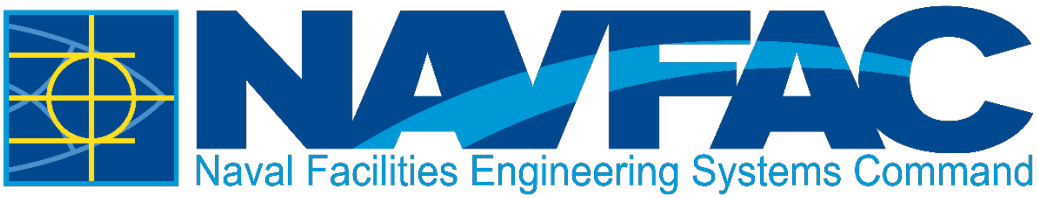

Naval Facilities Engineering Systems Command Northwest

Final

2021 Groundwater Monitoring Report

OPERABLE UNIT 1

NAVAL BASE KITSAP KEYPORT
KEYPORT, WASHINGTON

April 2023

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Naval Facilities Engineering Systems Command Northwest

Final

2021 Groundwater Monitoring Report

OPERABLE UNIT 1

NAVAL BASE KITSAP KEYPORT
BREMERTON, WASHINGTON

April 2023

Prepared for:
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Contract No. N44255-20-D-6006
Contract Task Order No. N4425521F4076
DCIN: EA-LTM/OM-6006-23-0072

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Final
2021 Groundwater Monitoring Report
Operable Unit 1
Naval Base Kitsap Keyport
Keyport, Washington

3 April 2023

Prepared for:

Department of the Navy
Naval Facilities Engineering Systems Command Northwest
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Acronyms and Abbreviations

µg/L ..... *microgram(s) per liter*

bgs ..... *below ground surface*

COC ..... *chemical of concern*

DO ..... dissolved oxygen

DoD ..... *Department of Defense*

DON ..... *Department of the Navy*

EA ..... *EA Engineering, Science, and Technology, Inc., PBC*

Ecology ..... *Washington State Department of Ecology*

EPA ..... *U.S. Environmental Protection Agency*

FS ..... *Feasibility Study*

LTM ..... *long-term monitoring*

msl ..... *mean sea level*

NAVFAC NW ..... *Naval Facilities Engineering Systems Command Northwest*

NBK ..... *Naval Base Keyport*

ORP ..... oxidation reduction potential

OU ..... *Operable Unit*

PA ..... *Preliminary Assessment*

PCB ..... *polychlorinated biphenyl*

PFAS ..... *per- and polyfluoroalkyl substances*

PFBS ..... *perfluorobutanesulfonic acid*

PFOA ..... *perfluorooctanoic acid*

PFOS ..... *perfluorooctanesulfonic acid*

RI ..... *Remedial Investigation*

ROD ..... *Record of Decision*

RSL ..... *Regional Screening Level*

SAP ..... *Sampling and Analysis Plan*

THQ ..... *target hazard quotient*

VOC ..... *volatile organic compound*

1 Introduction

This report summarizes and evaluates the December 2021 groundwater monitoring results for Operable Unit (OU) 1, consisting of Area 1, the former base landfill, at Naval Base Kitsap (NBK) Keyport, Washington. The locations of NBK Keyport and OU 1 are depicted on Figures 1-1 through 1-3 in relationship to surrounding properties and other features.

Field activities were performed by EA Engineering, Science, and Technology, Inc., PBC (EA) in December 2021 and included groundwater gauging and sampling in accordance with the Tier I Sampling and Analysis Plan (SAP, Department of the Navy [DON] 2021).

EA conducted this work for Naval Facilities Engineering Systems Command Northwest (NAVFAC NW) under Contract No. N44255-20-D-6006, Task Order N4425521F4076.

1.1 Site Description and Background

NBK Keyport occupies 340 acres (including tidelands) adjacent to Keyport in Kitsap County, Washington, on a small peninsula in the central portion of the east side of the Puget Sound. The peninsula is bordered by Liberty Bay to the northwest, north, and northeast and by Port Orchard inlet to the east and southeast.

Marine and brackish water bodies on and near the site consist of Liberty Bay, Dogfish Bay, the tide flats, a marsh, and a shallow lagoon. Freshwater bodies include two creeks discharging into the marsh pond and two creeks discharging into the lagoon.

The topography of the site rises gently from the shoreline to an average of 25 to 30 feet above mean sea level (msl), and then rises steeply at the southeast corner of the site to approximately 130 feet above msl.

The NBK Keyport property was acquired by the DON in 1913 and first used as a quiet water range for torpedo testing. The base was expanded during World Wars I and II. During the early 1960s, manufacturing and fabrication operations such as welding, metal plating, carpentry, and sheet metal work were added. In 1978, the facility's function broadened to include various undersea warfare weapons and systems engineering and development activities. Operations currently include test and evaluation, in-service engineering, maintenance and repair, and fleet readiness and industrial base support for undersea weapons systems, countermeasures, and sonar systems.

NBK Keyport OU 1 consists of Area 1, which is the Former Base Landfill and adjacent potentially impacted areas to the northwest, west, and south. The former landfill comprises approximately 9 acres in the western part of the base, located adjacent to a wetland area and the tide flats that flow into Dogfish Bay. Most of the landfill area was formerly a marshland. The landfill was the primary disposal area for both domestic and industrial wastes generated by the base from the 1930s until closure of the landfill in 1973. A burn pile for trash and demolition debris was located at the north end of the landfill from the 1930s to the 1960s. Unburned or partially burned materials from this pile were buried in the landfill or pushed into the marsh. A trash incinerator was operated at the north end of the landfill from the 1930s to the 1960s, and incinerator ash was disposed of in the landfill. Burning continued at the landfill until the early 1970s.

The base of the landfill is not lined, and the top is covered with areas of grass, trees, concrete, and asphalt. Data generated to date indicate that the unlined landfill is an ongoing source of groundwater contamination, which may impact downgradient groundwater, surface water, and sediments.

1.2 Previous Investigations

In September 1984, the DON began the investigation and assessment of OU 1 to identify areas of environmental contamination resulting from past site activities and to select environmental remedies. A Remedial Investigation (RI)/Feasibility Study (FS) process and human health and ecological risk assessments for OU 1 were completed in 1993 (DON 1993a, 1993b, and 1993c). A focused FS was completed in 1997 for OU 1 (DON 1997). The additional data collected in 1995 and 1996 to supplement the RI were used to evaluate two new pathways, as summarized in the human health risk section of the OU1 Record of Decision (ROD). The two pathways evaluated were risks to current and future seafood harvesters in the tide flats and Dogfish Bay and current and future off-site residential domestic use of groundwater from what was then thought to be the intermediate aquifer (DON 1993b and 1993c).

The OU 1 ROD was executed in September 1998 by United States (DON, U.S. Environmental Protection Agency [EPA], and Washington State Department of Ecology [Ecology]). The ROD specifies the maintenance of phytoremediation plantations and cover over the landfill; maintenance of a tide gate; implementation and monitoring of

Figure 1-1. Keyport Site Layout

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Figure 1-2. OU 1 Site Layout

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Figure 1-3. OU 1 Sample Locations

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institutional controls; and long-term monitoring (LTM) of groundwater, surface water, a groundwater seep, sediment, and marine tissue.

Based on the original RI (DON 1993a) and the supplemental data assessment, two classes of contaminants were identified as chemicals of concern (COCs): chlorinated volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs). The chlorinated VOCs were identified as COCs based on the drinking water and seafood ingestion pathways. PCBs were identified as COCs based on the seafood ingestion and ecological pathways. Although not listed as a COC in the ROD, 1,4-dioxane was first added to the groundwater analyte list as an emergent contaminant in 2006.

As discussed in the *Preliminary Assessment for Per- and Polyfluoroalkyl Substances* (PFAS PA; DON 2020), PFAS were detected in groundwater samples collected in 2018 at the OU 1 Landfill during supplemental RI activities. The recommendation of the PFAS PA was to move the investigation of PFAS as a COC directly to the RI phase.

Due to the ongoing supplemental RI, LTM for OU 1 has been postponed, by consensus of the Navy, Ecology, EPA, and the Suquamish Tribe, until site characterization activities have been completed and the LTM monitoring well/location network may be reassessed.

1.3 Project Objective

Based on the PFAS PA (DON 2020) recommendation to move the investigation of PFAS directly to RI and detection of PFAS in previous samples collected from the site, additional sampling at OU 1 was needed to delineate PFAS concentrations in groundwater across the site. This data gap was addressed by groundwater sampling at the monitoring wells and piezometers associated with the site.

1.4 Scope of Work

The December 2021 sampling event included the following scope of work:

- Collect water level measurements
- Collect field parameter measurements, including salinity
- Sample groundwater at 54 groundwater monitoring wells and 5 piezometers associated with OU 1 (Figure 1-3)
- Manage investigation derived waste
- Perform laboratory analysis and validation of PFAS results in groundwater
- Report resulting data

1.5 Screening Levels

Screening levels for PFAS in groundwater associated with the December 2021 sampling event are presented in the approved Tier I SAP (DON 2021) and were established based on Department of Defense (DoD) policy and guidance (DoD 2019a and 2020). Regional Screening Levels (RSLs) for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were calculated using the 2020 EPA online calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search) using the oral reference dose of 0.00002 milligrams per kilograms per day with target hazard quotient (THQ) of 0.1. The RSL for perfluorobutanesulfonic acid (PFBS) in groundwater may also be calculated using these assumptions; however, generic tables are available on the EPA RSL website. The screening levels are 0.040 micrograms per liter (µg/L) for PFOS and PFOA individually in water and 0.60 µg/L for PFBS in water, as shown in Table 1-1 in the "SAP Screening Level" column. As indicated in the Tier I SAP (DON 2021), screening levels had not yet been established under DoD policy and guidance (2019a and 2020) for the remaining 15 PFAS target analytes. The analytical data associated with the December 2021 sampling event are evaluated using the screening levels identified in the Tier I SAP (DON 2021).

Updated DoD policy guidance was released in July 2022 (DoD 2022) to address updated EPA RSLs released in May 2022. Residential scenario screening levels calculated using the EPA RSL calculator, as summarized in the policy guidance (DoD 2022) using a THQ of 0.1 are shown in Table 1-1 in the "2022 RSL" column. These 2022 RSLs are presented for the purpose of comparison.

Table 1-1. Screening Levels for Groundwater

Analyte	SAP Screening Level (µg/L)	2022 RSL (µg/L)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	0.0060[1/]
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NS	NS
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NS	NS
Perfluorobutanesulfonic acid (PFBS)	0.60[1/]	0.60[1/]
Perfluorodecanoic acid (PFDA)	NS	NS
Perfluorododecanoic acid (PFDoA)	NS	NS
Perfluoroheptanoic acid (PFHpA)	NS	NS
Perfluorohexanesulfonic acid (PFHxS)	NS	0.039[1/]
Perfluorohexanoic acid (PFHxA)	NS	NS
Perfluorononanoic acid (PFNA)	NS	0.0060[1/]
Perfluorooctanesulfonic acid (PFOS)	0.040[2/]	0.0040[1/]
Perfluorooctanoic acid (PFOA)	0.040[2/]	0.0060[1/]
Perfluorotetradecanoic acid (PFTA)	NS	NS
Perfluorotridecanoic acid (PFTrDA)	NS	NS
Perfluoroundecanoic acid (PFUnA)	NS	NS
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid	NS	NS
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	NS	NS
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	NS	NS

Notes:
[1/] Screening level is the EPA Regional Screening Level for tapwater (target hazard quotient [THQ] = 0.1), which is based on the protection of human health via drinking water only.
[2/] The screening levels for PFOA and PFOS are calculated using the 2020 EPA online calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search) using the oral reference dose of 0.00002 milligrams per kilogram-day (THQ = 0.1).
µg/L = microgram(s) per liter
NS = not specified
RSL = Regional Screening Level
SAP = Sampling and Analysis Plan

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2 Field Activities

The field activities completed during December 2021 include groundwater level and field parameter measurement, groundwater sampling, and investigation derived waste management. Field activities were conducted in accordance with the procedures established in the Tier I SAP (DON 2021) and *NAVFAC NW Standard Operating Procedures* for environmental sampling (NAVFAC NW 2019). Field forms and logbook excerpts documenting field activities are provided in Appendix A.

2.1 Groundwater Gauging

Groundwater level measurements were conducted between 6 and 8 December 2021. Monitoring locations are shown on Figure 1-3. Groundwater level and field parameter measurements are discussed in Section 3.1 and presented in Tables 3-1 and 3-2.

2.2 Groundwater Sampling

Groundwater sampling, including field parameter measurements, was conducted between 6 and 8 December 2021. Sampling locations are shown on Figure 1-3. Results of the groundwater sampling are discussed in Section 4.2.

The groundwater monitoring wells and piezometers were purged prior to sampling. Low-flow techniques were employed using a peristaltic or submersible pump connected to dedicated, disposable silicon and polyethylene tubing. A purging rate of 500 milliliters per minute or less was maintained throughout sampling. During purging, several field parameters (pH, specific conductance, turbidity, dissolved oxygen [DO], temperature, salinity, and oxidation-reduction potential [ORP]) were measured and recorded every 3 to 5 minutes using a YSI ProDSS™ water quality instrument as shown in Table 3-2 and on the field forms included in Appendix A. When field parameters (pH, specific conductance, turbidity, DO, ORP, and temperature) met stabilization criteria presented in the Tier I SAP (DON 2021), a groundwater sample was collected. Total purge volumes ranged from 1.0 liters to 8.0 liters for piezometers, and 3.0 liters to 12 liters for the other wells.

Sample containers were handled and shipped in accordance with the Tier I SAP (DON 2021).

2.3 Investigation Derived Waste Handling and Disposal

Investigation-derived waste generated during field activities included purge water and general sampling waste (used sample tubing, disposable gloves, and paper towels).

The purge water was contained in 55-gallon drums and staged at the designated Keyport waste transportation and disposal location in accordance with the Tier I SAP (DON 2021). The general sampling waste, such as used tubing and gloves, was placed in a designated onsite commercial waste dumpster.

2.4 Deviations

Field measurements and the collection of a groundwater sample was not performed at well MW1-56 channel 0 because the well screen was buried and the well did not produce water. The screened depth at this location is 33.75 to 34.25 feet below ground surface (bgs). However, the field measured total depth was 30 feet bgs. Additionally, MW1-56 channel 1 and 2 were mislabeled on the well casings compared to the reported depths. Wells MW1-56 channel 1 was reported as having a screen interval of 20 – 22 feet bgs, with an actual field measured total depth of 12.42 feet bgs, and MW1-56 channel 2 had a reported screen interval of 9 – 10 feet bgs with a field measurement total depth of 24.62 feet bgs.

Field parameters at well MW1-58 channel 1 did not stabilize during purging and were collected after the groundwater sample was collected because the well purged dry.

3 Groundwater Results

This section evaluates the gauging data, summarizes the distribution of contaminants detected in the samples collected during the monitoring event in December 2021, and compares the reported concentrations to the screening levels discussed in Section 1.5.

3.1 Groundwater Elevations and Flow

The depth to water and total well-depth measurements were collected between 6 and 8 December 2021 at the time of groundwater sample collection from 54 wells, which included two multi-channel piezometers at the OU 1. The groundwater level measurements and calculated elevation are provided in Table 3-1. Field forms with depth to water and total well-depth measurements are provided in Appendix A. Because these measurements were taken at different times during the tidal cycle, they cannot be used to produce an accurate isocontour map. An effort will be made to measure wells during the shortest period possible during future groundwater level measurements across OU 1.

Table 3-1. Well/Piezometer Information and December 2021 Groundwater Elevations

Well ID	Northing (ft)	Easting (ft)	TOC Elevation (ft msl)	Date	Time	Depth to Water (ft)	Groundwater Elevation (ft msl)
1MW-1	259620.00	1558681.50	13.346	12/7/2021	9:45	5.50	7.85
1MW-4	260091.70	1558902.60	15.707	12/8/2021	13:33	6.14	9.57
MW1-2	259823.50	1558741.90	15.156	12/8/2021	10:28	6.95	8.21
MW1-3	259695.80	1559108.60	16.783	12/7/2021	14:48	2.91	13.87
MW1-4	259031.70	1558935.20	15.563	12/6/2021	12:50	6.31	9.25
MW1-5	259138.10	1558746.00	16.36	12/6/2021	14:55	8.20	8.16
MW1-6	259287.20	1558736.10	16.505	12/6/2021	10:45	8.19	8.32
MW1-09	259546.30	1558417.90	15.336	12/8/2021	13:08	6.05	9.29
MW1-10	259535.60	1558417.70	15.312	12/8/2021	12:23	4.71	10.60
MW1-11	259691.60	1559108.90	16.687	12/7/2021	15:57	51.51	-34.82
MW1-14	259823.60	1558873.00	17.877	12/8/2021	12:03	7.15	10.73
MW1-15	259560.40	1558848.50	16.575	12/7/2021	15:32	6.02	10.56
MW1-17	259499.60	1558679.60	12.725	12/6/2021	14:53	5.07	7.66
MW1-18	260036.50	1558861.90	15.361	12/8/2021	14:15	6.15	9.21
MW1-20	259059.70	1559112.80	13.748	12/7/2021	12:48	3.63	10.12
MW1-23	260443.50	1558863.20	19.305	12/8/2021	11:08	9.14	10.17
MW1-24	260259.30	1559041.40	16.927	12/8/2021	11:23	4.84	12.09
MW1-25	259891.10	1558671.40	15.269	12/8/2021	13:47	7.27	8.00
MW1-27	259691.38	1559104.23	16.453	12/7/2021	15:48	4.60	11.85
MW1-28	259783.90	1558591.77	16.518	12/8/2021	13:51	8.86	7.66

Well ID	Northing (ft)	Easting (ft)	TOC Elevation (ft msl)	Date	Time	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW1-29	259676.50	1558514.10	16.048	12/8/2021	14:11	8.45	7.60
MW1-31	259431.50	1559138.40	15.996	12/7/2021	14:54	4.56	11.44
MW1-38	260261.87	1558354.67	13.231	12/8/2021	10:08	2.30	10.93
MW1-39	260266.50	1558358.03	13.218	12/8/2021	10:00	2.49	10.73
MW1-41	259731.50	1558880.50	18.512	12/8/2021	12:10	7.42	11.09
MW1-42	259497.02	1198819.77	12.77	12/7/2021	10:07	3.36	9.41
MW1-43	259456.23	1198809.41	12.69	12/6/2021	15:31	3.60	9.09
MW1-44	259394.52	1198806.50	12.24	12/6/2021	13:47	3.56	8.68
MW1-45	259325.26	1198822.32	12.99	12/7/2021	11:22	5.16	7.83
MW1-46	259508.60	1199026.27	16.71	12/7/2021	14:08	7.02	9.69
MW1-47	259466.25	1199023.85	16.44	12/7/2021	12:48	6.11	10.33
MW1-48	259416.03	1199082.01	15.8	12/6/2021	12:48	5.35	10.45
MW1-49	258986.91	1198907.63	14.17	12/6/2021	16:12	5.81	8.36
MW1-50	258988.47	1198967.28	16.75	12/7/2021	13:09	7.85	8.90
MW1-51	259088.54	1198979.37	17.23	12/6/2021	13:48	8.15	9.08
MW1-52	259050.35	1199004.93	17.11	12/6/2021	12:23	7.98	9.13
MW1-53	259067.70	1199065.84	13.4	12/6/2021	13:08	4.30	9.10
MW1-54	258949.79	1199050.16	15.57	12/6/2021	13:37	5.31	10.26
MW1-55	258977.68	1199101.47	15.6	12/6/2021	11:39	4.92	10.68
MW1-56, CH1	258984.05	1199144.30	15.82	12/7/2021	9:45	5.53	10.29
MW1-56, CH2	258984.05	1199144.30	15.82	12/7/2021	10:49	4.81	11.01
MW1-58, CH0	259057.79	1199138.21	16.84	12/7/2021	10:03	6.05	10.79
MW1-58, CH1	259057.79	1199138.21	16.84	12/7/2021	13:20	6.50	10.34
MW1-58, CH2	259057.79	1199138.21	16.84	12/7/2021	11:04	6.43	10.41
MW1-59	258934.36	1198963.99	12.68	12/7/2021	12:15	1.15	11.53
MW1-60	259345.11	1198555.91	18.01	12/8/2021	12:31	9.38	8.63
MW1-61	259195.56	1199035.84	13.47	12/6/2021	11:40	4.82	8.65
MW1-62	259592.91	1198976.33	19.46	12/7/2021	10:54	9.38	10.08
MW1-63	259664.43	1198921.44	18.17	12/7/2021	13:30	8.31	9.86
MW1-64	259759.23	1198871.21	17.13	12/8/2021	9:50	7.49	9.64
MW1-65	259780.55	1198937.41	16.77	12/8/2021	10:12	7.11	9.66
MW1-67	259780.68	1198935.04	16.6	12/8/2021	10:49	8.04	8.56
MW1-68	259010.62	1199148.31	14.99	12/6/2021	10:57	2.76	12.23
P1-01	259792.50	1558893.20	17.621	12/8/2021	11:32	7.09	10.53
P1-02	259769.50	1558825.70	17.031	12/7/2021	16:10	7.66	9.37
P1-03	259745.10	1558770.10	15.989	12/7/2021	14:33	7.65	8.34
P1-04	259665.80	1558755.50	15.824	12/7/2021	11:44	6.45	9.37
P1-09	259047.60	1558900.60	15.151	12/6/2021	15:54	6.22	8.93

3.2 Groundwater Field Parameters

Field parameters were measured during purging of monitoring wells and piezometers prior to sampling. Field parameter measurements are summarized in Table 3-2.

3.3 Laboratory Analysis

Groundwater samples were submitted to an off-site laboratory, Eurofins Lancaster Laboratory Environmental, located in Lancaster, Pennsylvania, for analysis in accordance with the Tier I SAP (DON 2021). Groundwater samples were analyzed for PFAS by liquid chromatography with tandem mass spectrometry compliant with Quality Systems Manual Version 5.3, Table B-15 (DoD 2019b).

3.4 Groundwater Analytical Results – December 2021

The analytical results for the December 2021 groundwater monitoring event are provided in Table 3-3.

For the December 2021 sampling event, the screening levels from the Tier I SAP for PFOS and PFOA (at 0.040 µg/L for each) were exceeded in the sample from well MW1-06, which had estimated concentrations at 0.16 µg/L and 0.12 µg/L, respectively. There were no other exceedances for PFOA or PFOS. There were no exceedances in groundwater of the screening level from the Tier I SAP for PFBS.

Analytical results that exceed the screening levels presented in the Tier I SAP (DON 2021) are summarized on Figure 3-1.

The following analytical results from the December 2021 sampling event are above the updated 2022 RSLs:

- PFOS for the samples from wells 1MW-1, MW1-05, MW1-06, MW1-14, MW1-15, MW1-17, MW1-41, MW1-42, MW1-47, MW1-48, MW1-56 CH1, MW1-56 CH2, MW1-58 CH1, MW1-58 CH2, MW1-61, MW1-67, and P1-3.
- PFOA for the samples from wells 1MW-1, MW1-02, MW1-06, MW1-14, MW1-15, MW1-17, MW1-41, MW1-42, MW1-47, MW1-48, MW1-58 CH1, MW1-61, MW1-63, MW1-64, MW1-67, P1-1, P1-2, and P1-3.
- Hexafluoropropylene oxide dimer acid for the sample from well MW1-58 CH1
- Perfluorohexanesulfonic acid for the sample from well MW1-06.

3.5 Data Quality

Data validation was performed by a third-party data validator, Laboratory Data Consultants, Inc., in Carlsbad, California on the analytical results associated with groundwater samples using the guidelines presented in the Tier I SAP (DON 2021). The data validation was performed at a minimum frequency of 10 percent at Stage 4 and the remainder at Stage 2B, as defined in the General Data Validation Guidelines (DoD 2019c). The results of the validation were reviewed, and a data quality assessment report was prepared by the Contractor's Project Chemist. The data quality assessment report is presented in Attachment B-1 and includes the data validation reports prepared by the third-party data validator.

The results of data verification and validation processes indicate that the data generated from the samples collected during the December 2021 field activities are generally of sufficient quality and quantity to accomplish project objectives. Unless rejected during data assessment, sample results accurately indicate the presence and/or absence of target analyte concentrations at sampled locations. Samples were analyzed as specified in the Tier I SAP (DON 2021), except as noted in Attachment B-1. Fifty-four sample results were rejected: 52 results due to labeled compound recovery below 20 percent and two results due to poor matrix spike/matrix spike duplicate recovery. However, the overall analytical percent completeness was calculated to be 94% which meets the 90% usable data acceptance criteria specified in the Tier I SAP (DON 2021).

Sample results are representative of site conditions at the time of collection. Results obtained are comparable to industry standards, in that collection and analytical techniques followed approved, documented procedures. Results are reported in industry standard units.

Figure 3-1. OU1 Groundwater Analytical Results

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Table 3-2. Groundwater Field Parameters, December 2021

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Table 3-3. Groundwater Analytical Results, December 2021

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4 Conclusions and Recommendations

This section presents conclusions and recommendations related to the field work completed at OU 1 in December 2021.

4.1 Conclusions

The analytical results for PFAS in groundwater samples collected during the monitoring event conducted in December 2021 were compared to available screening levels for PFBS, PFOS, and PFOA as outlined in the SAP. However, since the development of the SAP on which this report is based, available screening levels have been revised during 2022 to include more stringent RSLs as described in Sections 1.5 and 3.4. The analytical results that exceed the SAP screening levels (0.040 µg/L) are PFOS and PFOA at estimated concentrations of 0.16 µg/L and 0.12 µg/L, respectively, in the sample from well MW1-06 located at the southwest end of the landfill.

Analytical results that exceed the 2022 screening levels are summarized in Section 3.4 but not further evaluated in this report. Further evaluation of PFAS results for OU 1 will be conducted under separate contract.

4.2 Recommendations

The LTM program at OU 1 was suspended for 2021 during the ongoing supplemental RI work to reevaluate OU 1 groundwater conditions and the magnitude and extent of contaminants in groundwater and other media across OU 1. Once the supplemental RI has been completed and the conceptual site model has been updated based on data collected by all contractors and the results of this PFAS groundwater investigation, the OU 1 LTM program should be updated to reflect the new understanding of contaminant distribution at OU 1.

It is recommended that periodic sampling and analysis for PFAS in groundwater near MW1-06 be considered in the future because of the exceedance of screening levels. In addition, it is recommended that the results obtained be compared to revised action levels developed by the regulatory agencies and approved for use by the DON. The monitoring well network should also be evaluated in the future to determine the most representative well network to allow for meaningful future long-term monitoring of the horizontal and vertical extent of PFAS and other COCs in groundwater at OU 1.

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Appendix A
Field Forms and Field Logbooks

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Appendix B
Data Quality Assessment Report

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