8000
Vehicle# 8796
Container 8796
Billing # 0002601
Manifest OLF011620C
PO ROAN-TFORT

Volume

	Time	Scale	Operator	Inbound		
In	01/22/2020 13:25:01	Front Scale	tames1		Gross	66500 lb*
Out	01/24/2020 13:25:01		tames1		Tare	50100 lb*
			* Manual Weight		Net	16400 lb
					Tons	8.20

Comments DROPPED 9/20 - 1/20/20 = 122 DAYS RENT.

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Spwaste Cover RGC-	100	8.20	Tons				WA-COUPEVI
2	DEL U RGC-DELIVERY	100	1.00	Each				WA-COUPEVI
3	LINER RGC-LINER UN	100	1.00	Each				WA-COUPEVI
4	LOC U RGC-LOCAL TR	100	1	Load				WA-COUPEVI
5	RAIL U RGC-RAIL UN	100	1	Load				WA-COUPEVI
6	RENT RGC DAILY-CAN	100	122.00	Each				WA-COUPEVI
7	CD RGC $35-Cert of	100	1.00	Each				WA-COUPEVI

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
Not Required	1	978-387-8171	OLF051920-1

5. Generator's Name and Mailing Address
US Navy Air Station Whidbey Island
1115 W. Lexington St., Oak Harbor, WA 98277
Generator's Phone: 360-257-1008, 1115 Attn: Amber Derise

Generator's Site Address (if different than mailing address)
US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239

6. Transporter 1 Company Name: R. Transport — U.S. EPA ID Number: Not Required

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address
Columbia Ridge Comercial Landfill
18177 Cedar Springs LN
Facility's Phone: 541 454-2030 Arlington, OR 97812
U.S. EPA ID Number: Not Required

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
GENERATOR	1. Non-RCRA, Non DOT Regulated Waste Soil	001	CM	6500	P	None
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
1. App# 132143OR (OLF-SSI-soil) Cont# CWMU8514 CESI -TFORT 6328

Emergency Contact: Rachel Clennon-978-387-8171 or Jennifer Madsen-360-888-0281

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Amber Derise — Signature — Month 05 Day 19 Year 20

INT'L
15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER
16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Andy Anderson — Signature — Month 5 Day 19 Year 20
Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY
17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY TO GENERATOR

169-BLC-O 6 10498 (Rev. 9/09)

Columbia Ridge
18177 Cedar Springs Lane
Arlington, OR, 97812
Ph: (541) 454-2030

Reprint
Ticket# 626720

Customer Name CAPITOL ENVIRONMENTAL SERVICE
Ticket Date 05/26/2020
Payment Type Credit Account
Manual Ticket# 979169
Hauling Ticket#
Destination UP/R TRANSPORT
Profile 132143OR (LF02 - OLF-SSI-SoilRolloffs)
Generator 168-US NAVY AIR STATION WHIDBY US NAVY AIR STATION WHIDBEY ISLAND 18025 WA-2

Carrier 8000
Vehicle# 8516
Container 8516
Billing # 0002601
Manifest OLF051920-1
PO ROAN-TFORT

Volume

	Time	Scale	Operator	Inbound		
In	05/25/2020 09:51:14	Front Scale	tames1		Gross	61700 lb*
Out	05/26/2020 09:51:14		tames1		Tare	47440 lb*
			* Manual Weight		Net	14260 lb
					Tons	7.13

Comments DELIVERED 2/28 - 5/20 = 82 DAYS RENT. 8:10-9:30=45 MIN.STANDBY.

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Spwaste Cover RGC-	100	7.13	Tons				WA-COUPEVI
2	DEL U RGC-DELIVERY	100	1.00	Each				WA-COUPEVI
3	LINER RGC-LINER UN	100	1.00	Each				WA-COUPEVI
4	LOC U RGC-LOCAL TR	100	1	Load				WA-COUPEVI
5	RAIL U RGC-RAIL UN	100	1	Load				WA-COUPEVI
6	RENT RGC DAILY-CAN	100	82.00	Each				WA-COUPEVI
7	SB 1/4 HR RGC-STAN	100	3.00	Each				WA-COUPEVI

Driver`s Signature

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: Not Required

2. Page 1 of: 1

3. Emergency Response Phone: 978-387-8171

4. Waste Tracking Number: OLF051920-2

GENERATOR

5. Generator's Name and Mailing Address: US Navy Air Station Whidbey Island
1115 W. Lexington St., Oak Harbor, WA 98277
Generator's Phone: 360-257-1008, 1115 Attn: Amber Denise

Generator's Site Address (if different than mailing address): US Navy Air Station Whidbey Island
18025 WA-20
Coupeville, WA 98239
U.S. EPA ID Number

6. Transporter 1 Company Name: R. Transport
U.S. EPA ID Number: Not Required

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address: Columbia Ridge Comercial Landfill
18177 Cedar Springs LN
Facility's Phone: 541 454-2030 Arlington, OR 97812
U.S. EPA ID Number: Not Required

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA, Non DOT Regulated Waste Soil	001	CM	6500	P	None
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
1. App# 132143OR (OLF-SSI-soil) #8608
CESI -TFORT 6328
Emergency Contact: Rachel Clennon-978-387-8171 or Jennifer Madsen-360-888-0281

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.
Generator's/Offeror's Printed/Typed Name: Amber Denise
Signature
Month 05 Day 19 Year 20

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Andy Anderson
Signature
Month Day Year
Transporter 2 Printed/Typed Name
Signature: Andy Anderson
Month 5 Day 19 Year 20

DESIGNATED FACILITY

17. Discrepancy
Month Day Year
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year
18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name
Signature
Month Day Year

169-BLC-O 6 10498 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

Columbia Ridge
18177 Cedar Springs Lane
Arlington, OR, 97812
Ph: (541) 454-2030

Reprint
Ticket# 626849

Customer Name CAPITOL ENVIRONMENTAL SERVICE
Ticket Date 05/27/2020
Payment Type Credit Account
Manual Ticket# 979170
Hauling Ticket#
Destination UP/R TRANSPORT
Profile 132143OR (LF02 - OLF-SSI-SoilRolloffs)
Generator 168-US NAVY AIR STATION WHIDBY US NAVY AIR STATION WHIDBEY ISLAND 18025 WA-2

Carrier 8000
Vehicle# 8608
Container 8608
Billing # 0002601
Manifest OLF051920-2
PO ROAN-TFORT

Volume

	Time	Scale	Operator	Inbound		
In	05/25/2020 13:20:50	Front Scale	tames1		Gross	69820 lb*
Out	05/27/2020 13:20:50		tames1		Tare	45880 lb*
			* Manual Weight		Net	23940 lb
					Tons	11.97

Comments DELIVERED 2/17 - 5/19 = 92 DAYS RENT. 10:10-12:15=1.5 HRS.STANDBY.

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Spwaste Cover RGC-	100	11.97	Tons				WA-COUPEVI
2	DEL U RGC-DELIVERY	100	1.00	Each				WA-COUPEVI
3	LINER RGC-LINER UN	100	1.00	Each				WA-COUPEVI
4	LOC U RGC-LOCAL TR	100	1	Load				WA-COUPEVI
5	RAIL U RGC-RAIL UN	100	1	Load				WA-COUPEVI
6	RENT RGC DAILY-CAN	100	92.00	Each				WA-COUPEVI
7	SB 1/4 HR RGC-STAN	100	6.00	Each				WA-COUPEVI

Driver`s Signature

US ecology

US Ecology Nevada (Beatty) 800-239-3943
US Ecology Idaho (Grand View) 800-274-1516
US Ecology Texas (Robstown) 800-242-3209
US Ecology Michigan (Detroit) 800-396-3265

PROFILE #_____

WASTE/MATERIAL PROFILE FORM

A. GENERATOR INFORMATION

1. Generator: US Navy Air Station Whidbey Island	☐ Billing information is same ☐ P.O. required for payment
2. Facility Address: 18025 WA-20, Coupeville, WA 98239	**12. Billing Company:** Capitol Environmental Services, Inc.
	13. Billing Address: 200 Biddle Ave, Suite 205
3. Mailing Address: 1115 W. Lexington St.	**14. City/State/Zip:** Newark, DE
4. City/State/Zip: Oak Harbor, WA 98278	**15. Billing Contact:** Terri Fort
5. Technical Contact: Amber Derise	**16. Phone:** 540-777-6547 **17. Fax:**
6. Phone: 360-257-1008 **7. Fax:**	**18. Email:** tfort@capitolenv.com

8. Generator Status: ☑ CESQG ☐ SQG ☐ LQG

9. EPA ID #: N/A **10. State ID #:**

11. NAICS CODES:

B. SHIPPING INFORMATION

1. US DOT Shipping name: NonRCRA, NonDOT regulated wastewater

2. Hazard Class: nonhaz **3. UN/NA #:** N/A **4. Packaging Group:** N/A **5. RQ:** N/A

6. Container Type: ☐ Bulk ☑ Totes ☐ Pallet ☐ Boxes ☐ Drums ☐ Other, **Describe:**

7. Frequency: ☐ Year ☐ Quarterly ☐ Monthly ☑ 1 time ☐ Other, **Describe:**

8. Shipment: **Size:** 330 gal **Quantity:** 3

9. Waste Import: ☐ Yes ☑ No
(If yes, complete Waste Import Supplement)

C. GENERAL MATERIAL & REGULATORY INFORMATION

1. Common name: Water for solidification

2. Process generating:
Monitoring wells onsite. See Sample #'s WI-CV-IDW-AQ01-1219, WI-CV-IDW-AQ02-1219, and WI-CV-IDW-AQ03-1219 in Lab report 19-1319 for perfluoroinated compound testing. Sample #'s WI-CV-IDW-AQ01-121419, WI-CV-IDW-AQ02-121419, and WI-CV-IDW-AQ03-121419 in Lab report J91507-1.

3. Describe physical appearance:
Clear/cloudy water, minimal sediment.

4. Odor: ☑ None ☐ Slight ☐ Strong

5. Physical State: ☑ Liquid ☐ Sludge/Slurry ☐ Solid

6. Describe Color: Clear/cloudy

7. Liquid phases: ☑ Single ☐ Double Layer ☐ Multi-layer

8. Knowledge is from: ☑ Lab analysis ☐ MSDS ☐ Process/generator knowledge

9. Waste/Material Type (US Ecology Texas customers only): ☑ N/A ☐ Industrial ☐ Non-Industrial

10. Restricted under EPA Land Disposal Restrictions (§268)? ☐ Yes ☑ No

11. If LDR "Yes": ☑ Wastewater ☐ Non-wastewater ☐ Debris (§268.2) **12. Alt. Standards for soil?** ☐ Yes ☑ No

13. Is the material RCRA hazardous waste containing benzene and originating at a Petroleum Refinery (SIC 2911), Chemical Manufacturing Plant (SIC 2800 thru 2899) or Coke by-Product Recovery Plant (SIC 3312)? *(If yes, complete Benzene Waste/Material Operations Supplement Form and Thermal Supplement Form)*: ☐ Yes ☑ No

14. VO Conc.(§264.1083): ☑ <500 ppmw ☐ ≥500ppmw **15. Has it been treated after point of generation?** ☐ Yes ☑ No

16. CERCLA Regulated (Superfund) Waste: ☐ Yes ☑ No **17. Butadiene waste regulated by §63 Subpart XX:** ☐ Yes ☑ No

18. Waste contains UHC constituent(s) (§268.48), above a treatment standard, other than those for which the waste exhibits a characteristic. *(If yes, list all UHC's in Section D):* ☐ Yes ☑ No

19. Waste exempt from definition of "solid waste" or "hazardous waste" *(If yes, list reference 40CFR_____):* ☐ Yes ☑ No

20. State Waste Codes:	N/A					
21. RCRA Waste Codes:	N/A					

22. Source Code: G19 Other c **23. Form Code:** W119 Other **24. Management Code:** H _____ **(USE only)**

D. COMPOSITION *(use additional form if necessary)*

Constituent	Units	TCLP	Totals	Range total ≥ 100% Typical	Min	Max
Water	%	☐	☐		98	100
Soil/sediment	%	☐	☐		0	2
Perfluorohexanoic acid	ng/L	☐	☐		17.86	29.21
Perfluorooctanoic acid	ng/L	☐	☐		12.39	81.22
Perfluorohexanesulfonate	ng/L	☐	☐		35.60	77.69
Perfluorooctanesulfonate	ng/L	☐	☐		17.32	47.23
Perfluorobutanesulfonate	ng/L	☐	☐		2.68	7.37
		☐	☐			
See reference to analytical in Section C, #2.		☐	☐			
See analytical results for full testing of PFC chemicals.		☐	☐			
		☐	☐			

E. CHARACTERISTICS

1.	**Oxidizer**	☐ Yes	☑ No	9.	**Reactive sulfides** _____ **ppm**	☐ Yes	☑ No
2.	**Explosive**	☐ Yes	☑ No	10.	**Reactive cyanides** _____ **ppm**	☐ Yes	☑ No
3.	**Organic peroxide**	☐ Yes	☑ No	11.	**Water/air reactive**	☐ Yes	☑ No
4.	**Shock sensitive**	☐ Yes	☑ No	12.	**Thermally unstable**	☐ Yes	☑ No
5.	**Tires**	☐ Yes	☑ No	13.	**TSCA regulated PCB waste** *(control sheet required with shipment)*	☐ Yes	☑ No
6.	**Pyrophoric**	☐ Yes	☑ No	14.	**Medical/infectious waste**	☐ Yes	☑ No
7.	**Compressed gas**	☐ Yes	☑ No	15.	**Radioactive** *(If yes, complete Profile Supplement for Radioactive Waste)*	☐ Yes	☑ No
8.	**Halogenated organics**	☐ Yes	☑ No	16.	**Hazardous Secondary Material (HSM)**	☐ Yes	☑ No

17. **Possibility of incidental liquids from transportation?** ☐ Yes ☑ No

18. **Is waste/material a solid using the paint filter test?** ☐ Yes (solid) ☑ No (not solid)

19. **pH:** ***(If solid, what is pH if mixed with water?)*** **Range** 6 **to** 9 **Typical** _____ ☐ ≤ 2 ☑ 2 < 12.5 ☐ ≥ 12.5

20. **Flash Point:** > 211 **º F** ☐ < 140 º F

20. **Is the waste/material oil bearing from Petroleum Refining, Production or Transportation practices?** ☐ Yes ☑ No

F. GENERATOR'S CERTIFICATION

☑ Yes ☐ No **I certify this waste/material may be disposed without further treatment.**

☐ Yes ☑ N/A **I certify this waste/material meets all requirements of legitimate recycling of hazardous secondary materials under 40 CFR 260.43 and/or I am complying with the conditions for generators using the verified recycler exclusion.**

I authorize US Ecology to correct inconsistencies on the waste/material profile form that impact management decisions with my oral or written authorization. US Ecology will require re-submittal of the waste/material profile information if substantial changes are determined necessary. I understand waste/material that does not conform to specifications described in this profile may be rejected by US Ecology unless other contractual arrangements have been agreed to by both parties. I certify, under penalty of law, that I am familiar with this waste/material stream through analysis and/or process knowledge, and that all information provided is true, accurate, representative and complete, that all known or suspected hazards have been disclosed, and that this form was completed in accordance with the instructions provided.

Print Name	Signature	Title	Date
AMBER DERISE		ENV. PROT. SPEC.	02/24/2020

Appendix F
Data Validation Reports

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-0720

Prepared for

CH2M Hill

03 February 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

www.mecx.net

TABLE OF CONTENTS

TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-0720

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 11

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-080319	I5717-FS	W	08/03/2019 15:00	PFAS_QSM5.1	Stage 2B
WI-CV-EB02-080319	I5718-FS	W	08/03/2019 17:10	PFAS_QSM5.1	Stage 2B
WI-CV-EB03-080419	I5721-FS	W	08/04/2019 13:45	PFAS_QSM5.1	Stage 2B
WI-CV-EB04-080419	I5722-FS	W	08/04/2019 14:00	PFAS_QSM5.1	Stage 2B
WI-CV-EB05-080519	I5725-FS	W	08/05/2019 13:40	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-080319	I5719-FS	W	08/03/2019 16:30	PFAS_QSM5.1	Stage 2B
WI-CV-FB02-080419	I5723-FS	W	08/04/2019 14:10	PFAS_QSM5.1	Stage 2B
WI-CV-FB03-080519	I5726-FS	W	08/05/2019 11:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW26-130-0819	I5720-FS	W	08/03/2019 13:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW26-168-0819	I5724-FS	W	08/04/2019 13:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW26-193-0819	I5727-FS	W	08/05/2019 11:05	PFAS_QSM5.1	Stage 4

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-0720:

- The laboratory received the samples in this SDG within the SAP temperature limits of ≤10 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the cooler upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The COC noted limited sample volume (~400 milliliters) available for analysis of sample WI-CV-GW26-168-0819; however, sufficient sample volume was available for normal extraction and analysis.
- The laboratory's QA/QC Summary (case narrative) noted sample WI-CV-EB02-080319 contained particulates> Particulates in samples WI-CV-EB01-080319, WI-CV-GW26-130-0819, WI-CV-GW26-168-0819 and WI-CV-GW26-193-0819 clogged the top filter of the solid phase extraction (SPE) cartridges during extraction. The filters were "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. Although the laboratory indicated that "the effect on sample results was not considered significant," the reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence. Several results were subsequently qualified for other issues.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on February 3, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.3, Table B-15, the *DoD General Data Validation Guidelines, Revision 1* (November 2019) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blanks for adona (0.26 ng/L, 0.30 ng/L and 0.25 ng/L) indicated minimal carryover potential. The method blank, with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

With two exceptions, LCS recoveries were within the SAP control limits of 70-130%. Recoveries were marginally above control limits for PFOA (132%) and NEtFOSSA (131%). Detects for PFOA were qualified as estimated with a potential positive bias (J+). Nondetects were not qualified. NEtFOSSA was not detected in the associated samples and required no qualification.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on a sample in this SDG. MEC[X] evaluated method accuracy based on the LCS results.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Samples WI-CV-FB01-080319, WI-CV-FB02-080419 and WI-CV-FB03-080519 were identified as the field blanks, and samples WI-CV-EB01-080319, WI-CV-EB02-080319, WI-CV-EB03-080419, WI-CV-EB04-080419 and WI-CV-EB05-080519 were identified as equipment blanks associated with the site samples collected on the respective dates. Most detects in the field and equipment blank samples were <1/2 the LOQ; however, the detects noted below were sufficient to qualify associated site sample results <10× the field and/or equipment blank concentrations. Remaining contaminants in the field QC samples were either not detected in the associated site sample or were insufficient to qualify the associated sample result.

PFOA was detected in field blank WI-CV-FB01-080319 (0.27 ng/L) and both associated equipment blanks, and PFOS was detected above the LOQ in WI-CV-EB01-080319 (6.28 ng/L) and <1/2 the LOQ in WI-CV-EB02-080319 (1.18 ng/L). PFOA and PFOS results in associated site sample WI-CV-GW26-130-0819 were qualified as nondetects (U) at the LOD if detected below the LOD (PFOA) or at the level of contamination if detected above (PFOS).

PFOA detects in field blank WI-CV-FB02-080319 (0.22 ng/L) and both associated equipment blanks were not sufficient to qualify the associated sample result. PFOS was detected above the LOQ in WI-CV-EB04-080319 (9.3 ng/L) and <1/2 the LOQ in WI-CV-EB02-080319 (1.18 ng/L). PFOS in associated site sample WI-CV-GW26-168-0819 was qualified as a nondetect (U) at the level of contamination.

Field blank WI-CV-FB03-0805 had no detects above the DL. PFOA detected <1/2 the LOQ in WI-CV-EB05-080319 (0.21 ng/L) was not sufficient to qualify the result in associated site sample WI-CV-GW26-193-0819.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers, all nondetects, were qualified as estimated (UJ). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFDoA	48% 47%	WI-CV-EB04-080419 WI-CV-GW26-168-0819	PFDoA

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFTeDA	48%	WI-CV-EB04-080419	PFTeDA, PFTrDA
d3-MeFOSAA	27% 37% 45%	WI-CV-EB01-080319 WI-CV-EB04-080419 WI-CV-GW26-168-0819	MeFOSAA

III.5.2. ***INJECTED INTERNAL STANDARD RECOVERY***

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the sample reviewed at a Stage 4 validation level: WI-CV-GW26-193-0819. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the sample listed above reviewed at a Stage 4 validation level. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM. None of the samples required dilution.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-0720

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-080319 **Lab Sample Name:** I5717-FS **Sample Date:** 08/03/2019 15:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.35	4.39	0.35	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.35	4.39	0.35	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.22	4.39	0.35	NG_L	J	J	OT
HFPO-DA	13252-13-6	1	0.35	4.39	0.35	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.75	4.39	1.75	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.35	4.39	0.35	NG_L	U	UJ	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.8	4.39	0.44	NG_L	J	J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	6.28	4.39	0.44	NG_L		J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.34	4.39	0.44	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.88	4.39	0.88	NG_L	U	UJ	OT

Field ID: WI-CV-EB02-080319 **Lab Sample Name:** I5718-FS **Sample Date:** 08/03/2019 17:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.72	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.18	4.72	0.47	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.24	4.72	0.47	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	U	

Field ID: WI-CV-FB01-080319 **Lab Sample Name:** I5719-FS **Sample Date:** 08/03/2019 16:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.39	4.9	0.39	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.39	4.9	0.39	NG_L	U	U	
Adona	919005-14-4	1	0.24	4.9	0.39	NG_L	J	J	
HFPO-DA	13252-13-6	1	0.39	4.9	0.39	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.27	4.9	0.49	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.98	4.9	0.98	NG_L	U	U	

Field ID: WI-CV-GW26-130-0819 **Lab Sample Name:** I5720-FS **Sample Date:** 08/03/2019 13:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.27	4.81	0.48	NG_L	J	J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.18	4.81	0.48	NG_L	J	J	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.57	4.81	0.48	NG_L	J	UJ	EBL
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	J	UJ	FBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	UJ	OT

Field ID: WI-CV-EB03-080419 **Lab Sample Name:** I5721-FS **Sample Date:** 08/04/2019 13:45

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.33	4.1	0.33	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.33	4.1	0.33	NG_L	U	U	
Adona	919005-14-4	1	0.21	4.1	0.33	NG_L	J	J	
HFPO-DA	13252-13-6	1	0.33	4.1	0.33	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.82	4.1	0.82	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.64	4.1	1.64	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.41	4.1	0.41	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.33	4.1	0.33	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.82	4.1	0.82	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.18	4.1	0.41	NG_L	J	J+	BSH

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.82	4.1	0.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.41	4.1	0.41	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.82	4.1	0.82	NG_L	U	U

Field ID: WI-CV-EB04-080419 **Lab Sample Name:** I5722-FS **Sample Date:** 08/04/2019 14:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.72	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	9.31	4.72	0.47	NG_L			
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.22	4.72	0.47	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	U	

Field ID: WI-CV-FB02-080419 **Lab Sample Name:** I5723-FS **Sample Date:** 08/04/2019 14:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.39	4.9	0.39	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.39	4.9	0.39	NG_L	U	U	
Adona	919005-14-4	1	0.39	4.9	0.39	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.39	4.9	0.39	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.22	4.9	0.49	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.98	4.9	0.98	NG_L	U	U	

Field ID: WI-CV-GW26-168-0819 **Lab Sample Name:** I5724-FS **Sample Date:** 08/04/2019 13:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.41	5.1	0.41	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.41	5.1	0.41	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.41	5.1	0.41	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.41	5.1	0.41	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.02	5.1	1.02	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.04	5.1	2.04	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	24.51	5.1	0.51	NG_L		J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.62	5.1	0.51	NG_L	J	J	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.51	5.1	0.51	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	6.46	5.1	0.51	NG_L		J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	9.79	5.1	0.41	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	68.17	5.1	0.51	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.58	5.1	1.02	NG_L	J	J	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	5.61	5.1	0.51	NG_L		UJ	EBL
Perfluorooctanoic acid (PFOA)	335-67-1	1	32.63	5.1	0.51	NG_L		J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.02	5.1	1.02	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.51	5.1	0.51	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.02	5.1	1.02	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB05-080519 **Lab Sample Name:** I5725-FS **Sample Date:** 08/05/2019 13:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.33	4.1	0.33	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.33	4.1	0.33	NG_L	U	U	
Adona	919005-14-4	1	0.23	4.1	0.33	NG_L	J	J	
HFPO-DA	13252-13-6	1	0.33	4.1	0.33	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.82	4.1	0.82	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.64	4.1	1.64	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.41	4.1	0.41	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.33	4.1	0.33	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.82	4.1	0.82	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.41	4.1	0.41	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.21	4.1	0.41	NG_L	J	J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.82	4.1	0.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.41	4.1	0.41	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.82	4.1	0.82	NG_L	U	U	

Field ID: WI-CV-FB03-080519 **Lab Sample Name:** I5726-FS **Sample Date:** 08/05/2019 11:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.47	4.72	0.47	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.72	0.38	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.47	4.72	0.47	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.47	4.72	0.47	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.47	4.72	0.47	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	U

Field ID: WI-CV-GW26-193-0819 **Lab Sample Name:** I5727-FS **Sample Date:** 08/05/2019 11:05

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	8.37	4.72	0.47	NG_L		J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	7.11	4.72	0.47	NG_L		J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	8.16	4.72	0.38	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	37.32	4.72	0.47	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.72	4.72	0.47	NG_L	J	J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	45.59	4.72	0.47	NG_L		J+	BSH
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	UJ	OT

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-0741

Prepared for

CH2M Hill

03 February 2020

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TABLE OF CONTENTS

TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-0741

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B

No. of Samples: 5

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB09-080919	I6193-FS	W	08/09/2019 18:20	PFAS_QSM5.1	Stage 2B
WI-CV-GW23-130-0819	I6192-FS	W	08/08/2019 11:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW23-147-0819	I6194-FS	W	08/09/2019 09:20	PFAS_QSM5.1	Stage 2B
WI-CV-GW23-168-0819	I6195-FS	W	08/09/2019 14:30	PFAS_QSM5.1	Stage 2B
WI-CV-GW23-196-0819	I6196-FS	W	08/10/2019 12:05	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-0741:

- The laboratory received the samples in this SDG within the SAP temperature limits of ≤10 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the cooler upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted samples WI-CV-GW23-130-0819 and WI-CV-GW23-196-0819 contained particulates, and particulates in sample WI-CV-GW23-168-0819 clogged the top filter of the solid phase extraction (SPE) cartridge during extraction. The filter was "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. Although the laboratory indicated that "the effect on sample results was not considered significant," the reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence. One result was subsequently qualified for other issues.
- Four of five equipment blanks listed on the COC were not included in the data package: WI-CV-EB06-080819, WI-CV-EB07-080919, WI-CV-EB08-080919 and WI-CV-EB10-081019. The equipment blanks were reported in SDG 19-0742.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on February 3, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and the field QC sample were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All initial calibration recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.1. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. One detect <1/2 the LOQ in an instrument blank for adona (0.26 ng/L) indicated minimal carryover potential. The remaining instrument blank had no detects above the DL. The method blank had a detect for <1/2 the LOQ for PFOA. The detect for PFOA in associated sample WI-CV-GW23-130-0819 exceeded 10× the method blank concentration and required no qualification. Remaining sample detects for PFOA were qualified as nondetects (U) at the LOD.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on a sample in this SDG. MEC[X] evaluated method accuracy based on the LCS results.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB03-080519 (SDG 19-0720) was identified as the field blank and samples WI-CV-EB09-080919 (this SDG), WI-CV-EB06-080819, WI-CV-EB07-080919, WI-CV-EB08-080919 and WI-CV-EB10-081019 (SDG 19-0742) were identified as the equipment blanks associated with site samples collected on the respective dates. The detect in WI-CV-EB09-080919 <1/2 the LOQ for PFOA was previously qualified as method blank contamination and was not used to qualify site samples. Equipment blank WI-CV-EB07-080919 had a detect <1/2 the LOQ for PFOS (1.09 ng/L). The result for PFOS in sample WI-CV-GW23-168-0819 was qualified as a nondetect (U) at the LOD. The field blank and remaining equipment blanks had no detects above the DL.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers, all nondetects, were qualified as estimated (UJ). Reanalysis produced similar results indicating a probable matrix effect on the internal standards. As the reanalyses had fewer outliers, the reanalyses were reported.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFDoA	46% 45%	WI-CV-GW23-130-0819 WI-CV-GW23-147-0819	PFDoA
13C2-PFTeDA	37% 39% 46% 39%	WI-CV-GW23-130-0819 WI-CV-GW23-147-0819 WI-CV-GW23-168-0819 WI-CV-GW23-196-0819	PFTeDA, PFTrDA
D5-EtFOSAA	48%	WI-CV-GW23-196-0819	EtFOSAA

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification is not verified for samples reviewed at a Stage 2B validation level. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-1.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification is not verified for samples reviewed at a Stage 2B validation level. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM. None of the samples required dilution.

III.8. SYSTEM PERFORMANCE

System performance is not evaluated at a Stage 2B validation level.

Validated Sample Result Forms: 19-0741

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW23-130-0819 **Lab Sample Name:** I6192-FS **Sample Date:** 08/08/2019 11:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.41	5.1	0.41	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.41	5.1	0.41	NG_L	U	U	
Adona	919005-14-4	1	0.41	5.1	0.41	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.41	5.1	0.41	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.02	5.1	1.02	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.04	5.1	2.04	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	3.06	5.1	0.51	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.51	5.1	0.51	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.51	5.1	0.51	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.51	5.1	0.51	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	1.61	5.1	0.41	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	7.17	5.1	0.51	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	1.02	5.1	1.02	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.51	5.1	0.51	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.15	5.1	0.51	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.02	5.1	1.02	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.51	5.1	0.51	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.02	5.1	1.02	NG_L	U	U	

Field ID: WI-CV-EB09-080919 **Lab Sample Name:** I6193-FS **Sample Date:** 08/09/2019 18:20

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	U	

Field ID: WI-CV-GW23-147-0819 **Lab Sample Name:** I6194-FS **Sample Date:** 08/09/2019 09:20

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.37	4.63	0.37	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.37	4.63	0.37	NG_L	U	U	
Adona	919005-14-4	1	0.37	4.63	0.37	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.37	4.63	0.37	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.16	4.63	0.46	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.37	4.63	0.37	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.46	4.63	0.46	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.93	4.63	0.93	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.93	4.63	0.93	NG_L	U	U	

Field ID: WI-CV-GW23-168-0819 **Lab Sample Name:** I6195-FS **Sample Date:** 08/09/2019 14:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	UJ	OT

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.2	4.81	0.48	NG_L	J	J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.17	4.81	0.48	NG_L	J	J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	J	UJ	EBL
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	J	UJ	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	UJ	OT

Field ID: WI-CV-GW23-196-0819 **Lab Sample Name:** I6196-FS **Sample Date:** 08/10/2019 12:05

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/03/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.39	4.9	0.39	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.39	4.9	0.39	NG_L	U	U	
Adona	919005-14-4	1	0.39	4.9	0.39	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.39	4.9	0.39	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.49	4.9	0.49	NG_L	J	U	MBL

Analysis Method *PFAS_QSM5.1*

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.98	4.9	0.98	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.98	4.9	0.98	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-0838

Prepared for

CH2M Hill

06 February 2020

MEC^X, Inc.
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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-0838

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 10

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-082919	I7846-FS	W	08/29/2019 15:20	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-083019	I7848-FS	W	08/30/2019 14:15	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-090419	I7849-FS	W	09/04/2019 13:30	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-090519	I7852-FS	W	09/05/2019 13:50	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-090419	I7850-FS	W	09/04/2019 11:00	PFAS_QSM5.1	Stage 2B
WI-CV-FB04-082919	I7847-FS	W	08/29/2019 13:45	PFAS_QSM5.1	Stage 2B
WI-CV-GW22-133-0819	I7843-FS	W	08/29/2019 13:20	PFAS_QSM5.1	Stage 2B
WI-CV-GW22-164-0819	I7844-FS	W	08/30/2019 12:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW22-181-0819	I7845-FS	W	09/04/2019 11:55	PFAS_QSM5.1	Stage 4
WI-CV-GW22-194-0919	I7851-FS	W	09/05/2019 13:30	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-0838:

- The laboratory received the samples in this SDG within the SAP temperature limits of ≤10 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted floating particulates present in samples WI-CV-GW22-133-0819, WI-CV-GW22-164-0819 and WI-CV-GW22-181-0819. The particulates in sample WI-CV-GW22-164-0819 clogged the top filter of the solid phase extraction (SPE) cartridge during extraction. The filter was "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. Although the laboratory indicated that "the effect on sample results was not considered significant," the reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence. Several results were subsequently qualified for other issues.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

L. Calvin of MEC[X] reviewed the SDG on February 3, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

II.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

II.2. CALIBRATION

Calibration criteria were met.

II.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

II.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

II.3. QUALITY CONTROL SAMPLES

II.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. The method blank had a detect <1/2 the LOQ in the method blank for PFOA (0.48 ng/L). The sample result for PFOA in sample WI-CV-GW22-181-0819 was qualified as a nondetect (U) at the level of contamination.

II.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

II.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on a sample in this SDG. MEC[X] evaluated method accuracy based on the LCS results.

II.4. FIELD QC SAMPLES

MEC[X] evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC[X] used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

II.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Samples WI-CV-FB04-082919 and WI-CV-FB01-090419 were identified as the field blanks, and samples WI-CV-EB01-082919, WI-CV-EB01-083019, WI-CV-EB01-090419 and WI-CV-EB01-090519 were identified as equipment blanks associated with the site samples collected on the respective dates. Equipment blank WI-CV-EB01-090419 had a detect above the DL and <1/2 the LOQ for PFHxA (0.21 ng/L). The result for PFHxA in sample WI-CV-GW22-181-0819 was >10× the equipment blank concentration and required no qualification. The remaining samples had no detects for PFHxA. The field blanks and remaining equipment blanks had no detects above the DL.

II.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

II.5. INTERNAL STANDARDS PERFORMANCE

II.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers were qualified as estimated (UJ for nondetects and J for detects). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C5-PFHxA	42% 43% 44%	WI-CV-GW22-133-0819 WI-CV-GW22-164-0819 WI-CV-GW22-181-0819	PFHxA
13C9-PFNA	34%	WI-CV-GW22-164-0819	PFNA
13C6-PFDA	23%		PFDA
13C7-PFUnA	24%		PFUnA
13C2-PFDoA	25%		PFDoA
13C2-PFTeDA	30%		PFTeDA, PFTrDA
d3-MeFOSAA	13%		MeFOSAA
D5-EtFOSAA	22%		EtFOSAA
13C3-HFPO-DA	45% 44% 37% 45%	WI-CV-GW22-133-0819 WI-CV-GW22-164-0819 WI-CV-GW22-181-0819 WI-CV-GW22-194-0919	HFPO-DA

II.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

Compound Identification

Compound identification was verified for the sample reviewed at a Stage 4 validation level: WI-CV-GW22-181-0819. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

II.6. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the sample listed above reviewed at a Stage 4 validation level. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM. None of the samples required dilution.

II.7. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-0838

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW22-133-0819 **Lab Sample Name:** I7843-FS **Sample Date:** 08/29/2019 13:20

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	U	

Field ID: WI-CV-GW22-164-0819 **Lab Sample Name:** I7844-FS **Sample Date:** 08/30/2019 12:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	UJ	ISL

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	UJ	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	U	UJ	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	UJ	ISL

Field ID: WI-CV-GW22-181-0819 **Lab Sample Name:** I7845-FS **Sample Date:** 09/04/2019 11:55

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	9.63	4.72	0.47	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.49	4.72	0.47	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	2.3	4.72	0.38	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	28.92	4.72	0.47	NG_L		J	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.72	0.47	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	U	

Field ID: WI-CV-EB01-082919 **Lab Sample Name:** I7846-FS **Sample Date:** 08/29/2019 15:20

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.42	5.21	0.42	NG_L	U	U	

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-1	1	0.42	5.21	0.42	NG_L	U	U
Adona	919005-14-4	1	0.42	5.21	0.42	NG_L	U	U
HFPO-DA	13252-13-6	1	0.42	5.21	0.42	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.04	5.21	1.04	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.08	5.21	2.08	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.52	5.21	0.52	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.52	5.21	0.52	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.52	5.21	0.52	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.52	5.21	0.52	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.42	5.21	0.42	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.52	5.21	0.52	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	1.04	5.21	1.04	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.52	5.21	0.52	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.52	5.21	0.52	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.04	5.21	1.04	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.52	5.21	0.52	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.04	5.21	1.04	NG_L	U	U

Field ID: WI-CV-FB04-082919 **Lab Sample Name:** I7847-FS **Sample Date:** 08/29/2019 13:45

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.4	5	0.4	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.4	5	0.4	NG_L	U	U	
Adona	919005-14-4	1	0.4	5	0.4	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.4	5	0.4	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1	5	1	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2	5	2	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.5	5	0.5	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.5	5	0.5	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.5	5	0.5	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.5	5	0.5	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.4	5	0.4	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.5	5	0.5	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	1	5	1	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.5	5	0.5	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.5	5	0.5	NG_L	U	U	

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1	5	1	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.5	5	0.5	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1	5	1	NG_L	U	U

Field ID: WI-CV-EB01-083019 **Lab Sample Name:** I7848-FS **Sample Date:** 08/30/2019 14:15

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	U	

Field ID: WI-CV-EB01-090419 **Lab Sample Name:** I7849-FS **Sample Date:** 09/04/2019 13:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.44	5.56	0.44	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.44	5.56	0.44	NG_L	U	U	
Adona	919005-14-4	1	0.44	5.56	0.44	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.44	5.56	0.44	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.11	5.56	1.11	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.22	5.56	2.22	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.56	5.56	0.56	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.56	5.56	0.56	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.56	5.56	0.56	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.56	5.56	0.56	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.44	5.56	0.44	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.21	5.56	0.56	NG_L	J	J
Perfluorononanoic acid (PFNA)	375-95-1	1	1.11	5.56	1.11	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.56	5.56	0.56	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.56	5.56	0.56	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.11	5.56	1.11	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.56	5.56	0.56	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.11	5.56	1.11	NG_L	U	U

Field ID: WI-CV-FB01-090419 **Lab Sample Name:** I7850-FS **Sample Date:** 09/04/2019 11:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.42	5.21	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.42	5.21	0.42	NG_L	U	U	
Adona	919005-14-4	1	0.42	5.21	0.42	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	5.21	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.04	5.21	1.04	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.08	5.21	2.08	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.52	5.21	0.52	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.42	5.21	0.42	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	1.04	5.21	1.04	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.52	5.21	0.52	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.04	5.21	1.04	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.52	5.21	0.52	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.04	5.21	1.04	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW22-194-0919 **Lab Sample Name:** I7851-FS **Sample Date:** 09/05/2019 13:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.72	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	U	

Field ID: WI-CV-EB01-090519 **Lab Sample Name:** I7852-FS **Sample Date:** 09/05/2019 13:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/06/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.36	4.46	0.36	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.36	4.46	0.36	NG_L	U	U	
Adona	919005-14-4	1	0.36	4.46	0.36	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.36	4.46	0.36	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.45	4.46	0.45	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	**U**
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.45	4.46	0.45	NG_L	U	**U**
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	**U**
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.45	4.46	0.45	NG_L	U	**U**
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.45	4.46	0.45	NG_L	U	**U**
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.89	4.46	0.89	NG_L	U	**U**
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	**U**
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.89	4.46	0.89	NG_L	U	**U**

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-0872

Prepared for

CH2M Hill

07 February 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-0872

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 5

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-091019	I8101-FS	W	09/10/2019 11:20	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-091119	I8102-FS	W	09/11/2019 14:40	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-091119	I8103-FS	W	09/11/2019 11:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW21-115-0919	I8092-FS	W	09/10/2019 11:25	PFAS_QSM5.1	Stage 2B
WI-CV-GW21-160-0919	I8093-FS	W	09/11/2019 13:40	PFAS_QSM5.1	Stage 4

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-0872:

- The laboratory received the samples in this SDG within the SAP temperature limits of ≤10 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- Seven soil site samples included on the COC for this SDG were reported in SDG 19-0873.
- The laboratory's QA/QC Summary (case narrative) noted floating particulates present in sample WI-CV-GW21-115-0919 clogged the top filter of the solid phase extraction (SPE) cartridge during extraction. The filter was "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. Although the laboratory indicated that "the effect on sample results was not considered significant," the reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence. Several results were subsequently qualified for other issues.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on February 7, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. The method blank had a detect <1/2 the LOQ for PFOA (0.33 µg/L). Sample results for PFOA were qualified as nondetects (U) at the level of contamination if detected above the LOD, or at the LOD if detected below.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on a sample in this SDG. Accuracy was evaluated based upon LCS results.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-090419 (SDG 19-0838) and WI-CV-FB01-091119 were identified as the field blanks, and samples WI-CV-EB01-091019 and WI-CV-EB01-091119 were identified as equipment blanks associated with the site samples in this SDG. Equipment blank WI-CV-EB01-091019 also had a detect for PFOS (0.53 ng/L); however, the concentration in associated sample WI-CV-GW21-115-0919 exceeded 10× the equipment blank concentration and required no qualification. The field blanks and remaining equipment blanks had no other reportable detects above the DL.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers, were qualified as estimated (UJ for nondetects and J for detects). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C5-PFHxA	30% 35%	WI-CV-GW21-115-0919 WI-CV-GW21-160-0919	PFHxA
13C4-PFHpA	38% 42%		PFHpA
13C-PFOA	40%	WI-CV-GW21-115-0919	PFOA
13C9-PFNA	46%		PFNA
13C6-PFDA	37%		PFDA
13C7-PFUnA	38%		PFUnA
13C2-PFDoA	39%		PFDoA
d3-MeFOSAA	22%		MeFOSAA
D5-EtFOSAA	28%		EtFOSAA
13C3-HFPO-DA	36% 31%	WI-CV-GW21-115-0919 WI-CV-GW21-160-0919	HFPO-DA

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard

recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the sample reviewed at a Stage 4 validation level: WI-CV-GW22-181-0819. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the sample listed above reviewed at a Stage 4 validation level. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM. None of the samples required dilution.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-0872

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW21-115-0919 **Lab Sample Name:** I8092-FS **Sample Date:** 09/10/2019 11:25

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/07/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.36	4.46	0.36	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.36	4.46	0.36	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.36	4.46	0.36	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.36	4.46	0.36	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.79	4.46	1.79	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	16.41	4.46	0.45	NG_L		J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.21	4.46	0.45	NG_L	J	J	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	1.09	4.46	0.36	NG_L	J	J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	136.46	4.46	0.45	NG_L		J	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	4.55	4.46	0.45	NG_L		J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.6	4.46	0.45	NG_L	J	UJ	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.89	4.46	0.89	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.89	4.46	0.89	NG_L	U	UJ	ISL

Field ID: WI-CV-GW21-160-0919 **Lab Sample Name:** I8093-FS **Sample Date:** 09/11/2019 13:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/07/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.36	4.46	0.36	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.36	4.46	0.36	NG_L	U	U	
Adona	919005-14-4	1	0.36	4.46	0.36	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.36	4.46	0.36	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.4	4.46	0.45	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.64	4.46	0.45	NG_L	J	J	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.38	4.46	0.45	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.45	4.46	0.45	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.89	4.46	0.89	NG_L	U	U	

Field ID: WI-CV-EB01-091019 **Lab Sample Name:** I8101-FS **Sample Date:** 09/10/2019 11:20

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/07/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.36	4.46	0.36	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.36	4.46	0.36	NG_L	U	U	
Adona	919005-14-4	1	0.36	4.46	0.36	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.36	4.46	0.36	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.53	4.46	0.45	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.45	4.46	0.45	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.89	4.46	0.89	NG_L	U	U	

Field ID: WI-CV-EB01-091119 **Lab Sample Name:** I8102-FS **Sample Date:** 09/11/2019 14:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/07/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.36	4.46	0.36	NG_L	U	U	

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-1	1	0.36	4.46	0.36	NG_L	U	U	
Adona	919005-14-4	1	0.36	4.46	0.36	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.36	4.46	0.36	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.45	4.46	0.45	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.89	4.46	0.89	NG_L	U	U	

Field ID: WI-CV-FB01-091119 **Lab Sample Name:** I8103-FS **Sample Date:** 09/11/2019 11:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 02/07/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.4	5	0.4	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.4	5	0.4	NG_L	U	U	
Adona	919005-14-4	1	0.4	5	0.4	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.4	5	0.4	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1	5	1	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2	5	2	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.5	5	0.5	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.5	5	0.5	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.5	5	0.5	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.5	5	0.5	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.4	5	0.4	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.5	5	0.5	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	1	5	1	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.5	5	0.5	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.5	5	0.5	NG_L	J	U	MBL

Analysis Method *PFAS_QSM5.1*

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1	5	1	NG_L	U	**U**
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.5	5	0.5	NG_L	U	**U**
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1	5	1	NG_L	U	**U**

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-0954

Prepared for

CH2M Hill

10 February 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

TABLE OF CONTENTS

TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-0954

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B

No. of Samples: 4

No. of Reanalyses/Dilutions: 1

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-092219	I8616-FS	W	09/22/2019 15:30	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-092219	I8617-FS	W	09/22/2019 15:15	PFAS_QSM5.1	Stage 2B
WI-CV-GW25-131-0919	I8618-FS	W	09/22/2019 12:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW25-155-0919	I8619-FS	W	09/22/2019 17:00	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-0954:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on February 10, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blank (analyzed after the high point of the initial calibration) for PFTrDA on 10/02/2020 and 10/03/2020 (0.44 ng/L, 0.44 ng/L) indicated minimal carryover potential (see Compound Quantification and Reported Detection Limits section). PFOA was detected in the method blank at 0.30 ng/L. Sample data was either nondetect or >10× the concentration detected in the method blank and no qualifiers were required.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on samples in this SDG.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-092219 was identified as the field blank, and sample WI-CV-EB01-092219 was identified as equipment blank associated with the site samples. The field and equipment blanks had no target analyte detects above the DLs.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Extracted internal standard recoveries were within the QSM 5.1 control limits of 50-150% of the true value.

It was noticed that sample WI-CV-GW25-155-0919, was analyzed at a dilution for analytes PFOA and PFHxA, and the recoveries of the respective extracted internal standards, 13C8-PFOA and 13C5-PFHxA, were appropriately reported from this dilution analysis. The extracted internal standards associated with target compounds PFHpA, PFNA, and HFPO-DA, were also reported from the dilution analyses (performed for PFOA). The recoveries were reported from the dilution for PFOA to minimize interference with the injected internal standard that may have been present due to the concentration of the native PFOA in the sample. Though not reported, the recoveries of the extracted internal standards used to generate the results were within the QSM 5.1 control limits of 50-150% of the true value.

The work plan specifies that 13C2-PFDoA is the extracted internal standard to be used for the quantitation of 11Cl-PF3OUdS. In the calibration and analysis for these samples, 13C3-HFPO-DA was used as the extracted internal standards for this analyte. No qualifiers were applied for this deviation

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification is not verified at a Stage 2B validation level. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification is not verified at a Stage 2B validation level. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric

forms for the PFASs with linear and branched isomers as required by the DoD QSM.

All samples were initially analyzed undiluted. Sample WI-CV-GW25-155-0919 was subsequently analyzed at a 3.33× dilution for quantitation of PFHxA and PFOA and reporting limits were elevated accordingly. All other results were reported from the undiluted analyses.

III.8. SYSTEM PERFORMANCE

No system performance is not evaluated at Stage 2B.

Validated Sample Result Forms: 19-0954

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-092219 **Lab Sample Name:** I8616-FS **Sample Date:** 09/22/2019 15:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.33	4.17	0.33	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.33	4.17	0.33	NG_L	U	U	
Adona	919005-14-4	1	0.33	4.17	0.33	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.33	4.17	0.33	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.83	4.17	0.83	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.67	4.17	1.67	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.17	0.42	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.33	4.17	0.33	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.17	0.42	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.83	4.17	0.83	NG_L	U	U	

Field ID: WI-CV-FB01-092219 **Lab Sample Name:** I8617-FS **Sample Date:** 09/22/2019 15:15

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.4	5	0.4	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.4	5	0.4	NG_L	U	U	
Adona	919005-14-4	1	0.4	5	0.4	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.4	5	0.4	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1	5	1	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2	5	2	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.5	5	0.5	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.5	5	0.5	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.5	5	0.5	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.5	5	0.5	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.4	5	0.4	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.5	5	0.5	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	1	5	1	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.5	5	0.5	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.5	5	0.5	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1	5	1	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.5	5	0.5	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1	5	1	NG_L	U	U

Field ID: WI-CV-GW25-131-0919 **Lab Sample Name:** I8618-FS **Sample Date:** 09/22/2019 12:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	12.63	4.81	0.48	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	13.44	4.81	0.48	NG_L			
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	43.26	4.81	0.38	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	46.93	4.81	0.48	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	13.42	4.81	0.48	NG_L			
Perfluorooctanoic acid (PFOA)	335-67-1	1	43.78	4.81	0.48	NG_L			
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	U	

Field ID: WI-CV-GW25-155-0919 **Lab Sample Name:** I8619-FS **Sample Date:** 09/22/2019 17:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.72	0.38	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-1	1	0.38	4.72	0.38	NG_L	U	**U**
Adona	919005-14-4	1	0.38	4.72	0.38	NG_L	U	**U**
HFPO-DA	13252-13-6	1	0.38	4.72	0.38	NG_L	U	**U**
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	**U**
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.89	4.72	1.89	NG_L	U	**U**
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	35.98	4.72	0.47	NG_L		
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	**U**
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	**U**
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	20.24	4.72	0.47	NG_L		
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	44.52	4.72	0.38	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	**U**
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	4.02	4.72	0.47	NG_L	J	**J**
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.94	4.72	0.94	NG_L	U	**U**
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	**U**
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.94	4.72	0.94	NG_L	U	**U**
Perfluorohexanoic Acid (PFHxA)	307-24-4	3.33	63.25	15.72	1.57	NG_L	D	
Perfluorooctanoic acid (PFOA)	335-67-1	3.33	181.65	15.72	1.57	NG_L	D	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1048

Prepared for

CH2M Hill

10 December 2019

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1048

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 19

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-101519	I9503-FS	W	10/15/2019 16:48	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-101619	I9512-FS	W	10/16/2019 14:50	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-101719	I9518-FS	W	10/17/2019 18:30	PFAS_QSM5.1	Stage 2B
WI-CV-EB02-101519	I9504-FS	W	10/15/2019 17:05	PFAS_QSM5.1	Stage 2B
WI-CV-EB03-101519	I9505-FS	W	10/15/2019 18:10	PFAS_QSM5.1	Stage 2B
WI-CV-EB04-101519	I9506-FS	W	10/15/2019 17:42	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-101519	I9507-FS	W	10/15/2019 17:14	PFAS_QSM5.1	Stage 2B
WI-CV-GW01M-1019	I9519-FS	W	10/17/2019 16:35	PFAS_QSM5.1	Stage 2B
WI-CV-GW01MP-1019	I9520-FS	W	10/17/2019 16:45	PFAS_QSM5.1	Stage 2B
WI-CV-GW02M-1019	I9508-FS	W	10/15/2019 17:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW02S-1019	I9509-FS	W	10/15/2019 15:34	PFAS_QSM5.1	Stage 4
WI-CV-GW08M-1019	I9521-FS	W	10/17/2019 14:30	PFAS_QSM5.1	Stage 2B
WI-CV-GW08S-1019	I9522-FS	W	10/17/2019 13:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW13M-1019	I9523-FS	W	10/17/2019 10:45	PFAS_QSM5.1	Stage 2B
WI-CV-GW14M-1019	I9513-FS	W	10/16/2019 11:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW15M-1019	I9514-FS	W	10/16/2019 10:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW15S-1019	I9515-FS	W	10/16/2019 12:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW16M-1019	I9516-FS	W	10/16/2019 15:50	PFAS_QSM5.1	Stage 4
WI-CV-GW16S-1019	I9517-FS	W	10/16/2019 14:15	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1048:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The case narrative noted a small piece of plastic was present in the container of sample WI-CV-EB01-101519.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on December 10, 2019

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), *EPA Method 537.1,* the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% for the lowest level of each initial calibration and 75-125% for the remaining levels and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 75-125%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries were within the control limits of 75-125%, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blank (analyzed after the high point of the initial calibration) for PFBS, PFDA, PFDoA, PFHxS and PFTrDA indicated minimal carryover potential (see Compound Quantification and Reported Detection Limits section). The method blank (analyzed after the instrument blank), with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on sample WI-CV-GW02S-1019. Recoveries and RPDs were not evaluated for the following analytes detected in the parent sample at concentrations >4× the spiked amount: PFHxA, PFHxS, PFHpA, PFOA and PFBS. PFOS was recovered below the SAP control limits of 70-130% in the

MS (64%) and above the control limits in the MSD (153%). The parent sample result for PFOS was qualified as estimated (J), and due to the recovery discrepancy, bias was not assigned. The RPD exceeded the control limit (82%). The result was qualified as estimated (J) for the RPD outlier. Remaining recoveries were within the SAP control limits of 70-130%, and remaining RPDs were within the SAP control limit of ≤30%.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-101519 was identified as the field blank, and samples WI-CV-EB01-101519, WI-CV-EB02-101519, WI-CV-EB03-101519, WI-CV-EB04-101519, WI-CV-EB01-101619 and WI-CV-EB01-101719 were identified as equipment blanks associated with the site samples. Equipment blank WI-CV-EB01-101519 had detects below the LOQ for PFHxS (0.65 ng/L) and PFOS (1.37 ng/L), and equipment blanks WI-CV-EB01-101619 and WI-CV-EB01-101719 had detects below the LOQ for PFHxS (0.11 ng/L in both). The detect for PFOS in associated sample WI-CV-GW02S-1019 exceeded 10× the equipment blank concentration and required no qualification. The detect below the LOQ and above the LOD for PFHxS in sample WI-CV-GW08M-1019 was qualified as a nondetect (U) at the level of contamination. The field blank and remaining equipment blanks had no target analyte detects above the DLs.

III.4.2. *FIELD DUPLICATES*

Samples WI-CV-GW01M-1019 and WI-CV-GW01MP-1019 were identified as field duplicate samples. PFOA was detected below the LOQ in the field duplicate. The parent sample had no detects above the DL. The results for PFOA not detected in the parent sample and detected below the LOQ in the duplicate were within the reasonable control limit of ±LOQ. The pair was in good agreement.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers, all nondetects, were qualified as estimated (UJ). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C6-PFDA	45% 34%	WI-CV-GW01MP-1019 WI-CV-GW08S-1019	PFDA
13C7-PFUnA	49% 43% 45% 29%	WI-CV-GW16S-1019 WI-CV-GW01M-1019 WI-CV-GW01MP-1019 WI-CV-GW08S-1019	PFUnA

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFDoA	48%	WI-CV-EB01-101519	PFDoA
	44%	WI-CV-GW02S-1019	
	35%	WI-CV-GW08S-1019	
13C2-PFTeDA	48%	WI-CV-EB01-101519	PFTeDA
d3-MeFOSAA	28%	WI-CV-EB01-101519	MeFOSAA
	44%	WI-CV-GW02M-1019	
	36%	WI-CV-GW15S-1019	
	31%	WI-CV-GW16S-1019	
	31%	WI-CV-GW01M-1019	
	29%	WI-CV-GW01MP-1019	
	24%	WI-CV-GW08S-1019	
D5-EtFOSAA	40%	WI-CV-GW15S-1019	EtFOSAA
	32%	WI-CV-GW16S-1019	
	29%	WI-CV-GW01M-1019	
	30%	WI-CV-GW01MP-1019	
	23%	WI-CV-GW08S-1019	
13C3-HFPO-DA	30%	WI-CV-GW15M-1019	HFPO-DA
	23%	WI-CV-GW08M-1019	

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at a Stage 4 validation level: WI-CV-GW02S-1019 and WI-CV-GW16M-1019. The laboratory analyzed for 18 perfluorinated compounds by EPA Method 537.1, modified. (The laboratory modified the method to analyze groundwater.) Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by EPA Method 537.1 and the DoD QSM.

All samples were initially analyzed undiluted. The following samples were reanalyzed at one or more dilutions to report specific analytes within the linear range of the calibration: 5× dilutions of samples WI-CV-GW02S-1019 (PFHpA, PFBS and PFOS), WI-CV-GW15S-1019, WI-CV-GW16M-1019 and WI-CV-GW16S-1019 (PFOA, PFHxS), WI-CV-GW13M-1019 (PFBS, PFHxA and PFHxS); 12.5× dilution of sample WI-CV-GW02S-1019 (PFHxA and PFOA); and 78.1× dilution of sample WI-CV-GW02S-1019 (PFHxS). All other results were reported from the undiluted analyses.

Analyses immediately following undiluted samples with results above the linear range of the calibration were examined for potential carryover; however, the instrument run logs indicated dilutions of the same samples were analyzed in succession (e.g. 5×, 12.5× and 78.1× dilution analyses of sample CV-GW02S-1019 were analyzed immediately following the undiluted analysis of the same sample). In addition, the highest sample concentrations reported from undiluted analyses were checked and found to be well below the upper calibration range; therefore, carryover was not considered an issue.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-1048

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-101519 **Lab Sample Name:** I9503-FS **Sample Date:** 10/15/2019 16:48

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.47	4.72	0.47	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.94	4.72	0.94	NG_L	U	U	
Adona	919005-14-	1	0.94	4.72	0.94	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.47	4.72	0.47	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.94	4.72	0.94	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.65	4.72	0.38	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.42	4.72	1.42	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.37	4.72	0.94	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.42	4.72	1.42	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.89	4.72	1.89	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.47	4.72	0.47	NG_L	U	U	

Field ID: WI-CV-EB02-101519 **Lab Sample Name:** I9504-FS **Sample Date:** 10/15/2019 17:05

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-EB03-101519 **Lab Sample Name:** I9505-FS **Sample Date:** 10/15/2019 18:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.48	4.81	0.48	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.96	4.81	0.96	NG_L	U	U	
Adona	919005-14-	1	0.96	4.81	0.96	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.48	4.81	0.48	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.44	4.81	1.44	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.44	4.81	1.44	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.48	4.81	0.48	NG_L	U	U	

Field ID: WI-CV-EB04-101519 **Lab Sample Name:** I9506-FS **Sample Date:** 10/15/2019 17:42

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.37	4.63	0.37	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U

Field ID: WI-CV-FB01-101519 **Lab Sample Name:** I9507-FS **Sample Date:** 10/15/2019 17:14

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-GW02M-1019 **Lab Sample Name:** I9508-FS **Sample Date:** 10/15/2019 17:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U	

Field ID: WI-CV-GW02S-1019 **Lab Sample Name:** I9509-FS **Sample Date:** 10/15/2019 15:34

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	12.5	429.78	55.8	16.74	NG_L	D		
Perfluorooctanoic acid (PFOA)	335-67-1	12.5	526.24	55.8	16.74	NG_L	D		
Perfluorobutanesulfonic acid (PFBS)	375-73-5	5	183.62	22.32	2.23	NG_L	D		
Perfluoroheptanoic acid (PFHpA)	375-85-9	5	141.25	22.32	4.46	NG_L	D		
Perfluorooctane Sulfonate (PFOS)	1763-23-1	5	97.3	22.32	4.46	NG_L	D	J	MDP
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	78.13	4514.36	348.77	27.9	NG_L	D		

Field ID: WI-CV-EB01-101619 **Lab Sample Name:** I9512-FS **Sample Date:** 10/16/2019 14:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.11	4.63	0.37	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-GW14M-1019 **Lab Sample Name:** I9513-FS **Sample Date:** 10/16/2019 11:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.55	0.45	NG_L	U	U	

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-	1	0.91	4.55	0.91	NG_L	U	U
Adona	919005-14-	1	0.91	4.55	0.91	NG_L	U	U
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	32.32	4.55	0.45	NG_L		
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	12.64	4.55	0.91	NG_L		
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	39.28	4.55	0.36	NG_L		
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	62.49	4.55	1.36	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.55	0.91	NG_L	J	J
Perfluorooctanoic acid (PFOA)	335-67-1	1	68.63	4.55	1.36	NG_L		
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-GW15M-1019 **Lab Sample Name:** I9514-FS **Sample Date:** 10/16/2019 10:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	8.12	4.55	0.45	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	2.09	4.55	0.91	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	13.6	4.55	0.36	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	8.07	4.55	1.36	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	5.35	4.55	1.36	NG_L			

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-GW15S-1019 **Lab Sample Name:** I9515-FS **Sample Date:** 10/16/2019 12:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	16.28	4.55	0.45	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	3.91	4.55	0.91	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	47.73	4.55	1.36	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.61	4.55	0.91	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	5	355.74	22.73	1.82	NG_L	D		
Perfluorooctanoic acid (PFOA)	335-67-1	5	101.63	22.73	6.82	NG_L	D		

Field ID: WI-CV-GW16M-1019 **Lab Sample Name:** I9516-FS **Sample Date:** 10/16/2019 15:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.47	4.72	0.47	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.94	4.72	0.94	NG_L	U	U	
Adona	919005-14-	1	0.94	4.72	0.94	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.47	4.72	0.47	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	24.12	4.72	0.47	NG_L			

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	25.74	4.72	0.94	NG_L		
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	70.48	4.72	1.42	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	4.93	4.72	0.94	NG_L		
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.89	4.72	1.89	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.47	4.72	0.47	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	5	121.38	23.58	1.89	NG_L	D	
Perfluorooctanoic acid (PFOA)	335-67-1	5	181.41	23.58	7.08	NG_L	D	

Field ID: WI-CV-GW16S-1019 **Lab Sample Name:** I9517-FS **Sample Date:** 10/16/2019 14:15

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	18.87	4.63	0.46	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	21.98	4.63	0.93	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	54.27	4.63	1.39	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.33	4.63	0.93	NG_L	J	J	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	2.79	4.63	0.93	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	5	160.52	23.15	1.85	NG_L	D		
Perfluorooctanoic acid (PFOA)	335-67-1	5	211.5	23.15	6.94	NG_L	D		

Field ID: WI-CV-EB01-101719 **Lab Sample Name:** I9518-FS **Sample Date:** 10/17/2019 18:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.11	4.63	0.37	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U

Field ID: WI-CV-GW01M-1019 **Lab Sample Name:** I9519-FS **Sample Date:** 10/17/2019 16:35

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.49	4.9	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.98	4.9	0.98	NG_L	U	U	
Adona	919005-14-	1	0.98	4.9	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.47	4.9	1.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.47	4.9	1.47	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	UJ	ISL

Field ID: WI-CV-GW01MP-1019 **Lab Sample Name:** I9520-FS **Sample Date:** 10/17/2019 16:45

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.48	4.81	0.48	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.96	4.81	0.96	NG_L	U	U	
Adona	919005-14-	1	0.96	4.81	0.96	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.48	4.81	0.48	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.44	4.81	1.44	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.93	4.81	1.44	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.48	4.81	0.48	NG_L	U	UJ	ISL

Field ID: WI-CV-GW08M-1019 **Lab Sample Name:** I9521-FS **Sample Date:** 10/17/2019 14:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	1.45	4.46	0.45	NG_L	J	J	

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.75	4.46	0.36	NG_L	J	U	EBL
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.77	4.46	0.89	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U	

Field ID: WI-CV-GW08S-1019 **Lab Sample Name:** I9522-FS **Sample Date:** 10/17/2019 13:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.71	4.46	0.45	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.17	4.46	0.89	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	12.08	4.46	0.36	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.06	4.46	1.34	NG_L	J	J	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	2.46	4.46	1.34	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	UJ	ISL

Field ID: WI-CV-GW13M-1019 **Lab Sample Name:** I9523-FS **Sample Date:** 10/17/2019 10:45

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 10 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.49	4.9	0.49	NG_L	U	U	

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-	1	0.98	4.9	0.98	NG_L	U	**U**
Adona	919005-14-	1	0.98	4.9	0.98	NG_L	U	**U**
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	**U**
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	**U**
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	**U**
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	**U**
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	**U**
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	20.87	4.9	0.98	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	**U**
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.98	4.9	0.98	NG_L	U	**U**
Perfluorooctanoic acid (PFOA)	335-67-1	1	23.55	4.9	1.47	NG_L		
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	**U**
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	**U**
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	**U**
Perfluorobutanesulfonic acid (PFBS)	375-73-5	5	88.64	24.51	2.45	NG_L	D	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	5	45.23	24.51	1.96	NG_L	D	
Perfluorohexanoic Acid (PFHxA)	307-24-4	5	200.75	24.51	7.35	NG_L	D	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1051

Prepared for

CH2M Hill

10 February 2020

MEC^X, Inc.
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Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1051

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B

No. of Samples: 2

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-102119	I9623-FS	W	10/21/2019 11:30	PFAS_QSM5.1	Stage 2B
WI-CV-GW25-207-1019	I9622-FS	W	10/19/2019 16:00	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1051:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- Samples WI-CV-GW25-207-1019 was centrifuged to remove excess sedimentation from the sample.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on February 9, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. A detect for PFOA (0.49 ng/L) in the method blank. PFOA in the samples was qualified as nondetect at the level of contamination in sample WI-CV-GW27-207-1019 or the LOD in WI-CV-EB01-102119. The detect <1/2 the LOQ in the instrument blank for PFHxS (0.14 ng/L), analyzed directly after the high calibration standard, indicated minimal carryover potential.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on the sample in this SDG.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-101519 (SDG 10-1048) was identified as the field blank, and sample WI-CV-EB01-102119 was identified as equipment blank associated with the site sample. The equipment blank had a detect <1/2 LOQ for PFOA (0.46 ng/L) which was qualified for method blank contamination. The field blank had no target analyte detects above the DLs.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Extracted internal standard recoveries were within the QSM 5.1 control limits of 50-150% of the true value.

The work plan specifies that the extracted internal standards used for the quantitation of Adona, 9Cl-PF3ONS and 11Cl-PF3OUdS are 13C3-PFHxS, 13C9-PFNA and 13C2-PFDoA respectively. In the calibration and analysis for these samples, the extracted internal standards used for the quantitation of Adona, 9Cl-PF3ONS and 11Cl-PF3OUdS are 13C3-HFPO-DA, 13C8-PFOA and 13C3-HFPO-DA respectively. No qualifiers were applied for this deviation.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification is not verified at a Stage 2B validation level. The laboratory analyzed for 18 perfluorinated compounds an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification is not verified at a Stage 2B validation level. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM. None of the samples required dilution.

III.8. SYSTEM PERFORMANCE

System performance is not evaluated at Stage 2B.

Validated Sample Result Forms: 19-1051

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW25-207-1019 **Lab Sample Name:** I9622-FS **Sample Date:** 10/19/2019 16:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	5.43	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.43	5.43	0.43	NG_L	U	U	
Adona	919005-14-4	1	0.43	5.43	0.43	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	5.43	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.09	5.43	1.09	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	2.17	5.43	2.17	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	1.33	5.43	0.54	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.54	5.43	0.54	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.54	5.43	0.54	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.81	5.43	0.54	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.96	5.43	0.43	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.88	5.43	0.54	NG_L	J	J	
Perfluorononanoic acid (PFNA)	375-95-1	1	1.09	5.43	1.09	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	2	5.43	0.54	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.81	5.43	0.54	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.09	5.43	1.09	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.54	5.43	0.54	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	1.09	5.43	1.09	NG_L	U	U	

Field ID: WI-CV-EB01-102119 **Lab Sample Name:** I9623-FS **Sample Date:** 10/21/2019 11:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.38	4.81	0.38	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.38	4.81	0.38	NG_L	U	U	
Adona	919005-14-4	1	0.38	4.81	0.38	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.38	4.81	0.38	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.92	4.81	1.92	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.48	4.81	0.48	NG_L	J	U	MBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.96	4.81	0.96	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1061

Prepared for

CH2M Hill

13 December 2019

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1061

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 13

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-101819	I9672-FS	W	10/18/2019 15:00	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-101919	I9681-FS	W	10/19/2019 13:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW03D-1019	I9682-FS	W	10/19/2019 10:25	PFAS_QSM5.1	Stage 2B
WI-CV-GW03M-1019	I9683-FS	W	10/19/2019 12:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW04M-1019	I9684-FS	W	10/19/2019 11:35	PFAS_QSM5.1	Stage 4
WI-CV-GW04S-1019	I9685-FS	W	10/19/2019 14:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW04SP-1019	I9686-FS	W	10/19/2019 14:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW09M-1019	I9673-FS	W	10/18/2019 13:50	PFAS_QSM5.1	Stage 4
WI-CV-GW09MP-1019	I9674-FS	W	10/18/2019 13:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW10D-1019	I9675-FS	W	10/18/2019 16:25	PFAS_QSM5.1	Stage 2B
WI-CV-GW10M-1019	I9676-FS	W	10/18/2019 14:55	PFAS_QSM5.1	Stage 2B
WI-CV-GW12D-1019	I9677-FS	W	10/18/2019 11:15	PFAS_QSM5.1	Stage 2B
WI-CV-GW13S-1019	I9680-FS	W	10/18/2019 10:05	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1061:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The case narrative for this SDG noted sample WI-CV-GW04M-1019 clogged the top filter of the solid phase extraction (SPE) cartridge during extraction. The filter was "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. Although the laboratory indicated that "the effect on sample results was not considered significant," the reviewer qualified the site sample as estimated without bias due to the uncertainty in the effect and bias associated with the occurrence.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on December 13, 2019

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), *EPA Method 537.1,* the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% for the lowest level of each initial calibration and 75-125% for the remaining levels and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 75-125%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries were within the control limits of 75-125%, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blank (analyzed after the high point of the initial calibration) for PFDA, PFUnA, PFDoA, PFTrDA, PFBS and PFHxS indicated minimal carryover potential. The method blank (analyzed after the instrument blank), with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on sample WI-CV-GW12D-1019. Recoveries were within the SAP control limits of 70-130%, and RPDs were within the SAP control limit of ≤30%.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-101519 (SDG 19-1048) was identified as the field blank, and samples WI-CV-EB01-101819 and WI-CV-EB01-101919 were identified as equipment blanks associated with the site samples. Equipment blank WI-CV-EB01-101819 had a detect below the LOQ for PFHxA (0.63 ng/L). The detects for PFHxA in associated samples WI-CV-GW09M-1019 and WI-CV-GW09MP-1019 exceeded 10× the equipment blank concentration and required no qualification. The detect below the LOQ and above the LOD for PFHxA in sample WI-CV-GW10M-1019 was qualified as a nondetect (U) at the level of contamination. The field blank and remaining equipment blank had no target analyte detects above the DLs.

III.4.2. *FIELD DUPLICATES*

Samples WI-CV-GW09M-1019 / WI-CV-GW09MP-1019 and WI-CV-GW04S-1019 / WI-CV-GW04SP-1019 were identified as field duplicate pairs. All detected results were in common within each pair. The RPDs for results above the LOQ were within the control limit of ≤30%, and results below the LOQ in one or both samples were within the reasonable control limit of ±LOQ. The pairs were in good agreement.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analyte results associated with the internal standard outliers, all nondetects, were qualified as estimated (UJ). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C9-PFNA	41%	WI-CV-GW10M-1019	PFNA
13C6-PFDA	47% 30% 47%	WI-CV-GW10D-1019 WI-CV-GW10M-1019 WI-CV-GW12D-1019	PFDA
13C7-PFUnA	31% 45%	WI-CV-GW10M-1019 WI-CV-GW12D-1019	PFUnA
13C2-PFDoA	43%	WI-CV-GW10M-1019	PFDoA
d3-MeFOSAA	37% 41% 28% 33%	WI-CV-GW09M-1019 WI-CV-GW10D-1019 WI-CV-GW10M-1019 WI-CV-GW12D-1019	MeFOSAA

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
d5-EtFOSAA	35%	WI-CV-GW09M-1019	EtFOSAA
	44%	WI-CV-GW09MP-1019	
	38%	WI-CV-GW10D-1019	
	31%	WI-CV-GW10M-1019	
	33%	WI-CV-GW12D-1019	

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at a Stage 4 validation level: WI-CV-GW09M-1019 and WI-CV-GW04M-1019. The laboratory analyzed for 18 perfluorinated compounds by EPA Method 537.1, modified. (The laboratory modified the method to analyze groundwater.) Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by EPA Method 537.1 and the DoD QSM. None of the samples required dilution.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-1061

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-101819 **Lab Sample Name:** I9672-FS **Sample Date:** 10/18/2019 15:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.37	4.63	0.37	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.63	4.63	1.39	NG_L	J	J	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-GW09M-1019 **Lab Sample Name:** I9673-FS **Sample Date:** 10/18/2019 13:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.42	4.17	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.83	4.17	0.83	NG_L	U	U	
Adona	919005-14-	1	0.83	4.17	0.83	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	4.17	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	8.61	4.17	0.42	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.17	0.42	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.17	0.42	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.19	4.17	0.83	NG_L	J	J
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	3.83	4.17	0.33	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	34.48	4.17	1.25	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.83	4.17	0.83	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.83	4.17	0.83	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.37	4.17	1.25	NG_L	J	J
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.67	4.17	1.67	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.17	0.42	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.42	4.17	0.42	NG_L	U	U

Field ID: WI-CV-GW09MP-1019 **Lab Sample Name:** I9674-FS **Sample Date:** 10/18/2019 13:50

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.42	4.24	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.85	4.24	0.85	NG_L	U	U	
Adona	919005-14-	1	0.85	4.24	0.85	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	4.24	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.85	4.24	0.85	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	10.3	4.24	0.42	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.24	0.42	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.24	0.42	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.51	4.24	0.85	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	4.72	4.24	0.34	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	38.93	4.24	1.27	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.76	4.24	1.27	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.69	4.24	1.69	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.24	0.42	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.42	4.24	0.42	NG_L	U	U	

Field ID: WI-CV-GW10D-1019 **Lab Sample Name:** I9675-FS **Sample Date:** 10/18/2019 16:25

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.42	4.17	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.83	4.17	0.83	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Adona	919005-14-	1	0.83	4.17	0.83	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	4.17	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.42	4.17	0.42	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.17	0.42	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.17	0.42	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.33	4.17	0.33	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.25	4.17	1.25	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.25	4.17	1.25	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.67	4.17	1.67	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.17	0.42	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.42	4.17	0.42	NG_L	U	U	

Field ID: WI-CV-GW10M-1019 **Lab Sample Name:** I9676-FS **Sample Date:** 10/18/2019 14:55

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	3.04	4.46	0.45	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	3.91	4.46	0.36	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.38	4.46	1.34	NG_L	J	U	EBL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	UJ	ISL

Field ID: WI-CV-GW12D-1019 **Lab Sample Name:** I9677-FS **Sample Date:** 10/18/2019 11:15

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.44	4.39	0.44	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.88	4.39	0.88	NG_L	U	U	
Adona	919005-14-	1	0.88	4.39	0.88	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.44	4.39	0.44	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.44	4.39	0.44	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.88	4.39	0.88	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	1.65	4.39	0.35	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.32	4.39	1.32	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.88	4.39	0.88	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.88	4.39	0.88	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.32	4.39	1.32	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.75	4.39	1.75	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	ISL

Field ID: WI-CV-GW13S-1019 **Lab Sample Name:** I9680-FS **Sample Date:** 10/18/2019 10:05

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	2.61	4.63	0.46	NG_L	J	J	

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.66	4.63	0.37	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.82	4.63	0.93	NG_L	J	J
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U

Field ID: WI-CV-EB01-101919 **Lab Sample Name:** I9681-FS **Sample Date:** 10/19/2019 13:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U	

Field ID: WI-CV-GW03D-1019 **Lab Sample Name:** I9682-FS **Sample Date:** 10/19/2019 10:25

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.44	4.39	0.44	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-	1	0.88	4.39	0.88	NG_L	U	U
Adona	919005-14-	1	0.88	4.39	0.88	NG_L	U	U
HFPO-DA	13252-13-6	1	0.44	4.39	0.44	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.88	4.39	0.88	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.44	4.39	0.44	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.88	4.39	0.88	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.35	4.39	0.35	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.32	4.39	1.32	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.88	4.39	0.88	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.88	4.39	0.88	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.32	4.39	1.32	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.75	4.39	1.75	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.44	4.39	0.44	NG_L	U	U

Field ID: WI-CV-GW03M-1019 **Lab Sample Name:** I9683-FS **Sample Date:** 10/19/2019 12:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.14	4.46	0.45	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.72	4.46	0.36	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U

Field ID: WI-CV-GW04M-1019 **Lab Sample Name:** I9684-FS **Sample Date:** 10/19/2019 11:35

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.43	4.31	0.43	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-	1	0.86	4.31	0.86	NG_L	U	UJ	OT
Adona	919005-14-	1	0.86	4.31	0.86	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.43	4.31	0.43	NG_L	U	UJ	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.86	4.31	0.86	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.52	4.31	0.34	NG_L	J	J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.82	4.31	1.29	NG_L	J	J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.86	4.31	0.86	NG_L	U	UJ	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.19	4.31	1.29	NG_L	J	J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	UJ	OT

Field ID: WI-CV-GW04S-1019 **Lab Sample Name:** I9685-FS **Sample Date:** 10/19/2019 14:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.48	4.81	0.48	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.96	4.81	0.96	NG_L	U	U	
Adona	919005-14-	1	0.96	4.81	0.96	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.48	4.81	0.48	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.96	4.81	0.96	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.14	4.81	0.38	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.44	4.81	1.44	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.81	0.96	NG_L	J	J
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.44	4.81	1.44	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.92	4.81	1.92	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.48	4.81	0.48	NG_L	U	U

Field ID: WI-CV-GW04SP-1019 **Lab Sample Name:** I9686-FS **Sample Date:** 10/19/2019 14:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 13 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.13	4.63	0.37	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.79	4.63	0.93	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1062

Prepared for

CH2M Hill

16 December 2019

MEC^X, Inc.
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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1062

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 13

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-102019	I9691-FS	W	10/20/2019 13:00	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-102219	I9697-FS	W	10/22/2019 11:15	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-102219	I9698-FS	W	10/22/2019 09:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW01D-1019	I9692-FS	W	10/20/2019 13:35	PFAS_QSM5.1	Stage 2B
WI-CV-GW05M-1019	I9693-FS	W	10/20/2019 11:05	PFAS_QSM5.1	Stage 4
WI-CV-GW05S-1019	I9696-FS	W	10/20/2019 11:00	PFAS_QSM5.1	Stage 4
WI-CV-GW06M-1019	I9688-FS	W	10/19/2019 15:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW06MP-1019	I9689-FS	W	10/19/2019 15:40	PFAS_QSM5.1	Stage 2B
WI-CV-GW06S-1019	I9690-FS	W	10/19/2019 16:45	PFAS_QSM5.1	Stage 2B
WI-CV-GW07M-1019	I9699-FS	W	10/22/2019 10:35	PFAS_QSM5.1	Stage 2B
WI-CV-GW07S-1019	I9700-FS	W	10/22/2019 13:35	PFAS_QSM5.1	Stage 2B
WI-CV-GW11M-1019	I9701-FS	W	10/22/2019 10:10	PFAS_QSM5.1	Stage 2B
WI-CV-GW11S-1019	I9702-FS	W	10/22/2019 12:30	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1062:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The collection time of 10:20 listed on the COC for sample WI-CV-GW05M-1019MS did not match the collection times of the parent sample and MSD. An email dated 11/20/2019 corrected the collection time to 11:05.
- The case narrative noted floating particulate matter present in samples WI-CV-GW11M-1019 and WI-CV-GW11S-1019 not successfully removed by centrifuge, and sample WI-CV-GW07M-1019, also containing floating particulates, was not centrifuged.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

L. Calvin of MEC[X] reviewed the SDG on December 16, 2019

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), *EPA Method 537.1,* the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% for the lowest level of each initial calibration and 75-125% for the remaining levels and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 75-125%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries were within the control limits of 75-125%, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in one of two instrument blanks (analyzed after the high point of the initial calibration) for PFDA, PFUnA, PFDoA, PFTrDA, PFBS and PFHxS indicated minimal carryover potential (see Compound Quantification and Reported Detection Limits section). The method blank (analyzed after the instrument blanks), with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on sample WI-CV-GW05M-1019. Recoveries and RPDs were not evaluated for the following analytes detected in the parent sample at concentrations >4× the spiked amount or reported from the 12.5× dilution (considered diluted out at a 10× dilution or greater): PFHxA, PFHpA,

PFHxS, PFBS and PFOA. Remaining recoveries were within the SAP control limits of 70-130%, and remaining RPDs were within the SAP control limit of ≤30%.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Samples WI-CV-FB01-101519 (SDG 19-1048) and WI-CV-FB01-102219 were identified as the field blanks, and samples WI-CV-EB01-101919 (SDG 19-1061), WI-CV-EB01-102019 and WI-CV-EB01-102219 were identified as equipment blanks associated with the site samples. Field blank WI-CV-FB01-102219 and equipment blank WI-CV-EB01-102219 had detects below the LOQ for PFHxS (0.10 ng/L and 0.13 ng/L, respectively). The detect for PFHxS in associated sample WI-CV-GW07M-1019 exceeded 10× the equipment blank concentration and required no qualification. The detect below the LOD for PFHxS in samples WI-CV-GW11S-1019 and WI-CV-GW11M-1019 were qualified as a nondetect (U) at the LOD or level of contamination. The field blank and remaining equipment blank had no target analyte detects above the DLs.

III.4.2. *FIELD DUPLICATES*

Samples WI-CV-GW06M-1019 and WI-CV-GW06MP-1019 were identified as field duplicate samples. Neither sample had detects above the DL. The pair was in good agreement.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. The detect for PFBS in sample WI-CV-GW05S-1019 was qualified as estimated with a potential negative bias (J-), and results for MeFOSAA and EtFOSAA in sample WI-CV-GW07S-1019, both nondetects, were qualified as estimated (UJ). Reanalysis produced similar results indicating a probable matrix effect on the internal standards.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C3-PFBS	21%	WI-CV-GW05S-1019	PFBS
d3-MeFOSAA	43%	WI-CV-GW07S-1019	MeFOSAA
d5-EtFOSAA	43%	WI-CV-GW07S-1019	EtFOSAA

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at a Stage 4 validation level: WI-CV-GW05M-1019 and WI-CV-GW05S-1019. The laboratory analyzed for 18 perfluorinated compounds by EPA Method 537.1, modified. (The laboratory modified the method to analyze groundwater.) Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by EPA Method 537.1 and the DoD QSM.

All samples were initially analyzed undiluted. The following samples were reanalyzed at dilutions to report specific analytes within the linear range of the calibration: a 5× dilution of sample WI-CV-GW05S-1019 (PFOA, PFHxS) and a 12.5× dilution of sample WI-CV-GW05M-1019 (PFHxA, PFHpA, PFOA, PFBS and PFHxS). All other results were reported from the undiluted analyses.

Analyses immediately following undiluted samples with results above the linear range of the calibration were examined for potential carryover; however, the instrument run logs indicated dilutions were analyzed immediately following the undiluted analysis of the same sample; therefore, carryover was not considered an issue.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-1062

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-GW06M-1019 **Lab Sample Name:** I9688-FS **Sample Date:** 10/19/2019 15:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.37	4.63	0.37	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-GW06MP-1019 **Lab Sample Name:** I9689-FS **Sample Date:** 10/19/2019 15:40

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.47	4.72	0.47	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.94	4.72	0.94	NG_L	U	U	
Adona	919005-14-	1	0.94	4.72	0.94	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.47	4.72	0.47	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.94	4.72	0.94	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.72	0.38	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.42	4.72	1.42	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.42	4.72	1.42	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.89	4.72	1.89	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.47	4.72	0.47	NG_L	U	U

Field ID: WI-CV-GW06S-1019 **Lab Sample Name:** I9690-FS **Sample Date:** 10/19/2019 16:45

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.42	4.24	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.85	4.24	0.85	NG_L	U	U	
Adona	919005-14-	1	0.85	4.24	0.85	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	4.24	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.85	4.24	0.85	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.42	4.24	0.42	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.24	0.42	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.24	0.42	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.34	4.24	0.34	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.53	4.24	1.27	NG_L	J	J	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.85	4.24	0.85	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.27	4.24	1.27	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.69	4.24	1.69	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.24	0.42	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.42	4.24	0.42	NG_L	U	U	

Field ID: WI-CV-EB01-102019 **Lab Sample Name:** I9691-FS **Sample Date:** 10/20/2019 13:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.51	5.1	0.51	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	1.02	5.1	1.02	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Adona	919005-14-	1	1.02	5.1	1.02	NG_L	U	U
HFPO-DA	13252-13-6	1	0.51	5.1	0.51	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.02	5.1	1.02	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.02	5.1	1.02	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.51	5.1	0.51	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.51	5.1	0.51	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.51	5.1	0.51	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.02	5.1	1.02	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.41	5.1	0.41	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.53	5.1	1.53	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	1.02	5.1	1.02	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.02	5.1	1.02	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.53	5.1	1.53	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	2.04	5.1	2.04	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.51	5.1	0.51	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.51	5.1	0.51	NG_L	U	U

Field ID: WI-CV-GW01D-1019 **Lab Sample Name:** I9692-FS **Sample Date:** 10/20/2019 13:35

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.49	4.9	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.98	4.9	0.98	NG_L	U	U	
Adona	919005-14-	1	0.98	4.9	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.47	4.9	1.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.44	4.9	0.98	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.47	4.9	1.47	NG_L	U	U	

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	U

Field ID: WI-CV-GW05M-1019 **Lab Sample Name:** I9693-FS **Sample Date:** 10/20/2019 11:05

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.43	4.31	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.86	4.31	0.86	NG_L	U	U	
Adona	919005-14-	1	0.86	4.31	0.86	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.39	4.31	0.86	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	12.5	214.7	53.88	5.39	NG_L	D		
Perfluoroheptanoic acid (PFHpA)	375-85-9	12.5	151.05	53.88	10.78	NG_L	D		
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	12.5	669.68	53.88	4.31	NG_L	D		
Perfluorohexanoic Acid (PFHxA)	307-24-4	12.5	439.74	53.88	16.16	NG_L	D		
Perfluorooctanoic acid (PFOA)	335-67-1	12.5	357.28	53.88	16.16	NG_L	D		

Field ID: WI-CV-GW05S-1019 **Lab Sample Name:** I9696-FS **Sample Date:** 10/20/2019 11:00

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.5	5.04	0.5	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	1.01	5.04	1.01	NG_L	U	U	
Adona	919005-14-	1	1.01	5.04	1.01	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.5	5.04	0.5	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.01	5.04	1.01	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.01	5.04	1.01	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	168.61	5.04	0.5	NG_L		J-	ISL

Analysis Method PFAS_QSM5.1

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.5	5.04	0.5	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.5	5.04	0.5	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	87.53	5.04	1.01	NG_L		
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	411.04	5.04	1.51	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.67	5.04	1.01	NG_L	J	J
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	3.47	5.04	1.01	NG_L	J	J
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	2.02	5.04	2.02	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.5	5.04	0.5	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.5	5.04	0.5	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	5	433.89	25.2	2.02	NG_L	D	
Perfluorooctanoic acid (PFOA)	335-67-1	5	130.2	25.2	7.56	NG_L	D	

Field ID: WI-CV-EB01-102219 **Lab Sample Name:** I9697-FS **Sample Date:** 10/22/2019 11:15

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.47	4.72	0.47	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.94	4.72	0.94	NG_L	U	U	
Adona	919005-14-	1	0.94	4.72	0.94	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.47	4.72	0.47	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.13	4.72	0.38	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.42	4.72	1.42	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.42	4.72	1.42	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.89	4.72	1.89	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.47	4.72	0.47	NG_L	U	U	

Field ID: WI-CV-FB01-102219 **Lab Sample Name:** I9698-FS **Sample Date:** 10/22/2019 09:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.58	0.46	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-	1	0.92	4.58	0.92	NG_L	U	U
Adona	919005-14-	1	0.92	4.58	0.92	NG_L	U	U
HFPO-DA	13252-13-6	1	0.46	4.58	0.46	NG_L	U	U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.92	4.58	0.92	NG_L	U	U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.92	4.58	0.92	NG_L	U	U
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.58	0.46	NG_L	U	U
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.58	0.46	NG_L	U	U
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.58	0.46	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.92	4.58	0.92	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.1	4.58	0.37	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.37	4.58	1.37	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.92	4.58	0.92	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.92	4.58	0.92	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.37	4.58	1.37	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.83	4.58	1.83	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.58	0.46	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.58	0.46	NG_L	U	U

Field ID: WI-CV-GW07M-1019 **Lab Sample Name:** I9699-FS **Sample Date:** 10/22/2019 10:35

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	1.58	4.46	0.36	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.71	4.46	1.34	NG_L	J	J	

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U

Field ID: WI-CV-GW07S-1019 **Lab Sample Name:** I9700-FS **Sample Date:** 10/22/2019 13:35

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.31	4.63	0.46	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.37	4.63	0.37	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-GW11M-1019 **Lab Sample Name:** I9701-FS **Sample Date:** 10/22/2019 10:10

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.47	4.63	0.37	NG_L	J	U	FBL
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.77	4.63	0.93	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.65	4.63	1.39	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-GW11S-1019 **Lab Sample Name:** I9702-FS **Sample Date:** 10/22/2019 12:30

Matrix Type: W **Validator Initials:** lsc **Validation Date:** 16 December 2019

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-	1	0.49	4.88	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-	1	0.98	4.88	0.98	NG_L	U	U	
Adona	919005-14-	1	0.98	4.88	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.88	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.88	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.88	0.98	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.88	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.88	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.88	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.98	4.88	0.98	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.88	0.39	NG_L	J	U	FBL
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.46	4.88	1.46	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.88	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1.27	4.88	0.98	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.46	4.88	1.46	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.95	4.88	1.95	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.88	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.88	0.49	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1075

Prepared for

CH2M Hill

09 February 2020

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1075

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 8

No. of Reanalyses/Dilutions: 3

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-102319	I9786-FS	W	10/23/2019 17:10	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-102419	I9790-FS	W	10/24/2019 17:30	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-102619	I9793-FS	W	10/26/2019 14:00	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-102319	I9787-FS	W	10/23/2019 10:00	PFAS_QSM5.1	Stage 2B
WI-CV-FB02-102319	I9788-FS	W	10/23/2019 16:45	PFAS_QSM5.1	Stage 2B
WI-CV-GW20-100-1019	I9789-FS	W	10/23/2019 15:55	PFAS_QSM5.1	Stage 2B
WI-CV-GW20-141-1019	I9791-FS	W	10/24/2019 11:10	PFAS_QSM5.1	Stage 4
WI-CV-GW20-192-1019	I9792-FS	W	10/25/2019 11:15	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1075:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted several samples contained some solids. Samples WI-CV-GW20-100-1019, WI-CV-GW20-141-1019, and WI-CV-GW20-192-1019 were centrifuged to remove excess sedimentation from the sample.
- Samples WI-CV-GW20-100-1019 and WI-CV-GW20-192-1019 clogged the top filter of the solid phase extraction (SPE) cartridges during extraction. The filters were "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. The reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on February 9, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blanks and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. The detect <1/2 the LOQ in the instrument blank for PFHxS (0.14 ng/L), analyzed directly after the high calibration standard, indicated minimal carryover potential. The method blank, with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on sample in this SDG.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Samples WI-CV-FB01-102319 and WI-CV-FB02-102319 were identified as field blanks, and samples WI-CV-EB01-102319, WI-CV-EB01-102419, and WI-CV-EB01-102619 were identified as equipment blanks associated with the site samples collected on the respective dates. There were no field or equipment blank detects >1/2 the LOQ; however, the PFOA detect at 4.71 ng/L in associated site sample WI-CV-GW20-141-1019 was <10× the PFOA detect in field blank WI-CV-FB01-102319 at 0.53 ng/L. The PFOA detect in associated site sample WI-CV-GW20-141-1019 was qualified as nondetect (U) at the level detected. Remaining contaminants in the field QC samples, PFHxS (0.22 ng/L) in equipment blank WI-CV-EB01-102319 and PFHxS (0.1 ng/L) in field blank WI-CV-FB01-102319 were either not detected in the associated site sample or were insufficient to qualify the associated sample result.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS, identified as surrogates on the result summaries, represent the extracted internal standards. All extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value with the exception of recoveries in sample WI-CV-EB01-102419. The results are very atypical for a field QC sample. Reanalysis produced similar results however, the sample was not reextracted because the sample was consumed in the original extraction. Target analytes associated with the internal standard outliers <50% but >10%, all nondetects, were qualified as estimated (UJ). Target analytes associated with extracted internal standard outliers <10%, all nondetects, were qualified rejected (flagged R).

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C9-PFNA	15%	WI-CV-EB01-102419	PFNA
13C6-PFDA	1%	WI-CV-EB01-102419	PFDA
13C7-PFUnA	1%	WI-CV-EB01-102419	PFUnA
13C2-PFDoA	2%	WI-CV-EB01-102419	PFDoA
13C2-PFTeDA	7%	WI-CV-EB01-102419	PFTeDA, PFTriDA
d3-MeFOSAA	2%	WI-CV-EB01-102419	MeFOSAA
D5-EtFOSAA	2%	WI-CV-EB01-102419	EtFOSAA
13C8-PFOS	3%	WI-CV-EB01-102419	PFOS

It was noted that the surrogate recoveries reported were not always from the analytical run used to generate the reported results. The recoveries of the extracted internal standards associated were reported from the dilution analyses (performed for PFOA and PFOS). The recoveries were reported from the dilution for PFOA or PFOS to minimize interference with the injected internal standard that may have been present due to the concentrations of the native PFOA or PFOS in the samples. The validator noted though that all surrogate recoveries used to generate the results were within the QSM 5.1 control limits of 50-150% of the true value.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the SAP control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at a Stage 4 validation level: WI-CV-GW20-141-1019. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by and the DoD QSM.

All samples were initially analyzed undiluted. Sample WI-CV-GW20-100-1019 was subsequently analyzed at a 5× dilution for quantitation of PFHpA and PFBS, 31.25× for quantitation of PFHxA and PFOS, and 78.125× dilution for quantitation of PFOA and PFHxS.

Analyses immediately following undiluted samples with results above the linear range of the calibration were examined for potential carryover; however, the instrument run logs indicated dilutions were analyzed in succession (e.g. 1×, 5×, 31.25× and 78.1× dilution analyses) and therefore, carryover was not considered an issue.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-1075

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-102319 **Lab Sample Name:** I9786-FS **Sample Date:** 10/23/2019 17:10

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.46	4.63	0.46	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.93	4.63	0.93	NG_L	U	U	
Adona	919005-14-4	1	0.93	4.63	0.93	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.22	4.63	0.37	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.93	4.63	0.93	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.39	4.63	1.39	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	U	

Field ID: WI-CV-FB01-102319 **Lab Sample Name:** I9787-FS **Sample Date:** 10/23/2019 10:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.47	4.72	0.47	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.94	4.72	0.94	NG_L	U	U	
Adona	919005-14-4	1	0.94	4.72	0.94	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.47	4.72	0.47	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.94	4.72	0.94	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.94	4.72	0.94	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.47	4.72	0.47	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.47	4.72	0.47	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.94	4.72	0.94	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.1	4.72	0.38	NG_L	J	J
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.42	4.72	1.42	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.94	4.72	0.94	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	0.53	4.72	1.42	NG_L	J	J
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.89	4.72	1.89	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.47	4.72	0.47	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.47	4.72	0.47	NG_L	U	U

Field ID: WI-CV-FB02-102319 **Lab Sample Name:** I9788-FS **Sample Date:** 10/23/2019 16:45

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.49	4.9	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.98	4.9	0.98	NG_L	U	U	
Adona	919005-14-4	1	0.98	4.9	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.9	0.39	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.47	4.9	1.47	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.47	4.9	1.47	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	U	

Field ID: WI-CV-GW20-100-1019 **Lab Sample Name:** I9789-FS **Sample Date:** 10/23/2019 15:55

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.69	6.94	0.69	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

9Cl-PF3ONS	756426-58-1	1	1.39	6.94	1.39	NG_L	U	UJ	OT
Adona	919005-14-4	1	1.39	6.94	1.39	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.69	6.94	0.69	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.39	6.94	1.39	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.39	6.94	1.39	NG_L	U	UJ	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	1.8	6.94	0.69	NG_L	J	J	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.34	6.94	0.69	NG_L	J	J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	1.85	6.94	1.39	NG_L	J	J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	2.78	6.94	2.78	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.69	6.94	0.69	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.32	6.94	0.69	NG_L	J	J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	31.25	658.97	217.01	65.1	NG_L	D	J	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	31.25	380.39	217.01	43.4	NG_L	D	J	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	5	107.08	34.72	3.47	NG_L	D	J	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	5	146.37	34.72	6.94	NG_L	D	J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	78.13	5042.11	542.53	43.4	NG_L	D	J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	78.13	727.93	542.53	162.76	NG_L	D	J	OT

Field ID: WI-CV-EB01-102419 **Lab Sample Name:** I9790-FS **Sample Date:** 10/24/2019 17:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.48	4.81	0.48	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.96	4.81	0.96	NG_L	U	U	
Adona	919005-14-4	1	0.96	4.81	0.96	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.48	4.81	0.48	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.96	4.81	0.96	NG_L	U	R	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.96	4.81	0.96	NG_L	U	R	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.48	4.81	0.48	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.48	4.81	0.48	NG_L	U	R	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.48	4.81	0.48	NG_L	U	R	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.96	4.81	0.96	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.38	4.81	0.38	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.44	4.81	1.44	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.96	4.81	0.96	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.96	4.81	0.96	NG_L	U	R	ISL
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.44	4.81	1.44	NG_L	U	U	

Analysis Method PFAS_QSM5.1

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.92	4.81	1.92	NG_L	U	R	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.48	4.81	0.48	NG_L	U	R	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.48	4.81	0.48	NG_L	U	R	ISL

Field ID: WI-CV-GW20-141-1019 **Lab Sample Name:** I9791-FS **Sample Date:** 10/24/2019 11:10

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.49	4.9	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.98	4.9	0.98	NG_L	U	U	
Adona	919005-14-4	1	0.98	4.9	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	1.41	4.9	0.49	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.43	4.9	0.98	NG_L	J	J	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	23.45	4.9	0.39	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	2.9	4.9	1.47	NG_L	J	J	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	4.11	4.9	0.98	NG_L	J	J	
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.71	4.9	1.47	NG_L	J	U	FBL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	U	

Field ID: WI-CV-GW20-192-1019 **Lab Sample Name:** I9792-FS **Sample Date:** 10/25/2019 11:15

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.51	5.1	0.51	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	1.02	5.1	1.02	NG_L	U	UJ	OT
Adona	919005-14-4	1	1.02	5.1	1.02	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.51	5.1	0.51	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1.02	5.1	1.02	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1.02	5.1	1.02	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.51	5.1	0.51	NG_L	U	UJ	OT

Analysis Method *PFAS_QSM5.1*

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.51	5.1	0.51	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.51	5.1	0.51	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1.02	5.1	1.02	NG_L	U	UJ	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	68.32	5.1	0.41	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.53	5.1	1.53	NG_L	U	UJ	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.38	5.1	1.02	NG_L	J	J	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	18.52	5.1	1.02	NG_L		J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	13.1	5.1	1.53	NG_L		J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	2.04	5.1	2.04	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.51	5.1	0.51	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.51	5.1	0.51	NG_L	U	UJ	OT

Field ID: WI-CV-EB01-102619 **Lab Sample Name:** I9793-FS **Sample Date:** 10/26/2019 14:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/09/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.5	5	0.5	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	1	5	1	NG_L	U	U	
Adona	919005-14-4	1	1	5	1	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.5	5	0.5	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	1	5	1	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	1	5	1	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.5	5	0.5	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.5	5	0.5	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.5	5	0.5	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	1	5	1	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.4	5	0.4	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.5	5	1.5	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	1	5	1	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	1	5	1	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.5	5	1.5	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	2	5	2	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.5	5	0.5	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.5	5	0.5	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1193

Prepared for

CH2M Hill

08 February 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1193

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 16

No. of Reanalyses/Dilutions: 6

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-110819	H0445-FS	W	11/08/2019 12:05	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-111119	H0449-FS	W	11/11/2019 09:15	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-111219	H0455-FS	W	11/12/2019 10:35	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-111319	H0457-FS	W	11/13/2019 14:20	PFAS_QSM5.1	Stage 2B
WI-CV-EB01-111419	H0462-FS	W	11/14/2019 11:35	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-110819	H0446-FS	W	11/08/2019 10:45	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-111119	H0450-FS	W	11/11/2019 12:55	PFAS_QSM5.1	Stage 4
WI-CV-GW03S-1119	H0447-FS	W	11/08/2019 11:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW17M-1119	H0448-FS	W	11/08/2019 16:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW20S-1119	H0451-FS	W	11/11/2019 11:20	PFAS_QSM5.1	Stage 2B
WI-CV-GW21S-1119	H0458-FS	W	11/13/2019 15:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW21SP-1119	H0459-FS	W	11/13/2019 16:30	PFAS_QSM5.1	Stage 2B
WI-CV-GW23S-1119	H0460-FS	W	11/13/2019 12:35	PFAS_QSM5.1	Stage 2B
WI-CV-GW23SP-1119	H0461-FS	W	11/13/2019 13:00	PFAS_QSM5.1	Stage 4
WI-CV-GW26D-1119	H0456-FS	W	11/12/2019 16:50	PFAS_QSM5.1	Stage 2B
WI-CV-GW2SS-1119	H0454-FS	W	11/11/2019 15:30	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1193:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted several samples contained some solids. Sample WI-CV-GW26D-1119 was transferred to a fresh HDPE bottle and centrifuged twice at 2,500 RPM for 5 minutes to remove excess sedimentation from the sample. After centrifugation, the sample was returned to the original container for extraction.
- The narrative noted that sample WI-CV-EB01-110819 contained particulates.
- Samples WI-CV-EB01-111219, WI-CV-GW21S-1119, WI-CV-GW21SP-1119, WI-CV-GW23S-1119 and WI-CV-GW23SP-1119 clogged the top filter of the solid phase extraction (SPE) cartridges during extraction. The filters were "popped" and left inside the SPE cartridge for the remainder of the extraction and elution process. The reviewer conservatively qualified the sample results as estimated (J for detects and UJ for nondetects) without bias due to the uncertainty in the effect and bias associated with the occurrence. Several results were subsequently qualified for other issues.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on February 3, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site samples and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on sample WI-CV-GW20S-1119. The recoveries for PFHxA were below the SAP control limits of 70-130% in the MS/MSD at 44%/67% and PFOA was below the SAP control limits in the MS at 50%. The RPD was above QC limits for both of these compounds at 41.4% and 42.5% respectively. Recoveries and RPDs were not evaluated for the following target compound PFHxS because the parent sample concentration was >4× the spiked amount. The data for PFHxA and PFOA were qualified as estimated with a possible low bias (J-) in the parent sample. Compounds 11Cl-PF3OUdS and 9Cl-PF3ONS were recovered above the SAP control limits in the MS and/or the MSD at 136%/124% and 143%/140% respectively. These compounds were not detected in the sample and no qualifiers were required.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Samples WI-CV-EB01-110819, WI-CV-EB01-111119, WI-CV-EB01-111219, WI-CV-EB01-111319 and WI-CV-EB01-111419 were identified as the equipment blanks, and samples WI-CV-FB01-110819 and WI-CV-FB01-111119 were field blanks associated with the site samples in this SDG. The field blanks and equipment blanks had no target analyte detects above the LOD.

III.4.2. *FIELD DUPLICATES*

Samples WI-CV-GW21S-1119 and WI-CV-GW21SP-1119 and WI-CV-GW23S-1119 and WI-CV-GW23SP-1119 were identified as field duplicate pairs in this SDG. Detected results were in good agreement and all RPDs were within the SAP criteria of <30%.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outliers, all nondetects, were qualified as estimated (UJ). The samples were reanalyzed with similar results, but they were not reextracted as the sample was consumed in the original extraction.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C5-PFHxA	25% 30% 39%	WI-CV-EB01-110819 WI-CV-EB01-111219 WI-CV-EB01-111319	PFHxA, Adona
13C4-PFHpA	32% 35% 47%	WI-CV-EB01-110819 WI-CV-EB01-111219 WI-CV-EB01-111319	PFHpA
13C8-PFOA	43% 46% 49%	WI-CV-EB01-110819 WI-CV-EB01-111219 WI-CV-EB01-111319	PFOA
13C9-PFNA	41% 38%	WI-CV-GW17M-1119 WI-CV-GW2SS-1119	PFNA
C13C6-PFDA	45% 31% 34%	WI-CV-GW03S-1119 WI-CV-GW17M-1119 WI-CV-GW2SS-1119	PFDA

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C7-PFUnA	39% 35% 34%	WI-CV-GW03S-1119 WI-CV-GW17M-1119 WI-CV-GW2SS-1119	PFUnA
13C2-PFDoA	40% 47% 36%	WI-CV-GW03S-1119 WI-CV-GW17M-1119 WI-CV-GW2SS-1119	PFDoA
13C2-PFTeDA	40%	WI-CV-GW2SS-1119	PFTeDA, PFTrDA
d3-MeFOSAA	23% 32% 43% 44%	WI-CV-GW03S-1119 WI-CV-GW17M-1119 WI-CV-GW20S-1119 WI-CV-GW2SS-1119	MeFOSAA
d5-EtFOSAA	24% 38% 44% 41%	WI-CV-GW03S-1119 WI-CV-GW17M-1119 WI-CV-GW20S-1119 WI-CV-GW2SS-1119	EtFOSAA
13C3-HFPO-DA	17% 21% 27% 48%	WI-CV-EB01-110819 WI-CV-EB01-111219 WI-CV-EB01-111319 WI-CV-GW21S-1119	HFPO-DA, 11Cl-PF3OUdS, 9Cl-PF3ONS

It was noticed that sample WI-CV-GW20S-1119 was analyzed at a dilution for analyte PFOA and the recovery of extracted internal standard 13C8-PFOA was appropriately reported from this dilution analysis. However, the extracted internal standards associated with target compounds PFHxA, PFHpA, PFNA, and HFPO-DA, were also reported from this dilution analysis though those internal standards were not used to generate the reported results. Also, samples WI-CV-GW21S-1119, WI-CV-GW21SP-1119, WI-CV-GW23S-1119 and WI-CV-GW23SP-1119 were analyzed at a dilution to quantitate analyte PFOS. The extracted internal standard used to quantitate this compound was appropriately reported, however, the recoveries of the extraction internal standards associated with analytes PFHxS, MeFOSAA, EtFOSAA, and PFBS in this analysis were also reported, though they were not used for the calculation of the reported data. The recoveries of the extracted internal standards associated were reported from the dilution analyses (performed for PFOA and PFOS). The recoveries were reported from the dilution for PFOA or PFOS to minimize interference with the injected internal standard that may have been present due to the concentrations of the native PFOA or PFOS in the samples. The validator noted that, though not reported, the recoveries of the extracted internal standards used to generate the results were within the QSM 5.1 control limits of 50-150% of the true value.

The laboratory noted in the narrative that “Due to potential matrix interference, 9Cl-PF3ONS and 11Cl-PF3OUdS is quantified using 13C3-HFPO-DA.” The work plan specifies that the extracted internal standards used for the quantitation of Adona, 11Cl-PF3OUdS and 9Cl-PF3ONS are 13C3-PFHxS, 13C2-PFDoA and 13C9-PFNA, respectively. In addition to the deviation noted in the narrative, the extracted internal standard for adona was 13C5-PFHxA. No qualifiers were applied for this deviation.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the QSM 5.1 control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at a Stage 4 validation level: WI-CV-FB01-111119 and WI-CV-GW23SP-1119. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

PFOS in samples H0454-FS (WI-CV-GW2SS-1119), H0447-FS (WI-CV-GW03S-1119), H0448-FS (WI-CV-GW17M-1119), H0449-FS (WI-CV-EB01-111119), H0455-FS (WI-CV-EB01-111219), and H0457-FS (WI-CVEB01-111319) was not reported as the primary transition does not confirm in the secondary transition. The peak at or near the retention time of PFOS is not likely PFOS due to the lack of confirmation of the secondary transition.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM.

All samples were initially analyzed undiluted. Sample WI-CV-GW20S-1119 was reanalyzed at a 5× dilution to quantitate PFHxA and PFOA, and at a 25× dilution to quantitate PFHxS. Samples WI-CV-GW21S-1119, WI-CV-GW21SP-1119, WI-CV-GW23S-1119 and WI-CV-GW23SP-1119 were analyzed at a 12.5× dilution to quantitate PFOS. All other results were reported from the undiluted analyses

Analyses immediately following the undiluted samples were examined for potential carryover. Sample WI-CV-GW20S-1119 was followed by matrix spike analyses, and the undiluted analyses of samples WI-CV-GW21S-1119, WI-CV-GW21SP-1119, WI-CV-GW23S-1119 and WI-CV-GW23SP-1119 were analyzed consecutively and no indication of carryover was noted. In addition, the highest sample concentrations reported from undiluted analyses were checked and found to be well below the upper calibration range; therefore, carryover was not considered an issue.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

Validated Sample Result Forms: 19-1193

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-110819 **Lab Sample Name:** H0445-FS **Sample Date:** 11/08/2019 12:05

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	4.31	0.43	NG_L	U	UJ	ISL
9Cl-PF3ONS	756426-58-1	1	0.86	4.31	0.86	NG_L	U	UJ	ISL
Adona	919005-14-4	1	0.86	4.31	0.86	NG_L	U	UJ	ISL
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.86	4.31	0.86	NG_L	U	UJ	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.34	4.31	0.34	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.29	4.31	1.29	NG_L	U	UJ	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.29	4.31	1.29	NG_L	U	UJ	ISL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U	

Field ID: WI-CV-FB01-110819 **Lab Sample Name:** H0446-FS **Sample Date:** 11/08/2019 10:45

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-GW03S-1119 **Lab Sample Name:** H0447-FS **Sample Date:** 11/08/2019 11:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	50.01	4.55	0.45	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	4.77	4.55	0.91	NG_L			
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	18.04	4.55	0.36	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	73.17	4.55	1.36	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.04	4.55	1.36	NG_L	J	J	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	UJ	ISL

Field ID: WI-CV-GW17M-1119 **Lab Sample Name:** H0448-FS **Sample Date:** 11/08/2019 16:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	1.12	4.55	0.45	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	UJ	ISL

Field ID: WI-CV-EB01-111119 **Lab Sample Name:** H0449-FS **Sample Date:** 11/11/2019 09:15

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	4.31	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.86	4.31	0.86	NG_L	U	U	
Adona	919005-14-4	1	0.86	4.31	0.86	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.34	4.31	0.34	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.29	4.31	1.29	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.29	4.31	1.29	NG_L	U	U	

Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U

Field ID: WI-CV-FB01-111119 **Lab Sample Name:** H0450-FS **Sample Date:** 11/11/2019 12:55

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	4.31	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.86	4.31	0.86	NG_L	U	U	
Adona	919005-14-4	1	0.86	4.31	0.86	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.34	4.31	0.34	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.29	4.31	1.29	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.29	4.31	1.29	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U	

Field ID: WI-CV-GW20S-1119 **Lab Sample Name:** H0451-FS **Sample Date:** 11/11/2019 11:20

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	4.31	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.86	4.31	0.86	NG_L	U	U	
Adona	919005-14-4	1	0.86	4.31	0.86	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	12.38	4.31	0.43	NG_L			

Analysis Method PFAS_QSM5.1

Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	11.74	4.31	0.86	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	57.5	4.31	1.29	NG_L		J-	MSL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	30.38	4.31	0.86	NG_L			
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	25	502.48	107.76	8.62	NG_L	D		
Perfluorooctanoic acid (PFOA)	335-67-1	5	67.83	21.55	6.47	NG_L	D	J-	MSL

Field ID: WI-CV-GW2SS-1119 **Lab Sample Name:** H0454-FS **Sample Date:** 11/11/2019 15:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.42	4.17	0.42	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.83	4.17	0.83	NG_L	U	U	
Adona	919005-14-4	1	0.83	4.17	0.83	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.42	4.17	0.42	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.2	4.17	0.42	NG_L	J	J	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.42	4.17	0.42	NG_L	U	UJ	ISL
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.42	4.17	0.42	NG_L	U	UJ	ISL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.39	4.17	0.33	NG_L	J	J	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.25	4.17	1.25	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.83	4.17	0.83	NG_L	U	UJ	ISL
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.83	4.17	0.83	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.25	4.17	1.25	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.67	4.17	1.67	NG_L	U	UJ	ISL
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.42	4.17	0.42	NG_L	U	UJ	ISL
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.42	4.17	0.42	NG_L	U	UJ	ISL

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-111219 **Lab Sample Name:** H0455-FS **Sample Date:** 11/12/2019 10:35

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.44	4.39	0.44	NG_L	U	UJ	ISL
9Cl-PF3ONS	756426-58-1	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
Adona	919005-14-4	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
HFPO-DA	13252-13-6	1	0.44	4.39	0.44	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.35	4.39	0.35	NG_L	U	UJ	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.32	4.39	1.32	NG_L	U	UJ	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.32	4.39	1.32	NG_L	U	UJ	ISL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.75	4.39	1.75	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT

Field ID: WI-CV-GW26D-1119 **Lab Sample Name:** H0456-FS **Sample Date:** 11/12/2019 16:50

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	6.2	4.55	0.45	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	5.17	4.55	0.91	NG_L			

Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	6.95	4.55	0.36	NG_L		
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	30.01	4.55	1.36	NG_L		
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	33.37	4.55	1.36	NG_L		
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U

Field ID: WI-CV-EB01-111319 **Lab Sample Name:** H0457-FS **Sample Date:** 11/13/2019 14:20

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	UJ	ISL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	UJ	ISL
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	UJ	ISL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U	

Field ID: WI-CV-GW21S-1119 **Lab Sample Name:** H0458-FS **Sample Date:** 11/13/2019 15:50

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.44	4.39	0.44	NG_L	U	UJ	ISL
9Cl-PF3ONS	756426-58-1	1	0.88	4.39	0.88	NG_L	U	UJ	ISL
Adona	919005-14-4	1	0.88	4.39	0.88	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

HFPO-DA	13252-13-6	1	0.44	4.39	0.44	NG_L	U	UJ	ISL
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	24.23	4.39	0.44	NG_L		J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	2.23	4.39	0.88	NG_L	J	J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	13.43	4.39	0.35	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	53.61	4.39	1.32	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.35	4.39	0.88	NG_L	J	J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.85	4.39	1.32	NG_L		J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.75	4.39	1.75	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	12.5	164.93	54.82	10.96	NG_L	D	J	OT

Field ID: WI-CV-GW21SP-1119 **Lab Sample Name:** H0459-FS **Sample Date:** 11/13/2019 16:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.44	4.39	0.44	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.88	4.39	0.88	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.44	4.39	0.44	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.88	4.39	0.88	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	24.24	4.39	0.44	NG_L		J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	2.52	4.39	0.88	NG_L	J	J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	12.63	4.39	0.35	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	55.42	4.39	1.32	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.88	4.39	0.88	NG_L	U	UJ	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.76	4.39	1.32	NG_L		J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.75	4.39	1.75	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.44	4.39	0.44	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	12.5	153.76	54.82	10.96	NG_L	D	J	OT

Field ID: WI-CV-GW23S-1119 **Lab Sample Name:** H0460-FS **Sample Date:** 11/13/2019 12:35

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.46	4.63	0.46	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.93	4.63	0.93	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.93	4.63	0.93	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	2.21	4.63	0.46	NG_L	J	J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.67	4.63	0.93	NG_L	J	J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	6.63	4.63	0.37	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	7.3	4.63	1.39	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.32	4.63	0.93	NG_L	J	J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	4.47	4.63	1.39	NG_L	J	J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	12.5	202.22	57.87	11.57	NG_L	D	J	OT

Field ID: WI-CV-GW23SP-1119 **Lab Sample Name:** H0461-FS **Sample Date:** 11/13/2019 13:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.46	4.63	0.46	NG_L	U	UJ	OT
9Cl-PF3ONS	756426-58-1	1	0.93	4.63	0.93	NG_L	U	UJ	OT
Adona	919005-14-4	1	0.93	4.63	0.93	NG_L	U	UJ	OT
HFPO-DA	13252-13-6	1	0.46	4.63	0.46	NG_L	U	UJ	OT
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.93	4.63	0.93	NG_L	U	UJ	OT
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.93	4.63	0.93	NG_L	U	UJ	OT
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	2.14	4.63	0.46	NG_L	J	J	OT
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.46	4.63	0.46	NG_L	U	UJ	OT

Analysis Method PFAS_QSM5.1

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.73	4.63	0.93	NG_L	J	J	OT
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	6.19	4.63	0.37	NG_L		J	OT
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	7.14	4.63	1.39	NG_L		J	OT
Perfluorononanoic acid (PFNA)	375-95-1	1	0.37	4.63	0.93	NG_L	J	J	OT
Perfluorooctanoic acid (PFOA)	335-67-1	1	3.49	4.63	1.39	NG_L	J	J	OT
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.85	4.63	1.85	NG_L	U	UJ	OT
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.46	4.63	0.46	NG_L	U	UJ	OT
Perfluorooctane Sulfonate (PFOS)	1763-23-1	12.5	213.01	57.87	11.57	NG_L	D	J	OT

Field ID: WI-CV-EB01-111419 **Lab Sample Name:** H0462-FS **Sample Date:** 11/14/2019 11:35

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 02/08/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.46	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.89	4.46	0.89	NG_L	U	U	
Adona	919005-14-4	1	0.89	4.46	0.89	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.46	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.89	4.46	0.89	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.46	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.46	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.89	4.46	0.89	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.34	4.46	1.34	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.79	4.46	1.79	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.46	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.46	0.45	NG_L	U	U	

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 19-1296

Prepared for

CH2M Hill

30 January 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 19-1296

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B

No. of Samples: 3

No. of Reanalyses/Dilutions: 1

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-121019	H1356-FS	W	12/10/2019 10:30	PFAS_QSM5.1	Stage 2B
WI-CV-FB01-121019	H1357-FS	W	12/10/2019 10:00	PFAS_QSM5.1	Stage 2B
WI-CV-GW25M-1219	H1358-FS	W	12/10/2019 10:15	PFAS_QSM5.1	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 19-1296:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted sample WI-CV-GW25M-1219 contained particulates.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.1 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on January 30, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.1, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site sample and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blanks for PFHxS (0.11 ng/L) indicated minimal carryover potential. The method blank, with no detects above the DL, indicated no procedural contamination

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on samples in this SDG.

III.4. FIELD QC SAMPLES

MEC[X] evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC[X] used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-121019 was identified as the field blank, and sample WI-CV-EB01-121019 was identified as the equipment blank associated with the site sample WI-CV-GW25M-1219. The field blank and equipment blank had no target analyte detects above the LOD.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Extracted internal standard recoveries were within the QSM 5.1 control limits of 50-150% of the true value.

It was noticed that sample WI-CV-GW25M-1219 was analyzed at a dilution for analyte PFOA and the recovery of extracted internal standard 13C8-PFOA was appropriately reported from this dilution analysis. However, the extracted internal standards associated with target compounds PFHxA, PFHpA, PFNA, and HFPO-DA, were also reported from this dilution analysis though those internal standards were not used to generate the reported results. The recoveries of the extracted internal standards associated were reported from the dilution analyses (performed for PFOA). The recoveries were reported from the dilution for PFOA to minimize interference with the injected internal standard that may have been present due to the concentrations of the native PFOA in the sample. The validator noted that, though not reported, the recoveries of the extracted internal standards used to generate the results were within the QSM 5.1 control limits of 50-150% of the true value.

The work plan specifies that the extracted internal standards used for the quantitation of Adona, 11Cl-PF3OUdS and 9Cl-PF3ONS are 13C3-PFHxS, 13C2-PFDoA and 13C9-PFNA, respectively. The laboratory used 13C3-HFPO-DA for all three of these analytes in the calibration and analysis for these samples. No qualifiers were applied for this deviation.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the QSM 5.1 control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification is not verified at a Stage 2B validation level. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.1 Table B-15.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification is not verified at a Stage 2B validation level. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM.

All samples were initially analyzed undiluted. Sample WI-CV-GW25M-1219 was reanalyzed at a 5× dilution for the quantitation of PFOA. Reporting limits were elevated accordingly.

III.8. SYSTEM PERFORMANCE

System performance is not evaluated at Stage 2B.

Validated Sample Result Forms: 19-1296

Analysis Method PFAS_QSM5.1

Field ID: WI-CV-EB01-121019 **Lab Sample Name:** H1356-FS **Sample Date:** 12/10/2019 10:30

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 01/30/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.45	4.55	0.45	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.91	4.55	0.91	NG_L	U	U	
Adona	919005-14-4	1	0.91	4.55	0.91	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.45	4.55	0.45	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.91	4.55	0.91	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.45	4.55	0.45	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.36	4.55	0.36	NG_L	U	U	
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.36	4.55	1.36	NG_L	U	U	
Perfluorononanoic acid (PFNA)	375-95-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.91	4.55	0.91	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.36	4.55	1.36	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.82	4.55	1.82	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.45	4.55	0.45	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.45	4.55	0.45	NG_L	U	U	

Field ID: WI-CV-FB01-121019 **Lab Sample Name:** H1357-FS **Sample Date:** 12/10/2019 10:00

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 01/30/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.43	4.31	0.43	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.86	4.31	0.86	NG_L	U	U	
Adona	919005-14-4	1	0.86	4.31	0.86	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.43	4.31	0.43	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.86	4.31	0.86	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.86	4.31	0.86	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	0.43	4.31	0.43	NG_L	U	U	
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.43	4.31	0.43	NG_L	U	U	

Analysis Method *PFAS_QSM5.1*

Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.43	4.31	0.43	NG_L	U	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	0.86	4.31	0.86	NG_L	U	U
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	0.34	4.31	0.34	NG_L	U	U
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	1.29	4.31	1.29	NG_L	U	U
Perfluorononanoic acid (PFNA)	375-95-1	1	0.86	4.31	0.86	NG_L	U	U
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.86	4.31	0.86	NG_L	U	U
Perfluorooctanoic acid (PFOA)	335-67-1	1	1.29	4.31	1.29	NG_L	U	U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.72	4.31	1.72	NG_L	U	U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.43	4.31	0.43	NG_L	U	U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.43	4.31	0.43	NG_L	U	U

Field ID: WI-CV-GW25M-1219 **Lab Sample Name:** H1358-FS **Sample Date:** 12/10/2019 10:15

Matrix Type: W **Validator Initials:** kjz **Validation Date:** 01/30/2020

Analyte	CAS No	Dilution	Result Value	LOQ	LOD	Result Units	Lab Qualifier	Validation Qualifier	Validation Notes
11Cl-PF3OUdS	763051-92-9	1	0.49	4.9	0.49	NG_L	U	U	
9Cl-PF3ONS	756426-58-1	1	0.98	4.9	0.98	NG_L	U	U	
Adona	919005-14-4	1	0.98	4.9	0.98	NG_L	U	U	
HFPO-DA	13252-13-6	1	0.49	4.9	0.49	NG_L	U	U	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2991-50-6	1	0.98	4.9	0.98	NG_L	U	U	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2355-31-9	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1	26.76	4.9	0.49	NG_L			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	16.34	4.9	0.98	NG_L			
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1	35.74	4.9	0.39	NG_L			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	75.77	4.9	1.47	NG_L			
Perfluorononanoic acid (PFNA)	375-95-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorooctane Sulfonate (PFOS)	1763-23-1	1	0.98	4.9	0.98	NG_L	U	U	
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	1	1.96	4.9	1.96	NG_L	U	U	
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.49	4.9	0.49	NG_L	U	U	
Perfluorooctanoic acid (PFOA)	335-67-1	5	173.77	24.51	7.35	NG_L	D		

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 20-0414

Prepared for

CH2M Hill

08 May 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

www.mecx.net

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 20-0414

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 10

No. of Reanalyses/Dilutions: 3

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-EB01-031620	H4506-FS	W	03/16/2020 15:30	PFAS_QSM5.3	Stage 2B
WI-CV-EB01-031720	H4509-FS	W	03/17/2020 17:10	PFAS_QSM5.3	Stage 2B
WI-CV-EB01-031820	H4517-FS	W	03/18/2020 11:50	PFAS_QSM5.3	Stage 2B
WI-CV-EB02-031620	H4507-FS	W	03/16/2020 15:35	PFAS_QSM5.3	Stage 2B
WI-CV-FB01-031620	H4508-FS	W	03/16/2020 15:40	PFAS_QSM5.3	Stage 2B
WI-CV-GW28M-0320	H4518-FS	W	03/18/2020 11:10	PFAS_QSM5.3	Stage 4
WI-CV-GW28MP-0320	H4519-FS	W	03/18/2020 15:00	PFAS_QSM5.3	Stage 2B
WI-CV-GW29M-0320	H4510-FS	W	03/17/2020 16:40	PFAS_QSM5.3	Stage 2B
WI-CV-GW30M-0320	H4511-FS	W	03/17/2020 12:05	PFAS_QSM5.3	Stage 2B
WI-CV-GW31M-0320	H4514-FS	W	03/17/2020 14:20	PFAS_QSM5.3	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 20-0414:

- The laboratory received samples in this SDG within the temperature limits of ≤6 degrees Celsius (°C) and >0°C.
- The laboratory received the sample containers intact.
- According to the laboratory's sample receipt checklist, custody seals were present and intact on the coolers upon receipt.
- Field and laboratory personnel signed and dated the COC.
- The laboratory's QA/QC Summary (case narrative) noted sample WI-CV-GW28M-0320 and WI-CV-GW28MP-0320 contained particulates. No qualification was applied for this circumstance.
- An email from the client dated 03/20/2020 requested the sample listed as WI-CV-GW28M-0320-D on the COC be updated to WI-CV-GW28MP-0320.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.3 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on May 8, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.3, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

Groundwater site sample and field QC samples were extracted within 14 days of collection and analyzed within 28 days of collection. Note that sample WI-CV-GW31M-0320 was re-extracted outside of holding times and data was included in SDG 20-0469. Data in this SDG were all generated within holding times.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blanks for NMeFOSAA (0.54 ng/L) and NEtFOSAA (0.60 ng/L) indicated minimal carryover potential. These target compounds were also detected in sample WI-CV-GW31M-0320 at very comparable concentrations to the instrument blank, NMeFOSAA (0.48 ng/L) and NEtFOSAA (0.56 ng/L). This data was qualified as nondetect (U) at the LOD. The method blank, with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on sample WI-CV-GW30M-0320. Recoveries and RPDs were within the SAP control limits of 70-130% and ≤30%, respectively.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Sample WI-CV-FB01-031620 was identified as the field blank. The field blank did not have detects above the DL. Samples WI-CV-EB01-031620, WI-CV-EB02-031620, WI-CV-EB01-031720, and WI-CV-EB01-031820 were identified as equipment blanks associated with the site samples. There were no equipment blank detects >1/2 the LOQ with the exception of PFHxA (2.45 ng/L) in sample WI-CV-EB01-031820 (LOQ 4.39 ng/L). Results for PFHxA in samples associated with WI-CV-EB01-031820 were greater than 10× the concentration detected in the equipment blank and no qualification was applied. PFOS was detected in the equipment blank collected on 3/17/2020 at 0.60 ng/L, and in associated sample WI-CV-GW29M-0320 at 0.60 ng/L. This result was qualified as nondetect (U) at the LOD. PFOS was detected in the equipment blank collected on 3/16/2020 at 0.54 ng/L, and in associated sample WI-CV-GW28M-0320 and WI-CV-GW28MP-0320 above the LOD. This result was qualified as nondetect (U) at the level of contamination in the site samples.

III.4.2. *FIELD DUPLICATES*

Samples WI-CV-GW28M-0320 and WI-CV-GW28MP-0320 were identified as a field duplicate pair in this SDG. Detected results were in good agreement and all RPDs were within the SAP criteria of <30%.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Except as noted in the table below, extracted internal standard recoveries were within the SAP control limits of 50-150% of the true value. Target analytes associated with the internal standard outlier, both nondetects, were qualified as estimated (UJ). Reanalysis produced similar results, however the sample was not re-extracted in this SDG and therefore the low recoveries are not necessarily indicative of a matrix effect. A low recovery in the method blank for the same internal standard indicated a possible systemic effect. The method blank had low recovery of one IS; however, this did not affect sample results.

Internal Standard	Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFTeDA	38%	WI-CV-GW31M-0320	PFTeDA PFTriDA

This sample was re-extracted at a later date and submitted under SDG 20-0469. Results were similar, with two internal standard recoveries low. The data for the sample presented in this SDG is the preferred usable data, and was therefore retained.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post-extraction by the laboratory. The injected internal standard recoveries were within the QSM 5.1 control limits of ±50% of the peak areas of the initial calibration

midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for sample WI-CV-GW28M-0320, reviewed at a Stage 4 validation level. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.3 Table B-15. Review of retention times and ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the sample reviewed at a Stage 4 validation level listed above. Quantitation verification was performed and considered within the minor limitations of rounding and differing significant figures presented in the raw data. This was not considered a limitation of the validation process and is typical of analytical data. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J) by the laboratory. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by EPA Method 537.1 and the DoD QSM.

All samples were initially analyzed undiluted. Sample WI-CV-GW29M-0320 was reanalyzed at a 5× dilution to report PFHxS within the linear range of the calibration and samples WI-CV-GW28M-0320 and WI-CV-GW28MP-0320 were reanalyzed at a 5× dilution to report PFHxS and PFHxA within the linear range of the calibration. Reporting limits were elevated accordingly. All other results were reported from the undiluted analyses.

Analyses immediately following undiluted samples with results above the linear range of the calibration were examined for potential carryover; however, the instrument run logs indicated undiluted samples were not followed by detections in subsequent samples.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-EB01-031620
Battelle ID	H4506-FS
Sample Type	SA
Collection Date	03/16/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H4506-FS(0)	1.000	4/9/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H4506-FS(0)	1.000	4/9/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H4506-FS(0)	1.000	4/9/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H4506-FS(0)	1.000	4/9/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.54 J	H4506-FS(0)	1.000	4/9/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H4506-FS(0)	1.000	4/9/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H4506-FS(0)	1.000	4/9/2020	0.23	0.86	4.31

MEC X
KJZ 5.8.2020

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID		WI-CV-EB02-031620						
Battelle ID		H4507-FS						
Sample Type		SA						
Collection Date		03/16/2020						
Extraction Date		03/23/2020						
Analytical Instrument		Sciex 6500+ LC/MS/MS						
% Moisture		NA						
Matrix		WATER						
Sample Size		0.290						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H4507-FS(0)	1.000	4/9/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H4507-FS(0)	1.000	4/9/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H4507-FS(0)	1.000	4/9/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H4507-FS(0)	1.000	4/9/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H4507-FS(0)	1.000	4/9/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H4507-FS(0)	1.000	4/9/2020	0.23	0.86	4.31

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-FB01-031620
Battelle ID	H4508-FS
Sample Type	SA
Collection Date	03/16/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	. Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H4508-FS(0)	1.000	4/9/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H4508-FS(0)	1.000	4/9/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H4508-FS(0)	1.000	4/9/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H4508-FS(0)	1.000	4/9/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H4508-FS(0)	1.000	4/9/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H4508-FS(0)	1.000	4/9/2020	0.23	0.86	4.31

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-EB01-031720
Battelle ID	H4509-FS
Sample Type	SA
Collection Date	03/17/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	. Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H4509-FS(0)	1.000	4/9/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H4509-FS(0)	1.000	4/9/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H4509-FS(0)	1.000	4/9/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H4509-FS(0)	1.000	4/9/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.60 J	H4509-FS(0)	1.000	4/9/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H4509-FS(0)	1.000	4/9/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H4509-FS(0)	1.000	4/9/2020	0.23	0.86	4.31

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-GW29M-0320
Battelle ID	H4510-FS
Sample Type	SA
Collection Date	03/17/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.305
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	67.98	H4510-FS(0)	1.000	4/9/2020	0.43	1.23	4.10
PFHpA	375-85-9	14.28	H4510-FS(0)	1.000	4/9/2020	0.21	0.82	4.10
PFOA	335-67-1	65.21	H4510-FS(0)	1.000	4/9/2020	0.42	1.23	4.10
PFNA	375-95-1	0.82 U	H4510-FS(0)	1.000	4/9/2020	0.25	0.82	4.10
PFDA	335-76-2	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.11	0.41	4.10
PFUnA	2058-94-8	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.18	0.41	4.10
PFDoA	307-55-1	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.16	0.41	4.10
PFTrDA	72629-94-8	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.12	0.41	4.10
PFTeDA	376-06-7	1.64 U	H4510-FS(0)	1.000	4/9/2020	0.60	1.64	4.10
NMeFOSAA	2355-31-9	0.82 U	H4510-FS(0)	1.000	4/9/2020	0.29	0.82	4.10
NEtFOSAA	2991-50-6	0.82 U	H4510-FS(0)	1.000	4/9/2020	0.41	0.82	4.10
PFBS	375-73-5	25.58	H4510-FS(0)	1.000	4/9/2020	0.11	0.41	4.10
PFHxS	355-46-4	96.32 D	H4510-FS-D(3)	5.000	4/10/2020	0.45	1.64	20.49
PFOS	1763-23-1	~~0.46 J~~ 0.82	H4510-FS(0)	1.000	4/9/2020	0.36	0.82	4.10
HFPO-DA	13252-13-6	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.20	0.41	4.10
Adona	919005-14-4	0.82 U	H4510-FS(0)	1.000	4/9/2020	0.22	0.82	4.10
11Cl-PF3OUdS	763051-92-9	0.41 U	H4510-FS(0)	1.000	4/9/2020	0.19	0.41	4.10
9Cl-PF3ONS	756426-58-1	0.82 U	H4510-FS(0)	1.000	4/9/2020	0.22	0.82	4.10

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-GW30M-0320
Battelle ID	H4511-FS
Sample Type	SA
Collection Date	03/17/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 U	H4511-FS(0)	1.000	4/9/2020	0.46	1.32	4.39
PFHpA	375-85-9	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.23	0.88	4.39
PFOA	335-67-1	1.32 U	H4511-FS(0)	1.000	4/9/2020	0.45	1.32	4.39
PFNA	375-95-1	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.27	0.88	4.39
PFDA	335-76-2	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFUnA	2058-94-8	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.19	0.44	4.39
PFDoA	307-55-1	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.17	0.44	4.39
PFTrDA	72629-94-8	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.13	0.44	4.39
PFTeDA	376-06-7	1.75 U	H4511-FS(0)	1.000	4/9/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.44	0.88	4.39
PFBS	375-73-5	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFHxS	355-46-4	0.35 U	H4511-FS(0)	1.000	4/9/2020	0.10	0.35	4.39
PFOS	1763-23-1	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.22	0.44	4.39
Adona	919005-14-4	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9	0.44 U	H4511-FS(0)	1.000	4/9/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1	0.88 U	H4511-FS(0)	1.000	4/9/2020	0.24	0.88	4.39

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-GW31M-0320
Battelle ID	H4514-FS
Sample Type	SA
Collection Date	03/17/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	. Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H4514-FS(0)	1.000	4/9/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H4514-FS(0)	1.000	4/9/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H4514-FS(0)	1.000	4/9/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H4514-FS(0)	1.000	4/9/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H4514-FS(0)	1.000	4/9/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	~~0.48 J~~ 0.86	H4514-FS(0)	1.000	4/9/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	~~0.56 J~~ 0.86	H4514-FS(0)	1.000	4/9/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H4514-FS(0)	1.000	4/9/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.86 U	H4514-FS(0)	1.000	4/9/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H4514-FS(0)	1.000	4/9/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H4514-FS(0)	1.000	4/9/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H4514-FS(0)	1.000	4/9/2020	0.23	0.86	4.31

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-EB01-031820
Battelle ID	H4517-FS
Sample Type	SA
Collection Date	03/18/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.45 J	H4517-FS(0)	1.000	4/9/2020	0.46	1.32	4.39
PFHpA	375-85-9	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.23	0.88	4.39
PFOA	335-67-1	1.32 U	H4517-FS(0)	1.000	4/9/2020	0.45	1.32	4.39
PFNA	375-95-1	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.27	0.88	4.39
PFDA	335-76-2	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFUnA	2058-94-8	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.19	0.44	4.39
PFDoA	307-55-1	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.17	0.44	4.39
PFTrDA	72629-94-8	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.13	0.44	4.39
PFTeDA	376-06-7	1.75 U	H4517-FS(0)	1.000	4/9/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.44	0.88	4.39
PFBS	375-73-5	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFHxS	355-46-4	0.35 U	H4517-FS(0)	1.000	4/9/2020	0.10	0.35	4.39
PFOS	1763-23-1	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.22	0.44	4.39
Adona	919005-14-4	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9	0.44 U	H4517-FS(0)	1.000	4/9/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1	0.88 U	H4517-FS(0)	1.000	4/9/2020	0.24	0.88	4.39

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID		WI-CV-GW28M-0320						
Battelle ID		H4518-FS						
Sample Type		SA						
Collection Date		03/18/2020						
Extraction Date		03/23/2020						
Analytical Instrument		Sciex 6500+ LC/MS/MS						
% Moisture		NA						
Matrix		WATER						
Sample Size		0.280						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	168.62	D	H4518-FS-D(3)	5.000	4/10/2020	2.37	6.70	22.32
PFHpA	375-85-9	41.14		H4518-FS(0)	1.000	4/9/2020	0.23	0.89	4.46
PFOA	335-67-1	55.50		H4518-FS(0)	1.000	4/9/2020	0.46	1.34	4.46
PFNA	375-95-1	0.89	U	H4518-FS(0)	1.000	4/9/2020	0.28	0.89	4.46
PFDA	335-76-2	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.13	0.45	4.46
PFUnA	2058-94-8	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.20	0.45	4.46
PFDoA	307-55-1	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.17	0.45	4.46
PFTrDA	72629-94-8	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.13	0.45	4.46
PFTeDA	376-06-7	1.79	U	H4518-FS(0)	1.000	4/9/2020	0.65	1.79	4.46
NMeFOSAA	2355-31-9	0.89	U	H4518-FS(0)	1.000	4/9/2020	0.31	0.89	4.46
NEtFOSAA	2991-50-6	0.89	U	H4518-FS(0)	1.000	4/9/2020	0.45	0.89	4.46
PFBS	375-73-5	72.99		H4518-FS(0)	1.000	4/9/2020	0.13	0.45	4.46
PFHxS	355-46-4	109.04	D	H4518-FS-D(3)	5.000	4/10/2020	0.49	1.79	22.32
PFOS	1763-23-1	1.02	J	H4518-FS(0)	1.000	4/9/2020	0.39	0.89	4.46
HFPO-DA	13252-13-6	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.22	0.45	4.46
Adona	919005-14-4	0.89	U	H4518-FS(0)	1.000	4/9/2020	0.24	0.89	4.46
11Cl-PF3OUdS	763051-92-9	0.45	U	H4518-FS(0)	1.000	4/9/2020	0.21	0.45	4.46
9Cl-PF3ONS	756426-58-1	0.89	U	H4518-FS(0)	1.000	4/9/2020	0.24	0.89	4.46

U/EBL

WLEC x
KJZ 5.8.2020

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-GW28MP-0320
Battelle ID	H4519-FS
Sample Type	SA
Collection Date	03/18/2020
Extraction Date	03/23/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.		Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4		190.26	D	H4519-FS-D(3)	5.000	4/10/2020	2.32	6.58	21.93
PFHpA	375-85-9		39.41		H4519-FS(0)	1.000	4/9/2020	0.23	0.88	4.39
PFOA	335-67-1		55.75		H4519-FS(0)	1.000	4/9/2020	0.45	1.32	4.39
PFNA	375-95-1		0.88	U	H4519-FS(0)	1.000	4/9/2020	0.27	0.88	4.39
PFDA	335-76-2		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFUnA	2058-94-8		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.19	0.44	4.39
PFDoA	307-55-1		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.17	0.44	4.39
PFTrDA	72629-94-8		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.13	0.44	4.39
PFTeDA	376-06-7		1.75	U	H4519-FS(0)	1.000	4/9/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9		0.88	U	H4519-FS(0)	1.000	4/9/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6		0.88	U	H4519-FS(0)	1.000	4/9/2020	0.44	0.88	4.39
PFBS	375-73-5		75.53		H4519-FS(0)	1.000	4/9/2020	0.12	0.44	4.39
PFHxS	355-46-4		114.99	D	H4519-FS-D(3)	5.000	4/10/2020	0.48	1.75	21.93
PFOS	1763-23-1	U/EBL	2.05	J+	H4519-FS(0)	1.000	4/9/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.22	0.44	4.39
Adona	919005-14-4		0.88	U	H4519-FS(0)	1.000	4/9/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9		0.44	U	H4519-FS(0)	1.000	4/9/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1		0.88	U	H4519-FS(0)	1.000	4/9/2020	0.24	0.88	4.39

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KJZ 5.8.2020

DATA VALIDATION REPORT

NAS Whidbey Island, Oak Harbor
CTO-4405

SAMPLE DELIVERY GROUP: 20-0469

Prepared for

CH2M Hill

08 May 2020

MEC^X, Inc.
8864 Interchange Drive
Houston, Texas 77054

www.mecx.net

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TABLES

I. INTRODUCTION

Task Order Title: NAS Whidbey Island, Oak Harbor

Task Order No.: CTO-4405

MEC^X Project No.: 1143.013H.00

Sample Delivery Group: 20-0469

Project Manager: Tiffany Hill

Matrix: Water

QC Level: Stage 2B/4

No. of Samples: 1

No. of Reanalyses/Dilutions: 0

Laboratory: Battelle

TABLE 1 - SAMPLE IDENTIFICATION

Sample ID	Lab Sample Number	Matrix	Collection Date	Analysis Method	Validation Level
WI-CV-GW31M-0320	H4514-FS1	W	03/17/2020 14:20	PFAS_QSM5.3	Stage 2B

II. SAMPLE MANAGEMENT

The case narrative, sample condition upon receipt form, and the chain-of-custody (COC) was provided by the laboratory with sample delivery group (SDG) 20-0414. The recovery for the extracted internal standard 13C2-PFTeDA was below QC limits for sample WI-CV-GW31M-0320 in SDG 20-0414. The data for the re-extraction are included in this SDG 20-0469. Sample receipt conditions are documented in the data validation report for SDG 20-0414.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Description
I	Interferences present which may cause the results to be biased high
Exclude	Result should be excluded for reporting purposes
J	Analyte present. Reported value may or may not be accurate or precise
J-	Analyte present. Reported value may be biased low. Actual value is expected to be higher
J+	Analyte present. Reported value may be biased high. Actual value is expected to be lower
N	Tentative Identification. Consider Present. Special methods may be needed to confirm its presence or absence in future sampling efforts
NJ	Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity
Q	Estimated dioxin/furan concentration
R	Unreliable result
U	Not Detected
UJ	Not detected, quantitation limit may be inaccurate or imprecise
X	Dioxins only: Estimated Maximum Possible Concentration

TABLE 3 - REASON CODE REFERENCE

Reason Code	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Reason Code	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

III. METHOD PFAS_QSM5.3 — PERFLUORINATED COMPOUNDS

K. Zilis of MEC[X] reviewed the SDG on May 8, 2020

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Draft Sampling and Analysis Plan Supplemental Site Inspection Outlying Landing Field Coupeville, Naval Air Station Whidbey Island, Oak Harbor, Washington* (January 2019), the *Department of Defense (DoD) Quality Systems Manual* (QSM) *for Environmental Laboratories*, Version 5.3, Table B-15, the *DoD General Data Validation Guidelines* (February 2018) and the *National Functional Guidelines for Organic Superfund Methods Data Review* (January 2017).

III.1. HOLDING TIMES

The sample was extracted on 4/10/2020, 10 days after the holding time of 14 days from sample collection on 3/23/2020. The original data was confirmed and this data has been flagged for exclusion.

III.2. CALIBRATION

Calibration criteria were met.

III.2.1. *INITIAL CALIBRATION*

All recoveries were within 70-130% and all correlation coefficient r values were within the control limit of ≥0.995. The calculated peak asymmetry factors were within the control range of 0.8-1.5. The initial calibration verification (ICV) recoveries were within the control limits of 70-130%. MEC[X] noted the laboratory utilized as the calibration method a weighted (1/X) linear internal standard curve.

III.2.2. *CONTINUING CALIBRATION*

Continuing calibration verification (CCV) recoveries, and low-level instrument sensitivity checks (ISC) were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

The instrument blank and the method blank associated with the sample analyses had no target analyte detects above the control limits of <1/2 the LOQ or 1/10th of any sample amount. Detects <1/2 the LOQ in the instrument blanks for NMeFOSAA (0.54 ng/L) and NEtFOSAA (0.52 ng/L) indicated minimal carryover potential. The method blank, with no detects above the DL, indicated no procedural contamination.

III.3.2. *LABORATORY CONTROL SAMPLES*

LCS recoveries were within the SAP control limits of 70-130%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were not performed on the sample in this SDG.

III.4. FIELD QC SAMPLES

MEC[X] evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC[X] used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

Field and equipment blanks were not included in this SDG.

III.4.2. *FIELD DUPLICATES*

Field duplicate samples were not identified in this SDG.

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. *EXTRACTED INTERNAL STANDARD RECOVERY*

The labeled PFAS identified as surrogates on the result summaries represent the extracted internal standards. Extracted internal standard recoveries were within the QSM 5.1 control limits of 50-150% of the true value with the exception of 13C2-PFDoA at 36% and 13C2-PFTeDA at 23%, confirming results obtained from the original analysis reported in SDG 20-0414. Sample results in this SDG were excluded (Exclude) in favor of the original results.

III.5.2. *INJECTED INTERNAL STANDARD RECOVERY*

Injection internal standards were added post extraction by the laboratory. The injected internal standard recoveries were within the QSM 5.1 control limits of ±50% of the peak areas of the initial calibration midpoint standard or the peak areas of the most recent daily continuing calibration standard if an initial calibration was not analyzed that day.

III.6. COMPOUND IDENTIFICATION

Compound identification is not verified at a Stage 2B validation level. The laboratory analyzed for 18 perfluorinated compounds by an internal laboratory method noted as PFAS by DoD QSM 5.3 Table B-15.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification is not verified at a Stage 2B validation level. Nondetects are valid to the LOD. The laboratory integrated isomeric forms for the PFASs with linear and branched isomers as required by the DoD QSM.

The sample was analyzed without dilution.

III.8. SYSTEM PERFORMANCE

System performance is not evaluated at Stage 2B.

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Project Client: CH2M
Project Name: CTO-4405: NAS Whidbey Island, Oak Harbor - PFAS analysis
Project No.: 100130582-CTO4405

Client ID	WI-CV-GW31M-0320
Battelle ID	H4514-FS1
Sample Type	SA
Collection Date	03/17/2020
Extraction Date	04/10/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 UT	H4514-FS1(0)	1.000	4/15/2020	0.46	1.32	4.39
PFHpA	375-85-9	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.23	0.88	4.39
PFOA	335-67-1	1.32 UT	H4514-FS1(0)	1.000	4/15/2020	0.45	1.32	4.39
PFNA	375-95-1	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.27	0.88	4.39
PFDA	335-76-2	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.12	0.44	4.39
PFUnA	2058-94-8	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.19	0.44	4.39
PFDoA	307-55-1	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.17	0.44	4.39
PFTrDA	72629-94-8	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.13	0.44	4.39
PFTeDA	376-06-7	1.75 UT	H4514-FS1(0)	1.000	4/15/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.44	0.88	4.39
PFBS	375-73-5	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.12	0.44	4.39
PFHxS	355-46-4	0.35 UT	H4514-FS1(0)	1.000	4/15/2020	0.10	0.35	4.39
PFOS	1763-23-1	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.22	0.44	4.39
Adona	919005-14-4	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9	0.44 UT	H4514-FS1(0)	1.000	4/15/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1	0.88 UT	H4514-FS1(0)	1.000	4/15/2020	0.24	0.88	4.39

Exclude/RE

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Appendix G
Field Change Requests

Sampling Analysis Plan Field Change Request (FCR)

(9000-4405-FCR-01 OLF Coupeville SI)

Date of Change: 10/02/2019

FCR No. (assigned by RHSM): 1

Applicable Sampling Analysis Plan Title:
Supplemental Site Investigation, Outlying Landing Field Coupeville Sampling and Analysis Plan (SAP)

Project Number:	9000NVT1	Project Location:	Coupeville, WA
Contract Number:	N62470-16-D-9000, Contract Task Order 4405		

Subject of Change:

1. Changing the criteria for monitoring well screen interval determination.
2. Change sample collection approach at one location.
3. Change laboratory turn-around time (TAT) for select soil samples.
4. Update field blank frequency.
5. Change monitoring well name (WI-CV-MW3S).

Recommended Changes:

SAP Worksheet #11 Project Quality Objectives/Systematic Planning Process Statements

- Add if resulting soil and groundwater analytical results are not definitive, well screen completions may be determined by borehole lithology and site CSM, in consultation with the CH2M STC/PM and NAVFAC NW RPM
- Remove depth-discrete groundwater sample collection from location GW05
- Add 72-hour TAT for soil samples collected from GW01 and GW02

SAP Worksheet #12 Measurement Performance Criteria Table – Field QC Samples

- Change Field Blank sample frequency to one per site per week for groundwater sampling

SAP Worksheet #14 Summary of Project Tasks

- Remove depth-discrete groundwater sample collection from location GW05.

SAP Worksheet #17 Sampling Design and Rationale

- Remove depth-discrete groundwater sample collection from location GW05.
- Change GW05 location nomenclature to MW03X

SAP Worksheet #18 Location-Specific Sampling Methods/SOP Requirements Table

- Remove depth-discrete groundwater sample collection from location GW05.
- Change GW05 location nomenclature to MW03X

Reason for Change:

1. Depth-discrete groundwater sample analytical results for location GW03 were limited due to drilling conditions; installation of a monitoring well based on data from the intervals sampled would result in screen depth interval that is redundant to that of two adjacent installed wells. Instead, an alternate screen interval was selected based on borehole lithology.
2. Depth-discrete groundwater sample at location GW05 not required for screen depth completion determination since the installation proposal is for a well cluster, with existing deep and intermediate wells previously installed.
3. Adjusted TAT for soil samples collected from GW01 and GW02 to aid in screen depth completion determination.

4. Updated field blank frequency to once per week instead of one per site per day per project chemist recommendation and RPM concurrence. 5. Monitoring well location GW05 is a cluster location with MW03M & MW03D, and name change to MW03S (rather than MW24 as cited in SAP) is more consistent with current well nomenclature.			
Submitted by:	Mark Endo	Company: CH2M	Date: 10/2/19
Review & Acceptance:			
Activity Manager:	Jennifer Madsen	Date: 10/8/19	
Project Manager:	Rachel Clennon	Date: 10/8/19	
Environmental Manager:	NA	Date: NA	
Navy RPM:	Kendra Leibman	Date: 10/9/19	
Navy NTR:	NA	Date: NA	
Distribution:			
1. Approvers above	2. FTL	3. Field Staff	4.
5.	6.	7.	8.

File Copies: Project File

Sampling Analysis Plan Field Change Request (FCR)

(9000-4405-FCR-02 OLF Coupeville SI)

Date of Change: 11/07/2019

FCR No. (assigned by PM): 2

Applicable Sampling Analysis Plan Title:
Supplemental Site Investigation, Outlying Landing Field Coupeville Sampling and Analysis Plan (SAP)

Project Number:	9000NVT1	Project Location:	Coupeville, WA
Contract Number:	N62470-16-D-9000, Contract Task Order 4405		

Subject of Change:

1. Change monitoring well development method and sampling criteria.

Recommended Changes:

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements and Worksheet #14 - Summary of Project Tasks

- Change monitoring well development, which is conducted in accordance with NAVFAC NW SOP I-C-2 *Monitoring Well Development*, except where conditions warrant change in consultation and approval with the CH2M STC/PM and NAVFAC NW RPM.

If shallow wells are purged dry early in development, and are slow to recharge, in consult with senior technical team it was determined a modified well development approach would be taken to achieve well conditioning:

- Development under SOP I-C-2 would be attempted.
- If significant water drawdown occurred during the swabbing and bailing portion, the well would be allowed to recharge to ensure the full screen interval is completed.
- If significant water drawdown is observed during the over-pumping portion, that well would be purged dry and left to recharge. A total of three well volumes would be purged, if feasible. If turbidity is still extremely high at completion of third purge, the well would be scheduled for sampling towards the end of the sampling event to allow the well to settle. The well will be assessed during groundwater sampling and undergo additional development if warranted.

This change will be described in updated project Field Instructions.

Reason for Change:

1. Adjusted monitoring well development methods due to lithology and well conditions (e.g. WI-CV-MW21S, -MW22S, and -MW23S due to slow recharge rates).

Submitted by:	Mark Endo	Company:	CH2M	Date:	11/13/2019

Review & Acceptance:

Activity Manager:	Jennifer Madsen	Date: 11/15/19
Project Manager:	Rachel Clennon	Date: 11/13/19

Environmental Manager:	NA	Date:	
Navy RPM/NTR:	Kendra Clubb (Leibman)	Date: 11/18/19	
Distribution:			
1. Approvers above	2. FTL	3. Field Staff	4.
5.	6.	7.	8.

File Copies: Project File

Sampling Analysis Plan Field Change Request (FCR)

(9000-4405-FCR-02 OLF Coupeville SI)

Date of Change: 12/13/2019

FCR No. (assigned by PM): 3

Applicable Sampling Analysis Plan Title:

Supplemental Site Investigation, Outlying Landing Field Coupeville Sampling and Analysis Plan (SAP)

Project Number:	9000NVT1	Project Location:	Coupeville, WA
Contract Number:	N62470-16-D-9000, Contract Task Order 4405		

Subject of Change:

1. Change monitoring well nomenclature for proposed well WI-CV-MW25M.

Recommended Changes:

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements and Worksheet #17 – Sampling and Design Rationale

- The replacement well for broken WI-CV-MW25M will be named 'WI-CV-MW25M-R' to indicate 'replacement well'. Well abandonment and construction logs, respectively, will be submitted to the State of Washington in accordance with applicable requirements.

Reason for Change:

1. Well WI-CV-MW25M was redrilled and installed December 3-6, 2019, due to damage to the well installed on October 25-26. The replacement well is located approximately 10 feet from the original well, which was abandoned in place and will also require filing with the State of Washington.

Submitted by:	Rachel Clennon	Company:	CH2M	Date:	12/13/2019

Review & Acceptance:

Activity Manager:	Jennifer Madsen	Date: 12/13/19
Project Manager:	Rachel Clennon	Date: 12/13/19
Environmental Manager:	NA	Date:
Navy RPM/NTR:	Kendra Clubb (Leibman)	Date: 12/20/19

Distribution:

1. Approvers above	2. FTL	3. Field Staff	4.
5.	6.	7.	8.

File Copies: Project File

Sampling Analysis Plan Field Change Request (FCR)

(9000-4405-FCR-04 OLF Coupeville SI)

Date of Change: 02/12/2020

FCR No. (assigned by PM): 4

Applicable Sampling Analysis Plan Title:
Supplemental Site Investigation, Outlying Landing Field Coupeville Sampling and Analysis Plan (SAP)

Project Number: 9000NVT1 Project Location: Coupeville, WA

Contract Number: N62470-16-D-9000, Contract Task Order 4405

Subject of Change:

1. Change the diameter of well casing installation from 2-inch to 4-inch.
2. Change the number of Phase 2 single well aquifer tests.

Recommended Changes:

Executive Summary

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements and Worksheet #17 – Sampling and Design Rationale

- In original SAP body, the well construction diameter is not specified, although it is assumed and scoped with drilling subcontractor (and within contract pricing) that the wells will be 2-inch diameter. The proposed field change is to install two of the five Phase 2 monitoring well locations as 4-inch diameter wells.

Executive Summary

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements and Worksheet #14 – Summary of Project Tasks

- Update the number of Phase 2 single well aquifer tests from four to two. Though the original SAP states that 'up to four' aquifer tests will be conducted, it was assumed in planning to this point that four aquifer tests would be performed.

Reason for Change:

1. The performance of the aquifer testing requires a well diameter of 4 inches to provide estimates on aquifer properties and achieve sufficient pumping rate used in the groundwater flow modeling. Monitoring well locations WI-CV-29M and WI-CV-31M will be installed with 4-inch well casing, the other Phase 2 locations will remain 2-inch installations.
2. From the Phase 1 data evaluation, it was determined that two aquifer tests would be appropriate to refine the groundwater flow model at the site during Phase 2. Based on the greater cost of installing 4-inch wells (as compared to 2-inch wells), it was determined that two instead of four aquifer tests would be performed during Phase 2. The greater cost of drilling and installation of 4-inch wells will be offset by the reduction in number of aquifer tests.

Submitted by: Rachel Clennon Company: CH2M Date: 03/10/2020

Review & Acceptance:

Activity Manager:	Jennifer Madsen	Date: 03/10/2020
Project Manager:	Rachel Clennon	Date: 03/09/2020
Environmental Manager:	NA	Date:
Navy RPM/NTR:	Kendra Clubb (Leibman)	Date: 03/10/2020

Distribution:

1. Approvers above	2. FTL	3. Field Staff	4.
5.	6.	7.	8.

File Copies: Project File

Appendix H
Raw Data Tables

Sample ID	WI-CV-GW01D-1019	WI-CV-GW01M-1019	WI-CV-GW01MP-1019	WI-CV-GW02M-1019	WI-CV-GW02S-1019	WI-CV-GW03D-1019	WI-CV-GW03M-1019	WI-CV-GW03S-1119	WI-CV-GW04M-1019
Sample Date	10/20/19	10/17/19	10/17/19	10/15/19	10/15/19	10/19/19	10/19/19	11/8/19	10/19/19
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
11Cl-PF3OUdS	0.49 U	0.49 U	0.48 U	0.45 U	0.45 U	0.44 U	0.45 U	0.45 U	0.43 UJ
9Cl-PF3ONS	0.98 U	0.98 U	0.96 U	0.89 U	0.89 U	0.88 U	0.89 U	0.91 U	0.86 UJ
Adona	0.98 U	0.98 U	0.96 U	0.89 U	0.89 U	0.88 U	0.89 U	0.91 U	0.86 UJ
HFPO-DA	0.49 U	0.49 U	0.48 U	0.45 U	0.45 U	0.44 U	0.45 U	0.45 U	0.43 UJ
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.98 U	0.98 UJ	0.96 UJ	0.89 U	0.89 U	0.88 U	0.89 U	0.91 UJ	0.86 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.98 U	0.98 UJ	0.96 UJ	0.89 UJ	0.89 U	0.88 U	0.89 U	0.91 UJ	0.86 UJ
Perfluorobutanesulfonic acid (PFBS)	0.49 U	0.49 U	0.48 U	0.45 U	184	0.44 U	0.14 J	50.0	0.43 UJ
Perfluorodecanoic Acid (PFDA)	0.49 U	0.49 U	0.48 UJ	0.45 U	0.45 U	0.44 U	0.45 U	0.45 UJ	0.43 UJ
Perfluorododecanoic Acid (PFDoA)	0.49 U	0.49 UJ	0.48 U	0.45 U	0.45 U	0.44 U	0.45 U	0.45 UJ	0.43 UJ
Perfluoroheptanoic acid (PFHpA)	0.98 U	0.98 U	0.96 U	0.89 U	141	0.88 U	0.89 U	4.77	0.86 UJ
Perfluorohexanesulfonic acid (PFHxS)	0.39 U	0.39 U	0.38 U	0.36 U	4,514	0.35 U	0.72 J	18.0	0.52 J
Perfluorohexanoic Acid (PFHxA)	1.47 U	1.47 U	1.44 U	1.34 U	430	1.32 U	1.34 U	73.2	0.82 J
Perfluorononanoic acid (PFNA)	0.98 U	0.98 U	0.96 U	0.89 U	0.89 U	0.88 U	0.89 U	0.91 U	0.86 UJ
Perfluorooctane Sulfonate (PFOS)	0.44 J	0.98 U	0.96 U	0.89 U	97.3 J	0.88 U	0.89 U	0.91 U	0.86 UJ
Perfluorooctanoic acid (PFOA)	1.47 U	1.47 U	0.93 J	1.34 U	526	1.32 U	1.34 U	1.04 J	1.19 J
Perfluorotetradecanoic Acid (PFTeDA)	1.96 U	1.96 U	1.92 U	1.79 U	1.79 U	1.75 U	1.79 U	1.82 U	1.72 UJ
Perfluorotridecanoic Acid (PFTrDA)	0.49 U	0.49 U	0.48 U	0.45 U	0.45 U	0.44 U	0.45 U	0.45 U	0.43 UJ
Perfluoroundecanoic Acid (PFUnA)	0.49 U	0.49 UJ	0.48 UJ	0.45 U	0.45 U	0.44 U	0.45 U	0.45 UJ	0.43 UJ

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Notes:

J- - Analyte present. Value may be biased low. Value may be higher

J - Analyte present. Value may or may not be accurate or precise

J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW04S-1019	WI-CV-GW04SP-1019	WI-CV-GW05M-1019	WI-CV-GW05S-1019	WI-CV-GW06M-1019	WI-CV-GW06MP-1019	WI-CV-GW06S-1019	WI-CV-GW07M-1019	WI-CV-GW07S-1019
Sample Date	10/19/19	10/19/19	10/20/19	10/20/19	10/19/19	10/19/19	10/19/19	10/22/19	10/22/19
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
11Cl-PF3OUdS	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U
9Cl-PF3ONS	0.96 U	0.93 U	0.86 U	1.01 U	0.93 U	0.94 U	0.85 U	0.89 U	0.93 U
Adona	0.96 U	0.93 U	0.86 U	1.01 U	0.93 U	0.94 U	0.85 U	0.89 U	0.93 U
HFPO-DA	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.96 U	0.93 U	0.86 U	1.01 U	0.93 U	0.94 U	0.85 U	0.89 U	0.93 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.96 U	0.93 U	0.86 U	1.01 U	0.93 U	0.94 U	0.85 U	0.89 U	0.93 UJ
Perfluorobutanesulfonic acid (PFBS)	0.48 U	0.46 U	215	169 J-	0.46 U	0.47 U	0.42 U	0.45 U	0.31 J
Perfluorodecanoic Acid (PFDA)	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U
Perfluorododecanoic Acid (PFDoA)	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U
Perfluoroheptanoic acid (PFHpA)	0.96 U	0.93 U	151	87.5	0.93 U	0.94 U	0.85 U	0.89 U	0.93 U
Perfluorohexanesulfonic acid (PFHxS)	0.14 J	0.13 J	670	434	0.37 U	0.38 U	0.34 U	1.58 J	0.37 U
Perfluorohexanoic Acid (PFHxA)	1.44 U	1.39 U	440	411	1.39 U	1.42 U	1.27 U	1.34 U	1.39 U
Perfluorononanoic acid (PFNA)	0.96 U	0.93 U	0.86 U	0.67 J	0.93 U	0.94 U	0.85 U	0.89 U	0.93 U
Perfluorooctane Sulfonate (PFOS)	0.89 J	0.79 J	1.39 J	3.47 J	0.93 U	0.94 U	0.85 U	0.89 U	0.93 U
Perfluorooctanoic acid (PFOA)	1.44 U	1.39 U	357	130	1.39 U	1.42 U	1.27 U	0.71 J	1.39 U
Perfluorotetradecanoic Acid (PFTeDA)	1.92 U	1.85 U	1.72 U	2.02 U	1.85 U	1.89 U	1.69 U	1.79 U	1.85 U
Perfluorotridecanoic Acid (PFTrDA)	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U
Perfluoroundecanoic Acid (PFUnA)	0.48 U	0.46 U	0.43 U	0.5 U	0.46 U	0.47 U	0.42 U	0.45 U	0.46 U

Notes:

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J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW08M-1019	WI-CV-GW08S-1019	WI-CV-GW09M-1019	WI-CV-GW09MP-1019	WI-CV-GW10D-1019	WI-CV-GW10M-1019	WI-CV-GW11M-1019	WI-CV-GW11S-1019	WI-CV-GW12D-1019
Sample Date	10/17/19	10/17/19	10/18/19	10/18/19	10/18/19	10/18/19	10/22/19	10/22/19	10/18/19
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
11Cl-PF3OUdS	0.45 U	0.45 U	0.42 U	0.42 U	0.42 U	0.45 U	0.46 U	0.49 U	0.44 U
9Cl-PF3ONS	0.89 U	0.89 U	0.83 U	0.85 U	0.83 U	0.89 U	0.93 U	0.98 U	0.88 U
Adona	0.89 U	0.89 U	0.83 U	0.85 U	0.83 U	0.89 U	0.93 U	0.98 U	0.88 U
HFPO-DA	0.45 UJ	0.45 U	0.42 U	0.42 U	0.42 U	0.45 U	0.46 U	0.49 U	0.44 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.89 U	0.89 UJ	0.83 UJ	0.85 UJ	0.83 UJ	0.89 UJ	0.93 U	0.98 U	0.88 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.89 U	0.89 UJ	0.83 UJ	0.85 U	0.83 UJ	0.89 UJ	0.93 U	0.98 U	0.88 UJ
Perfluorobutanesulfonic acid (PFBS)	1.45 J	0.71 J	8.61	10.3	0.42 U	3.04 J	0.46 U	0.49 U	0.44 U
Perfluorodecanoic Acid (PFDA)	0.45 U	0.45 UJ	0.42 U	0.42 U	0.42 UJ	0.45 UJ	0.46 U	0.49 U	0.44 UJ
Perfluorododecanoic Acid (PFDoA)	0.45 U	0.45 UJ	0.42 U	0.42 U	0.42 U	0.45 UJ	0.46 U	0.49 U	0.44 U
Perfluoroheptanoic acid (PFHpA)	0.89 U	1.17 J	1.19 J	1.51 J	0.83 U	0.89 U	0.93 U	0.98 U	0.88 U
Perfluorohexanesulfonic acid (PFHxS)	0.75 U	12.1	3.83 J	4.72	0.33 U	3.91 J	0.47 J	0.28 J	1.65 J
Perfluorohexanoic Acid (PFHxA)	1.34 U	1.06 J	34.5	38.9	1.25 U	1.38 U	1.39 U	1.46 U	1.32 U
Perfluorononanoic acid (PFNA)	0.89 U	0.89 U	0.83 U	0.85 U	0.83 U	0.89 UJ	0.93 U	0.98 U	0.88 U
Perfluorooctane Sulfonate (PFOS)	1.77 J	0.89 U	0.83 U	0.85 U	0.83 U	0.89 U	0.77 J	1.27 J	0.88 U
Perfluorooctanoic acid (PFOA)	1.34 U	2.46 J	1.37 J	1.76 J	1.25 U	1.34 U	0.65 J	1.46 U	1.32 U
Perfluorotetradecanoic Acid (PFTeDA)	1.79 U	1.79 U	1.67 U	1.69 U	1.67 U	1.79 U	1.85 U	1.95 U	1.75 U
Perfluorotridecanoic Acid (PFTrDA)	0.45 U	0.45 U	0.42 U	0.42 U	0.42 U	0.45 U	0.46 U	0.49 U	0.44 U
Perfluoroundecanoic Acid (PFUnA)	0.45 U	0.45 UJ	0.42 U	0.42 U	0.42 U	0.45 UJ	0.46 U	0.49 U	0.44 UJ

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Notes:

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J - Analyte present. Value may or may not be accurate or precise

J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW13M-1019	WI-CV-GW13S-1019	WI-CV-GW14M-1019	WI-CV-GW15M-1019	WI-CV-GW15S-1019	WI-CV-GW16M-1019	WI-CV-GW16S-1019	WI-CV-GW17M-1119	WI-CV-GW20-100-1019
Sample Date	10/17/19	10/18/19	10/16/19	10/16/19	10/16/19	10/16/19	10/16/19	11/8/19	10/23/19
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
11Cl-PF3OUdS	0.49 U	0.46 U	0.45 U	0.45 U	0.45 U	0.47 U	0.46 U	0.45 U	0.69 UJ
9Cl-PF3ONS	0.98 U	0.93 U	0.91 U	0.91 U	0.91 U	0.94 U	0.93 U	0.91 U	1.39 UJ
Adona	0.98 U	0.93 U	0.91 U	0.91 U	0.91 U	0.94 U	0.93 U	0.91 U	1.39 UJ
HFPO-DA	0.49 U	0.46 U	0.45 U	0.45 UJ	0.45 U	0.47 U	0.46 U	0.45 U	0.69 UJ
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.98 U	0.93 U	0.91 U	0.91 U	0.91 UJ	0.94 U	0.93 UJ	0.91 UJ	1.39 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.98 U	0.93 U	0.91 U	0.91 U	0.91 UJ	0.94 U	0.93 UJ	0.91 UJ	1.39 UJ
Perfluorobutanesulfonic acid (PFBS)	88.6	2.61 J	32.3	8.12	16.3	24.1	18.9	1.12 J	107 J
Perfluorodecanoic Acid (PFDA)	0.49 U	0.46 U	0.45 U	0.45 U	0.45 U	0.47 U	0.46 U	0.45 UJ	1.8 J
Perfluorododecanoic Acid (PFDoA)	0.49 U	0.46 U	0.45 U	0.45 U	0.45 U	0.47 U	0.46 U	0.45 UJ	0.34 J
Perfluoroheptanoic acid (PFHpA)	20.9	0.93 U	12.6	2.09 J	3.91 J	25.7	22.0	0.91 U	146 J
Perfluorohexanesulfonic acid (PFHxS)	45.2	0.66 J	39.3	13.6	356	121	161	0.36 U	5,042 J
Perfluorohexanoic Acid (PFHxA)	201	1.39 U	62.5	8.07	47.7	70.5	54.3	1.36 U	659 J
Perfluorononanoic acid (PFNA)	0.98 U	0.93 U	0.91 U	0.91 U	0.91 U	0.94 U	0.33 J	0.91 UJ	1.85 J
Perfluorooctane Sulfonate (PFOS)	0.98 U	1.82 J	0.48 J	0.91 U	0.61 J	4.93	2.79 J	0.91 U	380 J
Perfluorooctanoic acid (PFOA)	23.6	1.39 U	68.6	5.35	102	181	212	1.36 U	728 J
Perfluorotetradecanoic Acid (PFTeDA)	1.96 U	1.85 U	1.82 U	1.82 U	1.82 U	1.89 U	1.85 U	1.82 U	2.78 UJ
Perfluorotridecanoic Acid (PFTrDA)	0.49 U	0.46 U	0.45 U	0.45 U	0.45 U	0.47 U	0.46 U	0.45 U	0.69 UJ
Perfluoroundecanoic Acid (PFUnA)	0.49 U	0.46 U	0.45 U	0.45 U	0.45 U	0.47 U	0.46 UJ	0.45 UJ	0.32 J

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Notes:

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J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW20-141-1019	WI-CV-GW20-192-1019	WI-CV-GW20S-1119	WI-CV-GW21-115-0919	WI-CV-GW21-160-0919	WI-CV-GW21S-1119	WI-CV-GW21SP-1119	WI-CV-GW22-133-0819
Sample Date	10/24/19	10/25/19	11/11/19	9/10/19	9/11/19	11/13/19	11/13/19	8/29/19
Chemical Name								
Semivolatile Organic Compounds (NG/L)								
11Cl-PF3OUdS	0.49 U	0.51 UJ	0.43 U	0.36 UJ	0.36 U	0.44 UJ	0.44 UJ	0.38 U
9Cl-PF3ONS	0.98 U	1.02 UJ	0.86 U	0.36 UJ	0.36 U	0.88 UJ	0.88 UJ	0.38 U
Adona	0.98 U	1.02 UJ	0.86 U	0.36 UJ	0.36 U	0.88 UJ	0.88 UJ	0.38 U
HFPO-DA	0.49 U	0.51 UJ	0.43 U	0.36 UJ	0.36 UJ	0.44 UJ	0.44 UJ	0.38 UJ
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.98 U	1.02 UJ	0.86 UJ	0.89 UJ	0.89 U	0.88 UJ	0.88 UJ	0.96 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.98 U	1.02 UJ	0.86 UJ	1.79 UJ	1.79 U	0.88 UJ	0.88 UJ	1.92 U
Perfluorobutanesulfonic acid (PFBS)	1.41 J	0.51 UJ	12.4	16.4 J	0.4 J	24.2 J	24.2 J	0.48 U
Perfluorodecanoic Acid (PFDA)	0.49 U	0.51 UJ	0.43 U	0.45 UJ	0.45 U	0.44 UJ	0.44 UJ	0.48 U
Perfluorododecanoic Acid (PFDoA)	0.49 U	0.51 UJ	0.43 U	0.45 UJ	0.45 U	0.44 UJ	0.44 UJ	0.48 U
Perfluoroheptanoic acid (PFHpA)	0.43 J	1.02 UJ	11.7	1.21 J	0.45 UJ	2.23 J	2.52 J	0.48 U
Perfluorohexanesulfonic acid (PFHxS)	23.5	68.3 J	502	1.09 J	0.36 U	13.4 J	12.6 J	0.38 U
Perfluorohexanoic Acid (PFHxA)	2.9 J	1.53 UJ	57.5 J-	136 J	0.64 J	53.6 J	55.4 J	0.48 UJ
Perfluorononanoic acid (PFNA)	0.98 U	0.38 J	0.86 U	0.89 UJ	0.89 U	0.35 J	0.88 UJ	0.96 U
Perfluorooctane Sulfonate (PFOS)	4.11 J	18.5 J	30.4	4.55 J	0.38 J	165 J	154 J	0.48 U
Perfluorooctanoic acid (PFOA)	4.71 U	13.1 J	67.8 J-	1.6 UJ	0.45 U	4.85 J	4.76 J	0.48 U
Perfluorotetradecanoic Acid (PFTeDA)	1.96 U	2.04 UJ	1.72 U	0.89 UJ	0.89 U	1.75 UJ	1.75 UJ	0.96 U
Perfluorotridecanoic Acid (PFTrDA)	0.49 U	0.51 UJ	0.43 U	0.45 UJ	0.45 U	0.44 UJ	0.44 UJ	0.48 U
Perfluoroundecanoic Acid (PFUnA)	0.49 U	0.51 UJ	0.43 U	0.89 UJ	0.89 U	0.44 UJ	0.44 UJ	0.96 U

Notes:

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NG/L - Nanograms per liter

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Sample ID	WI-CV-GW22-164-0819	WI-CV-GW22-181-0819	WI-CV-GW22-194-0919	WI-CV-GW23-130-0819	WI-CV-GW23-147-0819	WI-CV-GW23-168-0819	WI-CV-GW23-196-0819	WI-CV-GW23S-1119
Sample Date	8/30/19	9/4/19	9/5/19	8/8/19	8/9/19	8/9/19	8/10/19	11/13/19
Chemical Name								
Semivolatile Organic Compounds (NG/L)								
11Cl-PF3OUdS	0.38 UJ	0.38 U	0.38 U	0.41 U	0.37 U	0.38 UJ	0.39 U	0.46 UJ
9Cl-PF3ONS	0.38 UJ	0.38 U	0.38 U	0.41 U	0.37 U	0.38 UJ	0.39 U	0.93 UJ
Adona	0.38 UJ	0.38 U	0.38 U	0.41 U	0.37 U	0.38 UJ	0.39 U	0.93 UJ
HFPO-DA	0.38 UJ	0.38 UJ	0.38 UJ	0.41 U	0.37 U	0.38 UJ	0.39 U	0.46 UJ
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.96 UJ	0.94 UJ	0.94 U	1.02 U	0.93 U	0.96 UJ	0.98 UJ	0.93 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	1.92 UJ	1.89 U	1.89 U	2.04 U	1.85 U	1.92 UJ	1.96 U	0.93 UJ
Perfluorobutanesulfonic acid (PFBS)	0.48 UJ	9.63	0.47 U	3.06 J	0.16 J	0.2 J	0.49 U	2.21 J
Perfluorodecanoic Acid (PFDA)	0.48 UJ	0.47 U	0.47 U	0.51 U	0.46 U	0.48 UJ	0.49 U	0.46 UJ
Perfluorododecanoic Acid (PFDoA)	0.48 UJ	0.47 U	0.47 U	0.51 UJ	0.46 UJ	0.48 UJ	0.49 U	0.46 UJ
Perfluoroheptanoic acid (PFHpA)	0.48 UJ	1.49 J	0.47 U	0.51 U	0.46 U	0.48 UJ	0.49 U	0.67 J
Perfluorohexanesulfonic acid (PFHxS)	0.38 UJ	2.3 J	0.38 U	1.61 J	0.37 U	0.38 UJ	0.39 U	6.63 J
Perfluorohexanoic Acid (PFHxA)	0.48 UJ	28.9 J	0.47 U	7.17	0.46 U	1.17 J	0.49 U	7.3 J
Perfluorononanoic acid (PFNA)	0.96 UJ	0.94 U	0.94 U	1.02 U	0.93 U	0.96 UJ	0.98 U	0.32 J
Perfluorooctane Sulfonate (PFOS)	0.48 UJ	0.47 U	0.47 U	0.51 U	0.46 U	0.48 UJ	0.49 U	202 J
Perfluorooctanoic acid (PFOA)	0.48 UJ	1.34 U	0.47 U	4.15 J	0.46 U	0.48 UJ	0.49 U	4.47 J
Perfluorotetradecanoic Acid (PFTeDA)	0.96 UJ	0.94 U	0.94 U	1.02 UJ	0.93 UJ	0.96 UJ	0.98 UJ	1.85 UJ
Perfluorotridecanoic Acid (PFTrDA)	0.48 UJ	0.47 U	0.47 U	0.51 UJ	0.46 UJ	0.48 UJ	0.49 UJ	0.46 UJ
Perfluoroundecanoic Acid (PFUnA)	0.96 UJ	0.94 U	0.94 U	1.02 U	0.93 U	0.96 UJ	0.98 U	0.46 UJ

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Notes:

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J - Analyte present. Value may or may not be accurate or precise

J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW23SP-1119	WI-CV-GW25-131-0919	WI-CV-GW25-155-0919	WI-CV-GW25-207-1019	WI-CV-GW25M-1219	WI-CV-GW26-130-0819	WI-CV-GW26-168-0819	WI-CV-GW26-193-0819
Sample Date	11/13/19	9/22/19	9/22/19	10/19/19	12/10/19	8/3/19	8/4/19	8/5/19
Chemical Name								
Semivolatile Organic Compounds (NG/L)								
11Cl-PF3OUdS	0.46 UJ	0.38 U	0.38 U	0.43 U	0.49 U	0.38 UJ	0.41 UJ	0.38 UJ
9Cl-PF3ONS	0.93 UJ	0.38 U	0.38 U	0.43 U	0.98 U	0.38 UJ	0.41 UJ	0.38 UJ
Adona	0.93 UJ	0.38 U	0.38 U	0.43 U	0.98 U	0.38 UJ	0.41 UJ	0.38 UJ
HFPO-DA	0.46 UJ	0.38 U	0.38 U	0.43 U	0.49 U	0.38 UJ	0.41 UJ	0.38 UJ
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.93 UJ	0.96 U	0.94 U	1.09 U	0.98 U	0.96 UJ	1.02 UJ	0.94 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.93 UJ	1.92 U	1.89 U	2.17 U	0.98 U	1.92 UJ	2.04 UJ	1.89 UJ
Perfluorobutanesulfonic acid (PFBS)	2.14 J	12.6	36.0	1.33 J	26.8	0.27 J	24.5 J	8.37 J
Perfluorodecanoic Acid (PFDA)	0.46 UJ	0.48 U	0.47 U	0.54 U	0.49 U	0.18 J	0.62 J	0.47 UJ
Perfluorododecanoic Acid (PFDoA)	0.46 UJ	0.48 U	0.47 U	0.54 U	0.49 U	0.48 UJ	0.51 UJ	0.47 UJ
Perfluoroheptanoic acid (PFHpA)	0.73 J	13.4	20.2	0.81 J	16.3	0.48 UJ	6.46 J	7.11 J
Perfluorohexanesulfonic acid (PFHxS)	6.19 J	43.3	44.5	0.96 J	35.7	0.38 UJ	9.79 J	8.16 J
Perfluorohexanoic Acid (PFHxA)	7.14 J	46.9	63.3	1.88 J	75.8	0.48 UJ	68.2 J	37.3 J
Perfluorononanoic acid (PFNA)	0.37 J	0.96 U	0.94 U	1.09 U	0.98 U	0.96 UJ	0.58 J	0.94 UJ
Perfluorooctane Sulfonate (PFOS)	213 J	13.4	4.02 J	2 J	0.98 U	0.57 UJ	5.61 UJ	0.72 J
Perfluorooctanoic acid (PFOA)	3.49 J	43.8	182	4.81 U	174	0.48 UJ	32.6 J+	45.6 J+
Perfluorotetradecanoic Acid (PFTeDA)	1.85 UJ	0.96 U	0.94 U	1.09 U	1.96 U	0.96 UJ	1.02 UJ	0.94 UJ
Perfluorotridecanoic Acid (PFTrDA)	0.46 UJ	0.48 U	0.47 U	0.54 U	0.49 U	0.48 UJ	0.51 UJ	0.47 UJ
Perfluoroundecanoic Acid (PFUnA)	0.46 UJ	0.96 U	0.94 U	1.09 U	0.49 U	0.96 UJ	1.02 UJ	0.94 UJ

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Notes:

J- - Analyte present. Value may be biased low. Value may be higher

J - Analyte present. Value may or may not be accurate or precise

J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW26D-1119	WI-CV-GW2SS-1119
Sample Date	11/12/19	11/11/19
Chemical Name		
Semivolatile Organic Compounds (NG/L)		
11Cl-PF3OUdS	0.45 U	0.42 U
9Cl-PF3ONS	0.91 U	0.83 U
Adona	0.91 U	0.83 U
HFPO-DA	0.45 U	0.42 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.91 U	0.83 UJ
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.91 U	0.83 UJ
Perfluorobutanesulfonic acid (PFBS)	6.2	0.2 J
Perfluorodecanoic Acid (PFDA)	0.45 U	0.42 UJ
Perfluorododecanoic Acid (PFDoA)	0.45 U	0.42 UJ
Perfluoroheptanoic acid (PFHpA)	5.17	0.83 U
Perfluorohexanesulfonic acid (PFHxS)	6.95	0.39 J
Perfluorohexanoic Acid (PFHxA)	30.0	1.25 U
Perfluorononanoic acid (PFNA)	0.91 U	0.83 UJ
Perfluorooctane Sulfonate (PFOS)	0.91 U	0.83 U
Perfluorooctanoic acid (PFOA)	33.4	1.25 U
Perfluorotetradecanoic Acid (PFTeDA)	1.82 U	1.67 UJ
Perfluorotridecanoic Acid (PFTrDA)	0.45 U	0.42 UJ
Perfluoroundecanoic Acid (PFUnA)	0.45 U	0.42 UJ

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Notes:

J- - Analyte present. Value may be biased low. Value may be higher

J - Analyte present. Value may or may not be accurate or precise

J+ - Analyte present. Value may be biased high. Actual value may be lower

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-GW28M-0320	WI-CV-GW28MP-0320	WI-CV-GW29M-0320	WI-CV-GW30M-0320	WI-CV-GW31M-0320
Sample Date	3/18/20	3/18/20	3/17/20	3/17/20	3/17/20
Chemical Name					
Semivolatile Organic Compounds (NG/L)					
11Cl-PF3OUdS	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U
9Cl-PF3ONS	0.89 U	0.88 U	0.82 U	0.88 U	0.86 U
Adona	0.89 U	0.88 U	0.82 U	0.88 U	0.86 U
HFPO-DA	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.89 U	0.88 U	0.82 U	0.88 U	0.56 J
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	0.89 U	0.88 U	0.82 U	0.88 U	0.48 J
Perfluorobutanesulfonic acid (PFBS)	73.0	75.5	25.6	0.44 U	0.43 U
Perfluorodecanoic Acid (PFDA)	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U
Perfluorododecanoic Acid (PFDoA)	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U
Perfluoroheptanoic acid (PFHpA)	41.1	39.4	14.3	0.88 U	0.86 U
Perfluorohexanesulfonic acid (PFHxS)	109 D	115 D	96.3 D	0.35 U	0.34 U
Perfluorohexanoic Acid (PFHxA)	169 D	190 D	68.0	1.32 U	1.29 U
Perfluorononanoic acid (PFNA)	0.89 U	0.88 U	0.82 U	0.88 U	0.86 U
Perfluorooctane Sulfonate (PFOS)	1.02 J	2.05 J	0.46 J	0.88 U	0.86 U
Perfluorooctanoic acid (PFOA)	55.5	55.8	65.2	1.32 U	1.29 U
Perfluorotetradecanoic Acid (PFTeDA)	1.79 U	1.75 U	1.64 U	1.75 U	1.72 U
Perfluorotridecanoic Acid (PFTrDA)	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U
Perfluoroundecanoic Acid (PFUnA)	0.45 U	0.44 U	0.41 U	0.44 U	0.43 U

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Notes:

D - Compound identified in an analysis at a secondary dilution factor.

J - Analyte present. Value may or may not be accurate or precise

NG/L - Nanograms per liter

U - The material was analyzed for, but not detected

Sample ID	WI-CV-BH20-2-1019	WI-CV-BH20-24-1019	WI-CV-BH20-42-1019	WI-CV-BH20-80-1019	WI-CV-BH20-95-1019	WI-CV-BH21-1-0919	WI-CV-BH21-25-0919	WI-CV-BH21-4-0919	WI-CV-BH21-50-0919
Sample Date	10/22/19	10/23/19	10/23/19	10/23/19	10/23/19	9/6/19	9/8/19	9/6/19	9/8/19
Chemical Name									
Semivolatile Organic Compounds (NG/G)									
11Cl-PF3OUdS	1.71 U	1.61 U	1.63 U	1.53 U	1.89 U	1.04 U	1.04 U	1.08 U	1.25 U
9Cl-PF3ONS	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.08 U	1.25 U
Adona	2.29 U	2.15 U	2.17 U	2.04 U	2.52 U	1.04 U	1.04 U	1.08 U	1.25 U
HFPO-DA	2.29 U	2.15 U	2.17 U	2.04 U	2.52 U	2.07 U	2.07 U	2.15 U	2.5 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2.29 U	2.15 U	2.17 U	2.04 U	2.52 U	2.07 U	2.07 U	2.15 U	2.5 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2.86 U	2.69 U	2.72 U	2.55 U	3.14 U	2.59 U	2.59 U	2.69 U	3.13 U
Perfluorobutanesulfonic acid (PFBS)	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.08 U	1.25 U
Perfluorodecanoic Acid (PFDA)	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.08 U	1.25 U
Perfluorododecanoic Acid (PFDoA)	2.29 U	2.15 U	2.17 U	2.04 U	2.52 U	0.52 U	0.52 U	0.54 U	0.63 U
Perfluoroheptanoic acid (PFHpA)	1.71 U	1.61 U	1.63 U	1.53 U	1.89 U	1.04 U	1.04 U	1.08 U	0.68 J
Perfluorohexanesulfonic acid (PFHxS)	9.12	2.15 U	3.59 J	2.04 U	7.96	1.47 J	0.76 J	2.5 J	7.58
Perfluorohexanoic Acid (PFHxA)	1.01 J	2.15 U	2.17 U	2.04 U	2.52 U	1.04 U	1.04 U	1.08 U	1.25 U
Perfluorononanoic acid (PFNA)	4.94 J	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.9 J	0.73 J
Perfluorooctane Sulfonate (PFOS)	101	19.9 J-	60	2.04 U	2.52 U	4.92 J	16.9	936	402
Perfluorooctanoic acid (PFOA)	4.1 J	2.15 U	2.17 U	2.04 U	2.52 U	0.96 J	1.04 U	2.41 J	8.34
Perfluorotetradecanoic Acid (PFTeDA)	2.86 U	2.69 U	2.72 U	2.55 U	3.14 U	2.07 U	2.07 U	2.15 U	2.5 U
Perfluorotridecanoic Acid (PFTrDA)	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.08 U	1.25 U
Perfluoroundecanoic Acid (PFUnA)	1.14 U	1.08 U	1.09 U	1.02 U	1.26 U	1.04 U	1.04 U	1.08 U	1.25 U

Notes:

J- - Analyte present. Value may be biased low. Value may be higher

J - Analyte present. Value may or may not be accurate or precise

NG/G - Nanograms per gram

NS - Not sampled

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-BH21-71-0919	WI-CV-BH21-97-0919	WI-CV-BH21P-97-0919	WI-CV-SO01-1	WI-CV-SO01-13	WI-CV-SO01-39	WI-CV-SO01-71	WI-CV-SO01-93	WI-CV-SO02-01	WI-CV-SO02-24
Sample Date	9/8/19	9/8/19	9/8/19	9/15/19	9/15/19	9/15/19	9/15/19	9/15/19	8/15/19	8/15/19
Chemical Name										
Semivolatile Organic Compounds (NG/G)										
11Cl-PF3OUdS	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
9Cl-PF3ONS	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
Adona	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
HFPO-DA	2.47 U	2.29 U	2.29 U	2.22 U	2.25 U	2.01 U	2.29 U	2.37 U	2.17 U	2.14 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2.47 U	2.29 U	2.29 U	2.22 U	2.25 U	2.01 U	2.29 U	2.37 U	2.17 U	2.14 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	3.09 U	2.86 U	2.86 U	2.78 U	2.81 U	2.51 U	2.86 U	2.96 U	2.72 U	2.67 U
Perfluorobutanesulfonic acid (PFBS)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
Perfluorodecanoic Acid (PFDA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
Perfluorododecanoic Acid (PFDoA)	0.62 U	0.57 U	0.57 U	0.56 U	0.56 U	0.5 U	0.57 U	0.59 U	0.54 U	0.53 U
Perfluoroheptanoic acid (PFHpA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U
Perfluorohexanesulfonic acid (PFHxS)	2.22 J	8.85	10.5	0.27 J	0.55 J	0.5 J	4.99 J	5.23 J	4.67 J	0.56 J
Perfluorohexanoic Acid (PFHxA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.08 J	1.18 U	0.38 J	1.07 U
Perfluorononanoic acid (PFNA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1 J	1.07 U
Perfluorooctane Sulfonate (PFOS)	12.5	1.14 U	1.14 U	8.47	34.7	9.89	478	1.18 U	51.3	1.07 U
Perfluorooctanoic acid (PFOA)	1.64 J	7.9	9.47	1.11 U	1.12 U	1.01 U	1.09 J	0.99 J	1.09 U	1.07 U
Perfluorotetradecanoic Acid (PFTeDA)	2.47 U	2.29 U	2.29 U	2.22 U	2.25 U	2.01 UJ	2.29 U	2.37 U	2.17 U	2.14 U
Perfluorotridecanoic Acid (PFTrDA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 UJ	1.14 U	1.18 U	1.09 U	1.07 U
Perfluoroundecanoic Acid (PFUnA)	1.23 U	1.14 U	1.14 U	1.11 U	1.12 U	1.01 U	1.14 U	1.18 U	1.09 U	1.07 U

Notes:

J- - Analyte present. Value may be biased low. Value may be higher

J - Analyte present. Value may or may not be accurate or precise

NG/G - Nanograms per gram

NS - Not sampled

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-SO02-48	WI-CV-SO02-73	WI-CV-SO02-92	WI-CV-SO02P-73	WI-CV-SO03-27	WI-CV-SO03-3	WI-CV-SO03-58	WI-CV-SO03-73	WI-CV-SO03-92	WI-CV-SO04-1	WI-CV-SO04-12
Sample Date	8/15/19	8/16/19	8/16/19	8/16/19	9/13/19	9/12/19	9/13/19	9/13/19	9/13/19	9/13/19	9/14/19
Chemical Name											
Semivolatile Organic Compounds (NG/G)											
11Cl-PF3OUdS	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.08 U	1.04 U
9Cl-PF3ONS	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.08 U	1.04 U
Adona	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.08 U	1.04 U
HFPO-DA	2.12 U	2.23 U	2.35 U	2.2 U	2.07 U	2.29 U	2.29 U	2.23 U	2.21 U	2.15 U	2.08 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2.12 U	2.23 U	2.35 U	2.2 U	2.07 U	2.29 U	2.29 U	2.23 U	2.21 U	2.15 U	2.08 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2.65 U	2.79 U	2.94 U	2.75 U	2.59 U	2.86 U	2.86 U	2.79 U	2.76 U	2.69 U	2.6 U
Perfluorobutanesulfonic acid (PFBS)	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.08 U	1.04 U
Perfluorodecanoic Acid (PFDA)	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	2.82 J	1.04 U
Perfluorododecanoic Acid (PFDoA)	0.53 U	0.56 U	0.59 U	0.55 U	0.52 U	0.57 U	0.57 U	0.56 U	0.55 U	0.54 U	0.52 U
Perfluoroheptanoic acid (PFHpA)	1.15 J	1.12 U	1.18 U	1.1 U	1.04 U	0.79 J	1.62 J	1.12 U	1.1 U	0.56 J	1.04 U
Perfluorohexanesulfonic acid (PFHxS)	11.2	4.64 J	5.19 J	4.58 J	4.35 J	29.6	24.7	1.42 J	0.91 J	37.4	2.74 J
Perfluorohexanoic Acid (PFHxA)	1.06 U	0.74 J	1.18 U	1.1 U	0.87 J	1.39 J	1.77 J	1.12 U	1.1 U	4.49 J	1.04 U
Perfluorononanoic acid (PFNA)	0.75 J	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	7.74	0.82 J
Perfluorooctane Sulfonate (PFOS)	44.8	20.1	5.37 J	18.4	1.04 U	23.9	33.1	1.12 U	1.1 U	802	136
Perfluorooctanoic acid (PFOA)	3.85 J	1.62 U	1.18 U	1.48 U	1.9 J	71.7	74.7	2.95 J	1.44 J	4.59 J	0.87 J
Perfluorotetradecanoic Acid (PFTeDA)	2.12 U	2.23 U	2.35 U	2.2 U	2.07 U	2.29 U	2.29 U	2.23 U	2.21 U	2.15 U	2.08 U
Perfluorotridecanoic Acid (PFTrDA)	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.08 U	1.04 U
Perfluoroundecanoic Acid (PFUnA)	1.06 U	1.12 U	1.18 U	1.1 U	1.04 U	1.14 U	1.14 U	1.12 U	1.1 U	1.92 J	1.04 U

Notes:

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J - Analyte present. Value may or may not be accurate or precise

NG/G - Nanograms per gram

NS - Not sampled

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

Sample ID	WI-CV-SO04-40	WI-CV-SO04-63	WI-CV-SO04-79	WI-CV-SO04P-63
Sample Date	9/14/19	9/14/19	9/14/19	9/14/19
Chemical Name				
Semivolatile Organic Compounds (NG/G)				
11Cl-PF3OUdS	1.15 U	1.18 U	1.12 U	1.16 U
9Cl-PF3ONS	1.15 U	1.18 U	1.12 U	1.16 U
Adona	1.15 U	1.18 U	1.12 U	1.16 U
HFPO-DA	2.3 U	2.37 U	2.25 U	2.31 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	2.3 U	2.37 U	2.25 U	2.31 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA	2.87 U	2.96 U	2.81 U	2.89 U
Perfluorobutanesulfonic acid (PFBS)	1.15 U	1.18 U	1.12 U	1.16 U
Perfluorodecanoic Acid (PFDA)	1.15 U	1.18 U	1.12 U	1.16 U
Perfluorododecanoic Acid (PFDoA)	0.57 U	0.59 U	0.56 U	0.58 U
Perfluoroheptanoic acid (PFHpA)	1.15 U	1.18 U	1.3 J	1.16 U
Perfluorohexanesulfonic acid (PFHxS)	0.57 U	3.62 J	11.8	2.32 J
Perfluorohexanoic Acid (PFHxA)	1.15 U	1.18 U	1.12 U	1.16 U
Perfluorononanoic acid (PFNA)	1.15 U	1.18 U	1.12 U	1.16 U
Perfluorooctane Sulfonate (PFOS)	6.49	102 J	1.12 U	58.8 J
Perfluorooctanoic acid (PFOA)	1.15 U	23.1 J	10.9	12.6 J
Perfluorotetradecanoic Acid (PFTeDA)	2.3 U	2.37 U	2.25 U	2.31 U
Perfluorotridecanoic Acid (PFTrDA)	1.15 U	1.18 U	1.12 U	1.16 U
Perfluoroundecanoic Acid (PFUnA)	1.15 U	1.18 U	1.12 U	1.16 U

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Notes:

J- - Analyte present. Value may be biased low. Value may be higher
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NS - Not sampled
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate