

**Naval Facilities Engineering Systems Command Northwest** 

# Final 2021 Groundwater Monitoring Report OPERABLE UNIT 1

NAVAL BASE KITSAP KEYPORT KEYPORT, WASHINGTON

April 2023

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED



**Naval Facilities Engineering Systems Command Northwest** 

## Final **2021 Groundwater Monitoring Report** OPERABLE UNIT 1 NAVAL BASE KITSAP KEYPORT

**BREMERTON, WASHINGTON** 

April 2023

Prepared for: Department of the Navy Naval Facilities Engineering Systems Command Northwest 1101 Tautog Circle, Suite 203 Silverdale, WA 98315-1101

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC 2200 6th Avenue, Suite 707 Seattle, WA 98121

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

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

4 April 2023



Department of the Navy Naval Facilities Engineering Systems Command Northwest 1101 Tautog Circle, Suite 203 Silverdale, WA 98315-1101

Prepared by: EA Engineering, Science, and Technology, Inc., PBC 2200 6th Avenue, Suite 707 Seattle, WA 98121

Prepared under: N44255-20-D-6006, Contract Task Order N4425521F4076 DCIN: EA-LTM/OM-6006-23-0072

Emit

Preparer Signature:

4 April 2023

Dana Ramquist, EA Task Order Manager

Brinds O. Maling

04 April 2023

**Reviewer Signature:** 

Brenda Nuding, EA Program Quality Assurance Manager

#### **Table of Contents**

Lis	t of A	ppendicesii
Lis	t of F	ïguresii
Lis	t of T	ablesii
Ac	ronyn	ns and Abbreviationsiii
1	Intro	duction 1-1
	1.1	Site Description and Background1-1
	1.2	Previous Investigations
	1.3	Project Objective
	1.4	Scope of Work
	1.5	Screening Levels
-		
2	Field	Activities
	2.1	Groundwater Gauging2-1
	2.2	Groundwater Sampling
	2.3	Investigation Derived Waste Handling and Disposal
	2.4	Deviations
3	Grou	undwater Results
0	3.1	Groundwater Elevations and Flow
	3.1 3.2	Groundwater Field Parameters
	3.3	Laboratory Analysis
	3.4	Groundwater Analytical Results – December 2021
	3.5	Data Quality
4	Cond	clusions and Recommendations4-1
	4.1	Conclusions
	4.2	Recommendations
5	Refe	erences

#### List of Appendices

Appendix A:	Field Forms and Logbooks	<b>\-1</b>
Appendix B:	Data Quality Assessment ReportE	3-1

#### **List of Figures**

Figure 1-1. Keyport Site Layout	1-3
Figure 1-2. OU 1 Site Layout	1-5
Figure 1-3. OU 1 Sample Locations	1-7
Figure 3-1. OU1 Groundwater Analytical Results	3-5

#### **List of Tables**

Table 1-1. Screening Levels for Groundwater	1-11
Table 3-1. Well/Piezometer Information and December 2021 Groundwater	
Elevations	. 3-1
Table 3-2. Groundwater Field Parameters, December 2021	. 3-7
Table 3-3. Groundwater Analytical Results, December 2021	. 3-9

#### 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	
LTM	long-term monitoring
msl	mean sea level
NAVFAC NWNat	val Facilities Engineering Systems Command Northwest
NBK	Naval Base Keyport
ORP	oxidation reduction potential
OU	Operable Unit
РА	Preliminary Assessment
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RI	Remedial Investigation

Final 2021 Groundwater Monitoring Report Operable Unit 1 Naval Base Kitsap Keyport	
Keyport, Washington Contract No. N44255-20-D-6006, Contract Task Order N44255-21-F-4076	Acronyms and Abbreviations
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.

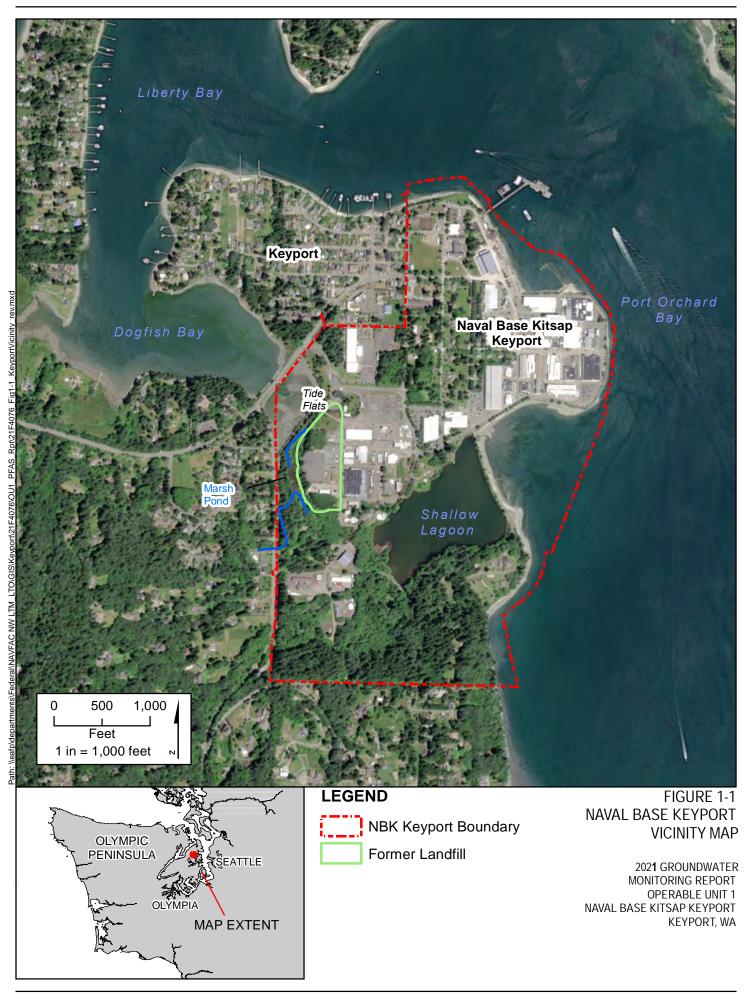
NBK Keyport OU 1 consists of Area 1, which is the Former Base Landfill and adjacent potentially impacted areas to the northwest, west, and south. The former landfill comprises approximately 9 acres in the western part of the base, located adjacent to a wetland area and the tide flats that flow into Dogfish 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.

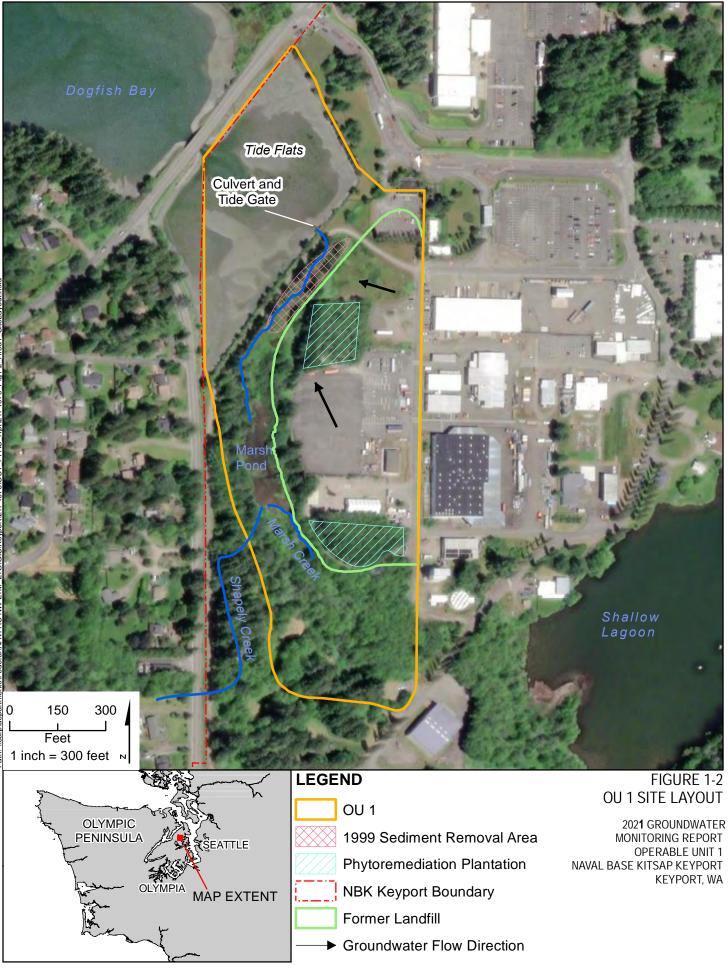
The base of the landfill is not lined, and the top is covered with areas of grass, trees, concrete, and asphalt. Data generated to date indicate that the unlined landfill is an ongoing source of groundwater contamination, which may impact downgradient groundwater, surface water, and sediments.

#### **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







# Area Extent NBK Keyport OU1, Area 1

# Monitoring Well Sampled in December 2021 NBK Keyport Boundary OU 1, Area 1 Former Landfill Phytoremediation Plantation

#### FIGURE 1-3 OU 1 SAMPLE LOCATIONS

2021 GROUNDWATER MONITORING REPORT OPERABLE UNIT 1 NAVAL BASE KITSAP KEYPORT KEYPORT, WA

EA-LTM/OM-6006-23-0072

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.

Analyte	SAP Screening Level (µg/L)	2022 RSL (μg/L)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NS	0.00601/
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NS	NS
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NS	NS
Perfluorobutanesulfonic acid (PFBS)	0.601/	0.601/
Perfluorodecanoic acid (PFDA)	NS	NS
Perfluorododecanoic acid (PFDoA)	NS	NS
Perfluoroheptanoic acid (PFHpA)	NS	NS
Perfluorohexanesulfonic acid (PFHxS)	NS	0.0391/
Perfluorohexanoic acid (PFHxA)	NS	NS
Perfluorononanoic acid (PFNA)	NS	0.00601/
Perfluorooctanesulfonic acid (PFOS)	0.040 <sup>2/</sup>	0.00401/
Perfluorooctanoic acid (PFOA)	0.040 <sup>2/</sup>	0.00601/
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) Notes:	NS	NS

#### Table 1-1. Screening Levels for Groundwater

<sup>1/</sup> 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.

<sup>2/</sup> 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).

 $\mu g/L = microgram(s)$  per liter

NS = not specified

RSL = Regional Screening Level

SAP = Sampling and Analysis Plan

### 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. Lowflow 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<sup>™</sup> 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.

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					

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

#### Final 2021 Groundwater Monitoring Report Operable Unit 1 Naval Base Kitsap Keyport Keyport, Washington Contract No. N44255-20-D-6006, Contract Task Order N44255-21-F-4076

Section 3, Groundwater Results

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 MW1-58,	259057.79	1199138.21	16.84	12/7/2021	10:03	6.05	10.79
CH1 MW1-58,	259057.79	1199138.21	16.84	12/7/2021	13:20	6.50	10.34
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  $\mu$ g/L for each) were exceeded in the sample from well MW1-06, which had estimated concentrations at 0.16  $\mu$ g/L and 0.12  $\mu$ g/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:

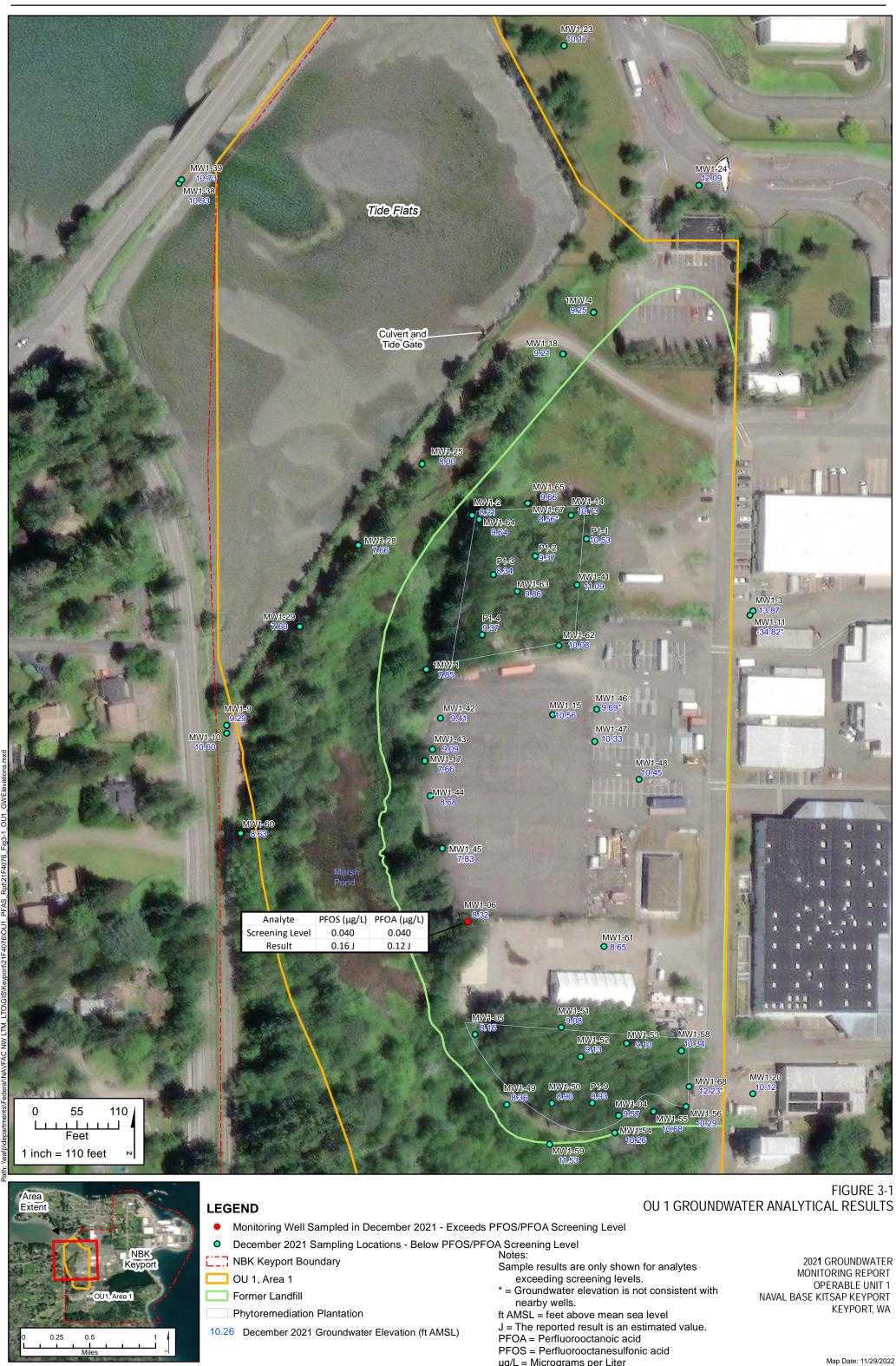
- PFOS for the samples from wells 1MW-1, MW1-05, MW1-06, MW1-14, MW1-15, MW1-17, MW1-41, MW1-42, MW1-47, MW1-48, MW1-56 CH1, MW1-56 CH2, MW1-58 CH1, MW1-58 CH2, MW1-61, MW1-67, and P1-3.
- PFOA for the samples from wells 1MW-1, MW1-02, MW1-06, MW1-14, MW1-15, MW1-17, MW1-41, MW1-42, MW1-47, MW1-48, MW1-58 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.



- µg/L = Micrograms per Liter

EA-LTM/OM-6006-23-0072

	Temperat	лЦ	OPP	Spec.	Turbidity	DO	Salinity
Well ID	ure	рН (S.U)	ORP (mv)	Cond.	Turbidity (NTU)	(mg/L)	-
	(°C)	(3.0)	(IIIV)	(ms/cm)	(1110)	(ing/L)	(ppt)
1MW-1	12.80	6.15	-3.20	0.24	7.97	0.16	0.12
1MW-4	13.00	7.03	-41.90	0.99	4.33	0.09	0.49
MW1-2	11.50	6.78	14.10	0.67	14.26	0.33	0.33
MW1-3	14.30	5.89	40.80	0.14	4.59	5.19	0.07
MW1-4	11.40	8.46	147.00	0.26	5.48	2.89	0.12
MW1-5	11.60	6.39	-66.90	0.32	30.34	3.87	0.15
MW1-6	13.50	6.37	39.80	0.76	33.46	0.11	0.38
MW1-09	12.10	7.03	-89.20	0.76	55.49	3.47	0.38
MW1-10	12.10	6.27	38.30	0.20	31.12	4.87	0.09
MW1-11	14.60	6.15	90.80	0.22	36.97	0.36	0.11
MW1-14	11.60	6.28	-30.40	0.65	12.97	0.48	0.32
MW1-15	16.70	6.20	-36.00	0.66	1.88	0.41	0.32
MW1-17	11.30	6.82	-80.90	0.46	7.37	0.38	0.22
MW1-18	10.90	6.62	-12.80	0.31	89.98	0.15	0.15
MW1-20	14.30	6.45	11.60	0.50	11.77	3.44	0.23
MW1-23	13.20	7.66	127.70	0.26	20.09	0.49	0.13
MW1-24	14.60	7.00	-95.40	0.22	106.75	3.18	0.11
MW1-25	12.10	6.79	13.70	0.99	2.23	0.49	0.49
MW1-27	15.20	6.76	-81.40	0.16	28.51	3.20	0.08
MW1-28	11.70	7.12	52.70	1.40	12.07	0.47	0.71
MW1-29	11.90	7.20	-68.60	2.15	10.01	3.46	1.11
MW1-31	15.60	6.14	85.00	0.23	17.69	0.29	0.11
MW1-38	13.40	7.66	-106.50	0.76	14.81	3.34	0.37
MW1-39	13.30	8.30	75.80	0.37	12.22	0.48	0.18
MW1-41	12.30	6.40	-38.00	0.90	5.92	0.07	0.45
MW1-42	15.00	7.40	-84.50	0.38	3.95	0.46	0.18
MW1-43	12.70	7.56	-116.20	1.96	7.34	0.45	1.02
MW1-44	4.05	12.90	8.65	-59.50	1.69	3.00	0.86
MW1-45	14.20	8.95	-82.50	0.73	6.66	0.42	0.36
MW1-46	15.60	7.13	-58.40	1.18	1.68	0.47	0.59
MW1-47	15.00	6.26	-29.10	0.59	6.00	0.46	0.29
MW1-48	15.70	6.32	-40.10	0.71	28.83	0.37	0.35
MW1-49	11.70	7.38	-28.40	0.26	2.84	3.88	0.12
MW1-50	11.60	7.45	85.80	0.23	8.01	0.29	0.11
MW1-51	11.40	8.55	10.50	0.29	3.59	3.86	0.14
MW1-52	11.00	8.52	-43.20	0.30	6.96	3.98	0.15
MW1-53	11.50	8.04	17.60	0.35	7.85	3.93	0.17
MW1-54	10.90	7.66	158.70	0.20	10.77	1.47	0.10
MW1-55	11.20	7.64	137.00	0.25	12.14	0.60	0.12
MW1-56, CH1	11.50	6.73	25.00	0.55	8.77	0.41	0.27
MW1-56, CH2	12.10	6.71	58.90	0.43	11.48	0.30	0.21
MW1-58, CH0	12.40	7.20	-127.00	0.32	46.50	3.67	0.15
MW1-58, CH1	11.60	6.36	158.10	0.89	541.24	7.49	0.44
MW1-58, CH2	13.20	6.60	-59.50	0.32	64.97	3.52	0.15
MW1-59	10.10	7.54	103.80	0.24	30.12	0.37	0.12
MW1-60	11.60	7.66	116.10	0.30	21.87	0.58	0.12
MW1-61	14.30	7.03	5.70	0.39	5.22	0.48	0.19
MW1-62	13.70	6.67	19.80	0.52	16.03	0.12	0.25

 Table 3-2. Groundwater Field Parameters, December 2021

Well ID	Temperat ure (°C)	рН (S.U)	ORP (mv)	Spec. Cond. (ms/cm)	Turbidity (NTU)	DO (mg/L)	Salinity (ppt)
MW1-63	13.00	6.70	-21.00	0.95	10.07	0.08	0.47
MW1-64	11.50	6.69	-11.20	0.88	6.64	0.09	0.44
MW1-65	11.60	6.74	-35.90	0.80	8.54	0.47	0.40
MW1-67	11.00	6.79	-78.40	0.85	4.24	0.50	0.42
MW1-68	12.20	7.24	-118.90	0.28	131.28	3.82	0.13
P1-01	11.90	6.36	-44.30	0.83	13.89	0.06	0.41
P1-02	11.50	6.38	-23.00	1.72	32.23	0.05	0.87
P1-03	13.10	6.34	-25.00	0.78	4.11	0.09	0.38
P1-04	13.00	6.84	-28.90	0.68	4.20	0.13	0.33
P1-09	11.40	8.06	70.10	0.26	0.18	0.31	0.12

Table 3-2. Groundwater Field Parameters, December 2021

Notes:

°C = degrees Celsius

DO = dissolved oxygen

mg/L = milligrams per liter

ms/cm = milliSiemens per centimeter

mV = millivolts

ppt = parts per thousand

Spec. Cond. = specific conductivity

S.U. = standard units

#### Table 3-3. Groundwater Analytical Results, December 2021

	Table 3-3. Groundwater Analytical Results, December 2021 Analyte HFPO-DA NEtFOSAA NMeFOSAA PFBS PFDA PFDoA PFHpA PFHxS PFHxA PFNA PFOS PFOA PFTA PFTrDA PFUnA 11CI-PF3OUdS 9CI-PF3ONS											DONA								
Basis Longing of the basis         Bit         Bit        Bit         Bit <th></th> <th>,</th> <th></th> <th>-</th> <th></th> <th>_</th> <th></th> <th>-</th> <th></th>		,		-		_		-												
Image: state	•							-			-					-		-		
Best 0         Best 0<	·	5		-				-	+ +								-			
1000         10000         100000         100000         100000         100000         100000         100000         100000         100000         1000000         1000000         100000 <th></th> <th>Unit</th> <th>µg/∟</th> <th>µg/∟</th> <th>µg/L</th> <th>µg/L</th> <th>µg/L</th> <th>µg/L</th> <th>µg/L</th> <th>µg/∟</th> <th>µg/L</th> <th>µg/L</th> <th>µg/∟</th> <th>µg/L</th> <th>µg/∟</th> <th>µg/∟</th> <th>µg/∟</th> <th>µg/L</th> <th>µg/L</th> <th>µg/∟</th>		Unit	µg/∟	µg/∟	µg/L	µg/L	µg/L	µg/L	µg/L	µg/∟	µg/L	µg/L	µg/∟	µg/L	µg/∟	µg/∟	µg/∟	µg/L	µg/L	µg/∟
1000         10000         100000         100000         100000         100000         100000         100000         100000         100000         1000000         1000000         100000 <td></td>																				
matrix         matrix<																				
Image         Image <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.00089 0</td><td></td><td></td><td></td><td></td><td></td></th<>															0.00089 0					
Image         Objection         Depart         Depar																				
Image: Applie Series         State II         Control III         Control III         Control IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII																				
Image: Applies         General Control         Contro         Control         Control </td <td>-</td> <td></td>	-																			
Warr CO         Object-Sold         Operation         Overall         Control															0.00090 U	0.00090 U			0.00090 U	0.00090 U
Image: 1         Image: 2	MW1-05	GM-21-007 6-Dec-2021	0.00089 J	0.00090 U	0.0011 U	0.00080 J	0.00090 U.	J 0.00090 L	J 0.00059 J	0.0023 J	0.00077 J	0.00090 U	0.0044 J	0.0020 J	0.00090 U	0.00090 U	0.00090 U	0.00090 UJ	0.00090 U	0.00090 U
Import         Gut2r-061         Apple.2017         C control         J control         C control <thc< td=""><td>MW1-06</td><td>GM-21-008 6-Dec-2021</td><td>0.0021 J</td><td>0.00094 U</td><td>0.0011 U</td><td>0.0051 J</td><td>0.00094 U.</td><td>J 0.00094 L</td><td>J 0.0076 J</td><td>0.051 J</td><td>0.023 J</td><td>0.00091 J</td><td><b>0.16</b> J</td><td></td><td>R</td><td>0.00094 U</td><td>0.00094 U</td><td>0.00094 UJ</td><td>0.00094 U</td><td>0.00094 U</td></thc<>	MW1-06	GM-21-008 6-Dec-2021	0.0021 J	0.00094 U	0.0011 U	0.0051 J	0.00094 U.	J 0.00094 L	J 0.0076 J	0.051 J	0.023 J	0.00091 J	<b>0.16</b> J		R	0.00094 U	0.00094 U	0.00094 UJ	0.00094 U	0.00094 U
DPATH         DR2-Att         TAB-2tt																				
Image: 1         Sec: 0         Control I         Contro I         Contro I         Cont																				
Image: 1         6 Sec. 2011         6 Abore 2011         6 Abore 2011         Abore 2011         Abore 2011         Abore 2011         Control 1         Abore 2011         Control 1         Abore 2011         Control 1         Control 1        Control 1        Control 1															0.00091 UJ					
Image: 1         Gale 2-141         Gale 2-201         Gale 2-201        Gale 2-201        Gale 2-201<	. ,														R					
Image: 100         Object: 100															R	0.00092 0 R	0.00092 0 R			
Methy:         Obs::         Source:         S															0.00093 [].	0.00093 11	0.00093 11			
Image: No.57.2         Obs:7.10         Control U				R	R		R	F					R		R	R	R	R	R	
IMM+34         OMX+32         OPE-2021         COURDE U         COURDE U        COURDE U         COURDE U				0.00086 U	0.0010 U		0.00086 U	0.00086 U					0.0026		0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	
HW1 AC (UP)         662 + 201         B-m. 2011         C 00096         U         C 00	MW1-23	GM-21-019 8-Dec-2021	0.00093 U	0.00093 U	0.0011 U	0.00053 J	0.00093 U	0.00093 L	J 0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00092 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
Image: Sec: 2         6.05027 U         0.0007 U															R					
IMM-22         0642-162         2-bac-321         0.00001 U         0.															0.00086 UJ	0.00086 U				
Image: Biologic U         Constr U <td></td> <td>R</td> <td>R</td> <td></td> <td>0.00097 U</td> <td></td> <td></td>															R	R		0.00097 U		
IMM*:5         GAM2102         5.8.m.200F         U         0.0006         U															R	R		R		
Image: New 1-30         CMM-1100         P-Tem. 2011         D.00088 U         D.00088 U <thd.00088 th="" u<=""></thd.00088>																				
MM1-38         OMA_1-202         6-00-2021         0.00088         U         0.000088<																				
IMM1-30         GM2-1/28/L         6.20074 U         0.00076 U <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>																				
Image: All controls         Gene 2:10:00         0.00088 U         0.00088 U        0.00088 U         0.00088 U <td></td>																				
IMM1+43         GH2-1031         0-00-2217         0.00090         U         0.000000<			0.00068 J											0.0099	R	0.00088 UJ	J 0.00088 U	0.00088 U	0.00088 U	0.00088 U
MV1-44         GM-21-902         6-0-8-2071         0.00091         0.000091         0.00091         0.00091	MW1-42	GM-21-030 7-Dec-2021	0.00098 UJ	0.00098 U	J 0.0012 U.	J 0.0012 J	0.00062 J	0.00098 U	J 0.0021 J	0.0021 J	0.0031 J	0.0011 J	0.0062 J	0.0074 J	R	0.00098 UJ	J 0.00098 UJ	0.00098 UJ	0.00098 U.	0.00098 UJ
IMM+45         GM-21-033         77-be-2021         0.00096 U					0.0011 U	0.00095 J	0.00090 U.											0.00090 UJ		0.00090 U
IMM+45         CUMP         Common LU         Control LU																				
Immunal         Constrain																				
MMV+47         GMx2+026         7-De=2021         0.00005 U         0.	. ,																			
Image: NMV+48         Chec+2103         E-Dec-2021         D00009E UU         D000009E UU         D00009E UU         D000																				
Image: NMV+49         CRA2+1038         6-De=2021         D00088 U         D00088 U        D00088 U         D00088 U																				
Image: New Y-50         GM-21-39         Y-Dec-2221         0.00092 UJ         0.00072 UJ         0.00092 UJ         0.00090 UJ         0.00091 UJ         0.000091 UJ         0.00091 UJ         0.0																				
Image: New 1-51         Gene-2ct 22         0.00089 U         0.00089 U         0.00089 U         0.00089 U         0.00089 U         0.00080 U																				
Image: New 1-642         6-Dec-2021         0.00090         U         0.00091         U         0.00001         U         0.00001																				
Image: NM-154         GM-21-043         6-De-2021         0.00091 U	MW1-52	GM-21-041 6-Dec-2021	0.00090 U	0.00090 U	0.0011 U	0.00090 U	0.00090 U	J 0.00090 L	J 0.00090 U	0.00090 U	0.00050 J	0.00090 U	0.00090 U	0.00082 J	0.00090 U	0.00090 U	0.00090 U	0.00090 UJ	0.00090 U	0.00090 U
MW1-55         GM-21-044         6-De-2021         0.00091         0         0.00092         0         0.00091         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.00092         0         0.000092<	MW1-53	GM-21-042 6-Dec-2021	0.00090 U				0.00090 U.									0.00090 U	0.00090 U			0.00090 U
Image: Number Sec: Processes         7-Dec-2021         0.00091         U         0.00092         U         0.000092																				
Image: Number Sec: Phile SM-21-046         7-Dec-2021         0.00071 J         0.0002 J         0.00047 J         R         0.0017 J         0.0038 J         0.0008 J         0.0009 J <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																				
Image: NM1-58, CH2         GM-21-048         7-Dec-2021         0.00092 U         0.0011 U         0.0012 U         0.00092 U         0.0001 U         0.00092 U         0.00092 U         0.00092 U         0.00093 U         0.00093 U         0.00095 U         0.00095 U         0.00092 U         0.00092 U         0.00095 U         0.00092 U         0.00092 U         0.00095 U         0.00095 U         0.00092 U         0.00092 U         0.00091 U         0.00092 U         0.00092 U         0.00091 U         0.00091 U         0.00092 U         0.00091 U         0.00091 U         0.00091 U         0.00092 U         0.00091 U         0.00091 U         0.00092 U         0.00092 U         0.00091 U         0.00092 U																				
MW1-58         CH1         GM-21-049         7-Dec-2021         0.00061         U         0.00095         U         0.00092         U															R D					
MW1-58         GM-21-650         7-Dec-2021         0.00092 U         0.00091 U         0.00092 U															0.00095111					
MW1-59         GM-21-051         7-Dec-2021         0.00091 U         0.00092 U																R				
MW1-60         GM-21-052         8-Dec-2021         0.00092 U         0.0011 U         0.00092 U         0								0.00091 U	J 0.00091 U							0.00091 UJ				
MW1-61         GM-21-054         6-Dec-2021         0.00095 U         0.0011 U         0.0012 J         0.00095 U         0.00023 J         0.0016 J         0.0029 J         0.0016 J         0.00052 J         0.00054 J         0.00095 U         0.00094 U         0.00095 U         0.000095 U         0.00095 U         0.00		GM-21-052 8-Dec-2021								0.00092 U						0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
MW1-62         GM-21-055         7-Dec-2021         0.00094 U         0.0011 U         0.00094 U         R         0.00094 U         0.00084 U         0.00084 U         0.00084 U         0.00084 U         0.00084 U         0.00084 U         0.00088 U         0.00088 U								-							R	R				
MW1-63         GM-21-056         7-Dec-2021         0.00085 U         0.0010 U         0.00085 U         0.00085 U         0.0019 U         0.0019 U         0.0019 U         0.00085 U         0.00008 U         0.00008 U         0.00															0.00095 U	0.00095 U				
MW1-64         GM-21-057         8-Dec-2021         0.0088 U         0.0011 U         0.0011 J         0.0088 U         0.0024         0.0050 J         0.0088 U         0.0065         R         0.0088 U         0.0088 U         0.0088 U         0.0088 U         0.0088 U         0.0088 U         0.00088 U         0.00080 U         0.00092 U <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>R</td><td>R</td><td></td><td></td><td></td><td></td></th<>															R	R				
MW1-65         GM-21-058         8-Dec-2021         0.0092 U         0.0011 U         0.0092 U         0.0092 U         0.0092 U         0.0092 U         0.0014 J         0.0092 U         0.0019 J         0.0019 J         0.0019 J         0.0019 J         0.0019 U         0.0092 U         0.0093 U         0.0093 U         0.0093 U															0.00085 U					
MW1-67         GM-21-059         8-Dec-2021         0.002 J         0.0011 J         0.0012 U         0.0096 U         0.0096 U         0.0032 J         0.0096 U         0.0096 U         0.0032 J         0.0096 U         0.0096 U         0.0096 U         0.0011 J         0.0096 U         0.0096 U         0.0012 J         0.0016 J         0.0096 U         0.0096 U         0.0096 U         0.0096 U         0.0096 U         0.0096 U         0.0011 J         0.0096 U         0.00096 U         0.0008 U															R					
MW1-68         GM-21-060         6-Dec-2021         0.0089 U         0.0011 U         0.00075 J         0.00089 U         0.00089 U         0.0011 J         0.0009 J         0.0012 J         0.0016 J         0.00089 U         0.0011 J         0.0009 J         0.0012 J         0.0016 J         0.00089 U         0.0011 J         0.00089 U         0.0012 J         0.0016 J         0.00089 U         0.00088 U <td></td>																				
P1-1         GM-21-061         8-Dec-2021         0.0075 J         0.0088 U         0.0011 U         0.0088 U         0.00088 U         0.0011 J         0.0097 J         0.0071 J         0.0038 U         0.0088 U         0.00088 U         0.00088 U         0.0011 J         0.0097 J         0.0071 J         0.0028 U         0.0013 U         0.00088 U         0.00088 U         0.00088 U         0.0011 J         0.0011 J         0.0071 J         0.0028 U         0.0013 U         0.00088 U																				
P1-2         GM-21-062         7-Dec-2021         0.0023 J         0.00093 U         0.0014 J         0.00093 U         0.0018 J         0.0018 J         0.00093 U         0.0009															R					
P1-3       GM-21-063       7-Dec-2021       0.0091 UJ       0.0091 UJ       0.0011 UJ       0.0014 J       0.0091 UJ       0.00089 U       0.00089 U       0.0089 UJ															0.00093 UJ					
P1-4 GM-21-065 7-Dec-2021 0.00087 UJ 0.00087 UJ 0.0010 UJ 0.00080 J 0.00087 UJ R 0.0013 J 0.0015 J 0.0029 J 0.0029 J 0.0025 J 0.0042 J R R R 0.0047 UJ 0.00087 UJ 0.0					J 0.0011 U.	J 0.0014 J									R					0.00091 UJ
		GM-21-064 7-Dec-2021																		
P1-9 GM-21-066 6-Dec-2021 0.00096 U 0.00096 U 0.0012 U 0.00096 U																				
	P1-9	GM-21-066 6-Dec-2021	0.00096 U	0.00096 U	0.0012 U	0.00096 U	0.00096 U.	J 0.00096 L	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 UJ	0.00096 U	0.00096 U

Notes:

<sup>1</sup> 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.

<sup>2</sup> 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).

<sup>3</sup> As discussed in Section 1.5 of this report, 2022 screening levels are presented only for the purpose of comparison. Analytical results from the December 2021 sampling event were not evaluated in comparison to these values.

Results that exceed the screening level are boldfaced and shaded grey.

µg/L = microgram(s) per liter Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualified during data validation.

UJ = The analyte is not detected; the associated numerical value is approximate.

Analytes:

DONA = 4,8-dioxa-3H-perfluorononanoic acid HFPO-DA = Hexafluoropropylene oxide dimer acid NEtFOSAA = N-ethyl perfluorooctanesulfonamidoacetic acid NMeFOSAA = N-methyl perfluorooctanesulfonamidoacetic acid PFBS = Perfluorobutanesulfonic acid PFDA = Perfluorodecanoic acid PFDoA = Perfluorododecanoic acid PFHpA = Perfluoroheptanoic acid PFHxA = Perfluorohexanoic acid PFHxS = Perfluorohexanesulfonic acid PFNA = Perfluorononanoic acid PFOA = Perfluorooctanoic acid PFOS = Perfluorooctanesulfonic acid PFTA = Perfluorotetradecanoic acid PFTrDA = Perfluorotridecanoic acid PFUnA = Perfluoroundecanoic acid 9CI-PF3ONS = 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11CI-PF3OUdS = 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid

#### 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  $\mu$ g/L) are PFOS and PFOA at estimated concentrations of 0.16  $\mu$ g/L and 0.12  $\mu$ g/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.

## **5** References

- Department of Defense (DoD). 2019a. Memorandum for Assistant Secretary of the Army (Installations, Energy and Environment); Assistant Secretary of the Navy (Energy, Installations and Environment); Assistant Secretary of the Air Force (Installations, Environment and Energy); Director, National Guard Bureau (Joint Staff, J8); Director, Defense Logistics Agency (Installation Support). Subject: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. 15 October.
- DoD. 2019b. Quality Systems Manual for Environmental Laboratories. Version 5.3. May.
- DoD. 2019c. General Data Validation Guidelines. Revision 1. Environmental Data Quality Workgroup. November.
- DoD. 2020. Interim Per- and Polyfluoroalkyl Substances Site Guidance for NAVFAC Remedial Project Managers/November 2020 Update. 24 November.
- DoD. 2022. Memorandum for Assistant Secretary of the Army (Installations, Energy and Environment); Assistant Secretary of the Navy (Energy, Installations and Environment); Assistant Secretary of the Air Force (Installations, Environment and Energy); Director, National Guard Bureau (Joint Staff, J8); Director, Defense Logistics Agency (Installation Management). Subject: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. 6 July.
- Department of the Navy (DON). 1993a. Remedial Investigation, Operable Unit 1, Naval Air Station Whidbey Island, Oak Harbor, Washington. Prepared by URS Consultants, Inc. for Engineering Field Activity, Northwest under CLEAN Contract No. N62474-89-D-9295, Contract Task Order 0005. June.
- DON. 1993b. Baseline Risk Assessment Report: Ecological Risk Assessment for the Comprehensive Long-Term Environmental Action Navy Northwest Area. Naval Undersea Warfare Center Division Keyport. URS Consultant, Seattle, Washington. October 1993.
- DON. 1993c. Feasibility Study Report for NUWC Keyport. Prepared by URS Consultants, Inc., and Science Applications International Corporation for the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract, Task Order No. 010. November.

- DON. 1997. Focused Feasibility Study Report for Operable Unit 1, Additional Pre-ROD Data Collection for the Comprehensive Long-Term Environmental Action Navy (CLEAN) Northwest Area. Naval Undersea Warfare Center, Division Keyport, Washington. Science Applications International Corporation and URS Greiner, Washington. November.
- DON. 2019. 2018 Groundwater Monitoring Report, OU 1 Naval Base Kitsap Keyport.
- DON. 2020. Preliminary Assessment for Per- and Polyfluoroalkyl Substances (PFAS), Naval Base Kitsap Keyport and Associated Special Areas. October.
- DON. 2021. Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site. Naval Base Kitsap, Keyport, Washington. October.
- DON, United States Environmental Protection Agency (EPA), and Washington State Department of Ecology (Ecology). 1998. Record of Decision for Operable Unit 1, Naval Undersea Warfare Center Division, Keyport, Washington. Prepared by URS Greiner and Science Applications International Corporation for EFA NW under CLEAN Contract No. N62474-89-D-9295, CTO 10. 30 September.
- Naval Facilities Engineering Systems Command Northwest (NAVFAC NW). 2019. Standard Operating Procedure: NAVFAC Northwest Field Procedures Manual. Version 6.1.

Appendix A Field Forms and Field Logbooks This page intentionally left blank.

		r	Engineering Fechnology, 00 6 <sup>th</sup> Ave, Suite 70	, Inc., PE	BC .	P	Well Insp urging, a easureme	nd Fie
Contract Number: <u>N447</u>	<u>255-20-0-la</u>	Task Worder: TOZ	Naval	on: <u>Key</u>	pont		ite me: OL	21
	101.1	•	Well					
Well ID: M		12 .	Well Head I Casing Straight and	ocked: Y:		-	Water (ft btoc	
Total Well Depth	(ft btoc): / //				/		roduct (ft btoo	
Length of Water (	Column in Well	(ft): <u>~////</u> 7_	Exterior Seal				Thickness (fi	
Diameter of Well				· · · ·			ate (liters/min	
Well Casing Volu			Well Volume (liter	s): <u>7.1</u>	6		Purged (liters	
Purge Methodr Pe	eristaltic/Submer	sible/Bailer/Ot	her:		· .	Date We	ll Purged:	2/7
		3. Na	<u>Water Sa</u>	<u>mple Data</u>				A
Sample ID:	M-Z(-00	Type:	Date	12/7/	<u>21</u> Time:	0945	# Contain	ers:
QC Sample ID:		Type:	Date		Time:	R	# Contain	ers:
Sampling Personn	nel: <u>/(, He</u>	spren						
Remarks (color, o								
		·						· · ·
- 28 Mar 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	rge Depth t ol. Water	21A PRESS 2 A 12 4 34 4 34 4 34 34	ORP	Spec. Cond.	Turbidity	DO	Salinity	
人民的國際總統認識的設置。但且我的國際人名	REALLING REPAIRING AND	(4) 不能成为的第三者的这一句:	"一般的关系"的问题,它们们是这些很多的问题。	· · · · · · · · · · · · · · · · · · ·				1.06 1.08 1.0
	ers) 🛛 (ft btoc	) (°C)	. pH (mv)	(mS/cm)	the second s		(% or (pt)	Nõ
Time (lite			(± 0.2		(±10%	(± 10%		Nõ
Time (lite	n Requiremen	ts (± 10%)	(± 0.2 units) (± 10)	(HIS/CHI) (± 10%) ittial Depth to	(± 10% or <10)	(± 10% or ± 0.1)	) (±10%)	Nō
Time (lite Stabilizatio O90 Z ~ O90 5 32	n Requiremen 	$ts (\pm 10\%)$ 5.50 $3^{2} (0) 1$	(± 0.2 units) (± 10) 50 pmL/m	$(\pm 10\%)$ itial Depth to $\pi/M$	(± 10% or <10) Water (pro	(± 10% or ± 0.1) >-pumping	) (± 10%) )	
Time(liteStabilizatio $090^{\circ}Z$ $0905$ $0905$ $0913$ $1.7$	n Requiremen 	$\frac{1}{12.6} \frac{(\pm 10\%)}{(\pm 10\%)}$	$ \begin{array}{c c} (\pm 0.2 \\ units) \\ \hline (\pm 10) \\ \hline 10 \\ \hline 5 \\ \hline 0 \\ rm \\ \hline 20 \\ \hline 32.8 \\ \hline \end{array} $	$(\pm 10\%)$ itial Depth to $\mathcal{O}$ , $\mathcal{O}$ , $$	(± 10% or <10) Water (pro Z1,000	(± 10% or ± 0.1) e-pumping 0.35	) (± 10%) ) Ø.1Z	
Time         (lite           Stabilizatio         090°Z         ~           090°Z         ~         ~           0905         B2         ~           0913         1.7         0917	on Requiremen 	$ \begin{array}{c} \text{ts} (\pm 10\%) \\ \text{s}, 5.50 \\ \text{s}, 60 \\ \text{s}, 60 \\ \text{s}, 6 \\ \text{s}, 6$	$\begin{array}{c c} (\pm 0.2 \\ \text{units}) & (\pm 10) \\ \hline \\ $	(± 10%) iitial Depth to ~ / ハ_ の. Z4 こ し、Z4 こ	(± 10% or <10) Water (pro '21,00 /8.08	(± 10% or ± 0.1) 3-pumping 0.35 0.29	(±10%) ), (±10%) ), (±10%) (±172) (±172)	
Time         (lite           Stabilizatio $090^{\circ}Z$ $$ $090^{\circ}S$ $90^{\circ}S$ $90^{\circ}S$ $90^{\circ}S$ $090^{\circ}S$ $90^{\circ}S$ $90^{\circ}S$ $90^{\circ}S$ $90^{\circ}S$ $091^{\circ}S$ $1.7$ $0.4$ $097^{\circ}S$ $1.7$ $091^{\circ}S$ $1.7$ $1.4$ $097^{\circ}S$ $1.7$ $097^{\circ}S$ $1.7$ $1.4$ $097^{\circ}S$ $3.5$	n Requiremen 	ts (± 10%) 5.50 3.00 12.6 12.6 12.5 6 12.5 6 12.5 6 12.5 7 6	(± 0.2 units) (± 10) 50 pmL/m -20 32-8 -14 14-7 -18 701 v 16 207	$(\pm 10\%)$ itial Depth to $\mathcal{O}$ , $\mathcal{O}$ , $$	(± 10% or <10) Water (pro Z1,000	(± 10% or ± 0.1) e-pumping 0.35	) (± 10%) ) Ø.1Z	
Time         (lite           Stabilizatio $0905$ $922$ $0905$ $922$ $9913$ $1.72$ $0913$ $1.72$ $0917$ $1.42$ $0917$ $1.42$ $0925$ $3.22$ $0925$ $3.22$ $3.22$ $0925$ $3.22$ $0925$ $3.22$ $0925$ $3.22$ $0927$ $3.22$	n Requiremen 	ts (± 10%) 5.50 12.6 12.6 12.5 12.5 12.8 6 12.8 6	$\begin{array}{c c} (\pm 0.2 \\ \text{units}) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to $\sqrt{12}$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$	(± 10% or <10) Water (pro 21,00 18.03 17.11 16.01 12.10	(± 10% or ± 0.1) 3-pumping 0.35 0.29 0.27 0.22 0.72	(±10%) (±10%) 0.12 0.12 0.12 0.12 0.12 0.12	
Time         (lite           Stabilizatio $0905$ $922$ $0905$ $922$ $9913$ $1.7$ $0917$ $1.4$ $0925$ $3.2$ $0925$ $3.2$ $0925$ $3.2$ $0929$ $3.2$ $0929$ $3.2$ $0923$ $4.2$ $3.2$ $0923$ $4.2$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c cccc} (\pm 0.2 \\ units) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to $\sqrt{11}$ 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242	(± 10% or <10) Water (pro 21,00 18.08 17.11 16.01 12.10 9.96	(± 10% or ± 0.1) ⇒pumping Ø.35 Ø.29 Ø.27 Ø.77 Ø.77 Ø.19	(±10%) (±10%) 0.12 0.12 0.12 0.12 0.12	
Time         (lite           Stabilizatio $090^{\circ}Z$ $$ $090^{\circ}Z$ $$ $090^{\circ}S$ $90^{\circ}Z$ $090^{\circ}S$ $90^{\circ}Z$ $$ $090^{\circ}S$ $90^{\circ}Z$ $091^{\circ}S$ $1.7$ $0.4$ $097^{\circ}Z$ $1.4$ $097^{\circ}Z$ $1.4$ $097^{\circ}Z$ $7.4$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $5.3^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.6$ $097^{\circ}Z$ $3.7$ $4.6$ $097^{\circ}Z$ $4.6$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} (\pm 0.2 \\ \text{units}) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to $\sqrt{12}$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$ $0.242$	(± 10% or <10) Water (pro 21,00 18.03 17.11 16.01 12.10	(± 10% or ± 0.1) 3-pumping 0.35 0.29 0.27 0.22 0.72	(±10%) (±10%) 0.12 0.12 0.12 0.12 0.12 0.12	
Time         (lite           Stabilizatio         090 Z         -           090 Z         -         -           091 Z         1. Z         -           091 Z         1. 4         -           092 Z         3.         -           093 Z         4.         -	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} (\pm 0.2 \\ units) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ iitial Depth to $\sim / 1/2$ 0.747 0.743	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12-10 9.96 9.972	(± 10% or ± 0.1) =pumping O.35 O.29 O.27 O.22 O.72 O.19 O.17 O.16	(±10%) (±10%) (0.12 (0.12 (0.12 (0.12 (0.12 (0.17) (0.17)	
Time         (lite           Stabilizatio $090^{\circ}$ Z $\sim$ $090^{\circ}$ Z $\sim$ $090^{\circ}$ B $090^{\circ}$ Z $\sim$ $090^{\circ}$ B $090^{\circ}$ Z $\sim$ $091^{\circ}$ Z         1.2 $091^{\circ}$ Z         1.4 $092^{\circ}$ Z         Z         3. $092^{\circ}$ Z         3. $092^{\circ}$ Z         Z         3. $092^{\circ}$ Z         3. $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z         Z $092^{\circ}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$(\pm 10\%)$ initial Depth to $\sqrt{12}$ 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.243 0.243 0.243	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12-10 9.96 9.972	(± 10% or ± 0.1) =pumping O.35 O.29 O.27 O.22 O.72 O.19 O.17 O.16	(±10%) (±10%) (0.12 (0.12 (0.12 (0.12 (0.12 (0.17) (0.17)	
Time         (lite           Stabilizatio $090 \circ Z$ $ 090 \circ Z$ $ 091 \circ Z$ $1.7$ $0.4$ $097 - 1 \circ A$ $097 - 1 \circ Z$ $7 \circ A$ $097 \circ Z$ $ 097 Z - 1 \circ Z$ $7 \circ A$ $097 \circ Z$ $ 097 Z - 1 \circ Z$ $7 \circ A$ $ 097 \circ Z$ $ 097 Z - 1 \circ Z$ $     097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $             -$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} (\pm 0.2 \\ units) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to $\sqrt{12}$ 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.243 0.243 0.243	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12-10 9.96 9.972	(± 10% or ± 0.1) =pumping O.35 O.29 O.27 O.22 O.72 O.19 O.17 O.16	(±10%) (±10%) (0.12 (0.12 (0.12 (0.12 (0.12 (0.17) (0.17)	
Time         (lite           Stabilizatio $090^{\circ}$ Z $\sim$ $090^{\circ}$ Z $\sim$ $090^{\circ}$ B $090^{\circ}$ Z $\sim$ $090^{\circ}$ B $090^{\circ}$ Z $\sim$ $091^{\circ}$ Z         1.2 $091^{\circ}$ Z         1.4 $092^{\circ}$ Z         Z         3. $092^{\circ}$ Z         3. $092^{\circ}$ Z         Z         3. $092^{\circ}$ Z         3. $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z $092^{\circ}$ Z         Z         Z $092^{\circ}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$(\pm 10\%)$ initial Depth to $\sqrt{12}$ 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.243 0.243 0.243	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12-10 9.96 9.972	(± 10% or ± 0.1) =pumping O.35 O.29 O.27 O.22 O.72 O.19 O.17 O.16	(±10%) (±10%) (0.12 (0.12 (0.12 (0.12 (0.12 (0.17) (0.17)	
Time         (lite           Stabilizatio $090 \circ Z$ $ 090 \circ Z$ $ 091 \circ Z$ $1.7$ $0.4$ $097 - 1 \circ A$ $097 - 1 \circ Z$ $7 \circ A$ $097 \circ Z$ $ 097 Z - 1 \circ Z$ $7 \circ A$ $097 \circ Z$ $ 097 Z - 1 \circ Z$ $7 \circ A$ $ 097 \circ Z$ $ 097 Z - 1 \circ Z$ $     097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $      097 Z - 1 \circ Z$ $             -$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \text{ts} (\pm 10\%) \\ \text{s}, \text{s}, \text{se} \\ \text{s}, \text{s}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$(\pm 10\%)$ iitial Depth to $\sqrt{12}$ 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.242 0.243 0.243	(± 10% or <10) Water (pro 21,00 /8.08 17.11 /6.01 /2.10 9.96 9.77 7.97	(± 10% or ± 0.1) =pumping O.35 O.29 O.27 O.22 O.722 O.19 O.16 O.16	(±10%) (±10%) 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12	
Time         (lite           Stabilizatio         0907         ~           0905         B2         0905         B2           0905         B2         0913         1.7           0913         1.7         0917         1.4           0912         7         1.4           0925         3         0           0925         3         4           0929         3         4           0933         4         0           0941         5         0           0941         5         0           0941         5         0           0941         5         0	n Requiremen - 5-70 201 Pure 5-74 5-75 5-74 5-75	ts $(\pm 10\%)$ 5.50 12.6 12.6 12.5 12.8 12.8 12.8 12.9 12.	$\begin{array}{c c} (\pm 0.2 \\ units) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to 10.742 0.742 0.742 0.742 0.742 0.742 0.742 0.742 0.742 0.743	(± 10% or <10) Water (pro 21,00 /8.08 17-11 /6.01 /2.10 9.96 9.96 7.97 7.97 7.97 Discharge Tri Length of wa	(± 10% or ± 0.1) ⇒pumping Ø.35 Ø.29 Ø.27 Ø.27 Ø.72 Ø.19 Ø.16 Ø.16 Ø.16 Mbing ter column	(±10%) (±10%) 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 0.12 (ft)]	
Time         (lite           Stabilizatio $0905$ $326$ $0905$ $326$ $9905$ $326$ $0905$ $1.7$ $0.4$ $0973$ $1.7$ $0905$ $1.7$ $0.4$ $0973$ $1.7$ $0973$ $1.7$ $0.4$ $0973$ $1.7$ $0973$ $7.4$ $0925$ $3.6$ $0929$ $3.6$ $0973$ $7.4$ $0.937$ $4.6$ $0.941$ $5.6$ $0941$ $5.6$ $5.7m$ $7m112$ $3.6$ $0941$ $5.6$ $5.7m$ $7m112$ $0941$ $5.6$ $5.7m$ $7m112$ $0941$ $5.6$ $5.7m$ $7m112$ $000000000000000000000000000000000000$	n Requiremen - 5.74 $20^{1}$ $20.74$ 3.607 4.607 0.605 6.05 6.05 3.605 4.605	ts $(\pm 10\%)$ 5.50 12.6 12.6 12.6 12.6 12.7 12.8 12.8 12.8 12.9 12.	$(\pm 0.2)$ $(\pm 10)$ $10$ $11$ $20$ $32.8$ $.14$ $14.7$ $.18$ $7.1$ $o.16$ $2.6.7$ $o.15$ $-0.1$ $o.16$ $-7.4$ $o.15$ $-3.2$ $.15$ $-3.2$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $-3.7$ $.15$ $.3.7$ $.15$ $.3.7$ $.15$ $.3.7$ $.15$ $.3.7$ $.15$ $.3.7$ $.17$ $.7777$ $.17$ $.7777$ $.17$ $.17777$ $.17$ $.17777$ $.17$ $.17777$ $.17$ $.17777$ $.17777$ $.177777$ $.17777$ $.177777$ $.177777$ $.1777777$	(± 10%) ittial Depth to 0.24 Z 0.24	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12.10 9.96 9.97 7.97 7.97 7.97 Discharge Tri Length of wa	$(\pm 10\%)$ or ± 0.1) ⇒pumping $\bigcirc.3s$ $\bigcirc.2\%$ $\bigcirc.2\%$ $\bigcirc.7\%$ $\bigcirc.1\%$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$ $\bigcirc.16$	(ft)] (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 12 (± 12 (± 12) (± 12) (± 12) (± 12) (± 12) (± 12) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 12) (0 · 12) (0	rolume (li
Time       (lite         Stabilizatio       0907         0905       122         0905       122         0913       1.7         0913       1.7         0913       1.7         0913       1.7         0925       3.         0925       3.         0929       3.         0937       4.         0941       5.         0941       5.	on Requiremen 	ts $(\pm 10\%)$ 5.50 12.6 12.6 12.6 12.6 12.7 12.8 12.8 12.8 12.9 12.	$\begin{array}{c c} (\pm 0.2 \\ units) & (\pm 10) \\ \hline \\ $	$(\pm 10\%)$ initial Depth to 10.742 0.742 0.742 0.742 0.742 0.742 0.742 0.742 0.742 0.743	(± 10% or <10) Water (pro 21,00 18.08 17-11 16.01 12.10 9.96 9.97 7.97 7.97 7.97 Discharge Tri Length of wa	(± 10% or ± 0.1) ⇒pumping Ø.35 Ø.29 Ø.27 Ø.27 Ø.72 Ø.19 Ø.16 Ø.16 Ø.16 Mbing ter column	(ft)] (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 12 (± 12 (± 12) (± 12) (± 12) (± 12) (± 12) (± 12) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (± 12) (0 · 12) (0	$\sim$

		nology,	, Science Inc., PB Seattle, WA	SC	Pu	Well Insp urging, a easureme	nd Fie
Contract Number: <u>1/44 255 - 20 - D-Care</u>	Task Order: <u>7021F40</u> 76	Naval Installation	n: 1Keype	5.4	· Si Nar	te ne: (	21
		Well D	<u>Data</u>				
Well ID: 1MW1-4	V	Vell Head Lo	ocked: Y: 🗸	' N:	Depth to V	Water (ft btoc	): 6,
Total Well Depth (ft btoc): 77.		Straight and	Clear: Y: 🗸	<b>'</b> N:	Depth to Pro	oduct (ft btoc	;):
Length of Water Column in Well (f	t): <u>'71,4</u> 6 E	xterior Seal	Good: Y: <u>V</u>	N:	Product	Thickness (ft	i):
Diameter of Well Casing (in): 2	Poc	led water in	Head: Y:	N:	Purge Ra	te (liters/min	): <u> </u>
Well Casing Volume (liters/ft):	.6 Well V	olume (liters	): 12.8	8	Volume I	Purged (liters	): <u>4</u>
Purge Method: Reristaltid/Submersi	ible/Bailer/Other:				Date Wel	ll Purged:	12/2
		Water San					
Sample ID: $\frac{M-21-002}{GM-21-003}$ QC Sample ID: $\frac{M-21-003}{KH12/8}$	Type:	Date:_	17/8/21	Time:	1333	# Containe	ers: <u>3</u>
QC Sample ID: $_{K+12/8}$	Type:	H Ins Date:	12/8/2	Time:	1340	# Containe	ers:
Sampling Personnel: 16. 1401							
Remarks (color, odor, etc.):	-	less	1			-	
		di ka di sa	TANKEN (T. C.				STER TEN
Purge Depth to Vol. Water	Temp.	ORP	Spec. Cond.	Turbidity	DO	Salinity	
· · · · · · · · · · · · · · · · · · ·	(°C) pH		(mS/cm)	(NTU)		(% or ppt)	
A state of a state of the state			1 10 10 10 10 10 10 10 10 10 10 10 10 10	100.601 -201.42 - 1. State	· · · · · · · · · · · · · · · · · · ·	(/0.01/00/	3989832833434 M
	$(\pm 0.2)$	(+ 10)		(±10%	(± 10%		
Stabilization Requirements	(± 10%) units)		(± 10%) tial Depth to	(± 10% or <10)	(± 10%) or ± 0.1)	(± 10%)	
Stabilization Requirements 1753 C.14 1757 Begin pm	(± 10%) `units) 9C Q 15	Ini TomL	(± 10%) tial Depth to イパイル	(± 10% or <10) Water (pre	(± 10% or ± 0.1) -pumping)	(± 10%)	
Stabilization Requirements 1253 - 6.14 1257 Besilve por 1305 1.2 6.58	(± 10%) `units) 5 C - 1 5 13 O 7 0 0 4	Ini TomL, 16.2	(± 10%) tial Depth to イバノル 0,992	(± 10% or <10) Water (pre	(± 10% or ± 0.1) -pumping) 0 , 36	(± 10%)	
Stabilization Requirements         1753       6.14         1753       8.14         1753       8.14         1753       8.14         1305       1.2         1309       1.8         1309       1.8         1313       2.4	(± 10%) `units) 70 0 15 130 7.04 13.0 7.04	In 	(± 10%) tial Depth to イパイル	(± 10% or <10) Water (pre	(± 10% or ± 0.1) -pumping)	(± 10%)	
Stabilization Requirements           1753         6.14           1753         8.14           1757         8.14           1305         1.2           1309         1.8           1313         2.4           6.65           1317         3.0	(± 10%) units) <u>5</u> C O 15 13.0 7.04 13.0 7.04 13.0 7.02 13.0 7.02	In TO 100 L 16.2 -25.4 -31.9	(± 10%) tial Depth to / m / n 0.992 0.997 0.996 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86	(± 10% or ± 0.1) -pumping) 0, 36 0.22 0.16 0.14	(± 10%) 0,49 0,49 0,50 0,50 0,49	
Stabilization Requirements           1253         6.14           1257         Benin purchas           1305         1.2         6.58           1309         1.8         6.60           1313         2.4         6.65           1317         3.0         6.68           1321         3.6         6.70	(± 10%) units) <u>9</u> 9 15 13.0 7.04 13.0 7.04 13.0 7.02 13.0 7.02 13.0 7.03	In TO L 	(± 10%) tial Depth to / m / n 0.997 0.997 0.996 0.994 0.994 0.997	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 7	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.14 0.12	(± 10%) 0,49 0,49 0,50 0,49 0,49 0,49	
Stabilization Requirements           1753         6.14           1753         8.14           1757         8.14           1305         1.2           1309         1.8           1313         2.4           6.65           1317         3.0	(± 10%) units) <u>5</u> C O 15 13.0 7.04 13.0 7.04 13.0 7.02 13.0 7.02	In TO 100 L 16.2 -25.4 -31.9	(± 10%) tial Depth to / m / n 0.992 0.997 0.996 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86	(± 10% or ± 0.1) -pumping) 0, 36 0.22 0.16 0.14	(± 10%) 0,49 0,49 0,50 0,50 0,49	
Stabilization Requirements         1753       6.14         1757       Benton pro- 1305         1305       1.2       6.58         1309       1.8       6.60         1313       2.4       6.65         1317       3.0       6.68         1321       3.6       6.70         1325       4.2       6.73	(± 10%) units) 5 C 0 15 13.0 7.04 13.0 7.04 13.0 7.02 13.0 7.03 13.0 7.03 13.0 7.03	In TO mL, 16.2 -10.8 -25.4 -31.9 -36.0 -40.1	(± 10%) tial Depth to / m / m 0.997 0.997 0.996 0.994 0.994 0.994 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 71 4,08	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.14 0.12 0.10	(± 10%) 0.49 0.49 0.50 0.49 0.49 0.49	
Stabilization Requirements $1753$ $6.14$ $1757$ $8e_{5}$ $1305$ $1.2$ $6.68$ $1309$ $1.8$ $6.60$ $1313$ $2.4$ $6.65$ $1317$ $3.0$ $6.68$ $1371$ $3.6$ $6.70$ $1375$ $4.2$ $6.73$ $1329$ $4.8$ $6.75$	(± 10%) units) <u>9</u> C 0 15 <u>13.0</u> 7.04 <u>13.0</u> 7.02 <u>13.0</u> 7.02 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03	In To mL 16.2 -25.4 -31.9 -36.0 -40.1 -41.9	(± 10%) tial Depth to / m / m 0.997 0.997 0.996 0.994 0.994 0.994 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 71 4,08	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.14 0.12 0.10	(± 10%) 0.49 0.49 0.50 0.49 0.49 0.49	
Stabilization Requirements $1753$ $6.14$ $1757$ $8e_{5}$ $1305$ $1.2$ $6.68$ $1309$ $1.8$ $6.60$ $1313$ $2.4$ $6.65$ $1317$ $3.0$ $6.68$ $1371$ $3.6$ $6.70$ $1375$ $4.2$ $6.73$ $1329$ $4.8$ $6.75$	(± 10%) units) <u>9</u> C 0 15 <u>13.0</u> 7.04 <u>13.0</u> 7.02 <u>13.0</u> 7.02 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03	In TO mL, 16.2 -10.8 -25.4 -31.9 -36.0 -40.1	(± 10%) tial Depth to / m / m 0.997 0.997 0.996 0.994 0.994 0.994 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 71 4,08	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.14 0.12 0.10	(± 10%) 0.49 0.49 0.50 0.49 0.49 0.49	
Stabilization Requirements $1753$ $6.14$ $1757$ $8e_{5}$ $1305$ $1.2$ $6.68$ $1309$ $1.8$ $6.60$ $1313$ $2.4$ $6.65$ $1317$ $3.0$ $6.68$ $1371$ $3.6$ $6.70$ $1375$ $4.2$ $6.73$ $1329$ $4.8$ $6.75$	(± 10%) units) <u>9</u> C 0 15 <u>13.0</u> 7.04 <u>13.0</u> 7.02 <u>13.0</u> 7.02 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03 <u>13.0</u> 7.03	In To mL 16.2 -25.4 -31.9 -36.0 -40.1 -41.9	(± 10%) tial Depth to / m / m 0.997 0.997 0.996 0.994 0.994 0.994 0.994	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 71 4,08	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.14 0.12 0.10	(± 10%) 0.49 0.49 0.50 0.49 0.49 0.49	
Stabilization Requirements         1753       6.14         1757       Benton         1305       1.2       6.58         1309       1.08       6.60         1313       2.4       6.65         1317       3.0       6.68         1321       3.6       6.70         1322       4.8       6.73         1329       4.8       6.75         Stabolized       9	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	In To mL 16.2 -10.8 -25.4 -31.9 -36.0 -40.1 -41.9 8/21	(± 10%) tial Depth to /m/ m 0.997 0.997 0.997 0.997 0.997 0.994 0.994 0.989	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 9, 86 9, 86 9, 86 4, 71 4,08 4, 33	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.12 0.12 0.10 0.09	(± 10%) 0,49 0,49 0,50 0,49 0,49 0,49 0,49	
Stabilization Requirements         1753       6.14         1757       Benin pun         1305       1.2       6.88         1309       1.8       6.60         1313       2.4       6.65         1317       3.0       6.68         1321       3.6       6.70         1325       4.2       6.73         1329       4.8       6.75         Stabulized       9         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         130       130         131       130         132       130	$\begin{array}{c cccc} (\pm 10\%) & units) \\ \hline 9 & \bigcirc & 15 \\ \hline 13 & \bigcirc & 7_{\circ} & \bigcirc & 4 \\ \hline 13 & \bigcirc & 7_{\circ} & \bigcirc & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 13 & \bigcirc & 7_{\circ} & \odot & 2 \\ \hline 121 \\ \hline \\ \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \hline \hline \\ \hline \hline \hline \hline \hline \\ \hline \hline$	In 0,	(± 10%) tial Depth to 0.997 0.997 0.997 0.996 0.994 0.994 0.994 0.989	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 4, 86 4, 86 4, 71 4, 08 4, 33	(± 10% or ± 0.1) -pumping) 0, 36 0, 22 0, 16 0, 14 0, 12 0, 10 0, 09 0, 09 0, 09	(± 10%) 0,49 0,49 0,50 0,49 0,49 0,49 0,49	
Stabilization Requirements         1753       6.14         1757       Benton         1305       1.2       6.58         1309       1.83       6.60         1313       2.4       6.65         1317       3.0       6.68         1321       3.6       6.70         1322       4.8       6.75         Stabilization       6.73         1329       4.8       6.75         Stabilization       6.75         Volume       0	$(\pm 10\%)  units)$ $(\pm 10\%)  units)$ $(\pm 10\%)  (\pm 10\%$	In 0 + - 2 $-16 \cdot 2$ $-25 \cdot 4$ $-31 \cdot 9$ $-36 \cdot 0$ $-40 \cdot 1$ $-40 \cdot 1$ $-41 \cdot 9$ 3/21 ns for Well ing volume (	(± 10%) tial Depth to [~~] ~ [O.997] [O.997] [O.997] [O.997] [O.994] [O.984] [O.984] [O.984] [O.984] [Casings or D [liters/ft)] x [L	(± 10% or <10) Water (pre 5. 75 5. 49 5. 86 9. 86 9. 86 9. 86 9. 86 9. 33 9. 34 9. 33 9. 33 9. 34 9. 35 9. 35 9. 34 9. 33 9. 33 9. 34 9. 33 9. 35 9. 34 9. 33 9. 33 9. 34 9. 35 9. 35 9. 35 9. 35 9. 35 9. 35 9. 35 9. 35 9. 35 9. 49 9. 33 9. 33 9. 34 9. 33 9. 34 9. 35 9. 35 9. 35 9. 49 9. 33 9. 35 9. 49 9. 33 9. 35 9. 35 9. 34 9. 35 9. 45 9. 4	(± 10% or ± 0.1) -pumping) 0,36 0.22 0.16 0.12 0.12 0.10 0.09 0.09 0.09	(± 10%) 0,49 0,49 0,50 0,49 0,49 0,49 0,49 0,49 0,49 0,49 (ft)]	
Stabilization Requirements         1753       6.14         1757       Benin pun         1305       1.2       6.88         1309       1.8       6.60         1313       2.4       6.65         1317       3.0       6.68         1321       3.6       6.70         1325       4.2       6.73         1329       4.8       6.75         Stabelized       9         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1329       4.8         1309       1.3         1310       1.3	$(\pm 10\%)  units)$ $5 \ (\pm 10\%)  units)$ $5 \ (\pm 10\%)  7_{\circ} \ 04$ $13.0  7_{\circ} \ 04$ $13.0  7_{\circ} \ 02$ $13.0  7_{\circ} \ 03$ $12.0  7_{\circ} \ 03$	In 0 + - 2 $-16 \cdot 2$ $-25 \cdot 4$ $-31 \cdot 9$ $-36 \cdot 0$ $-40 \cdot 1$ $-40 \cdot 1$ $-41 \cdot 9$ 3/21 ns for Well ing volume (	(± 10%) tial Depth to 0.997 0.997 0.997 0.996 0.994 0.994 0.994 0.989	(± 10% or <10) Water (pre 5, 75 5, 49 5, 86 9, 86 9, 86 9, 86 9, 86 9, 71 9, 08 9, 08 9, 33 9, 08 9, 10 9, 1	$(\pm 10\%)$ or $\pm 0.1$ ) -pumping) $0, 3_{6}$ $0.22$ $0.16$ $0.12$ $0.12$ $0.10$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$ $0.07$	(± 10%) 0,49 0,49 0,50 0,49 0,49 0,49 0,49 0,49 0,49 0,49 (ft)]	olume (li

	B E	Tech	nology,	<b>5, Scienc</b> <b>Inc., PH</b> 7 Seattle, WA	BC	P	Well Insj urging, a easurem	nd Fi
Contract Number: <u>144255 - 20-15</u>	Task -6000 Order: <u>7</u>	02154076	Naval Installatio	n: <u>16eyp</u>	100- <b></b>	SiNa	ite me: Øu	21
Malace			Well 1		2			(?)
Well ID:				ocked: Y: <u></u>	,		Water (ft btoo	
Total Well Depth (ft btoc):				Clear: Y: <u>V</u>		Depth to Pr	oduct (ft bto	c):
Length of Water Column in V			xterior Seal	Good: Y: 🔽	N:	Product	Thickness (f	t):
Diameter of Well Casing (in):				Head: Y:		-	ate (liters/mir	
Well Casing Volume (liters/ft	): <u>7,5</u>	Well Vo	olume (liters	): 35,1	3	Volume	Purged (liters	s): <u>5</u> ,
Purge Method: Peristaltic/Sub	mersible/Bailer	r/Other:	·			Date We	ll Purged:	12/8
	and a second		Water Sar	nple Data				
Sample ID: GM-21-0	<u>204. <sub>Typ</sub></u>	e: EM	Date:	12/81	Z Time:	1078	# Contain	ers:
QC Sample ID:	Тур	be: '	Date:		Time:		– # Contain	
Sampling Personnel: 1C	Hoppe		•	<u></u>				
Remarks (color, odor, etc.):	colorie	55.0	dorie	<<				
Remarks (color, odor, etc.)				<u> </u>				
and a second	1	al an alternation and	Notest etar 40 datuat arcenticara				Provide and the second second	
	th to			Spec.				
Vol. Wa	STREET,		ORP	Cond.	Turbidity	DO	Salinity	A. S.
CALLER AND A SALE AND A	otoc) (°C)	DH	(mv)	(mS/cm)	I (NTI)	(mg/L)	(% or anf)	N
Time (liters) (ft l		pH (± 0.2			(NTU) (± 10%	(± 10%	(% or opt)	N
Time (liters) (ft l Stabilization Requirer	nents (± 10%)	(± 0.2 units)	(± 10)	(± 10%)	(± 10% or <10)	(± 10%) or ± 0.1)	(±10%)	
Time(liters)(ft lStabilization Requirer09566.9	nents (± 10%) 75	(± 0.2 units)	<u>(± 10)</u> In	(± 10%) itial Depth to	(± 10% or <10)	(± 10%) or ± 0.1)	(±10%)	Non-Sector
Time         (liters)         (ft l           Stabilization Requirer         0956          6.9           0958         Begin p          6.9           1002         0.8         6.9	nents (± 10%) 15 200-9 C @ 45 J1 .6	(± 0.2 units) 700m 6.77	(± 10) In <i>L/mi</i> ~7,3	(± 10%) itial Depth to	(± 10% or <10)	(± 10%) or ± 0.1)	(±10%)	
Time         (liters)         (ft l           Stabilization Requirer         0956          6.9           0956          6.9         0.9           0958         Beglar         0           1002         0.8         6.9	nents (± 10%) 15 2222 2227 e @ 45 11.6 15 11.6	(± 0.2 units) 7000	(± 10) In <i>L / m i</i> - 7, 3 - 2, 1	(± 10%) tial Depth to 0.673 0,673	(± 10% or <10) Water (pre 19,98	(± 10% or ± 0.1) -pumping (), 5 <sup>-3</sup> () - 39	(± 10%) <i>O.33</i>	Non-Sector
Time         (liters)         (ft l           Stabilization Requirer         0956         -         6.9           0958         Begin         p           1002         0.8         6.9           1006         1.6         6.9           1010         7.4         6.9	nents (± 10%) 15 2000 C C 45 45 11,6 15 11,6	(± 0.2 units) 700044 6.77 6.80 6.80 6.80	(± 10) In <i>L/mi</i> - 7, 3 - 2, 1 1, 7	(± 10%) tial Depth to 0.673 0.673 0.671	(± 10% or <10) )Water (pre /9.98 /9.5% /9.5%	(± 10% or ± 0.1) -pumping (), 5 <sup>-3</sup> (), 39 ()-36	(± 10%) <i>O. 33</i> <i>O. 33</i> <i>O. 33</i>	n first
Time         (liters)         (ft I           Stabilization Requirer $0956$ $6.9$ $0956$ $$ $6.9$ $0.9$ $0958$ $Beg In$ $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.0$ $6.9$	$\begin{array}{c c} nents (\pm 10\%) \\ 15 & 333333 \\ 15 & 11.6 \\ 15 & 11.6 \\ 15 & 11.6 \\ 15 & 11.6 \\ 15 & 11.5 \\ 11.5 \\ 11.5 \\ 11.8 \\ 11.8 \end{array}$	(± 0.2 units) 7000	(± 10) In <i>L / m i</i> - 7, 3 - 2, 1	(± 10%) tial Depth to 0.673 0,673	(± 10% or <10) )Water (pre /9.98 /9.5% /9.5%	(± 10% or ± 0.1) -pumping (), 5 <sup>-3</sup> () - 39	(± 10%) <i>O.33</i>	n first
Time         (liters)         (ft I           Stabilization Requirer $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.0$ $6.9$ $1072$ $4.8$ $6.9$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(± 0.2 units) 70004 6.77 6.80 6.80 6.80 6.78 6.78 6.78	(± 10) <i>L/mi</i> - 7,3 - 2,1 1,7 <i>G.G</i> 10,5 12,9	(± 10%) tial Depth to 0.673 0.673 0.673 0.671 0.672 0.671 0.671 0.671	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.00 15.90 14.90 14.50	(± 10% or ± 0.1) -pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34	(± 10%) <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i> <i>O.33</i> <i>O.35</i> <i>O.33</i>	n first
Time         (liters)         (ft I           Stabilization Requirer           0956         -         6.9           0958         Begin         p           1002         0.8         6.9           1006         1.6         6.9           1010         7.4         6.9           1014         3.7         6.9           1018         4.0         6.9           1026         5.6         6.9	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(± 0.2 units) 7000m 6.77 6.80 6.80 6.78 6.78	(± 10) In L/mil ~7.3 -2.1 1.7 6.6 10.5	(± 10%) tial Depth to 0.673 0.673 0.671 0.672 0.671	(± 10% or <10) Water (pre 19.93 19.59 19.00 15.90 14.90	(± 10% or ± 0.1) =pumping, O. 5 3 O. 39 O. 36 O. 35 O. 34	(± 10%) <i>O.35</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i>	Non-Sector
Time         (liters)         (ft I           Stabilization Requirer $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $0956$ $6.9$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.0$ $6.9$ $1072$ $4.8$ $6.9$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(± 0.2 units) 70004 6.77 6.80 6.80 6.80 6.78 6.78 6.78	(± 10) <i>L/mi</i> - 7,3 - 2,1 1,7 <i>G.G</i> 10,5 12,9	(± 10%) tial Depth to 0.673 0.673 0.673 0.671 0.672 0.671 0.671 0.671	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.00 15.90 14.90 14.50	(± 10% or ± 0.1) -pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34	(± 10%) <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i> <i>O.33</i> <i>O.35</i> <i>O.33</i>	Non-Sector
Time         (liters)         (ft I           Stabilization Requirer $0956$ -         6.9 $0958$ Begln         p $1002$ $0.8$ 6.9 $1006$ $1.6$ 6.9 $1010$ $7.4$ 6.9 $1014$ $3.7$ 6.9 $1018$ $4.0$ 6.9 $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $5.6$ $6.9$ $6.9$	$\begin{array}{c c} \text{nents} (\pm 10\%) \\ 15 \\ 15 \\ 16 \\ 17 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11$	(± 0.2 units) 70004 6.77 6.80 6.80 6.80 6.78 6.78 6.78	(± 10) In L/mil ~7.3 -2.1 1.7 6.6 10.5 12.9 14.1	(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.00 15.90 14.90 14.50	(± 10% or ± 0.1) -pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34	(± 10%) <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i> <i>O.33</i> <i>O.35</i> <i>O.33</i>	n first
Time         (liters)         (ft I           Stabilization Requirer $0956$ $ 6.9$ $0956$ $ 6.9$ $0953$ $Begln$ $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1014$ $3.7$ $6.9$ $1072$ $4.8$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $5-1ecoldollited         -1000 -1000 $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(± 0.2 units) 70004 6.77 6.80 6.80 6.80 6.78 6.78 6.78	(± 10) <i>L/mi</i> - 7,3 - 2,1 1,7 <i>G.G</i> 10,5 12,9	(± 10%) tial Depth to 0.673 0.673 0.673 0.671 0.672 0.671 0.671 0.671	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.00 15.90 14.90 14.50	(± 10% or ± 0.1) -pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34	(± 10%) <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i> <i>O.33</i> <i>O.35</i> <i>O.33</i>	Non-Sector
Time         (liters)         (ft I           Stabilization Requirer $0956$ -         6.9 $0958$ $Begln$ $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.0$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $6.92$ $6.92$ $6.92$ $1026$ $5.6$ $6.9$ $5.6$ $6.9$ $6.92$	$\begin{array}{c c} \text{nents} (\pm 10\%) \\ 15 \\ 15 \\ 16 \\ 17 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11$	(± 0.2 units) 70004 6.77 6.80 6.80 6.80 6.78 6.78 6.78	(± 10) In L/mil ~7.3 -2.1 1.7 6.6 10.5 12.9 14.1	(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.00 15.90 14.90 14.50	(± 10% or ± 0.1) -pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34	(± 10%) <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.33</i> <i>O.35</i> <i>O.35</i> <i>O.33</i> <i>O.35</i> <i>O.33</i>	Non-Sector
Time         (liters)         (ft I           Stabilization Requirer $0956$ -         6.9 $0958$ $Begln$ $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.0$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $6.92$ $6.92$ $6.92$ $1026$ $5.6$ $6.9$ $5.6$ $6.9$ $6.92$	$\begin{array}{c c} \text{nents} (\pm 10\%) \\ 15 \\ 15 \\ 15 \\ 11.6 \\ 15 \\ 11.6 \\ 15 \\ 11.6 \\ 11.5 $	(± 0.2 units) 2000 6.77 6.80 6.78 6.78 6.78 6.78 6.78 6.78	$(\pm 10)$ 10 -7.3 -7.3 -7.1 1.7 6.6 10.5 12.9 12.9 12.9 12.9 12.9 12.9 12.9	(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671 0.671	(± 10% or <10) )Water((pre 19.98 19.59 19.59 19.59 14.90 14.50 ) 4.26	(± 10% or ± 0.1) pumping O. 5 <sup>-3</sup> O. 39 O. 36 O. 35 O. 34 O. 34 O. 34 O. 34	(± 10%) <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i> <i>O.3</i>	
Time         (liters)         (ft I           Stabilization Requirer $0956$ $6.9$ $0956$ Begin $p$ $0958$ Begin $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1014$ $3.7$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $5.96$ $9.9$ $$	$\begin{array}{c c} \text{nents} (\pm 10\%) \\ 15 \\ 15 \\ 15 \\ 11.6 \\ 15 \\ 11.6 \\ 15 \\ 11.6 \\ 11.5 $	(± 0.2 units)	$(\pm 10)$ In $\frac{1}{2} / m i^{1}$ $-7.3$ $-2.1$ $1.7$ $6.6$ $10.5$ $10.5$ $12.9$ $12.187$ ns for Well	(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671 0.671 721 Casings or D	(± 10% or <10) )Water.(pre 19,98 19,59 19,59 19,50 14,90 14,50 ) 4,26	(± 10% or ± 0.1) -pumping, O. 5 3 O. 39 O. 36 O. 35 O. 35 O. 34 O. 34 G. 3 3	(±10%) O.33 O.33 O.33 O.35 O.35 O.35 O.33 O.33 O.33 O.33 O.33 O.33 O.33 O.33	
Time       (liters)       (ft I         Stabilization Requirer $0956$ - $6.9$ $0956$ Begin $p$ $0958$ Begin $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.00$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ <td>nents       <math>(\pm 10\%)</math>         15       11.6         45       11.6         45       11.6         45       11.5         8       11.5         8       11.5         9       &lt;</td> <td><math>(\pm 0.2 \\ units)</math> 2000 - 100 6.77 6.80 6.78 7.88 6.78 7.88 7.88 7.88 7.88 7.</td> <td><math>(\pm 10)</math> In L/min -7.3 -2.1 1.7 6.6 10.5 10.5 12.9</td> <td>(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671 0.671 721 Casings or D</td> <td>(± 10% or &lt;10) )Water (pre 19.98 19.59 19.59 19.59 14.90 14.50 14.50 14.50 14.26 Discharge Tu Length of wa</td> <td>(± 10% or ± 0.1) -pumping O. 5 3 O. 39 O. 36 O. 35 O. 34 O. 35 C. 34 O. 34 C. 35 C. 34 C. 34 C. 35 C. 34 C. 35 C. 34 C. 34 C. 35 C. 35 C. 34 C. 35 C. 35 C. 34 C. 35 C. 35 C.</td> <td>(± 10%) O. 3 ± O. 5 ± O. 7 ± O. 7</td> <td></td>	nents $(\pm 10\%)$ 15       11.6         45       11.6         45       11.6         45       11.5         8       11.5         8       11.5         9       <	$(\pm 0.2 \\ units)$ 2000 - 100 6.77 6.80 6.78 7.88 6.78 7.88 7.88 7.88 7.88 7.	$(\pm 10)$ In L/min -7.3 -2.1 1.7 6.6 10.5 10.5 12.9	(± 10%) tial Depth to 0.673 0.673 0.671 0.671 0.671 0.671 0.671 721 Casings or D	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.59 14.90 14.50 14.50 14.50 14.26 Discharge Tu Length of wa	(± 10% or ± 0.1) -pumping O. 5 3 O. 39 O. 36 O. 35 O. 34 O. 35 C. 34 O. 34 C. 35 C. 34 C. 34 C. 35 C. 34 C. 35 C. 34 C. 34 C. 35 C. 35 C. 34 C. 35 C. 35 C. 34 C. 35 C.	(± 10%) O. 3 ± O. 5 ± O. 7	
Time       (liters)       (ft I         Stabilization Requirer $0956$ - $6.9$ $0958$ $Begla$ $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1018$ $4.0$ $6.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $1026$ $5.6$ $4.9$ $2.9$ $0.6$ $4.9$ $2.9$ $0.6$ $4.9$	nents       (± 10%) $15$ $11.6$ $9$	$(\pm 0.2 units)$ $(\pm 0.2 units)$ $(-5.5)$ $(\pm 0.2)$ $(-7.8)$ $(-7.$	$(\pm 10)$ In $\frac{1}{2} / m i^{-1}$ $- 7, 3$ $-2, 1$ $1, 7$ $6, 6$ $10, 5$ $10, 5$ $10, 5$ $12, 9$ $12, $	$(\pm 10\%)$ tial Depth to $\bigcirc .673$ $\bigcirc .673$ $\bigcirc .671$ $\bigcirc .71$ $\bigcirc .71$	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.59 14.90 14.90 14.50 ) 4.26 ] Discharge Tu ength of wars	(± 10% or ± 0.1) -pumping O. 5 3 O. 39 O. 36 O. 35 O. 34 O. 35 C. 34 O. 34 C. 35 C. 34 C. 34 C. 35 C. 34 C. 35 C. 34 C. 34 C. 35 C. 35 C. 34 C. 35 C. 35 C. 34 C. 35 C.	(± 10%)	
Time       (liters)       (ft I         Stabilization Requirer $0956$ - $6.9$ $0956$ Begin $p$ $0958$ Begin $p$ $1002$ $0.8$ $6.9$ $1006$ $1.6$ $6.9$ $1006$ $1.6$ $6.9$ $1010$ $7.4$ $6.9$ $1014$ $3.7$ $6.9$ $1018$ $4.00$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $1026$ $5.6$ $6.9$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $5.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ $7.6$ <td>nents       (± 10%)         <math>15</math> <math>11.6</math> <math>9</math></td> <td><math display="block">(\pm 0.2 units)</math> <math display="block">(\pm 0.2 units)</math> <math display="block">(-5.5)</math> <math display="block">(\pm 0.2)</math> <math display="block">(-7.8)</math> <math display="block">(-7.</math></td> <td><math display="block">(\pm 10)</math> In <math display="block">\frac{1}{2} / m i^{-1}</math> <math display="block">- 7, 3</math> <math display="block">-2, 1</math> <math display="block">1, 7</math> <math display="block">6, 6</math> <math display="block">10, 5</math> <math display="block">10, 5</math> <math display="block">10, 5</math> <math display="block">12, 9</math> <math display="block">12, </math></td> <td><math display="block">(\pm 10\%)</math> itial Depth in <math>\bigcirc . 673</math> <math>\bigcirc . 673</math> <math>\bigcirc . 671</math> <math>\bigcirc . 71</math> <math>\bigcirc . 71</math></td> <td>(± 10% or &lt;10) )Water (pre 19.98 19.59 19.59 19.59 14.90 14.90 14.50 ) 4.26 ] Discharge Tu ength of wars</td> <td>(± 10% or ± 0.1) -pumping <math>\bigcirc, 5^3</math> <math>\bigcirc, 3^q</math> <math>\bigcirc, 3^q</math> <math>\bigcirc</math></td> <td>(± 10%)</td> <td><math>rolume (1 \rightarrow 0.039)</math></td>	nents       (± 10%) $15$ $11.6$ $9$	$(\pm 0.2 units)$ $(\pm 0.2 units)$ $(-5.5)$ $(\pm 0.2)$ $(-7.8)$ $(-7.$	$(\pm 10)$ In $\frac{1}{2} / m i^{-1}$ $- 7, 3$ $-2, 1$ $1, 7$ $6, 6$ $10, 5$ $10, 5$ $10, 5$ $12, 9$ $12, $	$(\pm 10\%)$ itial Depth in $\bigcirc . 673$ $\bigcirc . 673$ $\bigcirc . 671$ $\bigcirc . 71$ $\bigcirc . 71$	(± 10% or <10) )Water (pre 19.98 19.59 19.59 19.59 14.90 14.90 14.50 ) 4.26 ] Discharge Tu ength of wars	(± 10% or ± 0.1) -pumping $\bigcirc, 5^3$ $\bigcirc, 3^q$ $\bigcirc, 3^q$ $\bigcirc$	(± 10%)	$rolume (1 \rightarrow 0.039)$

EA®	Technology	<b>Ig, Science, and</b> <b>y, Inc., PBC</b> 707 Seattle, WA 98121	Well Inspection, Purging, and Field Measurement Form
Contract Number: <u>N4-1255-20-P-60</u> C6	Task Nava Order: <u>21F 467</u> 6 Installa	ion: Keypert	Site Name: OUI
	We	<u>I Data</u>	
Well ID: <u>MW1-3</u>	Well Head	Locked: Y: N:	Depth to Water (ft btoc): 291
Total Well Depth (ft btoc):の3	Inner Casing Straight a	nd Clear: Y: <u>N</u> : I	Depth to Product (ft btoc): NA-
Length of Water Column in Well (ft	): $\delta_{i}[\mathcal{Z}]$ Exterior Se	al Good: Y:N:	Product Thickness (ft): <u>NA</u>
Diameter of Well Casing (in): <u>4.</u>	Pooled water	in Head: Y: <u>//</u> N:	Purge Rate (liters/min): 0, 2
Well Casing Volume (liters/ft): 2.			Volume Purged (liters): 4.
Purge Method: Peristalfic/Submersit	ble/Bailer/Other: Low Flow	)	Date Well Purged: 12-7.2
	Water S	ample Data	
Sample ID: GM - 21-005	Type: TNV Dat	e: 12-7-21	1448 # Containers: 3
QC Sample ID:	Type:Dat	e:Time:	# Containers:
Sampling Personnel: <u>S. KeHI</u>	ewell B. Haines		
Remarks (color, odor, etc.):		· ·	· · · · · · · · · · · · · · · · · · ·
	· · · · · · · · · · · · · · · · · · ·		
Purge Depth to	u da la companya da l		
The second se	Temp. ORP	Spec. Cond. Turbidity	DO Salinity
Time (liters) (ft btoc)	<u>(°C)</u> pH (mv)	(mS/cm) (NTU)	(mg/L) (% or ppt) Notes
Stabilization Requirements	$(\pm 10\%)$ (± 0.2 (± 10%) units) (± 10)	(± 10%) (± 10\%) (\pm 10\%	$(\pm 10\%)$ or $\pm 0.1)$ ( $\pm 10\%$ )
1430 (.0 3.06		nitial Depth to Water (pre-	pumping)
	4.3 5.99 24.3 14.4 5.97 30.8		5.53 0.07
1440 3.0 3.16	14.4 5.90 38.9	0.142 4.88	5.29 0.07
1445 20 3.1V	4.35.89 40.8	0.140 4.59	5.19 0.07
LITS LOTIECT SAM			
		-	
	<sup>13</sup> 29, 1317		
	in the second second		-+
	Volume Calculations for We	l Casings or Discharge. Tub	ing
Volume (li Well casing diameter (in)→Well c	ters) = [Casing/tubing volume		
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$	$6" \rightarrow 5.5$	scharge tubing diameter (in) $1/4" \rightarrow 0.010$ $3/8"$	→ Discharge tubing volume (liters. "→ $0.022$ $1/2$ " → $0.039$
		r l	
ecorded by: <u>0. NETTERE V</u> I eviewed by: <u>H. OCMNZ</u> D	Date: 12-17-21 Date: 10/14/24	Pageof	Meter Model: Robss 20Fr
	THE PART OF THE PART OF THE PART		at the second
		Filename: Well Inspec	tion, Purging, and Field Measurement Form

		Š		Tech	nology,	, Science Inc., PE Seattle, WA	BC	P	Well Insp urging, a easureme	nd Fiel
Contract Number: <u>A</u>	44235-70-7	P-6006	Task M Order:	4425521Fu	<b>ری (</b> Naval Installatio	n: KCYPOI	~ <i>t</i>	Si Nai	te ne: <u>OU</u>	
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	18.96-11-11-11-11-11-11-11-11-11-11-11-11-11		Well I	Data -				
	MW1-0					ocked: Y: 🗹			Water (ft btoc	
						Clear: Y: 🗹			oduct (ft btoc	
						Good: Y:		Product	Thickness (ft	): <u>N</u> A
						Head: Y:		Purge Ra	te (liters/min)	): <u> </u>
					olume (liters	):_21.8		Volume	Purged (liters)	): <u>3,0</u>
Purge Met	nod Peristalt	ic/Submersi	ble/Bailer	/Other:	·····			Date We	ll Purged:	12/6/2
					Water San	nple Data				2
Sample ID	: 6-21	-006	Тур	e: でへく	Date:_	nple Data	Time:_	1250	# Containe	ers:
QC Sample	ID:		Тур	e:	Date:_	<u> </u>	Time:_	*****	# Containe	ers:
Sampling I	Personnel:	B. Hai	nes							
Remarks (o	olor, odor, et	ic.): <u>cle</u>	er, no	o o dos	net					
	-									
	Purge	Depth to			arta reactatear Altanaeta	Casa			iera staine kyra zan Literaturi	ile de la composition
	Vol,	Water	Temp.		ORP	Spec. Cond.	<b>Turbidity</b>	DO	Salinity	
Time	(liters)	(ft btoc)	<u>(°C)</u>	pH	(mv)	<u>(mS/cm)</u>			(% or pp)	Not
Stabi	lization Req	uirements			(±10)	(± 10%)	(± 10% or <10)	(± 10% or ± 0.1)		
1211		6.31				itial Depth to	Water (pre	-pumping)		an a
1235	Begin	6.31	<u>507 P</u> 11.5	8-49	149.2	0.256	7.69	2.85	OIZ	NA
12110	2.0	6.31	11.5	8.56	147.0	6.256	5.12	2.83	512	1
1245	3.0	6.31	11.0	<i>छ</i> ्म6	147.0	0.256	5,48	1.89	210	
1250	611ect	Smere								
									<u> </u>	
			Volume	Calculatio	ns for Wall	Casinge on P			ВА	
						Casings or D liters/ft)] x [L				
Well casi	ng diameter ( $2^{\circ} \rightarrow 0.6$	Volume (in) $\rightarrow$ Well	(liters) = [ casing vo	Casing/tubi lume (liters	ng volume (	Casings or D liters/ft)] x [L charge tubing	ength of wat	er column	(ft)]	

EA®		ng, Science, y, Inc., PBC 707 Seattle, WA 98		Well Insp Purging, a Measureme	nd Field
Contract Number: <u>NM4255-D-6006</u>	Task Na Order: <u>UFUOR</u> Install	val ation: <u>Keypov</u> E	,	Site Name:	
	W	ell Data			
Well ID: <u>MW 1-6</u>		d Locked: Y: 🗹 N	I:De	epth to Water (ft btoc	): <u>8.20</u>
Total Well Depth (ft btoc): 14, 2		and Clear: Y: 🗹 N	l: Dep	oth to Product (ft btoc	:): <u>NA</u>
Length of Water Column in Well (		eal Good: Y: N	: <u> </u>	Product Thickness (ft	t): <u>NA</u>
Diameter of Well Casing (in): $\frac{24}{1}$		r in Head: Y: N	I: <u>~</u> P	urge Rate (liters/min	): <u>0,2</u>
Well Casing Volume (liters/ft): Z		ters): <u>15,125</u>	· V	Volume Purged (liters	):_5,0
Purge Method: Peristaltic/Submers	ible/Bailer/Other: UM Fille	luck brokke	D	Date Well Purged: <u>12</u>	-6-21
~ .		Sample Data	R -		
Sample ID: <u>GM-21-007</u>	Type:_ <u>ENV</u> D	ute: 12-6-21	Time:C	S # Containe	ers: <u> </u>
QC Sample ID:	Type:Da	ite:	Time:	# Containe	ers:
Sampling Personnel: <u>SKeH</u>				· · · ·	····
Remarks (color, odor, etc.): <u>TvW</u>	oid, slight color (po-	naleum)			
Purge         Depth to           Vol.         Water           Time         (liters)         (ft bloc)	Temp. ORP (°C) pH (mv	) (mS/cm) .	<u>(NTU)</u> (r	DO Salinity ng/L) (% or pt)	Notes
Stabilization Requirements	$(\pm 0.2)$ (± 10%) (± 10) (± 10)			± 10% (± 10%)	
1425 0,2 8,40		Initial Depth to W	ater (pre-pu	mping)	lan kanalar suran
1430 1.6 8.50	1.9 4.28 7.4	G		.06 0.16	
1440 3.0 8.50	11.8 6.42 -57.	8 6.321 3	34.29 3.	90 0.15	
1445 4.0 8.50 1450 5.6 8.50	11.17 4.40 -65.0			89 0.15	
1455 -6-0-8-50	11.6 6.39 -66.9 Sample Collecte		0.27 2,	87 6.15	
······································				<u>·</u>	······································
					-
				Q	
Volume	Volume Calculations for W (liters) = [Casing/tubing volu				
Well casing diameter (in)→Wel	casing volume (liters/ft)	Discharge tubing dia	ameter (in) →	<ul> <li>Discharge tubing version</li> </ul>	olume (liters/ft)
$2" \rightarrow 0.6 \qquad (4" \rightarrow 2.4)$	$6" \rightarrow 5.5$	$1/4" \rightarrow 0.01$	0 3/8" -	→ 0.022 1/2" –	→ 0.039
Recorded by: S. Ketlarell	_Date: <u>f2-(e-2(</u>	Pageof	<u>\</u>	Meter Model	:1 <u>R01055 20170</u> 312
Reviewed by: U. Dennis	_Date: 12/6/21	Filenam	e: Well Inspectio	on, Purging, and Field Me	asurement Form.docx

gty.

	S		Tech	nology,	<b>5, Scienc</b> <b>Inc., PE</b> 7 Seattle, WA	BC	P	Well Insj urging, a easurem	ind Fi
Contract Number: <u>1/44</u> 255~	20- <u>1)-60</u> 06	Task Order: <u></u>	vz1F407	Naval Installatio	n: NOW	C Kexp	Si Corq Nai	ite me: <u>Key</u> r	04-00
Δ.Α.	مر			Well 1	Data	· · · · · · · · · · · · · · · · · · ·			
Well ID: $MW$					ocked: Y:		Depth to Y	Water (ft bto	c): <u> </u>
Total Well Depth (ft b	toc): 16,C		her Casing				Depth to Pr	oduct (ft bto	c):
Length of Water Colur	nn in Well (i	ft): <u>7,8</u> :	<u>з</u> Е	xterior Seal	Good: Y: $\checkmark$	N:	Product	Thickness (f	it):
Diameter of Well Casi	ng (in):	<u>}</u>	Poc	oled water in	Head: Y:	N: <u>~</u>	Purge Ra	ate (liters/mii	1):
Well Casing Volume (							Volume	Purged (liters	s): 5.
Purge Method: Peristal								ll Purged:	
				Watar Sa-	mnla Nata			_	
Sample ID: GM	-21-0	08	. FNI	<u>Traiter Sal</u>	12/6/2	/	1045	#0	
		<u> </u>	U U			<u> </u>	1010	# Contain	ers:
QC Sample ID:								# Contain	ers:
Sampling Personnel:	1 , H	<u>oppe-</u>		-					
Remarks (color, odor,	etc.):	olorie	255,0	dorles	5				
TOTAL PROPERTY IS A PROVIDE OF CONTRACTOR	and a second which the second second			-					
Purge	Denth to				Space -	Ar in the second se			Page 20
Purge Vol.	Depth to Water			ORP	Spec. Cond.	Turbidity	DO	Salinity	
AND THE PERSON AND ADDRESS OF THE PERSON AND THE PERSON AND ADDRESS OF THE PERSON ADDRES		Temp.		ORP (mv)		<u>(NTU)</u>	(mg/L)	Salinity (% or ppt)	N
Time (liters)	Water (ft btoc)	Temp. (°C)	(± 0.2	(mv)	Cond. (mS/cm)	(NTU) (± 10%	(mg/L) (± 10%	(% or(ppt)	N
Vol.	Water (ft btoc)	Temp. (°C) (±10%) (578=?	(± 0.2 units) 6:0 2 ( - わや	(mv) (± 10)	Cond. (mS/cm) (± 10%) itial Depth to	(NTU) (± 10% or <10)	(mg/L) (± 10% or ± 0.1)	(% or(ppt) (± 10%)	
Vol. (liters)Stabilization Re09541004Beg	Water (ft btoc) quirements 8, PA	Temp. (°C) (±10%) \$78=7	(± 0.2 units) 6 0 2 ( br W Ze	(mv) (± 10) っこ In アの m L	Cond. (mS/cm) (± 10%) itial Depth to	(NTU) (± 10% or <10) Water (pre	(mg/L) (± 10% or ± 0.1) -pumping	(% or(ppt) (± 10%)	
Vol.           Time         (liters)           Stabilization Re           0954            1004         Begg           1009         1.00	Water (ft btoc) quirements 8.M 5. Put 8.41	Temp. (°C) (± 10%) ptre= / ~?e_ (0 13,Z	(± 0.2 units) U Za 6.40	(mv) (± 10) ~ In ?O m L 74.6	Cond. (mS/cm) (± 10%) itial Depth to (min) Oo 767	(NTU) (± 10% or <10) Water (pre 13,82	(mg/L) (± 10% or ± 0.1) -pumping <i>O</i> . 4 (	(% or(ppt) (± 10%) (± 38	
Vol. Time (liters) Stabilization Re 0954 1004 Beg 1009 1.0 1013 1.8	Water           (ft btoc)           quirements           8, A           8.41           8.45	Temp. (C) (± 10%) ptre=? ~?C_ ( 13,Z (3,Z	(± 0.2 units) 6.0 2 ( 154 W Za 6.40 6.43	(mv) (± 10) 20 m L 74.6 56.2	Cond: (mS/cm) ( $\pm 10\%$ ) itial Depth to ./m!// $O \cdot 767$ $O \cdot 763$	(NTU) (± 10% or <10) Waten (pre 13.82 19.26	(mg/L) (± 10% or ± 0.1) =pumping) 0.41 0.57	(% or (ppt) (± 10%) (± 20%) (± 20%) (	
Vol.           Time         (liters)           Stabilization Re           0954            1004         Beg           1009         1.0           1017         2.6           1021         3.44	Water (ft btoc) quirements 8, M 5, M 5, 4 8, 4 8, 45 8, 53 8, 53	Temp. (°C) (± 10%) ptre= / ~?e_ (0 13,Z	(± 0.2 units) U Za 6.40	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1	Cond. (mS/cm) (± 10%) itial Depth to (min) Oo 767	(NTU) (± 10% or <10) Water (pre 13,82	(mg/L) (± 10% or ± 0.1) -pumping <i>O</i> . 4 (	(% or(ppt) (± 10%) (± 38	
Vol.           Time         (liters)           Stabilization Re           0954            1004         Beg           1004         1.60           1017         1.8           1017         2.6           1021         3.4	Water (ft btoc) quirements 8.β \$.41 8.45 8.53 \$.53 \$.53 \$.53 \$.53	Temp. (°C) (± 10%) pTR= / 72. (° 13. 2 13. 3 13. 4 13. 2	(± 0.2 units) 6 0.2 ( br 20 Zc 6,40 6,40 6,43 6,40 6,40 6,40 6,38	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.9	Cond.         (mS/cm) $(\pm 10\%)$ itial Depth to $O.767$ $O.765$ $O.765$ $O.765$ $O.765$ $O.765$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 19.99	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.20 C.19	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38)	Pedre 4
Vol.           Time         (liters)           Stabilization Re           0954            1004         Beg           1007         1.60           1017         2.66           1021         3.64           1025         3.4           1024         3.8	Water (ft btoc) quirements \$.₽ \$.41 \$.45 \$.53 \$.53 \$.53 \$.53 \$.53 \$.53 \$.53 \$.5	Temp. (C) (± 10%) pTB= / 72. (3.2 (3.2 (3.3 (3.4 13.2 (13.3)	(± 0.2 units) 60 2 ( bit 20) ZC 6,40 6,43 6,40 6,40 6,40 6,38 6,37	(mv) (± 10) 20 m L 74.6 56.2 50.5 47.1 45.9 44.6	Cond.         (mS/cm) $(\pm 10\%)$ itial Depth to $0.763$ $0.765$ $0.765$ $0.762$ $0.762$	(NTU) (± 10% or <10) Waten (pre 13.82 19.26 14.32 17.20 14.94 14.94 14.94	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.57 0.23 0.20 0.19 0.17	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38) (0.38)	Pedre 4 Pag vol
Vol.           Time         (liters)           Stabilization Re $0954$ $1004$ $Beg$ $1009$ $1.0$ $1009$ $1.0$ $1009$ $1.0$ $1017$ $2.6$ $1021$ $3.64$ $1025$ $3.4$ $1029$ $3.8$ $1633$ $4.52$	Water (ft btoc) quirements 8.4 8.45 8.53 8.53 8.53 8.53 8.51 8.51 8.51 8.54	Temp. (°C) (± 10%) (± 10%) (± 10%) (± 10%) (± 10%) (3,72) (3,72) (3,72) (3,72) (3,72) (3,72) (13,72) (	(± 0.2 units) 6 2 ( b) 20 2 ( b) 20 2 ( b) 6,40 6,43 6,43 6,41 6,40 6,38 6,38 6,37 6,36	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.9 44.6 43.6	Cond.           (mS/cm) $(\pm 10\%)$ itial Depth to $O_0.767$ $O_0.765$ $O_0.765$ $O_0.765$ $O_0.762$ $O_0.762$ $O_0.763$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 14.49 14.49 14.49	(mg/L) (± 10% or ± 0.1) -pumping 0.41 0.27 0.23 0.23 0.23 0.720 0.17 0.15	(% or (pf) (± 10%) (± 10%) ().38 ().38 ().38 ().38 ().38 ().38 ().38 ().38	Pechec
Vol.           Time         (liters)           Stabilization Re           0954            1004         Beg           1007         1.60           1017         2.66           1021         3.64           1025         3.4           1024         3.8	Water (ft btoc) quirements 8.4 8.45 8.53 8.53 8.53 8.53 8.51 8.51 8.51 8.54	Temp. (C) (± 10%) pTB= / 72. (3.2 (3.2 (3.3 (3.4 13.2 (13.3)	(± 0.2 units) 60 2 ( bit 20) ZC 6,40 6,43 6,40 6,40 6,40 6,38 6,37	(mv) (± 10) 20 m L 74.6 56.2 50.5 47.1 45.9 44.6	Cond.         (mS/cm) $(\pm 10\%)$ itial Depth to $0.763$ $0.765$ $0.765$ $0.762$ $0.762$	(NTU) (± 10% or <10) Waten (pre 13.82 19.26 14.32 17.20 14.94 14.94 14.94	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.57 0.23 0.20 0.19 0.17	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38) (0.38)	Pedre 4 Pag vol
Vol.           Time         (liters)           Stabilization Re $0954$ $1004$ $Begge           1009 1.60 1017 2.6 1021 3.68 1025 3.4 1024 3.88 1025 3.88 1024 3.88 1037 4.66 $	Water (ft btoc) quirements 8.β. 8.41 8.45 8.53 8.53 8.53 8.53 8.53 8.53 8.53 8.5	Temp. (°C) (± 10%) (± 10%) (± 10%) (3,2 (3,2 (3,2 (3,3 (3,3 (3,4) 13,3 (13,4) 13,4 13,4 13,4	(± 0.2 units) 6 2 (167 2 (167 2 (167 2 (167 6 . 40 6 . 40 6 . 40 6 . 38 6 . 37 6 . 37 6 . 37 6 . 37	(mv) (± 10) 20 mL 74.6 56.2 56.5 47.1 45.9 44.6 43.6 41.2	Cond. $(mS/cm)$ $(\pm 10\%)$ itial Depth to $O.767$ $O.765$ $O.765$ $O.765$ $O.762$ $O.763$ $O.763$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 14.99 14.99 24.77 <del>49.90 24.77</del> <del>49.90 2.21</del>	(mg/L)) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.20 0.19 0.15 0.13	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38 (0.38) (0.38) (0.38)	Pedre 4 Pag vol
Vol. (liters)           Stabilization Resolution           0954           1004         Began           1004         Iegan           1004         Iegan           1007         Iegan           1017         Iegan           1021         Iegan           1025         Iegan           1026         Iegan           1037         Iegan           1041         S.O	Water (ft btoc) quirements 8.β. 8.41 8.45 8.53 8.53 8.53 8.53 8.53 8.53 8.53 8.5	Temp. (°C) (± 10%) (± 10%) (± 10%) (3,2 (3,2 (3,2 (3,3 (3,3 (3,4) 13,3 (13,4) 13,4 13,4 13,4	$(\pm 0.2 \\ units)$ (0.2) (-57) (-40) (-40) (-40) (-40) (-38) (-38) (-36) (-37) (-37)	(mv) (± 10) 20 mL 74.6 56.2 56.5 47.1 45.9 44.6 43.6 41.2	Cond. $(mS/cm)$ $(\pm 10\%)$ itial Depth to $O \cdot 767$ $O \cdot 765$ $O \cdot 765$ $O \cdot 762$ $O \cdot 763$ $O \cdot 762$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 14.99 14.99 24.77 <del>49.90 24.77</del> <del>49.90 2.21</del>	(mg/L)) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.20 0.19 0.15 0.13	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38 (0.38) (0.38) (0.38)	Pedre 4 Pag vol
Vol. (liters)           Stabilization Resolution           0954           1004         Began           1004         Iegan           1004         Iegan           1007         Iegan           1017         Iegan           1021         Iegan           1025         Iegan           1026         Iegan           1037         Iegan           1041         S.O	Water (ft btoc) quirements 8.β. 8.41 8.45 8.53 8.53 8.53 8.53 8.53 8.53 8.53 8.5	Temp. (°C) (± 10%) (± 10%) (± 10%) (3,2 (3,2 (3,2 (3,3 (3,3 (3,4) 13,3 (13,4) 13,4 13,4 13,4	(± 0.2 units) 6 2 (167 2 (167 2 (167 2 (167 6 . 40 6 . 40 6 . 40 6 . 38 6 . 37 6 . 37 6 . 37 6 . 37	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.9 44.6 43.6 41.2 39.8 	Cond. $(mS/cm)$ $(\pm 10\%)$ itial Depth to $O \cdot 767$ $O \cdot 765$ $O \cdot 765$ $O \cdot 762$ $O \cdot 763$ $O \cdot 762$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 14.99 14.99 24.77 <del>49.90 24.77</del> <del>49.90 2.21</del>	(mg/L)) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.20 0.19 0.15 0.13	(% or (pft) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38 (0.38) (0.38) (0.38)	Pedre 4 Pag vol
Vol. (liters)           Stabilization Resolution           0954           1004         Began           1004         Iegan           1004         Iegan           1007         Iegan           1017         Iegan           1021         Iegan           1025         Iegan           1026         Iegan           1037         Iegan           1041         Sequence	Water (ft btoc) quirements 8.β. 8.41 8.45 8.53 8.53 8.53 8.53 8.53 8.53 8.53 8.5	Temp. (C) (± 10%) <i>DTB=</i> <i>1</i> <i>1</i> <i>1</i> <i>3</i> , 7 <i>1</i> <i>3</i> , 3 <i>1</i> <i>1</i> <i>3</i> , 4 <i>1</i> <i>1</i> <i>3</i> , 5 <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>4</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i> <i>1</i>	$(\pm 0.2 \\ units)$ (0 2 (16)) 20 $206, 406, 436, 406, 436, 406, 386, 376, 366, 37$	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.4 44.6 43.6 41.2 39.8 	Cond. $(mS/cm)$ $(\pm 10\%)$ itial Depth to $0.763$ $0.763$ $0.763$ $0.763$ $0.763$ $0.763$	(NTU) (± 10% or <10) Waten (pre 13.82 19.26 14.32 17.20 14.99 74.99 74.99 74.99 74.99 74.90 74.90 73.21 33.46	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.57 0.23 0.20 0.17 0.15 0.15 0.13 0.13	(% or (p)) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38) (0.38) (0.38) (0.38) (0.38) (0.38)	Pedre -
Vol. (liters)           Stabilization Resolution           0954           1004         Began           1004         Iegan           1004         Iegan           1007         Iegan           1017         Iegan           1021         Iegan           1025         Iegan           1026         Iegan           1037         Iegan           1041         Sequence	Water (ft bloc)         quirements         8.4         8.41         8.45         8.53         8.53         8.53         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.553         8.551         8.554         8.554         8.554         8.554	Temp. (°C) (± 10%) pTA= / ??C ( 13, Z 13, Z 13, Z 13, 4 13, 2 13, 4 13, 4 13, 4 13, 4 13, 4 13, 4 13, 5 Volume	$(\pm 0.2 \\ units)$ $6 \circ 2(167)$ $2 \circ 2(167)$ $2 \circ 4 \circ 0$ $6 \circ 4 \circ 0$ $6 \circ 4 \circ 1$ $6 \circ 4 \circ 0$ $6 \circ 3 \circ 8$ $6 \circ 3 \circ 7$ $6 \circ 7$ $6 \circ 7$ $6 \circ 7$ $6 \circ 7$ $6 \circ 7$ $6 \circ 7$ $7 \circ 7$ $6 \circ 7$ $7 \circ 7$ 7	(mv) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.9 44.6 43.6 43.6 41.2 39.8 L2 2.16.12 multiple hs for Well	Cond. $(mS/cm)$ $(\pm 10\%)$ itial Depth to $O \cdot 767$ $O \cdot 765$ $O \cdot 765$ $O \cdot 762$ $O \cdot 763$ $O \cdot 762$	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 14.99 74.99 74.99 74.99 74.99 72.21 33.46	(mg/L)) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.20 0.17 0.15 0.15 0.13 0.15	(% or (p)) (± 10%) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (	Pedre
Vol. (liters)           Stabilization Reg $0954$ $1004$ $1009$ $10020$ $308$ $1033$ $1037$ $4000$ $5+abalized$ $5+abalized$ Well casing diameter	Water (ft bloc)         quirements $\& . /A$	Temp. (C) $(\pm 10\%)$ $p_{7/8}=7$ $p_{7/8}=7$ 13, 2 13, 2 13, 3 13, 4 13, 3 13, 4 13, 4 13, 4 13, 4 13, 4 13, 5 13, 6 13, 7 13, 7	$(\pm 0.2 \\ units)$ (0.2) (b) (0.40) (0.43) (0.43) (0.43) (0.43) (0.40) (0.40) (0.40) (0.33) (0	(mv) (± 10) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.4 44.6 43.6 41.2 39.8 2.66.2 50.5 4.7.1 45.4 44.6 43.6 41.2 39.8 2.66.2 10 10 10 10 10 10 10 10 10 10	Cond. (mS/cm) (± 10%) itial Depth to 0.767 0.765 0.765 0.765 0.765 0.762 0.762 0.763 0.763 0.763 0.763	(NTU) (± 10% or <10) Waten (pre 13.82 19.26 14.32 19.26 14.32 19.26 14.32 19.26 14.99 7.20 14.99 32.21 33.46 9 Scharge Tu ength of wa	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.23 0.720 0.17 0.15 0.13 0.15 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13	(% or ppt) (± 10%) (± 10%) (± 20%) (± 20%) (0 - 38 (0 - 38) (0 - 38) (	Pedre -
Vol. (liters)           Stabilization Re           0954           1004         Beg           1009         1.0           1009         1.0           1009         1.0           1017         2.6           1021         3.4           1022         3.4           1023         4.6           1037         4.6           1037         4.06           104_1         5.0           Stabalized         Stabalized	Water (ft bloc)         quirements $\& . /A$	Temp. (°C) (± 10%) pTR = / 27C ( 13, 2 13, 3 13, 4 13, 2 13, 3 13, 4 13, 2 13, 4 13, 4 13, 4 13, 4 13, 4 13, 5 Volume (liters) = [ l casing vo	$(\pm 0.2 \\ units)$ $(\pm 0.2 \\ units)$ $(\pm 0.2 \\ (\pm 0.2 \\$	(mv) (± 10) (± 10) 20 mL 74.6 56.2 50.5 47.1 45.4 44.6 43.6 41.2 39.8 2.66.2 50.5 4.7.1 45.4 44.6 43.6 41.2 39.8 2.66.2 10 10 10 10 10 10 10 10 10 10	Cond: (mS/cm) itial Depth to 0.767 0.765 0.765 0.765 0.765 0.762 0.763 0.763 0.763 0.763 0.763 0.763 0.763 0.763 0.763 0.763 0.763	(NTU) (± 10% or <10) Water (pre 13.82 19.26 14.32 17.20 19.99 24.77 49.99 24.77 49.99 33.46 33.46 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mg/L) (± 10% or ± 0.1) -pumping) 0.41 0.27 0.23 0.23 0.720 0.17 0.15 0.13 0.15 0.13 0.13 0.13 0.13 0.13 0.13 0.13 0.13	(% or (p)f) (± 10%) (± 10%) (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38 (0.38) (0.38 (0.38) (0.38 (0.38) (0.38) (0.38 (0.38) (0.	Pedre -

. . \_ . . .

		Techno	ering, Scienc logy, Inc., PI Suite 707 Seattle, WA	BC	Pu	/ell Insp rging, ar asureme	
Well ID: $\frac{PWH - 607^{-1} WW - 69}{PWW - 69}$ Well Head Locked: Y: $M$ : Depth to Water (ft btoc): $\frac{1}{2}, 05'$ Total Well Depth (ft btoc): $\frac{1}{2}, 05'$ Total Well Column in Well (ft): $\frac{1}{54, 52}$ Exterior Seal Good: Y: $M$ : Depth to Product (ft btoc): $\frac{1}{10}, 10'$ Parge Atter Column in Well (ft): $\frac{1}{54, 52}$ Exterior Seal Good: Y: $M$ : Product Thickness (ft): $MA$ Purge Atter (fters/ft): $\frac{1}{2}, \frac{1}{2}$ Pooled water in Head: Y: $M$ : Product Thickness (ft): $MA$ Purge Atter (fters/ft): $\frac{1}{2}, \frac{1}{2}$ Well Casing Volume (fiters/ft): $\frac{1}{2}, \frac{1}{2}$ Well Volume (fters/ft): $\frac{1}{2}, \frac{1}{2}$ Sample ID: $\frac{1}{2}, \frac{1}{2}, 1$	Contract Number: <u>NYY755-20-D-C</u> 00	Task -Order: <u>11 F4576</u> In	Naval stallation: Key	ocrt	Site Name	e: 04 1	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Total Well Depth (ft btoc): $(00.8)$ Length of Water Column in Well ( Diameter of Well Casing (in): 24 Well Casing Volume (liters/ft): 0 Purge Method: Peristaltic/Submers Sample ID: $64M - 21 - 099$ QC Sample ID: Sampling Personnel:S. Kert	Inner Casing Stra         ft): <u>54.83</u> Exter         Pooled         (0       Well Volum         ible/Bailer/Other:       Low         War       Yape:         Type:       ENV         Type:       ENV         Type:       ENV	Head Locked: Y: ight and Clear: Y: ior Seal Good: Y: water in Head: Y: ne (liters): <u>33.898</u> FLW ater Sample Data  Date:	N:D	epth to Prod Product Tl Purge Rate Volume Pu Date Well	huct (ft btoc) hickness (ft) (liters/min): urged (liters): Purged: <u>12</u> # Container	:_NA :_NA : : : 8. 21 : s:3
Recorded by: S. Kettleucl Date: 12.8-21 Page of Meter Model: 12-10:035	Vol.         Water (liters)           Time         Vol. (liters)         Water (ft btoc)           Stabilization Requirements $(1,2,0)$ $(2,0)$ 12.35         1.0 $(7,20)$ 12.35         1.0 $(7,20)$ 12.35         1.0 $(7,20)$ 12.40         2.0 $(2,1)$ 12.45         3.0 $(2,1)$ 12.55         5.0 $(2,1)$ 12.55         5.0 $(2,1)$ 12.55         5.0 $(2,1)$ 13.05 $7.0$ $(2,1)$ 13.05 $7.0$ $(2,1)$ 13.08 $Coll(e)$ $5.0$ $Volume$ $Volume$	Temp. (°C)       pH $(\pm 0.2)$ $(\pm 0.2)$ $(\pm 10\%)$ units)       (( $12.3$ $(\mu \cdot 0.2)$ $(\mu \cdot 1)$ $12.3$ $(\mu \cdot 0.2)$ $32$ $12.3$ $(\mu \cdot 0.2)$ $-80$ $12.3$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-80$ $12.1$ $1.03$ $-90$	DRP (mv)       Cond. (mS/cm)// $\pm$ 10)       ( $\pm$ 10%)         Initial Depth to $i \in O, G \in T$ $i \in O, T \in G$ $i \in O, T$	(NTU) (± 10% or <10) Water (pre-p 94.49 43.51 83.08 56.12 58.74 54.58 55.49 25.49	(mg/L) (9 (± 10% or ± 0.1) umping) 3.4°3 (1 3.5°2 (1 3.4°3 (1 3.4°3 (1 3.4°3 (1 3.4°1 (1 3.4°1 (1 3.4°1 (1 3.4°1 (1 3.4°1 (1 3.4°1 (1) 3.4°1 (1)	% 0( ppt)         (± 10%)         ().33         ().31         ().31         ().33         ().34         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35         ().35 <td>ume (liters/ft)</td>	ume (liters/ft)
Reviewed by: 14, OK ONS Date: 12/8/2021 Filename: Well Inspection, Purging, and Field Measurement Form.docx	Recorded by: S. Kettlencl	Date: 12.8-21	Pageo	f	М	leter Model:	20055,21FW31,2~

		nology,	<b>5, Scienc</b> Inc., PH 7 Seattle, WA	BC	P		pection, and Field ent Form
Contract Number: <u>N44255 - 70-0-6</u> ct	Task Order: <u>UFUO</u> K	Naval Installatic	n: Keyf	art		ite me:	
Well ID: <u>MU</u> <u>- U</u> Total Well Depth (ft btoc): <u>11, .8(</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>2</u> " Well Casing Volume (liters/ft): <u>0</u> Purge Method: Peristallic/Submersit	2 Inner Casing 12 09 E Poc 0 Well V	Straight and exterior Seal bled water in olume (liter	Data ocked: Y: Clear: Y: <u>/_</u> Good: Y: Head: Y: s): <u>1</u> :254	N: N: N:	Depth to Pr Product Purge Ra Volume	Water (ft bto oduct (ft bto Thickness (f ate (liters/min Purged (liters Il Purged: ]	n): 0,2 s): 5.0
		······································	mple Data	······································		in i uigou. <u>t</u> e	
Sample ID: <u>GM-71-010</u> QC Sample ID: <u>S. Ke H</u> Sampling Personnel: <u>S. Ke H</u> Remarks (color, odor, etc.): <u>CLeo</u>	Type:		12-8-21			# Contain # Contain	
Lock v	ery rested.						
Stabilization Requirements           1155         0.2         4.71           1200         1.0         6.0           1205         2.0         5.90	11.9 6:70 11.9 6:45	ORP (mv) (± 10) In &7, (p 34, 9	Spec. Cond. (mS/cm) (± 10%) (tial Depth to ひパワム	Turbidity (NTU) (± 10% or <10) Water (pre 56,12 44,30	(± 10% or ± 0.1)	(±10%)	Notes
210 3.0 5.00 1215 4.0 5.05 1220 5.0 5.00 1223 Collect San	120 6.33 2.1 (.28 2.1 6.21 1 ple	39.0 31   38.3	0.94 0.200 0.201	34 2.6 33, 73 31,12	500	0.09	
					$\overline{\mathbf{O}}$		
Volume (1	Volume Calculation iters) = [Casing/tubi	n <mark>s for Well</mark> ng volume (	Casings or D liters/ft)] x [L	ischarge Tu ength of wat	bing er column (	(ft)]	
Well casing diameter (in) $\rightarrow$ Well c $2" \rightarrow 0.6$ $4" \rightarrow 2.5$				diameter (in		rge tubing v	olume (liters/ft) → 0.039
Volume (1         Well casing diameter (in) $\rightarrow$ Well of $(2^{\circ} \rightarrow 0.6)$ $(2^{\circ} \rightarrow 0.6)$ $(4^{\circ} \rightarrow 2.5)$ ecorded by: $(1, 1)$	iters) = [Casing/tubi casing volume (liters	ng volume (	liters/ft)] x [L charge tubing $1/4" \rightarrow 0$ . Pageo	ength of wat diameter (in 010   3/2 f	er column ( ) → Discha 3" → 0.022	(ft)] urge tubing v 2. 1/2" – Meter Model	· · ·

Contract Number: <u>W44255-20-0-6</u> Well ID: <u>^</u> Total Well Depth (ft btoc): Length of Water Column in Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Paristaltic/S Sample ID: <u></u> Sample ID: <u></u> Kampling Personnel: <u></u> Remarks (color, odor, etc.):	$\frac{11}{\frac{6}{1}} = \frac{5}{10} = 5$	nner Casing Poo Poo Well V r/Other: pe:	Well ) Well Head L Straight and Exterior Seal oled water in folume (liters Water San	Data         Docked: Y:         d Clear: Y:         d Clear: Y:         d Good: Y:         n Head: Y:         s):         mple Data	N: N: N: N: N: w.correct ?)	Depth to Depth to Pr Product Purge Ra Volume Date We	ite ine:	(): 52, (): N (): N (): 7, (): 7,
Total Well Depth (ft btoc): Length of Water Column in Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Peristaltic/S Sample ID: $C \sim -21 -$ QC Sample ID: $-54$	$\frac{60.77}{\text{in Well (ft):} 9.75}$ in Well (ft): <u>9.75</u> (in): <u>7.7</u> (in): <u>7.77</u> (in):	nner Casing Poo Poo Well V r/Other: pe:	Well Head L Straight and Exterior Seal bled water in folume (liters <u>Water Sa</u>	Locked: Y: d Clear: Y: d Good: Y: n Head: Y: s):95 (v mple Data	N: N: N: w.correct ?)	Depth to Pr Product Purge Ra Volume Date We	roduct (ft btoc Thickness (ft ate (liters/min Purged (liters ell Purged: <u>12</u>	c): <u>A</u> t): <u>N</u> i): <u>O</u> i): <u>7</u> .
Total Well Depth (ft btoc): Length of Water Column in Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Peristaltic/S Sample ID:	$\frac{60.77}{(in)}  \text{In}$ in Well (ft): $9.70$ (in): $7.7$ (in): $7.7$ (in): $0.6$ Submersible/Bailer $\frac{-611}{60-21-61.2}$ Typ	nner Casing Poo Poo Well V r/Other: pe:	Straight and Exterior Seal oled water in folume (liters <u>Water Sa</u>	d Clear: Y: <u>/</u> l Good: Y: <u>/</u> n Head: Y: rs): <u>U.95 (</u> ) <u>mple Data</u>	N: N: N: w.correct ?)	Depth to Pr Product Purge Ra Volume Date We	roduct (ft btoc Thickness (ft ate (liters/min Purged (liters ell Purged: <u>12</u>	c): <u>A</u> t): <u>N</u> i): <u>O</u> i): <u>7</u> .
Length of Water Column in Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Peristaltic/S Sample ID: QC Sample ID: Sampling Personnel:	in Well (ft): $3.2$ (in): $2.7$ (in): $2.7$ (in): $0.6$ Submersible/Bailer Submersible/Bailer -611 Typ 0 - 21 - 0.2 Typ	Set in the set of	Exterior Seal bled water in folume (liters Water San	ا Good: Y: ۱ Head: Y: s): <u>ل.95 (م</u> mple Data	N: N: 	Depth to Pr Product Purge Ra Volume Date We	roduct (ft btoc Thickness (ft ate (liters/min Purged (liters ell Purged: <u>12</u>	c): <u>A</u> t): <u>N</u> i): <u>O</u> i): <u>7</u> .
Length of Water Column in Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Peristaltic/S Sample ID: QC Sample ID: Sampling Personnel:	in Well (ft): $3.2$ (in): $2.7$ (in): $2.7$ (in): $0.6$ Submersible/Bailer Submersible/Bailer -611 Typ 0 - 21 - 0.2 Typ	Set in the set of	Exterior Seal bled water in folume (liters Water San	ا Good: Y: ۱ Head: Y: s): لـ ٩٢ (۱۸ mple Data	N: N: 	Product Purge Ra Volume Date We	Thickness (ft ate (liters/min Purged (liters ell Purged: <u>12</u>	(): <u>N</u> (): <u>0</u> (): <u>7</u> .
Diameter of Well Casing (i Well Casing Volume (liters Purge Method: Paristaltic/S Sample ID: <u>Carol-</u> QC Sample ID: <u>BH</u> Sampling Personnel: <u>BH</u>	(in): $\underline{\gamma}$ (in): $\underline{\gamma}$ (jet $\overline{\gamma}$ Submersible/Bailer Submersible/Bailer $\underline{\gamma}$ (jet $\overline{\gamma}$ (jet $\overline{\gamma}$ (jet $\overline{\gamma}$ (jet $\overline{\gamma}$ ) (jet $\overline{\gamma})$	Poo Well V r/Other: pe: pe:	oled water in olume (liters Water San	n Head: Y: s):_ <u>U.95_(</u> <u>mple Data</u>	N: V	Purge Ra Volume Date We	ate (liters/min Purged (liters ell Purged: <u>17</u>	): <u>0</u> , ;): <u>7</u> .
Well Casing Volume (liters Purge Method: Peristaltic/S Sample ID: <u>Ca-21-</u> QC Sample ID: <u>BH</u> Sampling Personnel: <u>BH</u>	$\frac{1}{2} \frac{1}{2} \frac{1}$	Well V r/Other: pe: pe:	olume (liters	s): 4.95 (N	morrest?)	Volume Date We	Purged (liters ell Purged: <del>1</del> 2	): <u>7</u> .
Purge Method: Poristallic/S Sample ID: <u>Ca-21-</u> QC Sample ID: <u>bit</u> Sampling Personnel: <u>bit</u>	Submersible/Bailer -611 Typ 6 - 21 - 612 Typ 1	$\frac{C}{De} = \frac{C}{2} \frac{C}{2}$	Water Sa	mple Data	• 	Date We	ell Purged: <u>17</u>	1112
Sample ID: <u>C~-21-</u> QC Sample ID: <u> </u>	-011	ре: <u>Ел</u> и ре: <u>5</u>			Time: Time:			
Sampling Personnel:BH	l				Time:	(557 lbor	# Containe	ers: ers:
Sampling Personnel:BH	l		Date:	12/7/21 	Time: Time: Time:	1557 	# Containe	ers: ers:
Sampling Personnel:BH	l		) Su Date:		1/21 Time:	-1607	# Containe	rs: <u>9</u>
		odar				-		
		odar						
4	• • • • • • • • • • • • • • • • • • • •							
					·/···			
Purge D	Depth to			Spec.				
(1) 如此 (1) 如果 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Water Temp.	0 13 1 P 1 P 2 P 2 P 2 P 2 P 2 P 2 P 2 P 2 P	ORP	Cond.	Turbidity	2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	Salinity	
Time (liters) (f	ft btoc) (°C)		(mv)	<u>(mS/cm)</u>		(mg/L)	(% or opt)	No.
Stabilization Requir	rements (± 10%)	$\begin{array}{ } (\pm 0.2) \\ \text{units} \end{array}$	(±10)	(±10%)	(± 10%) or <10)	$(\pm 10\%)$	(±10%)	
1510 - 3	52.51				Water (pre	-pumping)	<u>( ( 1070)  </u>	k jeda se pli seri Selati na pli seri
1517 Begin pu	mace set F	162 10	0.20,			1		$\overline{\mathcal{N}}$
	2.51 14.4	6.58	-68.2	0,246	47.93	1.00	0.12	1
	2.51 14.4	6.42	86:1	0.249	44.51	0.67	0.12	
	1.22 14.6	6.19	92.00	0,23	38.91	0.48	°·11	
	1.00 14.6	6.18	90,8	0.227	32.10	0,42	0.11	
	10.08 14.5	6.17	90,8	0,219	35.23		0.0	-+
	0.08 14.6	6.15	90,8	0.222	36.97	0.36	0,11	
1557 Collect	Samples							
	ADDIDUCTION DCALD POINTING PLAN							
		an a	in et augusta					
			Contrast Statistics Statistics	The second	T776413810890000		·	
					and the second	Contraction of the second se	- B/4	$-\uparrow$
	Volume	Calculatio	ns for Well	Casings or D	ischarge Tu	hing		
I and the second se	Volume (liters) = [		1 mil 1 m	and the second se			(ft)]	<u>permites di</u>
Well casing diameter (in)				scharge tubing				lume (1)
	-	→ 5.5	, <b>.</b> ,	$1/4" \rightarrow 0$		$8^{"} \rightarrow 0.022$		•
				1				
Recorded by: B. Hane Reviewed by: H. Runn	<u>e5</u> Date: <u>17</u>	11/21		Pageo	f		Meter Model:	<u>751 pm</u>
Reviewed by: 17. Knnr	<u>5</u> Date: <u>V</u>	17/21		Filen	ame: Well Insp	ection, Purgin	g. and Field Mea	isurement l
lok - * DTW su	and models	1			Line all	1 200	مار محر الم	~?n

EA®	Techno	ering, Science logy, Inc., PE Suite 707 Seattle, WA	<b>S</b> C	Pu	Vell Inspec orging, and casurement	Field
Contract Number: <u>N44255-20-0-6006</u>	Task Order: <u>21F4076</u> In	Naval stallation: <u>Key</u> f	pert	Site Nam		
		Well Data				
Well ID: MWI-14		Head Locked: Y:	N:	Depth to W	/ater (ft btoc):	7,15
Total Well Depth (ft btoc): ビ	59 Inner Casing Stra	ight and Clear: Y: 🗹	N: D	epth to Pro	duct (ft btoc):	VP
Length of Water Column in Wel	l (ft): <u>8,44</u> Exter	ior Seal Good: Y:	N:	Product T	Thickness (ft):	and the second secon
Diameter of Well Casing (in):	_	water in Head: Y:			e (liters/min):	0.2
Well Casing Volume (liters/ft):_	in 1	ne (liters): 5,064			urged (liters):	
		ie (inters). <u>~700-</u>				
Purge Method: Peristaltic/Submo	rsible/Bailer/Other:			Date Well	Purged: 12/8	12021
(? 11 a) a)	$\frac{W}{2}$	ater Sample Data	r	i		~
Sample ID: <u>GM - 21-01</u>	<u> 3 Type: ENV</u> *	_Date: 12/8/202	2.]	203	_# Containers: _	3
QC Sample ID:	Туре:	Date:	Time:		_# Containers: _	
Sampling Personnel: <u>H</u> , <u>+</u>		· · ·			-	
Remarks (color, odor, etc.):		NOSS alia	7		<u>, , , , , , , , , , , , , , , , , , , </u>	
	in flow cell from	or 1 1 11 sea me	NL roll	NI.		1
some seament	in tion cell from	well bushles m	(+lov cen	1 real anoi.	un resolvie on pro	hid thing
Purge Depth	to	Spec.				
Vol. Wate		ORP Cond.			Salinity	
Time   (liters)   (ft bto	<u>c) (°C) pH</u> (± 0.2	(mv) (mS/cm)	(NIU) (± 10%)	(mg/L)))))) (± 10%	% or ppt	Notes
Stabilization Requireme		±10) (±10%)		or $\pm 0.1$ )	(±10%)	
1058 7.15		Initial Depth to	Water (pre-p	oumping)	an a	langen sin di sarah di Managan di sarah
1105 Beand Purge			12 21		<b></b>	NA
1110 1.0 8.06	11.2 6.28 2	5.2 0.650 ,3 0.651		0,96 0,75	0,32	
118 2,6 8,23		4 0.649			0,32	
122 3,4 8,23	11,5 6.28 -6	6.1 0,650	17.02 (	0,60 0	0,32	
1/26 4,2 8,23		3,4 0.651			0,32	
1130 5,0 8.23 1134 5,8 8,23		7.2 0,650	16.41 (	2.53 (	0,32	
138 6.6 8.23		1,6 0,650 5,4 0,650			0,32	Large chul
1142 7.4 8,23		8.8 0.648			0,32	of salling
1146 8.2 8.23	11,6 6,28 -2	1.8 0.651	12,69 0	0.62 (	0,32	cell
1150 9.0 8.23		5,3 0.650			0,32	
1154 9,8 8,23 1158 10,6 8,23	11,7 6:28 -2	8.7 0.650			0,32	
47 BUISZED -	and developments and an experimental data in the second of the second second second second second data in the	0.4 0.650			0,32	
	re(liters) = [Casing/tubing v					
Well casing diameter (in) $\rightarrow$ W		Discharge tubing				e (liters/ft)
$(2" \rightarrow 0.6)$ $4" \rightarrow$	• • • •	$1/4" \rightarrow 0$		$\rightarrow 0.022$	$1/2" \rightarrow 0.0$	. ,
			1			
ecorded by: H. Hajek	Date: 12/8/2021	Pageo	f	ז	Meter Model: Y	TPRO DS
eviewed by: 14, Dennis	Date: 12/8/2021	Filer	ame: Well Inspec	tion, Purging,	, and Field Measure	nent Form.doc

-

EA	EA Engi Tech 2200 6 <sup>th</sup> A	nology,	<b>5, Scienc</b> Inc., PE 7 Seattle, WA	ŚĊ	P	Well Insj urging, <i>a</i> easurem	ind Fi	ield
Contract Number: <u>N44255-20-D-60</u> 06	Task Order: 21 F4076	Naval Installatic	n: Keyp	ort	Si Na	ite me: <u>OU</u>	1	
		Well ]	Data	1	· · · · · · · · · · · · · · · · · · ·			
Well ID: <u>MW1-15</u>		Well Head L	ocked: Y: 🟒			Water (ft bto		~
Total Well Depth (ft btoc): 12.7			Clear: Y:	•	Depth to Pr	oduct (ft bto	c):_ <i>D</i>	
Length of Water Column in Well (fi			Good: Y:		Product	Thickness (f	t):	
Diameter of Well Casing (in): $2$			Head: Y:			ite (liters/mii	111126	710.
Well Casing Volume (liters/ft): 0,		olume (liters	s): 4,056	>		Purged (liter	1 .	128
Purge Method Peristaltic/Submersil	ble/Bailer/Other:		·····		Date We	ll Purged:	2/7/2	021
			<u>mple Data</u>					~
Sample ID: <u>GM-2 -0 4</u>	Type:ENV	Date:	12/7/202	Z	1532	# Contain	ers:	3
QC Sample ID:	Type:	Date:	Contraction of the local distance of the loc	Time:		# Contain	ers:	
Sampling Personnel: <u>H. Haje</u>					· · · · · · · · · · · · · · · · · · ·			
Remarks (color, odor, etc.): <u>Clea</u>	r, colorless,	odorle	55					
Bailed, no se	al rusted be	olts					-	
ALL CONTRACTOR OF THE ALL CONTRACTOR							North State	
Purge Depth to Vol. Water	Temp.	ORP	Spec. Cond.	Turbidity	DO	Salinity		
Time (liters) (ft btoc)	<u>(°C)</u> pH	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(mS/cm)	(NTÚ)	(mg/L)	(% or ppt)		otes
Stabilization Requirements	$(\pm 10\%)$ ( $\pm 0.2$ units)	(± 10)	(± 10%)	(± 10% or <10)	(± 10%) or ± 0.1)	(±10%)		
434 6.02	lan an an lan an an ann an an an an an an an an an	In	itial Depth to					
1447 Begin Purge 1452 1.0 6.04	Set Puzze 1 6.5 6.19	200 <u>0</u> 27,2	0,665	0/1	0.71	072	M	)
1457 2.0 6.05	16.5 6.20	8.2	0.665	0.61	0,59	0.33		•••
502 3,0 6.05	16.7 6.20	-5.3	0.664	1,21	0.53	0.33		
507 4.0 6.04	6.6 6.20	-15,8 -22,4	0.664	1,61	0,48	0,33		
517 6.0 6.04	16,7 6,20	-27.6	0.663	1.74	0.43	0,32		
	16.7 6.20	-33.8	0.662	1.67	0.42	0,32		
1527 8.0 6.04	16:7 6:20	-36.0	0.661	1,88	0.41	0,32		
SABLE Z		a an		<u> </u>				
		anticological and a second	HH 12/71	2021				
Tellino I. I. Version and State Stat				1			$\vdash$	
	Volume Calculatio	ns for Well	Casings or D	ischarge Tu	bing			
							AND THE POST OF TAXABLE PARTY OF	COLUMN STREET
Volume ( Well casing diameter (in) → Well	liters) = [Casing/tub		(liters/ft)] x [L charge tubing			· / 1		

	Techno	ering, Scienc logy, Inc., PH Suite 707 Seattle, WA	BC	Pu Pu	Well Insp urging, a easureme	nd Fiel
Contract Number: <u>N44255-70-D-60</u> 06 Of	ask :der: <u>21FH076</u> In	Naval stallation: <u>Keypo</u>	5+	Si Nai	te me: <u>OU</u>	1
		Well Data				
Well ID: $MW  - 17$		Head Locked: Y:	∕N:		Water (ft btoc	
Total Well Depth (ft btoc): 13.82	Inner Casing Stra	ight and Clear: Y:	N: I	Depth to Pr	oduct (ft btoc	): <u></u> ///
Length of Water Column in Well (ft):	8 <b>.7</b> 5 Exter	ior Seal Good: Y:	N: <u>/</u>		Thickness (ft	
Diameter of Well Casing (in):	_ Pooled	water in Head: Y:	N: <u></u>	Purge Ra	te (liters/min	
Well Casing Volume (liters/ft): 0, 6	Well Volur	ne (liters): 5,25			Purged (liters	, , , , , , , , , , , , , , , , , , , ,
Purge Method: Peristaltic Submersible	Bailer/Other:			Date We	ll Purged: 17	2/6/20
· · · · · · · · · · · · · · · · · · ·	W	ater Sample Data	-			<b>1997</b>
Sample ID: <u>GM-21-015</u>		_Date: 12/6/207	2(	1453	# Containe	ers: <u>3</u>
QC Sample ID:	Туре:		Time:		# Containe	ers:
Sampling Personnel: H. Havek	K. Hopper					
Remarks (color, odor, etc.): <u>clear</u>		Jarless, bubb	les in flo	ow cell		
Seal broken, old tuk	sing permoved	Franwell			, ,	
winder and the second in the second		anter a company and		PERIOD AND		stree of the state of the
Purge Depth to Vol. Water T	emp.	ORP Cond.	Turbidity	DO	Salinity	
Time (liters) (ft btoc)		(mv) (mS/cm)	(NTU)		(% or ppt)	) Not
Stabilization Requirements (±	(± 0.2 10%) units)	(±10) (±10%)	(± 10% or <10)	(± 10% or ± 0.1)	(±10%)	
356 5,07		Initial Depth to				
1403 Begin Augo 1408 1.0 5.14 11		@ 0, 2 L/min 5,3 0,194	12,17	017	0,09	- AR GARAN
1412 1.8 5.17 11		2.9 0,198	16,16	0,67 0,56	0.09	/
1418 2.6 5.17 11		59.7 0.201	19,18	0.50	0,10	
1420 3,4 5,17 11		555 0,213	21,95	0,46	0,10	Speslig
		0,4 0,314		0.42	0.15	out
		4.1 0.350	10.92	6.41	0.17	
	<u>.5 6,71 -6</u> 5 6,75 -7	7,9 0.388	13,44	0,40 0,40	0.19 0.20	
		16,5 0.445	7.86		0,22	
1448 9.0 5.17 11	.3 6,82 -8	0,9 0,459	7,37	0,38	0.22	
STABLUEZE	$\ominus =$					and the state of t
<b>V</b> A	olume Calculations f	or Well Casings or D	) Discharge Tul	oing		
		/olume (liters/ft)] x [I	the second s		and the second se	
Volume (lite Well casing-diameter (in) $\rightarrow$ Well cas		/ <u>// L</u>				

$\frac{13.574}{13.574}  1.5 \\ 8.13 \\ 11.5 \\ 6.63 \\ -14.4 \\ 0.305 \\ 100.11 \\ 0.24 \\ 0.15 \\ 0.17 \\ 0.15 \\ 100.17 \\ 0.15 \\ 110 \\ 0.307 \\ 89.16 \\ 0.17 \\ 0.15 \\ 0.15 \\ 0.15 \\ 1406 \\ 3.0 \\ 8.60 \\ 10.9 \\ 6.62 \\ -11.9 \\ 0.312 \\ 92.37 \\ 0.15 \\ $					Tech	nology,	<b>, Scienc</b> <b>Inc., PE</b> Seattle, WA	<b>SC</b>	. <b>P</b>	Well Insj urging, a easurem	ind Field
Well ID: $MWI - IB$ Well Head Locked: Y: $V$ :       Depth to Water (ft btoc): $G$ Total Well Opth (ft btoc): $20.45$ Inner Casing Straight and Clear. Y: $N$ :       Depth to Product (ft btoc): $G$ Length of Water Column in Well (ft): $H_0$ $H_0$ $N$ :       Product Thickness (ft): $G$ Diameter of Well Casing (in): $2$ Pooled water in Head: Y: $N$ : $V$ Purge Rate (liters/fni): $O$ .         Well Casing Volume (iters/ft): $G$ .       Well Volume (liters): $S$ . $S$ Volume Purged (liters): $S$ . $S$ Purge Method:       Certistatili       Submersible/Bailer/Other:       Date: $IZ/B/2I$ Time: $H/15$ $H$ Containers: $S$ QC Sample ID:       Type:       Date: $IZ/B/2I$ Time: $H/15$ $H$ Containers: $S$ Remarks (color, odor, etc.):       Control       Control $IRD/2$	Contract Number: <u>*</u>	1/44255-2	0- <b>D</b> -1101	Task Order:_7	921 <i>F40</i> 70	Naval Installatio	n: <u>Ke</u> ,	vport		ite me:C	001
Total Well Depth (ft bioc): 20.45 Inner Casing Straight and Clear: Y. N. Depth to Product (ft bioc): Length of Water Column in Well (ft): /4.30 Exterior Seal Good: Y. N. Product Thickness (ft): Diameter of Well Casing (in): 2 Pooled water in Head: Y. N. Purge Rate (liters/nin): 0. Well Casing Volume (liters/ft): 0.6 Well Volume (liters): $3.58$ Volume Purged (liters): $3.68$ Purge Method: Ceristaltic Submersible/Baller/Other: Date Well Purged (liters): $3.68$ Purge Method: Ceristaltic Submersible/Baller/Other: Date: $12/8/21$ Time: $14/5$ # Containers: $3.68$ QC Sample ID: $5M-721-016$ Type: $5M$ Date: $12/8/21$ Time: $14/5$ # Containers: $3.68$ Sampling Personnel: $1 \le .M. Date: 12/8/21$ Time: $4.615$ # Containers: $3.68$ Purge Depth 16 $Methods = 12.667+255-6$ $Methods = 12.667+255-7$ $Methods = 12.667+27-267+27-267+27-267+27-267+27-267+27-27+27+27+27+27+27+27+27+27+27+27+27+27+2$		mind	111		······································			, · ·	·,		1 1
Length of Water Column in Well (h): $\frac{14.30}{2}$ Exterior Seal Good: Y: N: Product Thickness (h): Diameter of Well Casing (in): Product Thickness (h): Purge Rate (liters/min): O. Volume Quires/h): O. Well Casing Volume (liters/h): O. Well Volume (liters): $\frac{5.58}{5}$ Volume Purged (liters): $\frac{5.58}{5}$ Volume Volume (liters): $\frac{5.58}{5}$				Ar ,				/	-		
Diameter of Well Casing (in): $2$ Pooled water in Head: Y: N: $Y$ Purge Rate (liters/min): $0$ . Well Casing Volume (liters/ft): $0.6$ Well Volume (liters): $3.58$ Volume Purged (liters): $3.6$ Purge Method: eristalling Submersible/Bailer/Other: Date Well Purged (liters): $3.6$ Purge Method: eristalling Submersible/Bailer/Other: Date $Y$ Sample ID: $6M-721-016$ Type: $EM$ Date: $17/8/21$ Time: $1415$ # Containers: $3$ QC Sample ID: Type: Date: Time: $1415$ # Containers: $3$ QC Sample ID: $12.460$ Vol. $Material Type: Date: Time: 1415 # Containers: 3Remarks (color, odor, etc.): 2560-7625^{-}, 0dorAle \leq 5, Cloudy, browshow = 100^{-1}Time: 1610^{-6} (liters) 160^{-6} (10\% (10\%) (10\%) 100^{-6} (10\% (10\%)Stabilization Requirements (\pm 10\%) (\pm 10^{-6}) (\pm 10\% (\pm 10\%) (\pm 10\%) (\pm 10\%) (\pm 10\%) (\pm 10\%) (\pm 10\%)Stabilization Requirements (\pm 10\%) 160^{-6}(2^{-1}1^{-6}) 0.15^{-1} (140^{-2} -6.15^{-1}1346 1325^{-1} purpe (20.16^{-6}) 160^{-6}(2^{-1}1^{-6}) 0.15^{-1} (140^{-2} 2.4^{-2} 3.6^{-1} 5.6^{-1} 1.6^{-6} 3.12^{-9} 9.312^{-9} 9.15^{-1} 0.15^{-1} 140^{-2} 2.4^{-2} 3.6^{-1} 1.6^{-2} 3.6^{-1} 1.6^{-2} 3.12^{-8} 9.312^{-8} 9.15^{-1} 0.15^{-1} 140^{-2} 12^{-1} 1$	1	-	-	· ·	-	-		/			
Well Casing Volume (liters/ft): $0.6$ Well Volume (liters): $3.5\%$ Volume Purged (liters): $3.6\%$ Purge Method:       cristalic Submersible/Bailer/Other:											
Date Well Purged: $\boxed{22/37}$ Water Sample Data         Sample ID: $\underbrace{M}_{2} = \underbrace{M}_{2} = M$											
Water Sample Data         Sample ID:			e~			olume (inters	): <u> </u>	V			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Purge Met	nod: Peristan	Submers	ible/Baller	/Otner:		· · · · · · · · · · · · · · · · · · ·		Date we	Il Purged:	4 d c
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Comula ID	GME	71-016	<b>m</b>	EN	<u>Water Sar</u>	nple Data 17/10/-	<b>71</b> m:	1115		>
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Sample ID	<u> </u>		Тур	e:	Date:	14/5/0	Time:	1715	# Contain	ers:
Remarks (color, odor, etc.):Color desters , Cloudy , brownIdd 1773Purge Vol.Depth to Water Temp, PH (mv)Spec. Cond. Turbidity DO Salinity (100% or QDF)NoStabilization Requirements ( $\pm 10\%$ ) ( $\pm 10\%$ ( $\pm 10\%$ ) ( $\pm 1$	QC Sample	ID:	16 14	Typ	e:	Date:		Time:	2	# Contain	ers:
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						- 1005				· · · · · · · · · · · · · · · · · · ·	
Vol. (liters)Water (ft bloc)Temp. (°C)ORP (mv)Cond. (ms)/(ms)/(ms)/(ms)/(mg/L)DO (mg/L)Salinity (% or of pr)NoStabilization Requirements $(\pm 10\%)$ </td <td>Remarks (</td> <td>color, odor, e</td> <td>tc.):</td> <td>107102 14 12/3</td> <td>55°, Oak</td> <td>ONIC?</td> <td>, Cloud</td> <td>y, bru</td> <td>Nr67</td> <td></td> <td></td>	Remarks (	color, odor, e	tc.):	107102 14 12/3	55°, Oak	ONIC?	, Cloud	y, bru	Nr67		
Vol.Water (ft btoc)Temp. (°C)ORP pHCond. (ms/cm)Turbidity (NTU)DO (mg/L)Salinity (% or of pr)NoStabilization Requirements( $\pm 10\%$ )( $\pm 10\%$ ) <td< th=""><th></th><th></th><th></th><th></th><th>1</th><th>•</th><th></th><th></th><th></th><th></th><th></th></td<>					1	•					
Time       (IIters)       (It bloc)       (C)       pH       (mv)       (mS/cm)       (NTU)       (mg/L)       (% or opp)       No         Stabilization Requirements       (± 10%)       (± 10%)       (± 10%)       (± 10%)       (± 10%)       or ± 0.1)       (± 10%)       (± 10%)       (± 10%)       (± 10%)       or ± 0.1)       (± 10%) <th></th> <th>1519 7 S. C. S. G. S. S.</th> <th>b) 140.40 (5) (5) (5) (5) (5) (5) (5) (5) (5) (5)</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>		1519 7 S. C. S. G. S.	b) 140.40 (5) (5) (5) (5) (5) (5) (5) (5) (5) (5)								
Stabilization Requirements (± 10%)       (± 0.2       (± 10%)         1342       %       M       ( $\bigcirc 0.15 \ 0$	Time	1. A. C. M.	5	1.12.11.10.100.00.00.00.00.00.00.00.00.00.00	nH	过来在1998年6月1日前1			1.57 新闻的第三人称单数的复数形式		Note
1342       6.15       Initial Depth to Water (pre-pumping)         1346 $Begi' \sim pu' pe'$ $22$ $16 \odot a(f) \approx 1.2$ $M$ 13574 $1.2$ $8.13$ $11.5$ $6.63$ $-14.4$ $0.305$ $110.11$ $0.244$ $0.15$ 1358 $1.8$ $8.25$ $11.3$ $6.59$ $-12.1$ $0.307$ $89.16$ $0.17$ $0.15$ $1402$ $2.4$ $8.40$ $11.1$ $6.53$ $-11.0$ $0.310$ $87.16$ $0.17$ $0.15$ $1406$ $3.0$ $8.52$ $11.0$ $6.60$ $-11.9$ $0.312$ $92.37$ $0.15$	Stab	lization Do			$(\pm 0.2)$		÷ .	(± 10%	(± 10%		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				$(\pm 10\%)$	<u> </u>						
1358       1.8       8.25       11.3       6.59 $-12.1$ $0.307$ $88.6$ $0.17$ $0.15$ 1402       2.4 $8.40$ 11.1 $6.53$ $-11.0$ $0.307$ $88.6$ $0.17$ $0.15$ 1406 $3.0$ $8.52$ $11.0$ $6.60$ $-11.9$ $0.312$ $92.37$ $0.15$ $0.15$ 1410 $3.6$ $8.60$ $10.9$ $6.62$ $-12.8$ $0.312$ $92.37$ $0.15$ $0.15$ 1410 $3.6$ $8.60$ $10.9$ $6.62$ $-12.8$ $0.312$ $92.37$ $0.15$ $0.15$ 1410 $3.6$ $8.60$ $10.9$ $6.62$ $-12.8$ $0.312$ $92.37$ $0.15$ $0.15$ 1410 $3.6$ $8.60$ $10.9$ $6.62$ $-12.8$ $0.312$ $89.98$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$ $0.15$	1346		'n pu		Constant of the local division of the local	Oml/	min				NA
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							7				
1406 $3.0$ $8.52$ $11.0$ $6.60$ $-11.9$ $0.312$ $92.39$ $0.15$ $0.15$ $140$ $3.6$ $8.60$ $10.9$ $6.62$ $-12.8$ $0.312$ $89.98$ $0.15$ $0.15$ $0.15$ $54abc.ll.ze$ $0.737$ $0.75$ $0.15$ <											
Stabc.ll ze       Image: Stabc.ll ze         Volume Calculations for Well Casings or Discharge Tubing         Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]         Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)         2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$	1 0				6.60	-11.9	0.312	92.39	0.15	0.15	
Volume Calculations for Well Casings or Discharge Tubing         Volume Calculations for Well Casings or Discharge Tubing         Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]         Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)       Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)         2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ Discharge tubing diameter (in) $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406		8.60	10,9	6.62	- 12,8	0.312	84.98	0.15	0.15	
Wolume Calculations for Well Casings or Discharge Tubing         Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]         Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)       Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)         2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ Discharge tubing $3/8$ " $\rightarrow 0.022$ $1/2$ " $\rightarrow 0.039$	1406 1410	<u> </u>									
Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ 1/4" $\rightarrow 0.010$ 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406 1410 Stab	· .					1				
Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ 1/4" $\rightarrow 0.010$ 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406 1410 Stab				11	10			1 - C		<b> </b>
Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ 1/4" $\rightarrow 0.010$ 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406 1410 Stab				17	1812	ļ				
Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ 1/4" $\rightarrow 0.010$ 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406 1410 Stab				N 12	1812					
Volume (liters) = [Casing/tubing volume (liters/ft)] x [Length of water column (ft)]Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft)2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$ 6" $\rightarrow 5.5$ 1/4" $\rightarrow 0.010$ 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$	1406 1410 Stab				12	1812					
Well casing diameter (in) $\rightarrow$ Well casing volume (liters/ft)Discharge tubing diameter (in) $\rightarrow$ Discharge tubing volume (liters/ft) $2" \rightarrow 0.6$ $4" \rightarrow 2.5$ $6" \rightarrow 5.5$ $1/4" \rightarrow 0.010$ $3/8" \rightarrow 0.022$ $1/2" \rightarrow 0.039$	1406 1410 Stab			Volumo		78 FZ			<u>۲</u>		
	1406 1410 Stab									out and the state of the state of the state of the	
VIII-an - Malace 1 1	1406 1410 Stab		Volume	(liters) = [	Casing/tubi	ng volume (	[liters/ft)] x [L	ength of wat	ter column	(ft)]	
Recorded by: <u>K. Hopper</u> Date: $\frac{72/8}{21}$ Page of <u>Meter Model:</u> $\frac{1}{52}$	1406 1410 5426 2	ing diameter 2" → 0.6	Volume (in) $\rightarrow$ Wel 4" $\rightarrow$ 2.5	(liters) = [ l casing vo 5 6" -	Casing/tubi blume (liters → 5.5	ng volume (	[liters/ft)] x [L charge tubing	ength of wat diameter (in	ter column ) → Discha	(ft)] arge tubing v	olune (liter

. .......

	EA Engineering Technology, 2200 6 <sup>th</sup> Ave, Suite 707	Inc., PBC	Well Ins Purging, s Measurem	and Field
Contract Task Number: <u>NY4 255-70-D-6000</u> Orde	k Naval er: <u>LIF4076</u> Installatio	n: Key part	Site Name: 00	( )
Δ	Well I	Data		
Well ID: MW 1 - 20	Well Head L	ocked: Y: N:	Depth to Water (ft bto	c): 31631
Total Well Depth (ft btoc): 10.05	Inner Casing Straight and	/	Depth to Product (ft bto	c): NA
Length of Water Column in Well (ft): 12	<u>.4</u> 2 Exterior Seal	Good: Y: N:	Product Thickness (	
Diameter of Well Casing (in):	2" Pooled water in	Head: Y: N:	Purge Rate (liters/mi	<b>A</b>
Well Casing Volume (liters/ft): 0.6	Well Volume (liters	): 1,452	Volume Purged (liter	
Purge Method, Peristaltie/Submersible/Ba			Date Well Purged:	
	Water Sar			
Sample ID: (-W - 6121 - 018	Type: <u>ENV</u> Date:	12-7-21	<u> 1248</u> # Contain	ners: <u>3</u>
QC Sample ID:	Type:Date:	Time:		
Sampling Personnel: <u>S. Ke H-l er</u>	well			
Remarks (color, odor, etc.): (leav, N			······································	x
, , , , , , , , , , , , , , , , , , ,		-		
Purge Depth to Vol. Water Ten		Spec. Cond. Turbidity	DO Salinity	
Time (liters) (ft btoc) (°C	<u>3) pH (mv)</u> (± 0.2	(mS/cm) (NTU) (± 10%	(mg/L)) (% or opt (± 10%	) Notes
Stabilization Requirements (± 10	0%) <b>units)</b> (±10)	(± 10%) or <10)	or ± 0.1) (± 10%)	1
1210 0.2 3.43		tial Depth to Water (pre 0、「ろ0」 くち、多つ		1
1220 20 5.20 14.	3 6.64 5.5	0.691 5.08	4,14 0.36 3,87 0.34	
1225 3.0 5.63 14.	3 6.44 2.3	0,624 13,84	3.64 0.30	
	36.60 3.7	0,548 12.60	354 0.21	
1240 6.0 5.82 4.	3 6.36 6.5	0,512 12.00	3.51 0.26	
1245 7.0 5.85 14.		0,499 11.07	3,44 0,23	
1248 Gellect Samp	?\€	· · · · · · · · · · · · · · · · · · ·		
			-	
				· · · ·
	me Calculations for Well			
	) = [Casing/tubing volume (	**************************************		
Well casing diameter (in) $\rightarrow$ Well casing $(2^{"} \rightarrow 0.6)$ $4^{"} \rightarrow 2.5$	g volume (liters/ft) Disc $6" \rightarrow 5.5$	charge tubing diameter (in $1/4" \rightarrow 0.010$ 3/		volume (liters/ft) → 0.039
Recorded by: S. Kettlew Date:	127.21	Pageof		1: PRODSS 20FCO3
Reviewed by: H, Junn's Date:	127-21 12/7/21	• • • –	ection, Purging, and Field M	

-

		Š		Tech	nology,	<b>, Scienc</b> <b>Inc., PE</b> Seattle, WA	BC	P	Well Insj urging, a easurem	and Fie	eld
Contract Number:	044255-20	-D-6006	Task Order: <u>1</u>	164076	Naval Installatio	n: keyp	0/+	Si Nai	ite me: _ O U	1	
					Well I	Data					
	mw1-			_ \	Well Head Lo	ocked: Y: 🗹	N:	Depth to '	Water (ft btoo	s): 9,1	4
Total Well	Depth (ft bto	oc): 30.0	<u>د</u> In	ner Casing	Straight and	Clear: Y:	N:	Depth to Pr	oduct (ft bto	c):^	1.A
Length of V	Water Colum	n in Well (f	t): <u>10.9</u>	<u>8</u> е	xterior Seal	Good: Y:	N:	Product	Thickness (f	t):⁄	'A-
	f Well Casin					Head: Y:			te (liters/mir		
Well Casin	g Volune (li	ters/ft): <u>6</u>	6			): 12.53		-	Purged (liters		
Purge Meth	od Peristalt	il/Submersi	ble/Bailer	/Other:					ll Purged:		
	<u>_</u>			· · · · · · · · · · · · · · · · · · ·	Water San	nple Data	·····				
Sample ID:	Gm-	21-019	Тур	e: Env			I Time:	1108	# Contain	ers:	S
QC Sample	ID:	. مىتىشتىتىنى	Тур	e:	Date:	12/8/2	Time:	Carpy Surger Statements	# Contain	ers:	
	ersonnel:								,,,		
	olor, odor, et		r . no	0 dag				5			
	0101, 0001, 0			0							
		<b>BENEFICA</b>	-	and the state	- Martine and Andrews	a a serie de la competencia	No. 2 No. 2 No.	An		Antel State	的基础在这时常来的
	Purge Vol,	Depth to Water	Temp.		ORP	Spec. Cond.	Turbidity	DÖ	Salinity		
Time	(liters)	(ft btoc)	(°C) .		(mv)		(NTU)			No	ites
Stabil	ization Req	uirements	(± 10%)	(± 0.2 units)	(±10)	(± 10%)	(± 10% or <10)	(± 10% or ± 0.1)	(± 10%)		
103.3	·	9.14			Ini	tial Depth to	Water (pre	An A 19 IC I MALL MATCHING AND AND AND		ensecuenty off Security of the	
1033	Begin	prese	set	FIOW	10.2	tial Depth to 、 こ。ス 名	21 20	0.97	1.10	<u></u>	<u> </u>
1043	2.0	9.22	13.4	8.00	112.5	0,269	26.90	0.71 9.75	0.13		· · · · · · · · · · · · · · · · · · ·
1048	3.0	9.22	1219	7.91	113.9	0.269	25.62	0,65-	0,13		
1053	<u>4.0</u> 5.0	9.22	13,2	7.76	124.5	0,263	20.40	0.54	0,13		·
1103	6.0	9,22	12.9	7.75	126.6	0258	21.43	01.49	0,13		
1108	7.0-	LACAT			ample		,		077 -		
A THE ADD IN THE ADDRESS OF THE ADDR	Non Kramerowa					·					· · ·
		TRANSPORTATION AND AND AND AND AND AND AND AND AND AN									<u> </u>
•			and the second second	Contraction of the second second second	SWANDURANU I KATA			<b></b>			<u> </u>
						<sup>873</sup> 385895(1284)70519244033787833787	( Yang-Sah) Taja ya 1 May 2014 ya 1990	R BANN I HE MAN AND ANY MARKAN IN MARKANA	None of the second		
	and the second		in sin soo alay					NAME AND ADDRESS	<u> </u>		
						Casings or D liters/ft)] x [L		the story of the start of the story of	(ft)]		
Well casir	ng diameter (					charge tubing				olume (li	ters/ft)
	$2^{\circ} \rightarrow 0.6$	<b>4"</b> → 2.5	-			$\frac{1}{4"} \rightarrow 0$		$3^{"} \rightarrow 0.022$		→ 0.039	
Recorded by:_ Reviewed by:	B · Hc H · Der	nn G	Date: <u>12</u> Date: <u>12</u>	18/21		Pageo Filen	f name: Well Insp	ection, Purgin	Meter Model g, and Field Me	: <u>YSI p</u> H <u>4</u> 44 asurement I	ra DSS 500 Form.doex

EA®	Techn	eering, Scienc ology, Inc., PH s, Suite 707 Seattle, WA	BC 1	Well Ins Purging, a Measurem	and Field
Contract Number: <u>N44755-76-0-6000</u>	Task Order <u>: UCU5H</u> 5	Naval Installation: Key	parke	Site Name: OV	1
		Well Data		<u>, i i i i i i i i i i i i i i i i i i i</u>	· · · · · · · · · · · · · · · · · · ·
Well ID: <u>MW - 24</u>	We	ell Head Locked: Y: 💆	N: I	Depth to Water (ft bto	c): 4.841
Total Well Depth (ft btoc): <u>\$9</u> , 3	Inner Casing St	raight and Clear: Y: ⊻		epth to Product (ft bto	
Length of Water Column in Well (f		erior Seal Good: Y:	N:	Product Thickness (1	ft): <u>NA</u>
Diameter of Well Casing (in): $\frac{2^{\prime}}{2}$		d water in Head: Y:		Purge Rate (liters/min	n): <u>0,2</u>
Well Casing Volume (liters/ft):		ume (liters): <u>14.676</u>		Volume Purged (liter	s): <u>(, ()</u>
Purge Method: Peristaltic/Submersi	ble/Bailer/Other:	tice, water in	well	Date Well Purged: 1	2.8.2
Sample ID: <u>G1M - 21 - () 2.0</u> QC Sample ID: <u>G1M - 21 - () 2.1</u> Sampling Personnel: <u>S. Ker</u>	Type: ENV Type: DV P	Water Sample Data Date: <u>12-8-21</u> Date: <u>12-8-</u> 2	Time: Time:	<u> 23</u> # Contain  26 # Contain	ers: <u>3</u> ers: <u>3</u>
Remarks (color, odor, etc.): (()	dy, Olight F	setrolevm c	dor		· · · · · · · · · · · · · · · · · · ·
Purge Depth to Vol. Water. Time (liters) (ft btoc)	Temp. (°C) pH (± 0.2	ORP Spec. (mv) (mS/cm)		DO Salinity (mg/L) (% or prt (± 10%	Notes
Stabilization Requirements	<u>(±10%)</u> units)	<u>(±10)</u> (±10%)	or <10)	or $\pm 0.1$ ) ( $\pm 10\%$ )	
050 0.2 4.84 055 1.0 4.90	14.5 7.14 -	Initial Depth to 44・4   0,マネテ		umping) 3,34 0,11	
100 2.0 4.90	14.6 7.05 -	66.4 0.222	232.82 3	3,25 0.11	· · · · · · · · · · · · · · · · · · ·
105 3.0 4.90 110 4.0 4.90	4.6 1.02 -	16.2 0.222 38.4 0.222	150.87 3	23 0.11	· · · · · · · · · · · · · · · · · · ·
115 5.0 4.90	14.5 1.00 -0	16.5 0.222	10.54 3	3.19 0.11	· · · · · · · · · · · · · · · · · · ·
1120 6.0 4.90 1123 Callert Sam	<u>14.6 N.CO - 1</u>	95.4 0,222	106:70 3	5.18 0.11	
	3,		· · ·		
		- CM			
		31			·
Volume (				<ul> <li>Control and the second s Second second s Second second se</li></ul>	
Well casing diameter (in) → Well		t) Discharge tubing		column (ft)] → Discharge tubing v	olume (liters/ft)
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$	$6" \rightarrow 5.5$	$1/4" \rightarrow 0$			$\rightarrow 0.039$
	Date: )2-8-21	Pageo	f	Meter Model	ADDS 20F031
Reviewed by: 17 Denny	Date: 12/8/2	Filen	ame: Well Inspect	ion, Purging, and Field Me	easurement Form.docx
			· .		

à

2.5

• • • •

EA®	EA Engineering Technology, 2200 6 <sup>th</sup> Ave, Suite 70	Inc., PBC	Well Ins Purging, a Measurem	and Field
Contract Number: <u>N44255-20-D-Cove</u>	Task Order: 21 F 4076 Naval Installation	n: Keyport	Site Name: <u>OU</u>	
Well ID: $MW   -2.5$ Total Well Depth (ft btoc): $5 _{,2}$ Length of Water Column in Well (ft Diameter of Well Casing (in): $2$ Well Casing Volume (liters/ft): $0$ Purge Method: $eristaltic/Submersi$	H       Inner Casing Straight and         t): 43.97       Exterior Seal          Pooled water in          Well Volume (liter)	ocked: Y: <u>N</u> : <u>N</u>	Depth to Water (ft bto Depth to Product (ft bto - Product Thickness (f Purge Rate (liters/min Volume Purged (liters Date Well Purged:	c): <u>JP</u> it): <u>O, 2</u> n): <u>O, 2</u> s): <u>7, 4</u>
Sample ID: <u>GM-21-022</u> QC Sample ID: <u></u> Sampling Personnel: <u>H. Haje</u> Remarks (color, odor, etc.): <u>Cle</u> <u>3eFF boffom</u>	Type:Date: Type:Date: K		1347 # Contain # Contain	ers: <u>3</u> ers:
Stabilization Requirements	in financial de la companya de la co	Spec. Cond.Turbidity (mS/cm)(mS/cm)(NTU)(± 10%)(± 10%) or <10)	(mg/L) (% or ppt) (± 10% or ± 0.1) (± 10%)	1
$\begin{array}{r rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0,995 0,995 0,995 0,994 0,994 7,65 0,994 0,994 0,67 0,994 0,67 0,994 0,28 0,994 0,34 0,994 0,23	1,12 0,49 0,83 0,49 0,73 0,49 0,64 0,49 0,60 0,49 0,60 0,49 0,56 0,49 0,51 0,49 0,49 0,49	
STABLEZEV		21212021		
Volume (Well casing diameter (in) $\rightarrow$ Well $2" \rightarrow 0.6$ $4" \rightarrow 2.5$	liters) = [Casing/tubing volume casing volume (liters/ft) Dis	(liters/ft)] x [Length of wat charge tubing diameter (in	ter column (ft)] ) → Discharge tubing v	
, .	Date: 12/8/2021 Date: 12/9/2021	Pageof Filename: Well Insp	Meter Model ection, Purging, and Field Me	: <u>VSI PRO</u> D assurement Form.doc

EA	Technolo	ring, Science, and Ogy, Inc., PBC ite 707 Seattle, WA 98121	Well Inspection Purging, and Fid Measurement Fo
Contract Number: <u>NU4255-75-D-(000</u> 6	Task I Order: <u>2.164076</u> Inst	Naval allation: Keypert	Site Name: OU
Well ID: $MWI \cdot 21 \cdot 023$ Total Well Depth (ft btoc): $29.88$ Length of Water Column in Well (ft Diameter of Well Casing (in): $2^{tt}$ Well Casing Volume (liters/ft): $0$ , Purge Method: Peristaltic/Submersit Sample ID: $21 - 023$ QC Sample ID: $5 \cdot 6$ Sampling Personnel: $5 \cdot 6$ Remarks (color, odor, etc.): $166$	Well H S Inner Casing Straig (1): <b>25.28</b> Exterio Pooled wa Well Volume ble/Bailer/Other: Low File <u>Wat</u> Type: <u>NS/MSD</u> Type: Well B. Houses	er Sample Data Date: <u>12 - 7 - 21</u> Tit Date:Tit	Depth to Product (ft btoc): <u>N</u> Product Thickness (ft): <u>N</u> Purge Rate (liters/min): <u>O</u> .c Volume Purged (liters): <u>9</u> .0 Illow Date Well Purged: <u>12-7-21</u>
Purge Depth to Vol. Water Time (liters) (ft btoc) Stabilization Requirements	(± 0.2	Spec.         Turbid           P         Cond.         Turbid           (mS/cm)         .(NTU           10)         (± 10%)         or <10	) (mg/L) (% or ppt) No 6 (± 10%
1500 0.2 4.60	156 6.30 31. 15,5 6.45 5. 15,6 6.61 -22. 153 6.70 - 44 152 6.74 - 51 152 6.74 - 61	Initial Depth to Water ( $6$ 6 0.162 ( $8.840$ 0.156 38,30 4 0.158 36.44 .3 0.162 47.36 .4 0.164 39.98 6 0.164 39.98 6 0.164 39.98	bre-pumping)         3,44       0.08         3.29       0.07         1       3.23       0.07         2       3.23       0.07         3.23       0.07       0.08         3.24       0.08       0.08         3.24       0.08       0.08         3.23       0.08       0.08
1540 80 520 1 1545 90 5.20	15.2 6.75 -78. 15.2 6.78 -80, 15.2 6.76 -81.0 01/ection		3.310.08 3.210.08 3.200.08
Volume (i	Volume Galculations for iters) = [Casing/tubing volutions] casing volume (liters/ft)	Well Casings or Discharge ume (liters/ft)] x [Length of v	Tubing vater column (ft)] (in) → Discharge tubing volume (lite

EA®	Technol	ring, Science ogy, Inc., PB nite 707 Seattle, WA 9	C ·	Well Insp Purging, a Measureme	nd Field
Contract Number: <u>NYY 255 - 20 - D - 10</u> 00	Task Order: <u>246404</u> 6 Ins	Naval tallation: <u>KeyP</u> c	»/ <del>1</del>	Site _ Name: のし	1
		Well Data			
Well ID: <u>MW 1-29</u>		 Head Locked: Y: 🗹	N: De	pth to Water (ft btoc	): 8.86
تر [1] Total Well Depth (ft btoc):	Inner Casing Straig	ght and Clear: Y:	N: Dep	th to Product (ft btoc	
Length of Water Column in Well (f		or Seal Good: Y:	·	Product Thickness (ft	
Diameter of Well Casing (in):		vater in Head: Y:	/	urge Rate (liters/min)	
Well Casing Volume (liters/ft): <u>}</u>	(VY)			olume Purged (liters)	
Purge Method: Peristaltic/Submersi				ate Well Purged:	
	Wa	ter Sample Data			
Sample ID: <u>Gm-21-02</u>			Time:	$35^{-1}$ # Containe	ers. 3
QC Sample ID:					
Sampling Personnel:					
Remarks (color, odor, etc.):		· · ·			
Purge Vol.Depth to WaterTime(liters)(ft btoc)	- 这是法国的管理部队、小规模、人口选进了本法法律的关闭的问题。 1217年14月	· 如此在1965、12736(1965-12476),而1965年,第二次的第三人称单数	MARA SALE PRODUCES A CONTRACT	DO Salinity ng/L) (% or opt)	Notes
	(± 0.2		(±10% (±	:10%	
Stabilization Requirements		= <u>10)   (± 10%)  </u> Initial Depth to \		$ \pm 0.1 $ (± 10%)	e an
13/1 Begin purge:		2 4/min	water (pre-pu	mping)	NA
1316 1.0 8.88	11.8 7.36 15	77 1.341		43 0.67	;
1321 2.0 2.88 1321. 2.0 8188		3.5 1.362	• /	188 0.69	
1331 4.0 8.88		7.6 1.376		157 6,70	
1336 5.0 8.83	11.7 7.18 U	9.3 1,393	12.56 0	0152 0.70	
1341 6.0 8.90 1346 7.0 8.90		2.0 1.404		1.48 0.71	
1351 Lollect Suma		2.7 1.403	12.07 0	147 0,71	
				BH	
	Volume Calculations for				n an
- Witcheld	(liters) = [Casing/tubing vo				
Well casing diameter (in) $\rightarrow$ Well $2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$		Discharge tubing d $1/4" \rightarrow 0.0$		Discharge tubing vo $\rightarrow 0.022$ 1/2" -	olume (liters/ft) → 0.039
Recorded by: B. Haines	Date: 12/8/21 Date: 12/9/21	Pageof	1		<u>75( pro D55</u> <u>14 y u 500</u> asurement Form.docx
Reviewed by: 11 . DRINNS	Date: 12/9/11	Filena	me: Well Inspection	n, Purging, and Field Mea	14 y U 500 asurement Form.docx

	EA Engineering, Science, and Technology, Inc., PBC 2200 6th Ave, Suite 707 Seattle, WA 98121	Well Inspection Purging, and Fie Measurement Fo
Contract Number: <u>pW125-70-0-6006</u>	Task Order: <u>UFUOL</u> Installation: Keypert	Site Name: OW I
Well ID: <u>MWI - 29</u> Total Well Depth (ft btoc): <u>39. [a</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>2"</u> Well Casing Volume (liters/ft): <u>0.1</u> Purge Method: Peristaltic/Submersit Sample ID: <u>GM - 21 - (12)</u> QC Sample ID: <u>S. Ke H</u>	1.100       Inner Casing Straight and Clear; Y:N:       Definition         1.100       Exterior Seal Good: Y:N:       N:         1.100       Pooled water in Head: Y:N:       N:         1.100       Well Volume (liters):       N:	# Containers:
Purge Vol.         Depth to Water           Time         Vol.         Water           (liters)         (ft btoc)           Stabilization Requirements         (ft btoc)           328         0.2         8.45           332         1.0         8.745           333         2.0         8.60           343         3.0         8.90           343         3.0         8.90           353         5.0         8.90           358         6.0         8.90           403         7.0         8.90           403         7.0         8.90           403         7.0         8.90           403         7.0         8.90           403         7.0         8.90	Temp.         ORP         Cond.         Turbidify           (°C)         pH         (mv)         (mS/cm).         (NTU)         (           (± 0.2         (± 10%)         (± 10%)         (or <10)	DO     Salinity       mg/L.)     (% or ppt)     No $\pm 10\%$ ( $\pm 10\%$ )     No $pr \pm 0.1$ ( $\pm 10\%$ )     No       unping)     ( $\pm 10\%$ )     ( $\pm 10\%$ ) $5.52$ 1.10 $5.52$ 1.10 $5.52$ 1.10 $5.52$ 1.10
Volume (li       Well casing diameter (in) $\rightarrow$ Well casi		column (ft)] → Discharge tubing volume (lite
ecorded by: S. Kettlevell D	Date: $12-8.2$ Page of $12-8.2$	$\rightarrow 0.022 \qquad 1/2" \rightarrow 0.039$ Meter Model <b>PRUPS</b> 20

	© I	Tech	nology,	<b>5, Scienc</b> Inc., PI 7 Seattle, WA	BC	P		pection, and Field lent Forn
Contract Number: <u>10 44255 - 20 - 70 - 7</u>	Task Order:	N44255246407	→ Naval Installatio	n: Keypos	F	S Na	ite me: OU	1
Well ID: <u>MWI-3</u> Total Well Depth (ft btoc): <u>2</u> Length of Water Column in V Diameter of Well Casing (in) Well Casing Volume (liters/f Purge Method Peristaltic/Sul	Well (ft): <u>\8.5</u> ;: <u>2''</u> t): <u>0</u> ,6	Inner Casing S 2 E Poo Well Ve	Straight and xterior Seal led water in olume (liters	ocked: Y: Clear: Y: Good: Y: Head: Y: ;):	N: N: N:	Depth to Pr Product Purge Ra Volume	roduct (ft bto Thickness (f ate (liters/min Purged (liter	ft): <u>NA</u> n): <u>6. Z</u>
$\alpha \rightarrow m (\alpha M \rightarrow \gamma \gamma \gamma)$	l	E.	Water Sar	nple Data		hicla		
Sample ID: <u>GM - L1 - OL</u> QC Sample ID: Sampling Personnel: <del>L</del> Av	inan De				Time:		# Contain # Contain	ners:
Remarks (color, odor, etc.):	signtly_	clandy.	no od	or	111 <sup>1</sup> - 11-			
Remarks (color, odor, etc.): _	signtly	clandy,	no od	or	<u></u>			
Purge     Dej       Vol.     W       Time     (liters)     (ft	ith to ater Temp btoc) (°C)	: pH (± 0.2	ORP (mv)	Spec. Cond. (mS/cm)	(±10%	(mg/L) (± 10%		Notes
Purge     Dep       Vol.     W       Time     (liters)       Stabilization Requirent       MOS     0.0	ith to ater Temp btoc) (°C)	; pH (± 0.2 b) units)	ORP (mv) (± 10)	Spec. Cond. (mS/cm)	(NTU) (± 10% or <10)	(mg/L) (± 10% or ± 0.1)	(% or ppt) (± 10%)	
Purge Vol.         Dej Vol.           Time         (liters)         (ft)           Stabilization Requirer           MOS         0.0         4.4           1417         2 nmp         0n           1422         1.0         5.1           1426         1.8         5.4           1430         2.6         5.1           1430         2.6         5.1           1430         2.6         5.1           1434         3.2         5.           M38         3.8         5.           1442         4.41         5.1           1430         5.0         5.1           1430         5.6         5.1           1430         5.0         5.1           1430         5.0         5.1           1430         5.0         5.1           1442         4.41         5.0           14450         5.6         5.1	ith to         ater       Temp         btoc)       (?C)         ments $(\pm 10\%)$ S6          S6          N       15.3         N       15.4         N       15.5         N       15.5         N       15.5         N       15.7         N       15.7         N       15.5         N       15.5         N       15.5         N       15.5         N       15.5         N       15.5         N       15.5	$ \begin{array}{c c}                                    $	ORP (mv) (± 10)	Spec, Cond. (mS/cm) (± 10%)	(NTU) (± 10% or <10)	(mg/L) (± 10% or ± 0.1) -pumping)	(% or ppt) (± 10%)	
Purge Vol.         Dej Vol.           Time         (liters)         (ft)           Stabilization Requirer           MOS         0.0         4.4           1417         2 nmp         0n           1422         1.0         5.1           1426         1.8         5.4           1430         2.6         5.1           1430         2.6         5.1           1430         2.6         5.1           1434         3.2         5.           M38         3.8         5.           1442         4.41         5.1           1430         5.0         5.1           1430         5.6         5.1           1430         5.0         5.1           1430         5.0         5.1           1430         5.0         5.1           1442         4.41         5.0           14450         5.6         5.1	ith to       ater     Temp       btoc) $(?C)$ ments $(\pm 10\%)$ SG $(15.3)$ N $15.4$ N $15.4$ N $15.4$ N $15.5$ IN $15.5$ IN $15.5$ IN $15.5$ IN $15.5$ IN $15.5$ IN $15.7$	$ \begin{array}{c c}                                    $	ORP (mv) (± 10) Ini IIU . 7 IOI. 7 IOI. 7 IOI. 7 IOI. 3 IOI. 3 IIU. 9 IIU. 9 IIU. 9 IIU. 9 IIU. 9 IIU. 9 IIU. 9 III IIU. 9 III IIU. 7 III IIU. 7 III III IIU. 7 III IIU. 7 IIU. 7 III	Spec. (Cond. (mS/cm) $(\pm 10\%)$ tial Depth to 0.2.18 0.225 0.225 0.225 0.225 0.126 0.228 0.227	(NTU) (± 10% or <10) Water (pre 35.83 27.18 24.24 22.60 21.67 16.90 17.16	2(mg/L) (± 10% or ± 0.1) -pumping) 0.76 0.76 0.51 0.43 0.43 0.43 0.43 0.43 0.52 0.32 0.32	(% on ppt) (± 10%) (± 10%) (0, 10 (0, 10 (0, 11 (0, 11 (0, 11) (0, 11)	

		EA Engineering, Sc Technology, Inc 2200 6 <sup>th</sup> Ave, Suite 707 Seatt	<b>., PBC</b> le, WA 98121	Well Inspection, Purging, and Field Measurement Form
	Contract Number: <u>NMM255 - 70- 0-</u> 604	Task Order: DIF4076 Installation: K	ypart	Site Name: <u>All</u>
•	Well ID: <u>MW 1-38</u> Total Well Depth (ft btoc): <u>50, 7</u>	· · · · ·		epth to Water (ft btoc): 230 '
	Length of Water Column in Well (ft) Diameter of Well Casing (in): $2^{\prime\prime}$	Pooled water in Head:	Y:N:P	product Thickness (ft): <u>NVA</u>
	Well Casing Volume (liters/ft): 0 , ( Purge Method: Peristaltic/Submersib			olume Purged (liters): 9.6 ate Well Purged: 12-8-7
	Sample ID: <u>GM 21-627</u> QC Sample ID: Sampling Personnel: Ket	Water Sample D	<u>ata</u> - <u>7</u>	08_# Containers: # Containers:
	Remarks (color, odor, etc.): <u>CAU</u>	, sewage smell		
-	THE REPORT OF A DECISION OF A DECISIONO OF A DECISIO	<u>.(°C) pH (mv) (mS</u>	nd. Turbidity /cm) (NTU) (n	DO Salinity 1g/1) (% or ppt) Notes
	(1931) 20 2.76 (1935 3.0 2.75 1	Initial De 3.5 7.50 104.2 0.7 3.6 7.62 40.2 0.7 3.6 9.65 -26.2 0.1	0%) or <10) or pth to Water (pre-pin 怒 えんのつろ、 39 33.62 3,	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{3.3}{3.4} + \frac{1.67}{1.69} - \frac{961}{991} = 0.71$ $\frac{3.4}{3.4} + \frac{1.69}{1.69} = 100.4$ $\frac{0.1}{3.4} + \frac{1.69}{1.69} = 104.2$ $\frac{0.1}{9} = 100.4$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	33 0.38
	1005 9,0 3,01 1 (108 Sample	3.4 17.106, -106, 5 0; 716 Collected	<u>( 14. 81 3.3</u>	<u>64</u> <u>6</u> , 37
		olume Calculations for Well Casing ers) = [Casing/tubing volume (liters/ft	] x [Length of water co	lumn (ft)]
	$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$		ubing diameter (in) $\rightarrow$ " $\rightarrow 0.010$ 3/8" $-$	Discharge tubing volume (liters/ft) $0.022   1/2" \rightarrow 0.039$
		ate: <u>17-8-21</u> Page_ ate: <u>12/9/21</u>	of Filename: Well Inspection	Meter Model: <u>PLU 1&gt;55 DHC</u> V3{2 , Purging, and Field Measurement Form.docx

.

EA		<b>neering,</b> <b>nology, I</b> .ve, Suite 707 S	[nc., PB	SC	P	Well Insj urging, a easurem	and Fi
Contract Number: <u>NYH 2557 20- D- 6006</u>	Task Order: 21 F40H	Naval Installation:	Keyp	io.rt	Si Na:	ite me:	-1
		Well Da	ita				
Well ID: ~~~1- 39		Well Head Loc		N:	Depth to V	Water (ft btoo	c);_~~.(
Total Well Depth (ft btoc):_ ろう	·71 Inner Casing	Straight and C	lear: Y: 🔽	N:	Depth to Pr	oduct (ft bto	c)://
Length of Water Column in Well						Thickness (f	
Diameter of Well Casing (in):	<b>.</b> .	oled water in H		/		nte (liters/mir	
Well Casing Volume (liters/ft):		olume (liters):	_			Purged (liters	
Purge Method: Peristaltic/Submer	/					Il Purged:	/
		Water Same	ala Data		a		
Sample ID: $(2m-21-0)^{-2}$	20 Type: Fall	Water Sam	<u>ne Data</u> 17 18/7	) Times	1000	# Courte in	-
QC Sample ID:	Type	Date		<u> </u>	1000	# Contain	ers:
QC sample ID.	1 ype:	Date:		11me:		# Contain	ers:
Sampling Personnel: <u>B·H</u> G							
Remarks (color, odor, etc.): <u> </u>	Lecs no od	<u>cr</u>	· · · · ·	•			
Purge Depth (			c		the straight state	ALC: NOT	5.10 Mar 10
	· Temp.	ORP	Spec. Cond.	Turbidity	DO	Salinity	ang sa
Time (liters) (ft btoc	) (°C) pH		(mS/cm)	THE ADDRESS AND STOCKED ADDRESS AND ADDRESS ADDRESS	-39-103-50 Report Management of the	(% or (pt)	1. C.
Stabilization Requiremen	$ts (\pm 10\%) = (\pm 0.2) (\pm 0.2) (\pm 10\%)$	(± 10)	(± 10%)	(± 10% or <10)	$(\pm 10\%)$	(± 10%)	
0900 - 2.49					-pumping)	<u>  (±1078)</u>	interio y dorrio Statistica
0A15 BCgin purge		+0 01	2 1/-				NH
0920 10 2.49 0925 200 2.49	12.7 9.20	181.2	0.397	12.34	1.311	0:19	
0925 2.0 2.49	13.0 8.34	151.8	0:376	12.27	0.95	0.18	
	13.24 8.41	37,1	0,370	13.83	0.66	0118	
0935 410 249	13.5 3,39	31.1	2 10	0	the trans		
0940 50 2.49			0,369	12.87.	0.57	0,18	
0940 5.0 2.49 0945 60 2.49	13.4 87.38	78.9	01369	12,30	OISU	0,18	
0940 5.0 2.49 0945 6.0 2.49 0950 7.0 2.49	13.4 81.38	71,5	0,369	12,30	0,54	0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 80 2.49	13.4 87.38 13.3 87.34 13.3 87.34	71,5	01369	12,30	OISU	0,18	
0940 5.0 2.49 0945 6.0 2.49 0950 7.0 2.49	13.4 87.38 13.3 87.34 13.3 87.34	71,5	0,369	12,30	0,54	0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 80 2.49	13.4 87.38 13.3 87.34 13.3 87.34	71,5	0,369	12,30	0,54	0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 80 2.49	13.4 87.38 13.3 87.34 13.3 87.34	71,5	0,369	12,30	0,54	0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 80 2.49	13.4 8,38 13,3 8,34 13,3 8,34 13,3 8,30 P(C	<u>783,9</u> 71,5 75,8	01369	12,30	0,54 0,50 0,48	0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 820 249 1000 Collect Gam	13.4 87.38 13.3 87.34 13.3 87.34 13.3 87.36 012 Volume Calculatio	88,9 71,5 75,3	ی، 369 0، 372 ۵، 372 ۵، 372	12,30 12,11 12:22	<u>ం, 54</u> ల.50 లి, 48	0.18 0.18 0.18 0.18 0.18	
0940 5.0 2.49 0945 b.0 2.49 0950 7.0 2.49 0955 8.0 2.49 1000 Collect Gam	$\frac{13.4}{13.3} \frac{$7.3$}{$7.34}$ $\frac{13.3}{13.3} \frac{$7.34}{$7.34}$ $\frac{13.3}{$7.3}$ $\frac{$7.3}{$7.34}$	73,9         71,5         75,8         ns for Well Cing volume (lite)	ی 369 0،373 0،373 0،373 0,373 0,1373 0,	12,30 12,11 12,22 Ischarge Tu ength of wat	کر 54 ع، 53 ک، 48 bing	0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18	
0940 5.0 2.49 0945 60 2.49 0950 7.0 2.49 0955 820 249 1000 Collect Gam	$\frac{13 \cdot 4}{13 \cdot 3} = \frac{97 \cdot 32}{13 \cdot 3}$ $\frac{13 \cdot 3}{37 \cdot 34}$ $\frac{13 \cdot 3}{13 \cdot 3} = \frac{97 \cdot 32}{13 \cdot 32}$ $\frac{97 \cdot 6}{12}$ $97$	73,9         71,5         75,8         ns for Well Cing volume (lite)	asings or D ers/ft)] x [Large tubing	12,30 12,11 12,22 Ischarge Tu ength of wat	$\frac{\bigcirc_{i} S4}{\bigcirc_{i} 48}$ $\frac{\bigcirc_{i} S4}{\bigcirc_{i} 48}$ bing er column () ) $\rightarrow$ Discha	<u>○.1</u> ○.1	olume (li → 0.039

	Technol	ering, Science, and logy, Inc., PBC uite 707 Seattle, WA 98121	Well Inspection, Purging, and Field Measurement Form							
Contract Number: <u>//44-255-20-1)-64</u>	Task o <u>é</u> Order: <u>ToziF40</u> 76 Ins	Naval stallation: <u>ICeypert</u>	Site Name: OU							
Well ID: <u>MW1 - 41</u> Total Well Depth (ft btoc): <u></u> Length of Water Column in W Diâmeter of Well Casing (in): Well Casing Volume (liters/ft Purge Method: <u>Peristaltic</u> /Sub	17.65         Inner Casing Strain           Vell (ft):         10.73         Exterior           2         Pooled v	Well Data         Head Locked: Y: $\checkmark$ N:         ght and Clear: Y: $\checkmark$ N:         or Seal Good: Y: $\checkmark$ N:         water in Head: Y:         N:         e (liters):	Depth to Water (ft btoc): 7.42 Depth to Product (ft btoc): Product Thickness (ft): Purge Rate (liters/min): 0.2 Volume Purged (liters): 4.2 Date Well Purged: 12/8/21							
QC Sample ID: Sampling Personnel://,	Water Sample Data         Sample ID:       GM-21-029       Type:       ENV       Date:       12/8/21       Time:       1210       # Containers:       3         QC Sample ID:									
Vol.     Wi       Time     (liters)     (ft liters)       Stabilization Requirem	otoc)         (?C)         pH         (           nents         (± 10%)         units)         (±	±10) (±10%) or <10	$\begin{array}{c cccc} (mg/L) & (\% \ opppt) & Notes \\ \hline b & (\pm 10\% \\ o \ or \pm 0.1) & (\pm 10\%) \\ \end{array}$							
	purge @ 2000 51 12.2 6.35 -30 51 12.3 6.37 -3 51 12.3 6.37 -3 50 12.3 6.40 -3 50 12.3 6.40 -3 50 12.3 6.40 -3	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	O.33         O.46           O.70         O.46           O.14         O.46           O.14         O.45							
	Volume Calculations for ume (liters) = [Casing/tubing vc Well casing volume (liters/ft)									

- -

	Techr	EA Engineering, Science, and Technology, Inc., PBC 2200 6 <sup>th</sup> Ave, Suite 707 Seattle, WA 98121				Well Inspection, Purging, and Field Measurement Form				
Contract Number <u>144 255-20-D-6006</u>	Task Order: <u>21F4076</u>	Naval Installation: Keyp	ort	Si Nar	te ne: <u>OU</u>	<u> </u>				
Well Data										
Well ID: MWI-42		ell Head Locked: Y: 🗹	N:	Depth to V	Water (ft btoc	): <u>3.3</u>	56			
Total Well Depth (ft btoc): <u>2</u>		traight and Clear: Y: 🗹	N:D	epth to Pro	oduct (ft btoc	): <u>NF</u>	)			
Length of Water Column in We	II (ft): <u>20,92</u> Ex	terior Seal Good: Y:	N:	Product '	Thickness (ft	t):				
Diameter of Well Casing (in): 2 Pooled water in Head: Y: N: Purge Rate (liters/min): 0.2										
Well Casing Volume (liters/ft):	O.6 Well Vo	lume (liters): 12,55	2		Purged (liters	<u> </u>				
Purge Method: Peristaltic/Subn		· · · · · · · · · · · · · · · · · · ·			1 Purged: 12	1 1				
		Water Sample Data				1-1-				
Sample ID: <u>GM-2</u> ]-030	Type FNU	Date: 12/7/20	YZI Time	$\infty$ 7	# Contain	7	)			
QC Sample ID:		•								
Sampling Personnel: <u>H</u> , F		Date:	Time:		# Containe	ers:				
							,			
Remarks (color, odor, etc.):(	clear, coloriess,	odoriess								
Bailed, water 2/3 m	casing, Boltsex	trenely rusty (he	ind to open	<u>. on, C</u>	seal					
Purge Dept	erene tandahan serier den sameran a	Spec.				(1.10) (s.10)				
Vol. Wat	r Temp.	ORP Cond.	Turbidity	DO	Salinity		al de la casa da Antonio de la casa da Antonio de la casa d			
Time   (liters)   (ft bt	E) (C) pH	(mv) (mS/cm)		(mg/L)	(% or ppt)	No	ites			
Stabilization Requireme	nts (± 10%) (± 0.2 units)	(± 10) (± 10%)		(± 10% or ± 0.1)	(± 10%)		-			
0904 3.30		Initial Depth to	Water (pre-p	oumping)						
0917 Begin Pur 0922 1.0 3.86	je Set-Purge R 14,5 7,25 1	ate				- 17				
0926 1,8 3,89	14.8 7.33	40.0 0.506 64.0 0.421		0,71	0.25	Y	)			
0930 2.6 3,90		33,0 0,466			0,23					
0934 3.4 3.91		8,0 0,454		0,62	0,22					
0938 4.2 3.91		-19,9 0,424		0,58	0,20					
0946 5.8 3.91		44,7 0,405			0,20					
0950 6.6 3.91		69.0 0,381			0,19	<u> </u>				
0954 7.4 3.91	14,9 7.39 -	75,5 0,383	4,22 (		0,12					
0958 8.2 3.91 01002 9.0 3.91		79.6 0,382			0,18					
5-10-1,91	15.0 7.40 -	84,5 0,376	3,95 (	0,46	0,18					
STABLE 2						$ \rightarrow $				
	Volume Calculations	for Well Casings or D	ischarge Tubi	ng						
Volu	ne (liters) = [Casing/tubing	g volume (liters/ft)] x [L	ength of water	column (f	(t)]					
Well casing diameter (in) $\rightarrow$ V $2" \rightarrow 0.6$ $4" \rightarrow$	- ,		diameter (in) -	→ Dischar			ers/ft)			
$\underbrace{2" \to 0.6}_{4" \to 0.6} 4" \to$	$2.5 \qquad 6" \rightarrow 5.5$	$1/4$ " $\rightarrow 0$ .	.010 3/8"	$\rightarrow 0.022$	1/2"→	• 0.039				
Recorded by: H. Hajek	Date: 12/7/2021	Pageo	f	· I	Meter Model:	YSIT	RODS			
Reviewed by: H. Denns	Date: 12/7/207									
Reviewed by: <u>Filename: Well Inspection, Purging, and Field Measurement Form.docx</u>										

EA®	EA Engineerin Technology 2200 6 <sup>th</sup> Ave, Suite	y, Inc., PE	BC	P	Well Insj urging, a easurem	nd Fi	eld
Contract Number: <u>N44-255-20-0-6006</u>	Task Nav. Order: Toz <i>iF4076</i> Installa	al tion: IZexpe	sof	S: Na:	ite me:O	シ1	
Well ID: $MW1 - 43$ Total Well Depth (ft btoc): 25. Length of Water Column in Well (ft) Diameter of Well Casing (in): 2 Well Casing Volume (liters/ft): 0. Purge Method: Peristaltig/Submersib	Well Head         39         Inner Casing Straight a         1: 21.79         Exterior Se         Pooled water         Well Volume (litted)	al Good: Y: <u>/</u> in Head: Y:	N: N: N:	Depth to Pr Product Purge Ra Volume	Water (ft btoo oduct (ft btoo Thickness (f tte (liters/min Purged (liters	c): t): n): s):	- 15 - - -
Sample ID: $GM-ZI-O3I$ QC Sample ID: $IC$ . $HO$ Sampling Personnel: $IC$ . $HO$ Remarks (color, odor, etc.): $CO$	<u>Water S</u> Type:Dat Type:Dat	e:	/Time: Time:	1531	ll Purged: <u>/*</u> # Containe # Containe	ers:_'3	
	Temp.         ORP           (°C)         pH         (mv)           (± 0.2         (± 10%)         (± 10)		Turbidity (NTU) (± 10% or <10)	(mg/L) (± 10%	Salinity (% or opt) (± 10%)	N	otes
1457 - 3.60 1459 Begin purp 1507 1.2 3.90 1511 1.8 3.88 1515 2.4 3.88 1519 3.0 3.90		Initial Depth to - 1.979 - 1.979 - 1.989 - 1.9972 - 1.9972 - 1.9972		0.68 0.68 0.54 0.51 0.49 0.47	1.02 1.02 1.02 1.02 1.02 1.02		4
1527 4.2 3.90 1 Stabilized	12.7 7.65 -116.2		7.34	0.45	<u> </u>		
Volume (li Well casing diameter (in) → Well c	Volume Calculations for We iters) = [Casing/tubing volum casing volume (liters/ft) $D$ $.6'' \rightarrow 5.5$		ength of wat diameter (in	er column (	[ft)] .rge tubing vo	olume (li	- iters/ft
Recorded by: K, Hopper I Reviewed by: H. Drums I		Page_/_o	f_/		Meter Model		

ì		<b>EA Engineering, Science, and</b> <b>Technology, Inc., PBC</b> 2200 6 <sup>th</sup> Ave, Suite 707 Seattle, WA 98121						P	Well Inspection, Purging, and Field Measurement Form			
	Contract Number:	N44255	-70-10-60	Task Ø Order:_2	215407	Naval Installatic	m: <u>K</u> ą	pag	* S Na	ite me:	101	_
	MINII - 1A Well Data											
	Well ID: Well Head Locked: Y: N: Depth to Water (ft btoc): 3.5 d										c): <u> </u>	,
	Total Well Depth (It btoc): 2/.69 Inner Casing Straight and Clear: Y: N: Depth to Product (ft btoc):									c):	_	
	Length of Water Column in Well (ft): 24.00       Exterior Seal Good: Y: N: Product Thickness (ft):         Diameter of Well Casing (in): 7       Pooled water in Head: Y: N: Purge Rate (liters/min); 0, 15										_	
			•	-			Head: Y:				n): 0,15	_
	1	ng Volume (l				olume (liters	s):/4-,4				s): <u>6.°Z</u>	
	Purge Met	hod: Peristalt	1¢/Submers	ible/Bailei	r/Other:				Date We	ell Purged:	12/6/21	
	Samula ID	. GM	-71-05	۲ <sup>.</sup>	FAL	Water Sai	nple Data		121	~	ers: <u>3</u>	
	Sample ID	<u>г. Стиг</u>		Typ	be:	Date:	127677	Time:	134	# Contain	ers:	
	QC Sample	Personnel:	1/ How		be:	Date:	Transportation of	Time:	***********************	# Contain	ers:	-
						, de de						_
	Remarks (	color, odor, e	ις.): <u>ζ</u>	O ICT I	12 33 /	BADAC	25					-
	75FATERUDARIS	-				-		- States and the state of the states of	-	CLARSON BELLING		
	Time	Purge Vol. (liters)	Depth to Water (ft btoc)	Temp. (°C)	рН	ORP (mv)	Spec. Cond. (mS/cm)	Turbidity (NTU)		Salinity (% or ppt)	Notes	
¢	Stabi	lization Req	uirements	(± 10%)	(± 0,2 units)	(±10)	(± 10%)	(± 10% or <10)	$(\pm 10\%)$	(±10%)		-
· 1258	of the se		3,56	DTB-	27.56	i⊌≁oc. In	itial Depth to	Water (pre	-pumping)	de deres engedone Billen de tradition	an the the first spinster was the State of the state of	
1303 1311	H54 ::** H20Z:**	1.Z	- punge 3.55	12.8	150ml 8.55		- Clowes 1.646	9-1- possibi 19.87	e nate_ 0.81	0.83	NA	
	1206-11/2		3.55	13.0	8.63	-3.8	1.645	3.14	0.60	0.84	 	_
	1319 1323	2,4 3.0	3.72	12.9	8.64	-15.7	1.658	3.32	0.55	0.85		
	1323	5.6 3.6	4.00	12.9 12.7	8.64	-78.7	1.680 1,684	3.54 3.56	0.50	0.86		
1	1331	4.Z	4.06	12.6	8.65	- 44.6	1.681	3.30	0,46	0.86		
	1335	4.8	4.06	12.9	8.65	-50.2	1,683	3.30	0.45	0,86		
	/339 /343	5,6	4.04	12.8	8.65	- 55.8	1,686	2,92	0.44	0,86		
		6.2	4.05	129	8.65	-59.5	1.690	3.00	0 43	0.86		_
						ا الله الله المالية و الله و الله الله الله الله الله الله	2/0/21	·				
		and the second secon							and a second			
	ine and states in a											
	Wall and	na diameter (					liters/ft)] x [L					
		ng diameter ( $2" \rightarrow 0.6$	$\frac{10}{4'' \rightarrow 2.5}$	-		Disc	charge tubing $1/4" \rightarrow 0$ .		) → Discha 8" → 0.022		olume (liters/ft) → 0.039	,
1	Recorded by:	16. Homper		Date:	2/6/21		Page_1_o	f /		Meter Model	Ist Pol	<b>بر</b> کر?
I	Reviewed by:	16. Hommer H. Denni	3	Date: 12	1712021	۰.					asurement Form.do	

\$

., \*

EA®	2200 6 <sup>th</sup> Av	ology	<b>g, Scienc</b> , <b>Inc., P</b> 7 Seattle, WA	BC		Well Ins Purging, a Ieasurem	and Fiel
Contract Number: <u>N44255-20-D-6006</u>	Task Order: <u>21F4076</u>	Naval Installatio	m: Key	port	Na	Site nme: 04	1
Well ID: <u>MWI-45</u> Total Well Depth (ft btoc): <u>25,03</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>2</u> Well Casing Volume (liters/ft): <u>0, 6</u>	<u>ع</u> Inner Casing S <u>): 19،87</u> Ex Poole Well Vol	traight and terior Seal ed water in	ocked V·	N:	Depth to P Product Purge R Volume	Water (ft bto roduct (ft bto t Thickness (f ate (liters/min Purged (liter	$\begin{array}{c} \text{(b):}  \mathcal{NP} \\ \text{(b):}  \mathcal{O}, \\ \text{(c):}  \mathcal{O}, \\ \\ \(c):}  \mathcal{O}, \\ \\ \(c):  \mathcal{O}, $
Purge Method: Peristaltid/Submersit		Water Sa	mple Data		Date We	ell Purged:	2/7/20
Sample ID: <u>GM-21-033</u> QC Sample ID: <u>GM-21-034</u> Sampling Personnel: <u>H. Hajol</u> Remarks (color, odor, etc.): <u>Slight</u> <u>Bailed</u> , water to top of i	< Hy cloudy mit	ially, e	gg smell	, colorles			
Purge Vol.Depth to Water (ft btoc)	Temp. (°C) pH	ORP (mv)	Spec. Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Salinity (% or ppt)	
Stabilization Requirements 1026 5,16 1040 Begin Purge	1 W. A. MARTIN MARTINE		(± 10%) tial Depth to 24/min	(± 10% or <10) Water (pro	(± 10% or ± 0.1) -pumping	(±10%)	
1045 1.0° 5.21° 1049 1.8 5.20 1053 2.6 5.20	14,0 8,47 - 14,1 8,97 - 14,2 8,97 -	14.8 28.6 37.0	0,726 0,724 0,724 0,722 0,725	23,25 15,48 8,55 7,94	0,77 0,65 0,57 0,51	0,36 0,36 0,36 0,36	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	14,2 8,97 - 14,2 8,96 - 4,3 8,96 -	-58,9 -65,1 -73,3 -77,8	0,725 0,724 0,721 0,721	7,77 7,48 6,88 6,96	0.48 0.46 0.44 0.44	0,36 0,36 0,35 0,36	
		82.5	0,725	6,66	0,42	0.36	
	Volume Calculations		Casings or D	ischarge Tu	hino		
Volume (liWell casing diameter (in) $\rightarrow$ Well c $2"\rightarrow 0.6$ $4"\rightarrow 2.5$	ters) = [Casing/tubing	y volume (1	$\frac{\text{casings of }p}{\text{liters/ft}} \propto [L]$ tharge tubing $1/4" \rightarrow 0.$	ength of wat diameter (in	er column (	(ft)] .rge tubing vo	
Recorded by: <u>H. Hajek</u> D	Date: 12/7/202) Date: 12/7/202)		Pageo	f		Meter Model:	YSIP

	Technology	ng, Science, and y, Inc., PBC 107 Seattle, WA 98121	Well Ins Purging, Measuren	
Contract Number: <u>N44255-20D-6006</u>	Task Nava Order: <u>21F407</u> 6 Installa	ion: Keyport	Site Name: O	1
Well ID: <u>MWI-46</u> Total Well Depth (ft btoc): <u>32.7</u> Length of Water Column in Well ( Diameter of Well Casing (in): <u>2</u> Well Casing Volume (liters/ft): <u>0</u> Purge Method: <u>Peristaltid</u> /Submers	Well         Well Head         Inner Casing Straight at         ft):       25.72         Exterior Se         Pooled water         U       Well Volume (liter)	<u>I Data</u> Locked: Y: N:	Depth to Water (ft bto Depth to Product (ft bto Product Thickness ( Purge Rate (liters/mi Volume Purged (liter Date Well Purged:	nc): <u>NP</u> ft): n): <u>O, 2</u> rs): <u>5, 8</u>
Sample ID: <u>CM-21-035</u>	Type: <u>ENV</u> Dat	e: <u>12/7/2021</u> Time:	: <u>1408</u> # Contair	ners: 3
QC Sample ID: Sampling Personnel: <u>H. Hare</u> Remarks (color, odor, etc.): <u>SI '</u> <u>No seal</u> , bailed Cupler +	Dat 	y odarless		
Stabilization Requirements		(± 10%) (± 10%) (± 10%)	(mg/L): (% or ppt (± 10% or ± 0.1) (± 10%)	Notes
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Set purpe rave @ 0.7 15.7 7.12 8.3 15.6 7.15 -10.5 15.5 7.16 -32.6 15.5 7.15 -40.5 15.6 7.15 -49.9 15.6 7.14 -54.7	nitial Depth to Water (pro	$\begin{array}{c c} \hline & & & \\ \hline \\ \hline$	
1403 5.8 7.10 STABILIZE	15.6 7.13 -58.4 NS НИ ГР	1,179 1.68	0.47 0.59	
Volume ( Well casing diameter (in) → Well	Volume Calculations for Wel liters) = [Casing/tubing volume casing volume (liters/ft) Di	(liters/ft)] x [Length of wat	ter column (ft)]	
$2^{"} \rightarrow 0.6^{?}  4^{"} \rightarrow 2.5^{"}$ Recorded by: <u>H</u> , <u>Hajek</u>	$\frac{12}{7}\frac{12}{2021}$ Date: $12\frac{7}{2021}$ Date: $12\frac{7}{2021}$	Pageof	$8" \rightarrow 0.022 \qquad 1/2" -$	→ 0.039 : YSE PROPS

	EA Engineerin Technolog 2200 6 <sup>th</sup> Ave, Suite	Purg	ll Inspection, ing, and Field urement Form							
Contract Number: <u>N44255-20-D-6006</u>	TaskNavOrder:21F-4076Installa	al Keyport	Site Name:	OUI						
Well Data										
Well ID: MWI-47 Well Head Locked: Y: N: Depth to Water (ft btoc): 6, 1										
Total Well Depth (ft btoc): <u>24,32</u> Inner Casing Straight and Clear: Y: <u>N</u> : Depth to Product (ft btoc): <u>NP</u>										
Length of Water Column in Well (ft): 18,21 Exterior Seal Good: Y: N: Product Thickness (ft):										
Diameter of Well Casing (in):		in Head: Y: N:		ters/min): $O, Z$						
Well Casing Volume (liters/ft):		ers): 10,926		$d$ (liters): $6_{a}6$						
Purge Method:/Peristalits/Submersi			-	ged: 12/7/2021						
			Date well Pur	ged: 12/1/2021						
Sample ID: <u>GM-21-036</u>	Trans ENIL D	Sample Data	10110	Z						
OC formula ID:										
QC Sample ID:	Dat	te:Time	:#C	Containers:						
Sampling Personnel: <u>H. Har</u>										
Remarks (color, odor, etc.):	NJ colorless, odarte	255								
rusted bolts, builed (f	illed to top of head)	noseal								
Purge         Depth to           Vol.         Water           Time         (liters)         (ft bloc)	Temp. (°C) pH (my)	Spec. Cond. Turbidity (mS/cm) (NTU)		linity D(ppt) Notes						
Stabilization Requirements	(+ 100()) (+ 0.2	(± 10%	(±10%)							
11:54 6.11		(± 10%)   or <10) Initial Depth to Water (pr	$  \text{ or } \pm 0.1 )   (\pm 1)$	<u>10%)  </u>						
1210 Begin Purge	Set Putre Pade @	-O,ZL/min		Π M						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	15.4 6.23 48.6	0.594 40.17	0,87 0,7							
1223 2.6 6.39	15,4 6,24 17,6 15,4 6,25 3,2	0,593 29,89	0.68 0.7							
1227 3.4 6.39	5.3 6.25 -9.1	0.593 16.04	0.60 0.2							
	15,3 6,25 -16,9	0,592 11.33	0,50 0.2							
235 5.0 6.39 239 5.8 6.39	15.2 6.25 -21.5	0,593 9,23	0.48 0.2							
	15.0 6.26 -27.1 15.0 6.26 -29.1	0,592 5,25	0.47 0.2							
	<u>NIC 0, C0 2131</u>		0.46 0.2	-9						
STABLE CE			· Functional and a state and a state of the							
and or construction of the	1111 10 17 17 00									
	HH 12/17/207									
	Volume Calculations for We	U Casings or Discharge Th	ubing							
Volume (	liters) = [Casing/tubing volume	e (liters/ft)] x [Length of wa	ter column (ft)]							
Well casing diameter (in) $\rightarrow$ Well	casing volume (liters/ft) D	ischarge tubing diameter (ir	$) \rightarrow \text{Discharge tu}$	bing volume (liters/ft)						
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$	6" → 5.5	$1/4" \rightarrow 0.010$ $3/$	/8"→ 0.022	$1/2$ " $\rightarrow 0.039$						
Recorded by: H. Huylek	Date: 12/7/2021	Pageof	Meter	Model: VSI PRODS						
eviewed by: 14. Ocn 5 Date: 12/7/2021 Filename: Well Inspection, Purging, and Field Measurement Form. docx										

	EA Engineering Technology 2200 6 <sup>th</sup> Ave, Suite 70	Well Ins Purging, Measurem	and Field						
Contract Number: <u>N44255-20-D-6006</u>	Task Naval Order: <u>2) F4076</u> Installation	on: Keypert	Site Name: OU	1					
Well Data									
Well ID:       MWI-48       Well Head Locked: Y:       N:       Depth to Water (ft btoc):       5,35         Total Well Depth (ft btoc):       24.72       Inner Casing Straight and Clear: Y:       N:       Depth to Product (ft btoc): $\mathcal{NP}$									
Total Well Depth (ft btoc): 24.72	Inner Casing Straight and	l Clear: Y: N:	Depth to Product (ft btc	DC): NP					
Length of Water Column in Well (ft)		Good: Y: <u>N:</u>	Product Thickness (	ft):					
Diameter of Well Casing (in):	Pooled water in	Head: Y:N:	Purge Rate (liters/mi						
Well Casing Volume (liters/ft): 0, (	6 Well Volume (liter	s): 11.622	Volume Purged (liter						
Purge Method: Peristaltic/Submersibl	le/Bailer/Other:		Date Well Purged:						
	Water Sa	<u>mple Data</u>							
Sample ID: <u>GM-21-037</u>	Type: <u>ENV</u> Date:	12/6/2021 Time:	<u>1248</u> # Contain	uers: <u>3</u>					
QC Sample ID:	Type:Date:	Time:	# Contain	iers:					
Sampling Personnel: <u>H. Hayek</u>	i, K. Hopper								
Remarks (color, odor, etc.):	Hy-cloudy initially,	odorless, colorl	ess, bubbles in f	Yow coll					
Bailed well casing of rustor	angewater	,							
Purge Depth to		Spec.		The second					
Vol. Water	Temp. ORP	Cond. Turbidity	DO Salinity						
Time (liters) (ft btoc)	(°C) pH (mv)	(mS/cm) (NTU)	Construction of the second sec	) Notes					
Stabilization Requirements (=	$\pm 10\%$ (± 0.2 (± 10) (± 10)	(± 10%) (± 10%) (± 10%) (± 10%)	$(\pm 10\%)$ or $\pm 0.1$ ( $\pm 10\%$ )						
154 5:35		itial Depth to Water (pre							
	5.5 6.35 5.8	54/min	A (1) 0 2 5						
1211 2.4 5.41 1	5,5 6:32 -8:7	0.705 98,59	0,64 0,35	NA_					
1215 3.6 5,41 1	5,3 6.32 -14.3	0.705 58,76	0,50 0,35	<u> </u>					
1219 4.8 5.41 15	5,4 6,32 -21,0	0,707 51,03	0,46 0.35						
	5.5 6.32 -25.4 5.5 6.32 -29.3	0.706 47.59	0,44 0,35	·					
1231 8,4 5,41 1	5,5 6,32 -32,6	0,708 39,86 0,708 33,83	0.42 0.35	· · · · · · · · · · · · · · · · · · ·					
235 9.6 5.41 1	5. 6.32 -35.2	0.708 28.46	0,41 0,35						
	5,7 6,32 -37,8	0,706 27.41	0,38 0,35						
1243 12.0 5,41 19	5.7 6.32 -40.1	0,705 28.83	0,37 0,35						
STABILIZE		HH 12/61	202						
			ile a construction and a construction of the second second second second second second second second second se	an a					
<u></u>	olume Calculations for Well- ters) = [Casing/tubing volume (	Basings or Discharge Tu	bing						
Well casing diameter (in) $\rightarrow$ Well ca		large tubing diameter (in)		olume (liters/ft)					
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$	$6" \rightarrow 5.5$		$3^{\circ} \rightarrow 0.022$ 1/2" –						
Recorded by: <u>H. Hay'ek</u> Da	ate: 12/6/2021	Page of		YST PRODS					
eviewed by: <u>H. Plnnvs</u> Date: <u>p4712071</u> Filename: Well Inspection, Purging, and Field Measurement Form.docx									

·· •

.

	EA Engineering, Science, and Technology, Inc., PBC 2200 6 <sup>th</sup> Ave, Suite 707 Seattle, WA 98121	Well Inspection, Purging, and Field Measurement Form
Contract Number: <u>NU1755-10-D-60</u> 06	Task Naval Order: <u>MF4076</u> Installation: <u>Keypevet</u>	Site Name: OV I
Well ID: <u>MUL</u> - <u>4</u> - <u>4</u> Total Well Depth (ft btoc): <u>17, 55</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>9</u> Well Casing Volume (liters/ft): <u>0</u>	$\begin{array}{c} \underline{12.04} \\ \underline{2.04} $	Product Thickness (ft): $\underline{NA}$ Purge Rate (liters/min): $\underline{O, Q}$ Volume Purged (liters): $\underline{(a, O)}$
Sample ID: <u>GW 21 - 038</u> QC Sample ID: <u>Sampling Personnel: S. Ke</u> -	le/Bailer/Other: <u>low flow, water in shilu</u> <u>Water Sample Data</u>	ne: $\frac{1}{12}$ # Containers: 3
Remarks (color, odor, etc.): <u>(lear</u>	, slight petroteun colur.	
Purge Vol.     Depth to Water       Time     (liters)       Stabilization Requirements	Temp.         ORP         Spec.           (°C)         pH         (mv)         (mS/cm)         [Turbidi           (± 0.2         (± 10%)         (± 10%)         (± 10%)	(mg/L) (% or ppt) Notes
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Initial Depth to Water (p $1, 1$ $7, 0.4$ $-6, 7$ $0.256$ $6, 09$ $1, 1$ $7, 0.4$ $-6, 7$ $0.256$ $4.71$ $1, 1$ $7, 0.4$ $-6, 10$ $0.256$ $4.71$ $1, 1$ $-10, 0$ $0.256$ $4.34$ $1, 1$ $7, 16$ $-12.9$ $0.256$ $3.47$ $1, 1$ $7.36$ $-25.71$ $0.256$ $3.47$ $1, 1$ $7.38$ $-25.4$ $0.256$ $3.84$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
full Sample colder		
Volume (lit Well casing diameter (in) → Well ca	olume Calculations for Well Casings on Discharge T ers) = [Casing/tubing volume (liters/ft)] x [Length of w	Tubing vater column (ft)] (in) → Discharge tubing volume (liters

		Techno	ering, Sciend logy, Inc., P Suite 707 Seattle, WA	BC	P	Well Ins Purging, a leasurem	and Fie
Contract Number: <u>N44155 - W</u> - N-600	Task من Order:	425521 F24076 In	Naval stallation: <u>Keyp</u>	ort		ite me:	~
Well ID: <u>MW1 - 50</u> Total Well Depth (ft btoc): <u>1</u> Length of Water Column in W Diameter of Well Casing (in) Well Casing Volume (liters/f Purge Method: Peristaltic Sul	Well (ft): <u>۹. 3</u> : <u>۲</u> t): <u>۵. د</u>	er Casing Stra Exter Pooled Well Volun	<u>Well Data</u> Head Locked: Y: $$ ght and Clear: Y: $$ or Seal Good: Y: $$ water in Head: Y: e (liters): <b>5 C</b>	N: N: N:	Depth to Pr Product Purge Ra Volume	Water (ft bto roduct (ft bto Thickness (f ate (liters/min Purged (liter	nc): <u>NA</u> ft): <u>NA</u> n): <u>C</u> . s): <u>S-C</u>
Sample ID: <u>CAM - 21 -</u> QC Sample ID:		Wa	iter Sample Data	<u> </u>		ll Purged: <u>+</u> # Contain	
Sampling Personnel:/0/ Remarks (color, odor, etc.):		•					
Vol. W	ater Temp. (°C)	(	RP Cond. mv) (mS/cm)	Turbidity (NTU)	DO (mg/L)	Salinity (% or ppr)	No
Stabilization Requirem 12.32 - 7.7 12.33 Beg. A Pu		(± 0.2 units) (:	<u>= 10) (± 10%)</u> Initial Depth to	(± 10% or <10) 5 Water (pre-	(± 10% or ± 0.1) pumping)	(± 10%)	Key Kengging
1238 1.0 70	0 11-6	7.51 121	2.5 0.229 2.5 0.228 2.6 0.228	12-15 9.76 9.37	0.60 0.47 0.43	0.11	
1242 71.8 7.9				8.61	0.38	0.11	
1246 2.6 7.9 1250 3.2 7.9 1254 3.8 7.	90 11.6 90 11.6	7.57. 11	1.9 0.228 3.0 0.277	8.24	0.35	0.11	
1246 7.6 7.6 1250 3.2 7. 1254 3.8 7. 1258 4.4 7 1302 5.0 7. 1306 5.6 7.	10         11.6         1.6           90         11.6         11.6           90         11.6         11.6	7.52 11 7.51 10 7.49 95 7.47 8	1.9 0.228	8.24 7.95 7.97 8.01			
1246 2.6 7.0 1250 3.2 7. 1254 3.8 7. 1258 4.4 7 1302 5.0 7. 1306 5.6 7.	10         11.6           10         11.6           90         11.6           90         11.6           90         11.6	7.52 11 7.51 10 7.49 95 7.47 8	1.9 0.228 3.0 0.777 5.2 0.227 7.8 0.227	8.24 7.95 7.97	0.35 0.33 0.31	0.11	
1246 2.6 7.0 1250 3.2 7. 1254 3.8 7. 1258 4.4 7 1302 5.0 7. 1306 5.6 7. 1309 Collect 30.	10     11.6       10     11.6       90     11.6       90     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6       70     11.6	7.52 11 7.51 10 7.19 95 7.97 8 7.97 8 7.97 8 7.95 8 9	1.9 0.228 3.0 0.777 5.2 0.227 7.8 0.227	8.24 7.95 7.92 8.01	0.35 0.33 0.31 0.24	0.11 0.11 0.11 0.11	

----

EA	Techno	eering, Science ology, Inc., Pl Suite 707 Seattle, WA	BC	Well Ins Purging, Measurem	and Field
Contract Number: <u>N44155-Do-O-60</u> 06	Task Order: <u>21F4076</u>	Naval Installation: <u>Keyp</u>	vA_	Site Name: <u>OU</u>	· · · · · · · · · · · · · · · · · · ·
	¥.	Well Data			
Well ID: MW 1-S1		ll Head Locked: Y:		Depth to Water (ft bto	c): <u>8.15</u>
Total Well Depth (ft btoc): <u>3.()(</u>		aight and Clear: Y: <u>\</u>		pth to Product (ft bto	c): NA
Length of Water Column in Well (ft	, ``	rior Seal Good: Y:		Product Thickness (	ft): <u>NA-</u>
Diameter of Well Casing (in): $2^{"}$		water in Head: Y:		Purge Rate (liters/mi	n): <u>O Q</u>
Well Casing Volume (liters/ft): <u>U</u>		me (liters): 8,94(	· · · · · · · · · · · · · · · · · · ·	Volume Purged (liter	s): <b>5</b> ,0
Purge Method: Peristaltic/Submersit	ole/Bailer/Other: <u>مريم</u>	Flow Clock bro	<u>ke) (</u>	Date Well Purged:	2-6.21
Sample ID: <u>GM - 21 - 0140</u> QC Sample ID: Sampling Personnel: <u>SKettte</u> Remarks (color, odor, etc.): <u>N6-0</u>	wel				
	(°C) pH (± 0.2	Spec.           ORP         Cond.           (mv)         (mS/cm)           (± 10)         (± 10%)	(±10% (=	DO Salinity mg/L) (% or ppt) ± 10% r ± 0.1) (± 10%)	Notes
1320 0,2 8,15	11.3 8.50 2	Initial Depth to	Water (pre-pu	umping)	an a
1330 Z.O 8.35		19.9 U.285 N.O G.285		4.06 0.14	
1335 30 8.35	11.4 8.53 10	1.4 0 285	4.15 3	3,90 0,14	
1340 <u>4.0</u> <u>8.35</u> 134 <u>3</u> 5.0 <u>8.35</u>		3.0 N 285		5.88 0.14	
1348 Sample Colle	cted			3,86 0.14	· · · · · ·
	***				
	Savaran and the second second				
		- Std		·····	
				$\square$	
	Voluma Calculations f				
Volume (li	ters) = [Casing/tubing v	olume (liters/ft)] x [].	ength of water c	<u>g</u> column (ft)]	in Constants
Well casing diameter (in) $\rightarrow$ Well c	asing volume (liters/ft) $6" \rightarrow 5.5$		diameter (in) →	Discharge tubing vo	olume (liters/ft) → 0.039
viewed by: <u>H. Dennis</u> D	Date: 12-6-21 Date: 12/6/21	Pageo	r_\_		<u>PRUIXS 201-02</u>

ŧ

;

	Tech	incering, S nology, In ave, Suite 707 Se	ıc., PE	BC	P		pection, and Field ent Form
Contract Number:уЧЧ755 - 70- О- (a	Task Worder: <u>NE4076</u>	Naval Installation:	Key po	eve		ite OV me: Keypor	A
		Well Data	<u>ı</u>				
Well ID: MW 1-52		Well Head Locks	ed: Y: 🧹	N:	Depth to	Water (ft bto	c): <u>7.98</u>
Total Well Depth (ft btoc): 19.8	Inner Casing	Straight and Cle	ear: Y: 🗹	N:	Depth to Pr	roduct (ft bto	c): 1954 NA-
Length of Water Column in Well	(ft): <u>1.91</u> I	Exterior Seal Goo	od: Y: <u>/</u>	N:	Product	Thickness (f	t):_NA
Diameter of Well Casing (in):		oled water in Hea	ad: Y:	N:	Purge Ra	ate (liters/min	1): <u>(j, )</u>
Well Casing Volume (liters/ft):		olume (liters):	Π.146		Volume	Purged (liter	s): <u>8.6</u>
Purge Method Peristaltic/Submer	sible/Bailer/Other: <u>L</u> e	N Flow			Date We	ll Purged: <u>\</u>	2.6.21
		Water Sample					· · · · · · · · · · · · · · · · · · ·
Sample ID: <u>GM - 21 - 041</u>	Type: <u>EN V</u>	Date: 12	-6.21	Ťime:	1223	# Contain	ers: <u>3</u>
QC Sample ID:	Type:	Date:		Time:		# Contain	ers:
Sampling Personnel: <u>Susan</u>	Kettlewell						
Remarks (color, odor, etc.):	gr, No colu	<u> </u>				• · · · · · · · · · · · · · · · · · · ·	
		····		9		-	
·····	Temp. ('C) pH	(my) (i	Spec. Cond. mS/cm)	(± 10%	(mg/L) (±10%		) Notes
Stabilization Requirement		<u>(± 10)</u> (: Initial	<u>± 10%)</u> Denth to	or <10) Woter (nr	<u>or ± 0.1)</u>		an and Angel and Ang
145 1.0 8,20	11.1 834	1 5 65 5	300	13.45	4.13	0,14	
1150 2.0 0.20	1.0 8.49	4.8 0	<u>,300</u> 300	9.09	4.09	0,14	
1200 4.0 8.20	11:0 8:46	-10.5 0	30	8.31	4.06	UIY	
1205 5.0 8.20	1.0 8.48		302	7.41	4.03		
1215 7.0 8.20	11.0851		<u>, 20 2</u> 303	7.20	4.00	0,14	
1220 8.0 8.20 1273 Sample (	1.08.52		302	6.96	3,98	0,15	-
1223 Sample Co	llected						
				•••••••		<u>\</u>	
		NUMBER OF STREET, STORE STOR		A			· · · · · · · · · · · · · · · · · · ·
			0				
	Volume Calculatio	ns for Well Cas	ings or Di	ischarge Tu	bing		
$\frac{\text{Volume}}{\text{Well casing diameter (in)}} \rightarrow \text{Well}$	(liters) = [Casing/tubi						-1
$\underbrace{2" \rightarrow 0.6}_{\text{(III)}} 4" \rightarrow 2.3$		· · · ·	ge tubing $1/4" \rightarrow 0.$		$0 \rightarrow D_{1scha}$ $8^{"} \rightarrow 0.022$		olume (liters/ft) → 0.039
ecorded by: S. Kettlewell	Deta 12 (a 21		1	١			
eviewed by: <u>A. Dennis</u>	_Date: $12 - 6 - 21$ _Date: $12/6/21$	Pa	igeof				1980155 20170036
<u></u>			Filen	ame: well insp	ection, Purgin	g, and Field Me	asurement Form.doc
•							
	-						

•

<b>E</b> A®	Technol	ering, Scienc logy, Inc., PI buite 707 Seattle, WA	BC	Pu		pection, and Field ent Form
Contract Number: <u>19447.55 - 70 - (6</u> 006	Task Order: UF40H In:	Naval stallation: <u>Keyper</u>	4-	Site Nan	e ne: <u>0V1</u>	
Well ID: <u>MW 1-53</u> Total Well Depth (ft btoc): <u>153</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>2</u> Well Casing Volume (liters/ft): <u>0</u> . Purge Method: Revistaltic/Submersi Sample ID: <u>GM-21-042</u> QC Sample ID: <u>544</u> Remarks (color, odor, etc.): <u>Class</u>	Inner Casing Strai         Inner Casing Strai         Image: Constraint of the straint o	ter Sample Data	N: D	epth to Pro Product T Purge Rat Volume P Date Well	duct (ft btoo Thickness (ft e (liters/min urged (liters Purged: <u>\</u> 2	t): <u>NA-</u> i): <u>0, 2</u> i): <u>4, 6</u> z-6, -21
1300 3.0 3.90 1305 4.0 3.90	(°C)         pH         ( $(\pm 0.2)$ (± 0.2)         (± 0.2) $(\pm 10\%)$ units)         (= $(\pm 10\%)$ $(\pm 10\%)$ (= $(\pm 10\%)$ <th>Spec.       <math>(mv)</math>     Cond.       <math>mv)</math> <math>(mS/cm)</math> <math>\pm</math> 10)     <math>(\pm</math> 10%)       Initial Depth to      S     <math>0.351</math> <math>1.0</math> <math>0.351</math> <math>2.3</math> <math>0.350</math> <math>2.3</math> <math>0.350</math></th> <th>(± 10% or &lt;10) Water (pre-p 13,&amp;る り、リレ り、ロタ</th> <th>(± 10% or ± 0.1) umping) 나. (역 ( 국 역역 ( 국 역역</th> <th>(±10%)</th> <th>Notes</th>	Spec. $(mv)$ Cond. $mv)$ $(mS/cm)$ $\pm$ 10) $(\pm$ 10%)       Initial Depth to      S $0.351$ $1.0$ $0.351$ $2.3$ $0.350$ $2.3$ $0.350$	(± 10% or <10) Water (pre-p 13,&る り、リレ り、ロタ	(± 10% or ± 0.1) umping) 나. (역 ( 국 역역 ( 국 역역	(±10%)	Notes
	Volume Calculations for liters) = [Casing/tubing vo casing volume (liters/ft)		ischarge Tubl ength of water	colunn (f		
$\underbrace{(2^{"} \rightarrow 0.6 \qquad 4^{"} \rightarrow 2.5}_{(2^{"} \rightarrow 0.6 \qquad 4^{"} \rightarrow 2.5}$	$6" \rightarrow 5.5$ Date: $\frac{17 \cdot 16 \cdot 7}{16 \cdot 12}$ Date: $\frac{17 \cdot 16 \cdot 7}{16 \cdot 12}$	$1/4" \to 0.$ Pageo	<u>010 3/8"</u> f	→ 0.022	1/2" —	summe (inters/ii) $\rightarrow 0.039$ $RODS 20 \neq COS(2)$ is urement Form. docx

····

ES	Tecl	incering 1nology, Ave, Suite 707	Inc., Pl	BC	P	Well Ins <sup>2</sup> urging, a leasurem	and Fiel
Contract Number: <u>N44255-20-0-6006</u>	Task Order: <u>UF4076</u>	Naval Installation	n: WCXPO	lt	S Na	ite me: ÔU	1
		Well D	ata				
Well ID: <u> </u>		Well Head Lo	ockeđ: Y: 🖄	N:	Depth to	Water (ft bto	c): 5.3
Well ID: <u>いーラリ</u> Total Well Depth (ft btoc): <u></u>	Inner Casing	g Straight and	Clear: Y: 🗸	N:	_	roduct (ft bto	/
Length of Water Column in Wel	(ft): <u>35.71</u>	Exterior Seal (				Thickness (f	·
Diameter of Well Casing (in):	-	oled water in				ate (liters/min	
Well Casing Volume (liters/ft):_						Purged (liter	
Purge Method: Peristallic/Subme			. <u> </u>			•	
			· ····			ell Purged:	11/6/2
Sample ID. BM-21-	T Part	<u>Water Sam</u>			120 -		ali
Sample ID: $6m - 21 - 64^{-1}$		Date:	16/0/2	Time:	1237	# Contain	ers: <u>2</u>
QC Sample ID:		Date:		Time:		# Contain	ers:
Sampling Personnel: <u>B. H</u> c	ines			-	· · · ·		
Remarks (color, odor, etc.):	can, no oder	-			-		
			*				
			an a	Construction of the	111 States of States of States	ANNO AND	March March 1999
Purge Depth Vol. Wate		ORP	Spec.	T	50	<b>C</b> 11 • 1 • 1	
Time (liters) (ft bto		10 STORAGE STATES AND STATES AND STATES	Cond. (mS/cm)	Turbidity (NTU)	1010 0000000000000000000000000000000000	Salinity (% or opt)	Note
Stabilization Doguinamore	(± 0.2			(± 10%	(± 10%		SAMPLE OF
Stabilization Requiremen	In a second the second s	(± 10)	<u>(± 10%)</u> iel Denth to	or <10)	<u>or ± 0.1)</u>		an a state and a state of the s
1312 Begin purge	Set FIOW		U/min		-bambing)	nonesengas ().	M
1317 1.0 5.31	10.9 7.80	158.7	0.201	11.13	1.85	0.10	1
1322 2.0 5.31 1327 310 5.31	10.9 7.76	156.7	0.201	11.07	1.57	0.10	
1327 310 5.31 1332 4.0 5.31	10.9 7.70	157.3	0.202	16,84	1.51	0.10	
1337 collect Sum			0.202	10.77	1,47	0110	
			Concernance and the second				
				NPLANNORS   MOVING   MOVING			
		ļ					
			Conference and the	District State of the second		Ð	t V
	A CONTRACTOR OF						
Well casing diameter (in) $\rightarrow$ Well	e (liters) = [Casing/tub				·		
$\begin{array}{c} \text{(iii)} \rightarrow (i$		SITI DISCI	harge tubing $1/4" \rightarrow 0$ .		) → Discha 8" → 0.022	rge tubing vo $\frac{1}{2}$	olume (liters → 0.039
				J/	5 7 V.UZZ	1/2 -	7 0.039
ecorded by: B. Harnes	Date: 12 16/21			<b>`</b>			
eviewed by: 1. Olynus	_Date: <u>12/6/21</u> _Date: <u>12/7-121</u>		Pageo	f		Meter Model:	451 Pro # 4150

EA	<b>EA Engi</b> i <b>Techi</b> 2200 6 <sup>th</sup> Av	neering, nology, I <sup>7</sup> e, Suite 707 S	nc., PB	C	P		pection, and Field ent Form
Contract Number: <u>NUU255-76-D-660</u> 6	Task Order: <u>NU125521Fu</u> o	Naval " <sup>Installation</sup> :_	Κεγρυ	vt	S Na	ite me:_ <i>О</i> И	
Well ID: <u>AA いっちち</u> Total Well Depth (ft btoc): <u>34.3</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>2</u> Well Casing Volume (liters/ft): <u>0</u> . Purge Method: Revistaltie/Submersit	<u>אר וחחפר Casing S</u> <u>י 2<sup>6</sup>ן, או בא</u> <u>ר Pool</u> <u>ס</u> Well Vo	Well Dat Vell Head Lock Straight and Cl sterior Seal Go ed water in He lume (liters):	eat: Y: <u>/</u> ear: Y: <u>/</u> od: Y:	N: I N: N:	Depth to Pi Product Purge Ra Volume	Water (ft bto oduct (ft bto Thickness (f nte (liters/min Purged (liters ll Purged:	it): <u>~ ~ A</u> n): <u>~ ~ Z</u> s): <u>3 ~ ~</u>
Sample ID: <u>6~-21-244</u> 2C Sample ID: <u>B. Han</u> Sampling Personnel: <u>B. Han</u> Remarks (color, odor, etc.): <u>cle</u>	Type: <u></u>		<u>e Data</u> 2./6./2	lTime:_ Time:_	1139 FZ 8	9# Contain <sup>11}_</sup> # Contain	ers:
Stabilization Requirements	Temp.         pH           (°C)         pH           (± 0.2)         units)	(±10) (	<u>mS/cm)    </u> + 10%)	$(\pm 10\%)$	$(\pm 10\%)$	(± 109/)	Notes
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2. 5C + Piol 11.2 7.68 11.2 7.67 11.2 7.67 11.2 7.64 - DIC	137,5 0 136.7 0	12 21	Vater (pre- 12.80 12.58 12.14	pumping) 	0.12 0.12 0.12 21.0	
Volume (li Well casing diameter (in) → Well c	Volume Calculations ters) = [Casing/tubing asing volume (liters/f	g volume (liter	s/ft)] x [Ler	igth of wate	r column (	ft)]	olume (liters/ft)

	Tech	ineering, Science, and mology, Inc., PBC Ave, Suite 707 Seattle, WA 98121				Purging,	spection, and Field 1ent Forn
Contract Number: <u>NUU255 - 26-D-60-6</u>	Task Order:	76 Naval Installatio	n: <u>Ke</u> xf	srt		Site ame:	0
		Well I	Data				
Well ID: <u>MW1-56, CHZ</u>	V		ے مر : ocked: Y	N:	Depth to	Water (ft bto	): <u>4,81</u>
Total Well Depth (ft btoc): 2以い	<u> </u>						$b(x): \underline{A'A}$
Length of Water Column in Well (f	0 f A << P1		Good: Y: <u>⁄</u>	-		t Thickness (	
Diameter of Well Casing (in):			Head: Y:				n): <u>0</u> .Z
Well Casing Volume (liters/ft): 0.			): 11.89			Purged (liter	
Purge Method: Revistaltic Submersi				h.,,			s): <u>6.0</u> 12/7/21
		Water San	unle Data		Date W		10/11/21
Sample ID: <u>6M-21-045</u>	Type: Env	Date:	12/7/2	I Time	1000 9	# Courts!	( ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
QC Sample ID:	Type:	Date		Time.		# Contain	iers: <u> </u>
Sampling Personnel:		Date	······	1 ime:		# Contain	ers:
Remarks (color, odor, etc.):	dy ag ada			<u> </u>			
(condit, out), etc.),	01, 10 000	<u>]-                                    </u>	[ Theen	<u> </u>	<u> </u>		
na baranganan ing manganan manganan ing manganan manganan							
Purge Depth to Vol. Water	<b>T</b>		Spec.				eller i Sanger ver Men der reter die
	Temp. (°C) pH	ORP (mv)	Cond. (mS/cm)	Turbidity	DO .	Salinity	
	(1.0.2		<u>«(mo/em)</u> »	<u>(NTU)</u> (± 10%	( <u>mg/L))</u> (± 10%	(% or Dbt)	Notes
Stabilization Requirements	( <u>± 10%)  units)  </u>	<u>(± 10)</u>	<u>(±10%)</u>	or <10)	or $\pm 0.1$ )	(± 10%)	
1014 Begin Durger, 5	et flow te		ial Depth to	Water (pre	-pumping)		
1011 (.0 4.8)	11.5 6.89	47.6	0.439	74.87	0.92	0.21	
1024 2.0 4.BI	11.7 6.84	5210	61435	56 55	0.57	0,21	
	12.1 6.75	53.9	0.434	37.80	0.33	021	
1039 5.0 4.81	12.1 6.73	58.3	0.430	12,10	0.31	0.21	
044 Collect Samp	12.1 6.71	58.9	0,428	11.48	0,30	15.0	
044 Collect Samp	<u>ve</u>						
			**********				
				A CONCERNING OF ENVIRONMENT			
						BI	<u></u>
Volume (ii	olume Calculations	for Well C	asings or Di	scharge Tul	hing.	Verte servez	* 
	ters) = [Casing/tubing]	, volume (lit	ers/ft)] x [Le	ngth of wate	er column (	ft)]	
well casing diameter (in) $\rightarrow$ Well c	asing volume (liters/f		arge tubing o	liameter (in)			lume (liters/ft
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$	6" → 5.5		$1/4$ " $\rightarrow 0.0$	010 3/8	"→ 0.022	1/2" →	
orded by: B. Haines D	ate: <u>12/1/2)</u> ate: <u>12/9/21</u>		Page <u></u> of	,			YSI pro DSS

	Techi	<b>gineering, Science, and</b> <b>hnology, Inc., PBC</b> Ave, Suite 707 Seattle, WA 98121			Well Inspection, Purging, and Field Measurement Form			
Contract Number: <u>NЦЦСЗБ-20-5-6006</u>	Task Nuuzssel Fund Order:	ん Naval Installation: 人	expost		Site ame:	1		
		Well Data						
Well ID: MW1-56, Ch	<u>.                                    </u>	ell Head Locked: Y	:N:	Depth to	Water (ft bto	c): <u>5,5</u>		
Total Well Depth (ft btoc): 12, 2					roduct (ft bto			
Length of Water Column in Well (	C 40	terior Seal Good: Y			t Thickness (i			
Diameter of Well Casing (in):		ed water in Head: Y			ate (liters/mi			
Well Casing Volume (liters/ft): <u>(</u>		lume (liters): <u>4</u> .						
Purge Method: Peristaltic/Submers					Purged (liter			
				Date we	ell Purged:]	UNI		
Sample ID: <u>6~~71-046</u> QC Sample ID:	Terra Cara	Water Sample Da	$\frac{11}{12}/7/202$					
C Sample ID:	Type: <u>CAV</u>	Date:	Time	0945	# Contain	iers:		
	Type:	Date:	Time:		# Contain	ers:		
Sampling Personnel:B 1-}	······································			-				
Remarks (color, odor, etc.):	organ / Lend							
Purge     Depth to       Vol.     Water       Time     (liters)     (ft btoc)	Temp, (°C) pH	ORP Con (my) (mS/c	d. Turbidity	5.4. Pres 3. + 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Salinity (% or mb)	Notes		
Stabilization Requirements	(10)		(± 10%	(±10%		NEW CASE OF COLCES		
5959 - 5.53		<u>(± 10)</u> (± 10 Initial Den	<u>%) or &lt;10)</u> th to Water (pre	$or \pm 0.1$	(± 10%)	(4) King King Strategy Strategy		
1910 Begin purge.	Set tipu to a	2.26/2		pumping)		MA		
0915 1.0 5.53 0910 2.0 5.53	11.3 6.66	017 0:55		0,90	0.27			
925 30 5.53	11.5 6.70	18.1 0.50		0,66	0,27			
0930 4.0 5.53	11.3 6.76	21.2 0.54		0:55	0127			
1935 5.0 5.53 2940 6.0 5.53		23.0 6.50	16 9.69	0.44	6,27			
3940 6.0 5.53 3945 Collect Samp	11.5 6.73	25,0 0,50	6 8.77	0.41	0,27			
					· · · · · · · · · · · · · · · · · · ·			
					<u></u>			
	<b>Volume Calculations</b>	for Well Casings	or Discharge Tu	bing	(P) and a second	Carl Professory - 11 - 22 - 1 Strange - 11 - 22 - 1 Strange - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 1		
Volume (	liters) = [Casing/tubing	volume (liters/ft)]	x [Length of wate	er column (	ft)]	errorierrowandskie Radeik.		
Well casing diameter (in) $\rightarrow$ Well 2" $\rightarrow 0.6$ 4" $\rightarrow 2.5$			oing diameter (in)	$\rightarrow$ Discha	rge tubing vo	lume (liters/ft)		
	6" → 5.5	1/4" -	→ 0.010 3/8	$3" \rightarrow 0.022$	<u> </u>	0.039		
viewed by: 12. DLnus	Date: 12/7/21	Page \	of		Meter Model	<u>XI 900 155</u> Huug		
iewed by: 12 Draws	Data: 17 18/2/		Filename: Well Inspe			- <u></u>		

	EA Engineering, Science, and Technology, Inc., PBC 2200 6 <sup>th</sup> Ave, Suite 707 Seattle, WA 98121			
Contract Number: <u>N41155-20-0-6006</u>	Task Order: WENOW Installation: Keypert	Site Name: OUI		
	Well Data			
Well ID: MWI-58 (Channel 2		Depth to Water (ft btoc): $(43')$		
Total Well Depth (ft btoc): 9,95	Inner Casing Straight and Clear: Y: $\checkmark$ N·	epth to Product (ft btoc): NH		
Length of Water Column in Well (ft)	): My Un choin vel (MC) Exterior Seal Good: Y: N:	Product Thickness (ft): _/V +-		
Diameter of Well Casing (in) <u>M</u> ℓ	11 IV	Purge Rate (liters/min): 0.2		
Well Casing Volume (liters/ft):Mc	Well Volume (liters):	Volume Purged (liters): 6.6		
Purge Method: Peristaltic/Submersib	1-/Datter/Ort	Date Well Purged: <u>1'2-17-2</u>		
	Water Sample Data			
Sample ID: <u>GW - 21 - 048</u>	Type:Date: (2-7)-2 Time: 1	04 #Containers		
QC sample ID:	Type:Date:Time: -	# Containers:		
Sampling Personnel: <u>Skettle</u>	incl			
Remarks (color, odor, etc.): <u>()</u>	y, Slight petroleum shell			
Time (liters) (ft btoc) Stabilization Requirements (=	$(\pm 10\%)$ (± 10%) (± 10%) (=	DO mg/L)Salinity (% or ppt) $\pm 10\%$ $r \pm 0.1$ ( $\pm 10\%$ )		
030 0.2 4.43	Initial Depth to Water (pre-pu	(mping)		
040 2.0 6.43 1	2.9 4.65 -20.9 0.318 66.34 3. 3.0 6.63 - 36.2 0.318 94.29 4	90 0.15		
	3.1 6.61-47.6 0.319 01-57.3	14 0.15 Turbility		
	3-2 4.63-53.7 0.218 57.16 3. 3-2 4.60 57.2 0.319 60.27 3	55 6.15		
100 60 6.43 1	31 6.60-59,5 0.319 04.91 2	54 0.15		
104 Sample colle	-C +C /1			
		-a		
Volume (lite	plume Calculations for Well Casings or Discharge Tubing	Shurtanni an ta' ann an ta'		
Well casing diameter (in) $\rightarrow$ Well cas	(iters/ft)] x [Length of water co	olumn (ft)]		
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$		Discharge tubing volume (liters/ft) $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$		
viewed by: <u>6, Kettlevell</u> Dat	te: $12 - 1 - 21$ Page of Fileneme: Well Inspection	Meter Model PRUDSS 201-00-37		

ES	<b>Tech</b> 2200 6 <sup>th</sup> A	incering, Scient nology, Inc., P Ave, Suite 707 Seattle, W.	<b>BC</b> A 98121	Purgi	l Inspection, ing, and Field irement Form
Contract Number: <u>NMM155 - 20 - 0</u> - 60	Task a Order: <u>NEMO</u> Y	Naval Installation: Key Pc	vt	Site Name:	oul
		Well Data			
Well ID: MWL - 58 (Chan	ne(1)	Well Head Locked: Y: <u>\</u>	<u>/N:</u>	Depth to Water	(ft btoc): (ft btoc)
Total Well Depth (ft btoc):	- 0	Straight and Clear: Y: <u>\</u>	N: D		(ft btoc): <u>\</u>
Length of Water Column in Well		Exterior Seal Good: Y:	N:	Product Thick	ness (ft): NA-
Diameter of Well Casing (in):	Poo	oled water in Head: Y:	N: <u>V</u>	Purge Rate (lite	ers/min): 02
Well Casing Volume (liters/ft):		olume (liters): MC		Volume Purged	l (liters): C
Purge Method: Peristaltic/Submer	sible/Bailer/Other:	N AON		Date Well Purg	
		Water Sample Data			
Sample ID: GW - 2 - 649	Type:ENV	Date: 12-7-2	Time:	3:20 #C	ontainers: 3
QC Sample ID:	Туре:	Date:		# C	
Sampling Personnel: <u>S. Ke</u> f	Howell				
Remarks (color, odor, etc.): Vev	y turbid, N	o oder	·····	···	
	Redwarged to		ded para	Alers Call	owry Scimpel
Tricks the There are a survey of the	A A A A A A A A A A A A A A A A A A A	Manager Charles and the second	<u> </u>		Wig Marpet
Purge         Depth to           Vol.         Water           Time         (liters)         (ft btoc)	Temp. :(°C) pH	ORP Cond. (mv) (mS/cm)	Turbidity (NTU)	(mg/L) (% oi	nity- . ppt Notes
Stabilization Requirements	$(\pm 10\%)$ (± 0.2 units)	(±10) (±10%)	1 1	(± 10% or ± 0.1) (± 1	0%)
1120 0.2 4.50' 1134 Well Dry-		Initial Depth to	Water (pre-p	umping)	
$134$ Well $D_{-}$ $ 1310$ $ 6.167$	-Collected .	sample -well	<u> </u>		Phranelour
1339	11,7 6.65	178.0 0.899	54963	6.67 0.4	LI Sample due
1342	11.6 6.36	158.1 0.891	541.34 1		
6					ary.
	· · · · · ·				
				· · · · ·	
	you.	Proversion and and a second and a			
			<u> </u>	2	
	Volume Calculation	s for Well Casings or D	ischarge Tubi	ng	
Well casing diameter (in) $\rightarrow$ Well	(liters) = [Casing/tubin	ig volume (liters/ft)] x [L	ength of water	column (ft)]	
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$		(it) Discharge tubing $1/4" \rightarrow 0.$			ing volume (liters/ft) $1/2" \rightarrow 0.039$
Recorded by: S. Kettling 1	Date: 12-7-21		- 1		
	Date: $12772$	0	f		Vodel: PRUDS 20FWBE
	Date. VEIIVI	Filen	ame: Well Inspecti	on, Purging, and Fie	eld Measurement Form.docx

·····

۰.

\_\_\_\_\_ .

ن Petromana					Ν.
	EA Engined Technol 2200 6 <sup>th</sup> Ave, S	ering, Scien logy, Inc., P ute 707 Seattle, W	BC	Purging,	spection, and Field nent Form
Contract Number: <u>19491255</u> , 20.D-6006	Task Order: 2 104076 Ins	Naval stallation: Keyp	iert	Site Name:6∪	1
	L Inner Casing Straig t): <u>32.01</u> Exterio telema ((MC) Pooled w Well Volume ble/Bailer/Other: <u>ww F</u> 1-21-05-0 <u>Wa</u> M Type: <u>EN V</u> Type: I = V-e []	or Seal Good: Y: <u>~</u> vater in Head: Y: e (liters): <u>M(</u> <u>ter Sample Data</u> _Date: <u>[]. ]</u>	N:De N:N: N: MMC@(U~(())) Time:	# Contair	$\frac{1}{10000000000000000000000000000000000$
Purge Depth to Vol. Water	Temp. O	Z         Spec.           RP         Cond.           nv)         (mS/cm)	Turbidity	DO Salinity	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	(± 0.2	10)     (± 10%)       Initial Depth to       (     0.723       ()     0.323       ()     ()       ()     ()	(± 10% (= or <10) 0 Water (pre-pu 3 5,177 3, 2 9.95 3 971,84 3 914,14 3	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	) Notes
000 8.0 6.05		3.9 (1.322	47,56 3,48,36 3,	68 0,15 10 0,15 61 0,15	
Volume (liWell casing diameter (in) $\rightarrow$ Well c $2" \rightarrow 0.6$ $4" \rightarrow 2.5$	/olume Calculations for ters) = [Casing/tubing vol- asing volume (liters/ft) $6^{\circ} \rightarrow 5.5$	ume (liters/ft)] x [L	ength of water conditional diameter (in) $\rightarrow$	olumn (ft)] Discharge tubing vo	blume (liters/ft)
ecorded by: S.K. PHIM-CI	Date: 12-7-21 ate: 12/7/21	Pageof	f		→ 0.039 <u>Rubs 2uFCC</u> surement Form.docx

EA	Techno	ering, Scien logy, Inc., P Suite 707 Seattle, W.	BC	Pi	arging, a	pection, and Field ent Form
Contract Number: ~ 44755-10- 0-600 L	Task Order: In	Naval stallation: <u>Ve</u>	yport	Sit	te ne:Ou	~1
		Well Data				
Well ID: <u>mw1-59</u>	Well	Head Locked: Y: <u></u>	/ <sub>N:</sub>	Depth to V	Vater (ft btoo	N. 1.15
Total Well Depth (ft btoc): 74.3	_	ght and Clear: Y: <u> </u>			oduct (ft bto	
Length of Water Column in Well (f	~ J1 ~~	or Seal Good: Y:				t):
Diameter of Well Casing (in):	11	vater in Head: Y:			e (liters/min	
Well Casing Volume (liters/ft): 0.1		e (liters): 43. 8			urged (liters	
Purge Method: Reristaltic/Submersi		(			Purged:	
	Wa	ter Sample Data	,			
Sample ID: 6-21-051	Type: Env	Date: 12/7/2	() Times	1710-		2
C Sample ID:	Type:	Date:	1 line:	1015	_# Containe	ers:
ampling Personnel:B]4		_Date	11me:		_# Containe	ers:
Remarks (color, odor, etc.):						
(color, ouor, etc.): <u></u>	, no o dar					
for the second				<u> </u>		
Purge Vol.         Depth to Water           Time         (liters)	Temp. O	RP. Spec. Cond.	Turbidity	DO	Salinity	
	<u>(°C)</u> pH (r (± 0.2	<u>nv) (mS/cm)</u>	(NTU) (±10%	(mg/L) ( (± 10%	% or ppt)	Notes
Stabilization Requirements		<u>10) (± 10%)</u>	or <10)	$r \pm 0.1$	(± 10%)	
1145 Begin Runge, Se	A FILL D	Initial Depth to	Water (pre-p	umping) .		Noversite state
1150 1.0 1.15	1011 7.62 30	2. Lynin 1.1 0.243	25,48	0.18	0.12	NA
1155 2.0 115	10.1 7.57 79	5 0.243			51.0	
1200 3.0 115 205 4.0 1.15		16 0.243 0.2 0.243		5,45	0.12	
1210 5.0 1.15	1011 010-7,54 103				51.0	
215 collect 54	mpie				0.12	
					· ·	
	· · · · · · · · · · · · · · · · · · ·				- DI	
<i>k</i>	olume Calculations for	Well Casings or Di	scharge Tubi	19	<u> </u>	
	ers) = [Casing/tubing vol	ume (liters/ft)] x [Le	ength of water	column (ft)	enneration (* 1996) ]	CALLS AND ALL A
Well casing diameter (in) $\rightarrow$ Well cases $(2^{\circ}) \rightarrow 0.6 \qquad 4^{\circ} \rightarrow 2.5$	using volume (liters/ft)	Discharge tubing	diameter (in) –	• Discharge	tubing volu	ume (liters/ft)
	6" → 5.5	$1/4$ " $\rightarrow 0.$	010 3/8"	→ 0.022	1/2" →	
orded by: <u>B. Hands</u> D iewed by: <u>H. Denn;</u> D	ate: 12/7/21	Pageof	me: Well Inspectio	<b>Ъ</b>	eter Madal. 4	KI DIA DZI
	12 12 121 2	~ <del>~ ~ ~ ~ ~</del> ~ * *		101	cici model.	131 11 45

Number: $NU + 1255 - 10 - 0 - 6000$ Well ID: $-6 =$ Total Well Depth (ft btoc): $27.97$ Length of Water Column in Well (ft): Diameter of Well Casing (in): $2^{-1}$ Well Casing Volume (liters/ft): $0.62$ Purge Method: Revistaltic/Submersible	Inner Casing IB.59 Po Po Well V /Bailer/Other: 	<u>Well</u> Well Head I g Straight and Exterior Seal poled water in Volume (liter <u>Water Sa</u> <u>Date</u> ;	on: <u><u><u><u></u></u><u><u></u><u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u></u></u>	N: N: N:	Depth to Depth to P Product Purge Ra Volume Date We	Water (ft bto roduct (ft bto t Thickness (f ate (liters/min Purged (liter ell Purged:	c): $)$ . c): $\Lambda$ ft): $\Lambda$ n): $\bigcirc$ s): $\bigcirc$
Total Well Depth (ft btoc): $27.97$ Length of Water Column in Well (ft): Diameter of Well Casing (in): $2^{\prime\prime}$ Well Casing Volume (liters/ft): $0.42$ Purge Method: Refistalffc/Submersible Sample ID: $6 - 21 - 052$ QC Sample ID: $6 - 21 - 053$	Inner Casing <u>13.59</u> Po <u>Po</u> Well V /Bailer/Other: 	Well Head I g Straight and Exterior Seal poled water in Volume (liter <u>Water Sa</u> <u>Date</u> ;	Locked: Y: <u>1</u> 1 Clear: Y: <u>/</u> 1 Good: Y: <u>/</u> 1 Head: Y: <u></u> s): <u>11.15</u>	N: N: N:	Depth to P Product Purge Ra Volume Date We	roduct (ft bto t Thickness (f ate (liters/min Purged (liter	$f(t): \underline{\Lambda}$ $f(t): \underline{\Lambda}$ $f(t): \underline{C}$ $f(t): \underline{C}$ $f(t): \underline{C}$ $f(t): \underline{C}$
Sample ID: <u>6~-21-052</u> QC Sample ID: <u>6~-21-053</u>	/Bailer/Other: Type: らい	Water Sa	mple Data		Date We		
		Date:					and the second secon
Remarks (color, odor, etc.):	, no odo	<u>بر</u>					
	r, no odo						······
	emp. <u>°C)</u> pH	ORP (mv)	Spec. Cond. (mS/cm)	Turbidity (NTU)		Salinity (% or ppt)	) N
Stabilization Requirements (±	$\frac{10\%}{10\%} = \frac{(\pm 0.2)}{\text{units}}$	(± 10)	(± 10%) itial Depth to	(± 10%   or <10)	(± 10% or ± 0.1)	(± 10%)	
1201 Best-a purge. SI 1206 1.0 9.40 11	et FIOW 1.7 7.70 ·8 7.72	to 6.2 94.1 109.8	0,30G 0.298	20.74 20.81	-pumping) 1,19 9קס	0.14	
1216 310 9.40 11 1221 4.6 9.40 11	1.6 7.66	114.2 115.5 116.1	01300 01300 01300	21.12 20.04 21.87	0164	0.14 0.14 0.14	
Volume (liter	 lume Calculatio s) = [Casing/tubi	ns for Well	Casings or D	ischarge Tu	bing	B/ <del>1</del>	V
Well casing diameter (in) $\rightarrow$ Well casing $(\overline{2^{3}}) \rightarrow 0.6  4^{"} \rightarrow 2.5$	ing volume (liters $6" \rightarrow 5.5$		charge tubing $1/4" \rightarrow 0.$	diameter (in)		rge tubing vo	olume (li → 0.039

	2200 6 <sup>th</sup> Ave, Su	<b>bgy, Inc., P</b> ite 707 Seattle, W	<b>BC</b> A 98121		Well Ins Purging, Ieasuren	and Fiel
Contract Number: <u>NHH255-20-D-60</u> 6	Task 1 6 Order: 2) F 4 0 76 Inst	Naval Allation: Key	port	N	Site Hhiz	2/6/2021 OUI
Well ID: <u>MWI-6</u> Total Well Depth (ft btoc): <u>J294</u> Length of Water Column in Well ( Diameter of Well Casing (in): <u>8</u> Well Casing Volume (liters/ft): <u>0</u>	Well H Inner Casing Straigh ft): 8.12 Exterior Pooled wa	Well Data ead Locked: Y: ∖ nt and Clear: Y: ↓ Seal Good: Y: ↓ tter in Head: Y: (liters):↓8 <sup>-</sup>	N: N: N:	Depth to F Produc Purge R	Water (ft btc Product (ft btc t Thickness ( Late (liters/mi Purged (liter	n): <u>0.2</u>
Purge Method. Peristaltic/Submers	ible/Bailer/Other:				ell Purged:	1
Sample ID: <u>GM-21-0.54</u> QC Sample ID: <u></u> Sampling Personnel: <u>H</u> , <u>Hayk</u> Remarks (color, odor, etc.): <u>egg-1</u> Persi Pumo stroped ( upp)	Type:	Date:	Time:	arlesc	#Contain	iers:
Peri Punp stopped worki	ng at 1058; red	apted u/new.	punps at 11	10	1 100163	
Purge Depth to Vol. Water Time (liters) (ft bloc) Stabilization Requirements	Temp.         OR           (°C)         pH         (m           (± 0.2         (± 0.2)         (± 0.2)	P Spec. Cond. v) (mS/cm)	Turbidity (NTU) (± 10%	DO (mg/L)) (±10%	Salinity (% or opt)	Note
1006 4.82	$\frac{ (\pm 10\%)  \text{ units} }{ (\pm 1) } = \frac{ (\pm 1) }{ (\pm 1) }$	0) (± 10%) Initial Depth to	or <10)   • Water (nre-	<u>or ± 0.1)</u> numning	) <u>(±10%)</u>	
1025 1.0 4.90 1030 2.0 4.91 1035 3.0 4.91	Set Purpe Rate @ 14.4 6.85 182. 14.4 6.92 177. 14.4 6.96 157.	0,25/m 0 0,397 8 0,394	13,21	1,69 2,05 1.74	0.19 0.19 0.19	
1040 4.0 4.91 1045 5.0 4.91 1050 6.0 4.91 1055 7.0 4.91	14,2 7.00 130; 14,4 7.00 121, 14,0 7.01 48; 14.0 7.01 77,3	7 0.39  5 0.39  7 0.390	12,71 12,75 7,98	1.38 1.23 1.03	0,19 0,19 0,19	
$\frac{1100}{105} - \frac{8.0}{10} - \frac{4.91}{4.91}$	Peri Pump died, 13,9 7,02 55,	Suitched- 7 0,390	0 new pin 11.97	<u>н</u> 0.76	0., 19 <u>HINGIZOZI</u> 0,19	
120 10.0 4,91 125 11.0 4,91	14.3         7.02         44.9           14.4         7.03         30.5           14.4         7.04         12.1           Volume Calculations for V	0.392	11.65 0	0,63 9,54 ).47	0,19 0,19 0,19	
Volume (Well casing diameter (in) $\rightarrow$ Well2" $\rightarrow$ 0.64" $\rightarrow$ 2.5	liters) = [Casing/tubing volu	me (liters/ft)] x [L Discharge tubing $1/4" \rightarrow 0$	ength of wate diameter (in)	r column (	ft)] rge tubing vo	olume (liters
	Date: 12/6/2021 Date: 12/7/2021	·	f_2 ame: Well Inspec		Meter Model:	YSIPRO

ан сайта. С

	Techno	<b>Cering, Science</b> <b>logy, Inc., PB</b> Suite 707 Seattle, WA S	C	Well Ins Purging, a Measurem	and Field
Contract Number: <u>N44255-20- D-6066</u>	Task Order: <u>21F4076</u> In	Naval Installation: <u>Keypor</u>	H	Site Name: DU	1
		Well Data			
Well ID: MWI-61 (CON	UT) Well	Head Locked: Y:	N: D	epth to Water (ft bto	c): 4.82
Total Well Depth (ft btoc): 2,0	1 <u>4</u> Inner Casing Stra	ight and Clear: Y: 📿		oth to Product (ft bto	
Length of Water Column in Well (	ft): <u>8,12</u> Exter	tior Seal Good: Y:		Product Thickness (f	
Diameter of Well Casing (in):	Pooled	water in Head: Y:	, /	Purge Rate (liters/mir	
Well Casing Volume (liters/ft):	<u>6</u> Well Volur	ne (liters):872_	V	Volume Purged (liters	s): 13.0
Purge Method: Peristaltic/Submers	ible/Bailer/Other:			Date Well Purged: 1	,
	W	ater Sample Data	,,		
Sample ID: <u>GM-21-054</u>	Type:ENV	_Date: 12/6/2021	Time:	40 # Containe	ers: 3
QC Sample ID:	Type:	Date:		# Containe	
Sampling Personnel: H, Hay's	ek	·			
Remarks (color, odor, etc.):	-like odar upon	opening, clear	, colosles	s, bubbles in r	flowcell
	anticipation (Americanian and (American	and the second statement of the	NEW WAY BY FOR SHITLEY LASS.	Areas and a second s	
Purge         Depth to           Vol.         Water           Time.         (liters)         (ft bloc)	Temp.		化丁酸盐酸盐酸盐 网络古姓氏法王住所 电动机械器	DO Salinity ng/L) (% or ppt)	Notes
Stabilization Requirements	(± 0.2 (± 10%) units) (		(±10% (±	10%	James and TOLCS and the
1006 4.82		<u>± 10)   (± 10%)  </u> Initial Depth to V	<u>or &lt;10)</u> or Vater (pre-pu	$ \pm 0.1 $ (± 10%)   mping)	and the second second
1130 12.0 4.91	14.4 7.03 8	,9 0,390	3,43 0	147 0,19	<u>N4<sup>1</sup></u>
	14.3 7.03 5	.7 0,390 !	5,22 0,	48 0.19	
-2HDFC	-CEP -	and a second	de a l'anticipation de la contraction de la cont		
	144 12/6	120,21	and the second se	CARACTER CONTRACTOR CONTRACTOR	
	The second secon				
			NOTION		
	Volume Calculations fo	r Well Casings or Disc	harge Tubing		And the second second
Volume (	liters) = [Casing/tubing ve	olume (liters/ft)] x [Len	gth of water co	olumn (ft)]	
Well casing diameter (in) $\rightarrow$ Well $2^{"} \rightarrow 9,6 \qquad 4^{"} \rightarrow 2.5$		Discharge tubing dia $1/4" \rightarrow 0.01$	ameter (in) $\rightarrow$ 10 3/8" -	Discharge tubing vo → 0.022 1/2" →	
	Date: 12/6/2021	Page 2_of	2		YST PRODS
eviewed by: HDennus	Date: <u>(2/7/202</u>			, Purging, and Field Meas	

-

		<b>Tec</b>	hnology	ng, Scien 7, Inc., P 707 Seattle, W	BC		Well Ins Purging, Measuren	and Fig
Contract Number: <u>14</u>	<u>4 255-20-D-600</u>	Task 6 Order: <b>To ZIF4</b> 6	Nava Nava Nava Installat	l ion: <u> </u>	export	N	Site Jame:	4
Total Well De Length of Wat Diameter of W Well Casing V	2447 - 62 pth (ft btoc): 43 er Column in Well fell Casing (in): olume (liters/ft): Peristaltic/Submen	$\frac{38}{(ft): 34, 5}$ $\frac{2}{2}$ P	Well Head ng Straight an Exterior Sea ooled water i	Data         Locked: Y:         d Clear: Y:         d Clear: Y:         nl Good: Y:         n Head: Y:         rs):	N: N: N:	Depth to Produce Purge I Volume	o Water (ft bto Product (ft bto ct Thickness ( Rate (liters/mi e Purged (liter /ell Purged:	ft): ft): in): rs):4
	( M 31		Water Sa	mple Data				
Sampring Perso	$\text{mnel:} \underline{} \phantom$	Type: EN Type: NPE Norles, 50					# Contain	lers:
<u>Time (1</u>	Purge     Depth to       Vol.     Water       iters)     (ft btoc)       ion Requirement        9.38	Temp.         pH           (°C)         pH		Spec. Cond. (mS/cm) (± 10%)	Turbidity (NTU) (± 10% or <10)	(mg/L) (± 10% or ± 0.1	Salinity (% or prt) ) (± 10%)	Note
1018 Be	Bola parge	: @ ZOO	nL/m	itial Depth to	) Water (pro	-pumping	) (	101
1023 <u> </u> 1027 ],	0 9.42 8 9.44	13.5 6.73	24.5	0.521	24.72	0.82		NA
031 2.	4 9.44	13.9 6.72	22.6	0.527	30.33	0.27	0.75	
1035 3.	the second se	13.6 6.70	23.1	0.527	27.91	0.32	0.26	
1043 4	<u>0</u> 9.40 8 9.40	13.5 6.70 13.6 6.67	23.2	0.524	19.87	0.21	0.25	
1047 5.	6 9.40	13.7 6.67	22.3	0.522	16.00	0.15	0.25	
1051 6. 1055 4 St		13.7 6.67	19.8	0.520	16.03	0.12	0.25	
10 101	zibrized -						2	
			n-17	7717				
·				-				
				i and the second second	NAME AND ADDRESS OF COMPANY	Carlos and the second second second		
	u a shu shu ta shu ta shu ta shu	Volume Calculatio	ns for Well.	Casings or D	ischarge Tu	bing	l Al Carlo Indonesia Al Carlo Indonesia	
	Volume (		arg vorume (1	ners/It)   X [L	ength of wate	er column (	[ft)]	
Well casing dia	$\frac{\text{Volume (}}{\text{meter (in)} \rightarrow \text{Well}}$	liters) = [Casing/tubi casing volume (liters	s/ft) Digo	harge tubin-	diameter (1)			
Well casing dia $2^{"} \rightarrow$	meter (in) $\rightarrow$ Well	casing volume (liters $6" \rightarrow 5.5$	s/ft) Disc	harge tubing	diameter (in)	$\rightarrow$ Discha		
2"→	$\begin{array}{cc} \text{ineter (in)} \rightarrow \text{Well} \\ 0.6 & 4" \rightarrow 2.5 \end{array}$	casing volume (liters $6" \rightarrow 5.5$	s/ft) Disc	harge tubing $1/4" \rightarrow 0$ .	diameter (in)	$\rightarrow \text{Discha}$ $3" \rightarrow 0.022$	1/2"→	0.039
2"→	$\begin{array}{cc} \text{ineter (in)} \rightarrow \text{Well} \\ 0.6 & 4" \rightarrow 2.5 \end{array}$	casing volume (liters $6" \rightarrow 5.5$	s/ft) Disc	harge tubing 1/4" → 0. Pageof	diameter (in) 010   3/8 f $l$	0 → Discha 3" → 0.022	1/2" → Meter Model:	0.039
2"→	$\begin{array}{cc} \text{ineter (in)} \rightarrow \text{Well} \\ 0.6 & 4" \rightarrow 2.5 \end{array}$	casing volume (liters	s/ft) Disc	harge tubing 1/4" → 0. Pageof	diameter (in) 010   3/8 f $l$	0 → Discha 3" → 0.022	1/2"→	0.039

EA®	Techno	ering, Science logy, Inc., PB Suite 707 Seattle, WA	C	Well Inspecti Purging, and F Measurement F
Contract Number: <u>N44-255-20-1)-600</u>	Task Order: <u>Tozil4076</u> Ir	Naval stallation: ILeype		Site Name: $OU$
Well ID: $MWI - 63$ Total Well Depth (ft btoc): $43$ Length of Water Column in Well Diameter of Well Casing (in): Well Casing Volume (liters/ft): Purge Method: Peristaltic/Submet	$\frac{7/2}{(ft): 34.81}$ Exter $\frac{7}{2}$ Pooled $\frac{7}{6}$ Well Volum	Well Data Head Locked: Y: ight and Clear: Y: ior Seal Good: Y: water in Head: Y: ne (liters):O. &	N: Depth to N: Produ N: Purge	o Water (ft btoc): Product (ft btoc): ct Thickness (ft): Rate (liters/min): e Purged (liters): Vell Purged:77/77
Sample ID: (M-21-050	<u>Wa</u>	iter Sample Data	· · · · · · · · · · · · · · · · · · ·	
Sample ID: <u><u>M-21-056</u> QC Sample ID:</u>	1 ype:	Date: 12/7/2/		2# Containers:
Sampling Personnel:		_Date:	Time:	# Containers:
Remarks (color, odor, etc.):		ndesc		
(	<u> </u>	/ 12-25		
	1 - TE CONTRACTOR AND A CONTRACTOR		·	
Purge         Depth to           Vol.         Water           Time         (liters)           Stabilization Description	Temp.     O       (°C)     pH       (+0.2)	RP Cond. 7 mv) (mS/cm)	Furbidity         DO           (NTU)         (mg/L)           (± 10%)         (± 10%)	Salinity (% or ppt) N
Stabilization Requirement		$(\pm 10)$ ( $\pm 10\%$ )	or $<10$   or $+0.1$	(+10%)
	Be @ 200	Initial Depth to W	ater (pre-pumping	5)
1247 1.0 8.35 1251 1.8 8.33	12.6 6.71 7	9.1 0.861	28,20 0.66	0.43
1251 1.8 8.33 1255 2.4 8.31	12.6 6.71 31	finan-	29.80 0.34 29,44 0,27	
1259 3.2 8.33	12.7 6.71 -1.		29,44 0,27 26.66 <i>0.19</i>	0.43
303 4.0 8.36 1307 4.8 8.36	12.8 6.70 -10	-5 0.893 2	6.72 0.14	0.44
1311 5.6 8.39	12.8 6.70 -14.		6.59 0.13	0.46 OR1=-
1315 6.4 8.40	12.9 6.70 -17		8.47 0.11	0.46
1314 7.2 8.40 1323 8.0 8.40	13.0 6.76 -19	5 0.949 1	0.50 0.09	0.47
1323 8.0 8.40 1327 8.8 8.40	13.0 6.70 -20 13.0 6.70 -21	2 0.950 11	.03 0.08	047
Stabilized -			0.03	0.47
		277/21		
	Volume Calculations for	Well Casings or Disc	iarge Tubiez	<u> </u>
Volune	(Casing/tubing vol	ume (liters/ft)] x [Leng	th of water column	(ff)]
wen casing diameter (in) $\rightarrow$ Well	casing volume (liters/ft)	Discharge tubing dia	meter (in) $\rightarrow$ Dische	urge tubing volume (lit
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5$		1/4" → 0.010	$\frac{3}{8} \rightarrow 0.022$	$l = 1/2$ " $\rightarrow 0.039$
corded by: 12,140pper	Data: 12/9/01	_ 1	1	
	1) 18 10	Pageof	1	Meter Model: /SI
viewed by: $[\lambda, [V]]$ And $\Sigma$	Date 1/ 1/ 1/			g, and Field Measurement F

Well ID: $MW1-64$ Total Well Depth (ft btoc): $57.75$ Length of Water Column in Well (ft): Diameter of Well Casing (in): $2$ Well Casing Volume (liters/ft): $0.6$ Purge Method Peristaltid/Submersible/ Sample ID: $6M-21-057$ QC Sample ID: $$ Sampling Personnel: $1C.Hespee$ Remarks (color, odor, etc.): $Coloc$	Pooled water in Head: Y:N:        Well Volume (liters):3O, /6         /Bailer/Other:        Water Sample Data        Type:Date:Tin        Date:Tin	Depth to Product (ft btoc): Product Thickness (ft): Purge Rate (liters/min): $\bigcirc$ , $25$ Volume Purged (liters): Date Well Purged: 12./8/2 me: $\bigcirc$ 95 $\bigcirc$ # Containers: $\overset{>}{>}$
Total Well Depth (ft btoc): $57.75$ Length of Water Column in Well (ft): Diameter of Well Casing (in): $2$ Well Casing Volume (liters/ft): $0.6$ Purge Method, Peristaltid/Submersible/ Sample ID: $6M-21-0677$ QC Sample ID: $$ Sampling Personnel: $1C.HopperRemarks (color, odor, etc.): color$	Well Head Locked: Y:N:         Inner Casing Straight and Clear: Y:N:         50,26       Exterior Seal Good: Y:N:         Pooled water in Head: Y:N:         Well Volume (liters):30,16         Bailer/Other:         Water Sample Data         Type:Date:Tipe:         Type:	Depth to Product (ft btoc): Product Thickness (ft): Purge Rate (liters/min): $\bigcirc$ , $25$ Volume Purged (liters): Date Well Purged: 12./8/2 me: $\bigcirc$ 95 $\bigcirc$ # Containers: $\overset{>}{>}$
Time     (liters)     (ft btoc)     (?)       Stabilization Requirements     (± 1)       \$\mathcal{G900}\$     7.49       \$\mathcal{O907}\$     \$\mathcal{Begins}\$ purge       \$\mathcal{O907}\$     \$\mathcal{Begins}\$ purge	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Well casing diameter (in) $\rightarrow$ Well casing	me Calculations for Well Casings or Discharge T = [Casing/tubing volume (liters/ft)] x [Length of wa y volume (liters/ft)] Discharge tubing discrete (	ater column (ft)]
$2" \rightarrow 0.6 \qquad 4" \rightarrow 2.5 \qquad 6$ ecorded by: <u>1C Hepper</u> Date:	$\frac{3^{\prime\prime} \rightarrow 5.5}{1/4^{\prime\prime} \rightarrow 0.010}$	n) $\rightarrow$ Discharge tubing volume (liters/ft) 3/8" $\rightarrow 0.022$ 1/2" $\rightarrow 0.039$

•

Contrac				2200 6 <sup>th</sup>	hnolog Ave, Suite	ng, Scier y, Inc., I 707 Seattle, V	PBC		Well Ir Purging Measure	, and F	Tiel
Number	r: <u>1044255-20</u>	<u>-D-6006</u>	Task Order	:21F407	Nav Installa	al tion: <u>Key</u>	port		Site Name:(	41	
Total W Length o Diamete Well Cas	$\frac{MWJ - 0}{1000}$ fell Depth (ft to of Water Colu r of Well Cast sing Volume ( to the constant to the constant to the consta	btoc): <u>66</u> umn in Well ing (in): (liters/ft): <u>C</u>	2.6	P Well	Well Head ng Straight a Exterior Se Pooled water	<u>II Data</u> Locked: Y: nd Clear: Y: al Good: Y: in Head: Y: ers): <u>ろら</u> , イ	N: N: N:	Depth to Produ Purge Volum	to Water (ft b Product (ft b act Thickness Rate (liters/m ne Purged (lite Vall D	toc): (ft): nin): ers): _[O,	1P ,2 6
			······································		Waton S	ample Data			Well Purged:		20
Sampling Remarks	D: <u>GM-2</u> le ID: g Personnel: (color, odor, o - botto M	H. Haje	ek			e: <u> 2/8/20</u> e:		e:	<u> </u>	ners:	>
Time Stab	Purge Vol. (liters)	quirement	(°C)	<u>pH</u>		Spec. Cond. (mS/cm) (± 10%)	Turbidit (NTU) (± 10% or <10)	y DO (mg/L) (± 10% or ± 0.		1	otes
0914	Begin	7.11 Purge	Se,	- Dime	II Rocke C	titial Denth t	o Water (pr	e-pumpin	g)		
0919 0923 0927 0931 0935 0939 0943 0947 0947	1,0 1,8 2,6 3,4 4,2 5,0 5,8 6,6 7,4	7.11 7.11 7.11 7.11 7.11 7.11	11.1 11.3 11.4 11.4 11.4 11.5 11.5 11.5 11.5	6.41 6.66 6.78 6.72 6.71 6.71 6.71 6.71 6.71	169;5 135,8 97,1 73,4 40,1 31,4 6,1 -0,4	0,568 0,724 0,743 0,712 0,730 0,739 0,758 0,770	35,49 37,67 26,77 25,70 18,05 18,55 14,00 13,53	1.22 0.86 0.74 0.69 0.69 0.62 0.60 0.56 0.56	0,28 0,36 0,37 0,35 0,36 0,36 0,36 0,37 0,38		
- · · · ·	8,7 9,0 9,8	7.11 7.11 7.11	11.6 11.6 11.6 11.6	6.73 6.73 6.73 6.74 6.74	-11,9 -20,9 -28,5 -31,3 -35,9	0,77 <u>6</u> 0,786 0,794 0,808 0,804	9.46 8,84 8,57 7,84 8,54	0,53 0,51 0,49 0,48	0,38 0,39 0,39 0,40 0,40		
0955 0959 1003 1007	10,6	<u>-D</u> Volume (	liters) = $[0]$	Casing/tubi	ing volume (	Casings or D liters/ft)] x [L	ischarge Tu	lbing	( <del>Ռ</del> )]		

1

	<b>Technolog</b> 2200 6 <sup>th</sup> Ave, Suite	ng, Science, and y, Inc., PBC 707 Seattle, WA 98121	Well Inspect Purging, and I Measurement I
Contract Number: <u>N44255-20-0-6006</u>	Task Nav Order: 21 F 4076 Installa	al tion: Keyport	Site Name: OUI
Well ID: <u>MW1-67</u> Total Well Depth (ft btoc): <u>17,32</u> Length of Water Column in Well (f Diameter of Well Casing (in): <u>2</u> Well Casing Volume (liters/ft): <u>0</u> Purge Method: Peristaltic/Submersi	Well Head Inner Casing Straight a T: 9,78 Exterior Se Pooled water	II Data         Locked: Y:N:         nd Clear: Y:N:         al Good: Y:N:         in Head: Y:N:         ers):5,568	Depth to Water (ft btoc): 8 Depth to Product (ft btoc): 1 Product Thickness (ft): 1 Purge Rate (liters/min): 0 Volume Purged (liters): 5
Sample ID: <u>GM-21-0.59</u>	Watar	ample Data	Date Well Purged: 12/8/
QC Sample ID: Sampling Personnel: <u>H. Hajel</u> Remarks (color, odor, etc.): <u>Clea</u> Bubbles <u>J</u>	Κ		e:# Containers:
Time       (liters)       (ft bloc)         Stabilization Requirements $lo[6$ $g_{a}O4$ $lo[6$ $g_{a}O4$ $lo[8$ $g_{a}O4$ $lo23$ $l. c$ $g_{a}30$ $lo24$ $l.6$ $g_{a}32$ $lo24$ $l.6$ $g_{a}32$ $lo24$ $l.6$ $g_{a}32$ $lo24$ $2.8$ $g_{a}33$ $lo32$ $2.8$ $g_{a}33$ $032$ $2.8$ $g_{a}33$ $032$ $g_{a}6$ $g_{a}33$ $032$ $g_{a}8$ $g_{a}33$ $038$ $4.0$ $g_{a}33$ $041$ $4.6$ $g_{a}33$ $O41$ $5.2$ $g_{a}33$ $O41$ $g_{a}2$ $g_{a}33$ $O41$ $g_{a}2$ $g_{a}33$ $O41$ $g_{a}2$ $g_{a}33$	Set Purpe Role C C 11.1 6.77 -28.9 11.1 6.77 -36.9 11.1 6.78 -44.8 1.0 6.78 -53.5 1.1 6.78 -61.9 1.1 6.79 -76.4 1.0 6.79 -76.4 1.0 6.79 -78.4 1.0 6.79 -78.4	Casings of Discharge T	$(mg/L) (\% \text{ or pp}) \\ (\pm 10\% \\ or \pm 0.1) (\pm 10\%) \\ (\pm$
went casing diameter (in) $\rightarrow$ well c. $2" \rightarrow 0.6$ $4" \rightarrow 2.5$	asing volume (liters/ft) Dis $6" \rightarrow 5.5$	charge tubing diameter (in	a) → Discharge tubing volume (li $8" \rightarrow 0.022$ 1/2" → 0.039 Meter Model: $\sqrt{5T}$
viewed by: <u>H. Hayek</u> D viewed by: <u>H. Denn 3</u> D	nate: <u>12/8/2021</u> ate: <u>12/8/202</u> 1	Pageof	

	Techno	eering, Science, a blogy, Inc., PBC Suite 707 Seattle, WA 9812	, P	Well Inspection Purging, and Fie leasurement Fo
Contract Number: <u>1944 255 - 20 - 0 -</u>	body Order: <u>UE407</u> 6 I	Naval nstallation: <u>Keypert</u>	S Na	ite me: Keyperte OU
		Well Data		-
Well ID: MW.I - 68	Wel	l Head Locked: Y: $\checkmark$ N:	Depth to	Water (ft btoc): 2.7 (
Total Well Depth (ft btoc): <u>5(</u>	<u>Inner Casing Stra</u>	aight and Clear: Y: $\stackrel{\checkmark}{\smile}$ N:	Depth to Pr	roduct (ft btoc): NP
Length of Water Column in W	:ll (ft): <u>4미.4</u> Exte	rior Seal Good: Y: 🗹 N:_	Product	Thickness (ft):
Diameter of Well Casing (in):_	· · ·	water in Head: Y: 🗹 N:_	_ 0	ate (liters/min):
Well Casing Volume (liters/ft)		me (liters): <u>28, 446</u>	Volume	Purged (liters): <u><u><u></u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u>
Purge Method Peristaltie/Subn	ersible/Bailer/Other:	Flow		ll Purged: 12 4 - 21
GM-21-060	<u>w</u>	ater Sample Data		
Sample ID: MUVI-Ce851		Date: 7-1-21	Time: 1057	# Containers: 3
QC Sample ID:	Туре:	Date:	Time:	# Containers:
Sampling Personnel: <u>S. Ke</u>	Hewell			
Remarks (color, odor, etc.): <u>Iv</u>	bid. No odar		· · · · · · · · · · · · · · · · · · ·	
				······································
Purge Dent				
Purge Depti Vol. Wat	· 新聞語 · 新聞語言: 法 解释者 · 新聞語 · 新聞語 · 新聞語	ORP Cond. Tur	bidity DO	Salinity-
Time (liters) (ft bt	oc) (°C) pH	A Status at 15 Mar. H R. A Read and a state of the state of the	CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR OF A	(% or ppf) Not
Stabilization Requireme	$(\pm 0.2)$ (± 0.2) (\pm		10% (± 10% <10) or ± 0.1)	
1010 0.2 2.8		Initial Depth to Wat	er (pre-pumping)	<u>   (+ 1078)                                    </u>
1015 1.00 2.8 1020 2.00 2.8			77 3.94	0.13
1025 3.0 2.8			77 3.9(, 4,03 3,89	0,13
1030 4.0 289	12.2 7.02-0	1.9 0.277 24	1.98 3,86	0,13
103550280 10404040280		5,4 0.278 23 13.5 0.277 103	2 3.85	0.13
1045 7.0 2.80	F 12.1 7.21 -11	4.5 0.274 35	06 3.83	0.13
1050 8.0 3.8 1055 9.0 28		4.20.276 3	13 3.81	0.13 (133.92
	1 12.2- 7.24 -11	8,9 0,275 131	28 3.82	0,13
		WAY ADAM DALA MAN ACCOUNT OF THE OWNER		
			Sh	
	Volume Calculations for	or Well Casings or Dischar	ge Tubing	
	ne (liters) = [Casing/tubing v	olume (liters/ft)] x [Length	of water column (	ft)]
Volui		Discharge tubing diama	eter (in) → Dischar	rge tubing volume (lite
Well casing diameter (in) $\rightarrow V$		Discharge tubing utaine		
Well casing diameter (in) $\rightarrow \mathbb{V}$ $2^{"} \rightarrow 0.6 \qquad 4^{"} \rightarrow $		$1/4" \rightarrow 0.010$	3/8" → 0.022	$1/2$ " $\rightarrow 0.039$
Volume Well casing diameter (in) $\rightarrow V$ $2^{"} \rightarrow 0.6$ $4^{"} \rightarrow 0.6$ Lecorded by: S. Kell ewe II	$2.5 \qquad 6" \rightarrow 5.5$ Date: $12 ( \cdot 2 )$	$\frac{1/4" \rightarrow 0.010}{\text{Page} \ of \ }$	3/8" → 0,022	
Well casing diameter (in) $\rightarrow$ W $2^{"} \rightarrow 0.6$ $4^{"} \rightarrow$	$2.5 \qquad 6" \rightarrow 5.5$	$\frac{1/4" \rightarrow 0.010}{\text{Page} \ of \ }$	3/8" → 0,022	$1/2" \rightarrow 0.039$ Meter Model: <u>Prevoss</u>

• • • •

Sampling Personnel: <u>IC. Hopp</u>	3         Inner Casing S           t):         10.04         Ex           Pool         900           15         Well Vo           ble/Bailer/Other:         900           Type:         1000           Type:         1000	xterior Seal G led water in H blume (liters): <u>Water Samp</u> Date: Date:	ata         cked: Y:         Clear: Y:         iood: Y:         Iead: Y:         I. 5           Sx C-using         De Data         IZ / S/ ::	N: N: N: N: D= 4.53	Depth to Depth to Produ Purge J Volum Date W	o Water (ft bi Product (ft bi ct Thickness Rate (liters/m e Purged (lite /ell Purged:# Contai	toc): (ft): nin):, $O_{, f}$ ers): 1 Z / S ners: $3$
Total Well Depth (ft btoc): <u>17.1</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>1</u> Well Casing Volume (liters/ft): <u>0</u> Purge Method Peristaltic/Submersit Sample ID: <u>M-Z1-06 (</u> QC Sample ID: <u>16. Hopp</u>	3         Inner Casing S           t):         10.04         Ex           Pool         900           15         Well Vo           ble/Bailer/Other:         900           Type:         1000           Type:         1000	Vell Head Loc Straight and C xterior Seal G led water in H blume (liters): <u>Water Samp</u> Date: Date:	cked: Y: Clear: Y: food: Y: Icad: Y:	N: N: N: D= 4.53	Depth to Produ Purge I Volum Date W	Product (ft bi ct Thickness Rate (liters/m e Purged (lite /ell Purged:	toc): (ft): nin):, $O_{, f}$ ers): 1 Z / S ners: $3$
Total Well Depth (ft btoc): <u>17.1</u> Length of Water Column in Well (ft Diameter of Well Casing (in): <u>1</u> Well Casing Volume (liters/ft): <u>0</u> , Purge Method, Peristal vic/Submersit Sample ID: <u>M-Z1-06 (</u> QC Sample ID: <u>K.Hopp</u>	3         Inner Casing S           t):         10.04         Ex           Pool         900           15         Well Vo           ble/Bailer/Other:         900           Type:         1000           Type:         1000	Straight and C xterior Seal G led water in H blume (liters): <u>Water Samp</u> Date: Date:	Clear: Y: food: Y: lead: Y: l. 5   % C-silvy <u>ble Data</u>	N: N: N: D= 4.53	Depth to Produ Purge I Volum Date W	Product (ft bi ct Thickness Rate (liters/m e Purged (lite /ell Purged:	toc): (ft): nin):, $O_{, f}$ ers): 1 Z / S ners: $3$
Length of Water Column in Well (fi Diameter of Well Casing (in): Well Casing Volume (liters/ft): Purge Method, Peristalpic/Submersit Sample ID: Sample ID: Sampling Personnel: <i>K.Hopp</i>	t): <u>10.04</u> Ex Pool <u>5</u> Well Vo ble/Bailer/Other: 	xterior Seal G led water in H blume (liters): <u>Water Samp</u> Date: Date:	iood: Y: Iead: Y: <u>I . 5  </u> Nr Casiling <u>Die Data</u> <u>I Z / B / T</u>	N: N: D= 4.53	Depth to Produ Purge I Volum Date W	Product (ft bi ct Thickness Rate (liters/m e Purged (lite /ell Purged:	toc): (ft): nin):, $O_{, f}$ ers): 1 Z / S ners: $3$
Diameter of Well Casing (in): Well Casing Volume (liters/ft): Purge Method_Peristalpic/Submersit Sample ID: QC Sample ID: Sampling Personnel: <u>IC.Hopp</u>	Pool 95 Well Vo ble/Bailer/Other: Type:_EMDType:	led water in H blume (liters): <u>Water Samp</u> Date: Date:	Iead: Y: 1.51 3x Cresting Die Data 1.2/8/ **	N: 7 4.53 7 1 Time Time	Produ Purge J Volum Date W	ct Thickness Rate (liters/m e Purged (lite /ell Purged:	(ft): nin):, ers):, $1 \ge 1 \le 3$ ners: $3$
Well Casing Volume (liters/ft): 0 Purge Method Peristaltic/Submersit Sample ID: <u>M-Z1-06</u> QC Sample ID: <u>K.Hopp</u>	5  Well Vo    ble/Bailer/Other:	blume (liters): <u>Water Samp</u> Date: Date:	1.61 Br Cressing Die Data 12/8/	2 <b>- 4.5</b> 3	Purge I Volum Date W 2: <u>1132</u>	Rate (liters/m e Purged (lite /ell Purged:	$\frac{\text{nin}}{2} = \frac{O_{1}}{3}$ $\frac{O_{2}}{3} = \frac{O_{2}}{3}$
Purge Method Peristalpic/Submersit Sample ID: <u>M-ZI-06 (</u> QC Sample ID: <u> </u>		Water Samp Date: Date:	<u>Die Data</u> 77/81 **	ZI_Time	Volum Date W 2:	e Purged (lite /ell Purged: # Contai # Contai	ers): <u>3</u> , - <u>17/8</u> iners: 3
Sample ID: <u>M-ZI-06 (</u> QC Sample ID: <u> </u>		Water Samp Date: Date:	<u>Die Data</u> 77/81 **	ZI_Time	Date W	/ell Purged: # Contai # Contai	1 <u>718</u>
Sampling Personnel: <u>IC. Hopp</u>	ser				<u>: 1132</u>	# Contai	iners: 3
Sampling Personnel: <u>IC. Hopp</u>	ser						ners: <u>3</u>
QC Sample ID: Sampling Personnel: <u>////////////////////////////////////</u>	ser						ners:
Sampling Personnel: <u>IC. Hopp</u>	ser						ners:
		Soft	1 igert	braum	Gualda		
			Tigut	proun	Goualdon		
					Contra	7	
	With the Manual Street of the	Activity Automorphics and Income					······
	Temp. (C) pH	ORP	Spec. Cond.	Turbidity	A PECKER PARAMAN	Salinity	
and a second		<u>(mv)</u>	(mS/cm)	<u>(NTU)</u> (± 10%	(mg/L) (± 10%	(% or opt	) Note
Stabilization Requirements (	<u>± 10%) units)  _</u>	<u>(± 10)</u> (	<u>(±10%)</u>	or <10)	$\int \mathbf{or} + 0.1$	1 (+ 100/)	
1054 Bealn pume	= al 100m	<u>L/min (</u>	Depth to	Water (pro	e-pumping	)	
1104 1.0 7.70 1	113 0.26 -	-16.5 0,	.815	41.06	O.35	0,40	14
	100 1 2 2		1.812	27.80	0.23	0.40	
116 2.2 7.70 1				31,78		0.41	
	201 6.43 -	44.10	2.833	14.53	0.10	0.41	┼──┼─
1124 3.0 7.73 12 1128 3.4 7.75 11	.9 6.36 -	-46.2 O	834	14.81	0.08	0.41	
Stabalized		44.3 0.	.831	13.89	0.06	0.41	
	1 1 2	2			1944 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 - 1949 -		
		18/21					
Ň	olume Calculations f	for Well Casi	ings or Disc	charge Tu	bing	and the second sec	
	ers = [Casing/tubing]	volume (liters	s/ft)] x [Len	ngth of wate	er column (	ft)]	
Well casing diameter (in) $\rightarrow$ Well cas 2" $\rightarrow$ 0.6 4" $\rightarrow$ 2.5	sing volume (liters/ft) $6" \rightarrow 5.5$	) Discharg	ge tubing di	iameter (in)	→ Discha	rge tubing vo	olume (liters
			$\frac{1/4" \rightarrow 0.01}{2}$	10 3/8	$" \rightarrow 0.022$	1/2"—	→ 0.039
viewed by: 14, 140pper Da	te: 12/8/21	Pag	ge_1of			Meter Model:	IST P

Contract	<b>Techno</b> 2200 6 <sup>th</sup> Ave, S	ering, Scien logy, Inc., 1 Suite 707 Seattle, V	PBC		Purging	ispection, , and Fiel ment For
Number: <u>N44255-70-0-600</u>	Task Order: <u>TOZI F4076</u> In	Naval stallation: <u>Ley</u>	port	Ì	Site Name:()	21
Well ID: P1-02		Well Data				
	Well	Head Locked: Y: _	<u>ע</u> <u>N:</u>	Depth t	o Water (ft bi	toc): <u>7. 66</u>
Total Well Depth (ft btoc): <u>/7.6</u>					Product (ft b	
Length of Water Column in Well (ft		or Seal Good: Y:_u	<u> </u>		ct Thickness	
Diameter of Well Casing (in):		water in Head: Y:	N:			nin): 0,15
Well Casing Volume (liters/ft):	iち Well Volum	e (liters): 1049				ers): <u>4.</u> 2
Purge Method: Reristaltie/Submersit	le/Bailer/Other:	-				12/7/2
	Wa	ter Sample Data			the second s	
Sample ID: <u>GM-Z1-06Z</u> QC Sample ID: <u> </u>	Type:	Date: 12/7/	71 Tim	1610		~
QC Sample ID:	Type:	Date:	<u> </u>	<u>- 1010</u>	# Contai	ners: $3$
Sampling Personnel: 1C, Hopp		_Date	Time	:	# Contai	ners:
			<u>·</u>			
Remarks (color, odor, etc.):	<u>unge 50++.401</u>	uring pre	y cloud	(y wat	er, 00	dorless
Purge Depth to Vol. Water		Spec.		t Rijandi sela		
	Temp. OI	<b>P</b> Cond.	Turbidity		G 11-12	
		《行行》"《诗句》""曰:"是你的'说',"这句话说的是我的情况。		5. 1982 JAAN 122 188 1 17	Salinity	
Time (liters) (ft btoc)	<u>(°C) pH (n</u>	<u>nv) (mS/cm)</u>	<u>(NTU)</u>	(mg/L)		Notes
Time (liters) (ft btoc) Stabilization Requirements (=	(°C) pH (n (± 0.2 ± 10%) units) (±	nv) (mS/cm) 10) (±10%)	(NTU) (± 10%	(mg/L)) (± 10%	(% orpp)	Notes
Time     (liters)     (ft bloc)       Stabilization Requirements (=       1459     7.66	(°C) pH (n (± 0.2 ± 10%) units) (±	nv) (mS/cm) 10) (± 10%) Initial Depth to	(NTU) (± 10%	(mg/L)) (± 10%	(% orpp) (±10%)	
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           1459          7.66           1501         Begin         purge         0           1509         1.62         -         1	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	nv) (mS/cm) 10) (± 10%) Initial Depth to ~	(NTU) (± 10% or <10) Water (pro	(mg/L) (± 10% or ± 0.1) -pumping	(% or@p) (± 10%)	Notes
Time         (liters)         (ft bloc)           Stabilization Requirements         (=           1459         -         7.66           1501         Begin         purge         6           1509         1.02         -         1           1513         2.4         Unable         1	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	nv)         (mS/cm)           10)         (± 10%)           Initial Depth to           2.4         1.617	(NTU) (± 10% or <10) 2 Water (pro- 4 3. 43	(mg/L)) (± 10% or ± 0.1) -pumping	(% orpp) (± 10%) 	
Time         (liters)         (ft bloc)           Stabilization Requirements         (=           1459         -         7.66           1501         Begin         purge         6           1509         1.02         -         1           1513         2.04         Unable         1           1573         2.04         Unable         1	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	nv) (mS/cm) 10) (± 10%) Initial Depth to 1.4 1.617 2.4 1.617 2.9 ause pure	(NTU) (± 10% or <10) Water (pro- 43. 43	(mg/L)) (± 10% or ± 0.1) -pumping 	(% orpp) (± 10%) (± 20%) (± 10%) (± 20%) (± 20%) (± 20%) (± 20%) (± 20%) (± 20%) (± 10%) (± 10	
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           14579         -         7.066           1501         Beoin         purge         6           1509         1.02         -         1           1513         2.4         Unable         1           1574         Resolve         155000         1           1573         2.4         Unable         1           1573         2.4         Unable         1           1574         Resolve         1550000         1         1           1594         2.9         11.18         1         1	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline 10 & (\pm 10\%)$	(NTU) = (+10%) + (+	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 trainidest -/min ( O = 14	(% orpp) (± 10%) (± 10	
Time         (liters)         (ft bloc)           Stabilization Requirements         (=           1459         -         7.66           1501         Begin         puzze         6           1503         2.4         Unable         1           1513         2.4         Unable         1           1538         3.4         13500         11           1548         3.4         12.44         11           1548         3.9         12.80         11	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline 10 & (\pm 10\%) \\ \hline 10 & 10\% \\ \hline 100\% \\ \hline $	(NTU) (± 10% or <10) Water (pro- 43. 43 72. 40 Ø 125 m 24.47 32.63	(mg/L)) (± 10% or ± 0.1) -pumping - - - - - - - - - - - - - - - - - - -	(% orpp) (± 10%) (± 10	
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           1457         -         7.66           1501         Benin         purge         (=           1509         1.02         -         1           1513         2.4         Unable         (=           1573         2.4         Unable         (=           1543         2.94         Unable         (=           1544         2.99         11.18         11           1548         3.94         12.44         11           1555         3.9         12.80         11           1556         4.4         13.07         11	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(NTU) = (+10%) = (+	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 translatest -/min ( O = 14 O = 13 O = 07	(% or (p)) (± 10%) (±	
Time         (liters)         (ft btoc)           Stabilization Requirements         (= $1459$ $ 7_{\circ}66$ $1501$ $\mathcal{B}_{con}$ $pwyc$ $(=$ $1501$ $\mathcal{B}_{con}$ $pwyc$ $(=$ $1509$ $1 \circ \mathbb{Z}$ $ 1$ $1513$ $\mathbb{Z}_{\circ}4$ $Unable$ $1532$ $\mathbb{Z}_{\circ}4$ $11.12$ $11$ $1544$ $\mathbb{Z}_{\circ}9$ $11.12$ $11$ $1543$ $3 \circ 4$ $12.60$ $11$ $15552$ $3 \circ 9$ $12.80$ $11$ $15556$ $4.4$ $13.07$ $11$ $1600$ $4.9$ $13.10$ $11$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(NTU) (± 10% or <10) Water (pro 43. 43 70. 40 24. 43 32. 83 32. 83	(mg/L)) (± 10% or ± 0.1) -pumping 0 ~ 14 troutdest -2min ( 0 ~ 14 0 . 13 0 . 07 0 . 06	(% orpp) (± 10%) (± 10%) (5. 82 (cot proye (-lowest) (0. 78 (0. 81 (0. 88)	
Time(liters)(ft btoc)Stabilization Requirements $1459$ $ 7\circ 66$ $1501$ Begin $puge$ $1573$ $2\circ 4$ Unable $1573$ $2\circ 4$ $11.12$ $1544$ $2\circ 9$ $11.12$ $1543$ $3\circ 4$ $12\circ 44$ $1552$ $3\circ 9$ $12\cdot 80$ $1556$ $4\cdot 4$ $13\cdot 07$ $1556$ $4\cdot 4$ $13\cdot 07$ $1600$ $4\circ 4$ $13\cdot 10$ $1604$ $5\circ 4$ $13\circ 15$ $11$ $9\circ 16$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(NTU) (± 10% or <10) Water (pro 43. 43 70. 40 24. 43 32. 83 32. 83	(mg/L)) (± 10% or ± 0.1) -pumping 0 ~ 14 troutdest -2min ( 0 ~ 14 0 . 13 0 . 07 0 . 06	(% orpp) (± 10%) (± 10	
Time(liters)(ft btoc)Stabilization Requirements $1459$ $ 7\circ 66$ $1501$ Begin $puge$ $1573$ $2\circ 4$ Unable $1573$ $2\circ 4$ $11.12$ $1544$ $2\circ 9$ $11.12$ $1543$ $3\circ 4$ $12\circ 44$ $1552$ $3\circ 9$ $12\cdot 80$ $1556$ $4\cdot 4$ $13\cdot 07$ $1556$ $4\cdot 4$ $13\cdot 07$ $1600$ $4\circ 4$ $13\cdot 10$ $1604$ $5\circ 4$ $13\circ 15$ $11$ $9\circ 16$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline Initial Depth to \\ \hline \\ $	(NTU) (± 10% or <10) Water (pro 43. 43 70. 40 (24. 43 32. 83 32. 83 33. 4]	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 translatest -2min ( O = 14 O = 13 O = 07 O = 06 O = 04	(% orpp) (± 10%) (± 10%) (5. 82 (cot proye (-lowest) (0. 78 (0. 81 (0. 88)	
Time         (liters)         (ft btoc)           Stabilization Requirements         (ft btoc)           1459 $-$ 7.66           1501         Begin         purge         6           1503         2.4         Unable         15           1513         2.4         Unable         15           1573         2.4         Unable         15           1548         3.4         12.80         11           1548         3.9         12.80         11           1557         3.9         12.80         11           1556         4.4         13.07         11           1600         4.9         13.10         11           1604         5.4         13.05         11	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(NTU) (± 10% or <10) Water (pro 43. 43 70. 40 (24. 43 32. 83 32. 83 33. 4]	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 translatest -2min ( O = 14 O = 13 O = 07 O = 06 O = 04	(% orpp) (± 10%) (± 10	
Time         (liters)         (ft btoc)           Stabilization Requirements         (= $1459$ — $7\circ 66$ $1501$ Begin         purge $6$ $1501$ Begin         purge $6$ $1501$ Begin         purge $6$ $1501$ Begin         purge $6$ $1501$ Begin $purge$ $6$ $1501$ Begin $purge$ $6$ $1501$ Begin $purge$ $6$ $1502$ $1\circ Z$ — $1$ $1513$ $Z \circ 4$ $0nable$ $15532$ $1544$ $Z \circ 9$ $11.12$ $11$ $1552$ $3 \circ 9$ $12.80$ $11$ $1556$ $4.4$ $13.07$ $11$ $1600$ $4\circ 9$ $13.10$ $11$ $1604$ $5 \circ 4$ $13 \circ 15$ $11$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline Initial Depth to \\ \hline \\ $	(NTU) (± 10% or <10) Water (pro 43. 43 70. 40 (24. 43 32. 83 32. 83 33. 4]	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 translatest -2min ( O = 14 O = 13 O = 07 O = 06 O = 04	(% orpp) (± 10%) (± 10	
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           1459         7066           1501         Benin         purge           1509         102         1           1573         204         Unable           1573         204         Unable           1573         204         Unable           1573         204         Unable           1538         204         1548           1548         204         12.80           1555         204         12.80           15556         404         13.07           1600         409         13.10           1604         504         1305           1604         504         1305	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%$	(NTU) (± 10% or <10) Water (pr 43. 43 7c +v © 175 m 24.47 32.83 32.83 32.83 33.41 32.23	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 traviales/ -/min ( O - 14 O - 13 O - 07 O - 06 O - 04 O - 04	(% or pp) (± 10%) (± 10%) C. &Z (correst) C. 73 O. 73 O. 81 O. 81 O. 81 O. 87 U. 88 O. 87 U. 87	assibe ne
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           1459         -         7.66           1501         Beoin         pwye         6           1501         Beoin         pwye         6           1501         Beoin         pwye         6           1501         Beoin         pwye         6           1509         1.02         -         1           1513         2.4         Unable         6           1532         2.4         Unable         1           1548         3.9         12.60         11           1552         3.9         12.80         11           1556         4.4         13.07         11           1604         5.4         13.07         11           1604         5.4         13.07         11           1604         5.4         13.07         11           1604         5.4         13.5         11           1604         5.4         13.07         14           1604         5.4         13.07         14           1604         5.4         13.07         14      <	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%$	(NTU) (± 10% or <10) Water (pr 43. 43 7c +v © 175 m 24.47 32.83 32.83 32.83 33.41 32.23	(mg/L)) (± 10% or ± 0.1) -pumping O = 14 traviales/ -/min ( O - 14 O - 13 O - 07 O - 06 O - 04 O - 04	(% or pp) (± 10%) (± 10%) C. &Z (correst) C. 73 O. 73 O. 81 O. 81 O. 81 O. 87 U. 88 O. 87 U. 87	assible ne
Time         (liters)         (ft btoc)           Stabilization Requirements         (=           1459         7066           1501         Beoin         pwyc           1509         102         1           1513         204         Unable           1544         209         11.18           1543         304         12.44           1548         304         12.80           1555         4.4         13.07           1556         4.4         13.07           1604         504         13.10           1604         504         13.10	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} nv) & (mS/cm) \\ \hline 10) & (\pm 10\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ \hline 100\%) \\ 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%) \\ \hline 100\%) \\ 10\%$	(NTU) (± 10% or <10) Water (pro- 43. 43 7e +v @ 125 m 24.42 32.83 32.83 32.83 33.41 32.23 s3.41 32.23 scharge Tul Ength of wate	$(mg/L)) (\pm 10\%) (\pm 10\%) (\pm 10\%) (0 \pm 0.1) (\pm 0.1) (\pm$	(% or pp) (± 10%) (± 1	2055164 10

 $\cdot$ 

	<b>Technol</b> 2200 6 <sup>th</sup> Ave, Su	ring, Science, a Dgy, Inc., PBC ite 707 Seattle, WA 9812		Well Insj Purging, a Measurem	nd Fiel
Contract Number: <u>N44755-20-0.602</u>	Task Drder:F4076 Inst	Naval allation: <u>Keypo</u> rf		Site Name:	21
Well ID: <u>Pl - 03</u> Total Well Depth (ft btoc): <u>18.00</u> Length of Water Column in Well (ft): Diameter of Well Casing (in): <u>1</u> Well Casing Volume (liters/ft): <u>0</u> , <u>purge Method</u> : <u>Peristaltic</u> Submersible	Well H Inner Casing Straigh 10.35 Exterior Pooled wa 5 Well Volume 2/Bailer/Other:	Well Data         ead Locked: Y: $\checkmark$ N: _         nt and Clear: Y: $\checkmark$ N: _         Seal Good: Y: $\checkmark$ N: _         ter in Head: Y: _       N: _         (liters):	Depth to Produ Purge Volum Date V	to Water (ft btoc) Product (ft btoc) act Thickness (ft) Rate (liters/min) a Purged (liters) Vell Purged: <u>1</u>	): : :3( :7/
Sample ID: $\mathcal{M} - \mathcal{Z} I - \mathcal{O} G \mathcal{J}$ QC Sample ID: $\mathcal{M} - \mathcal{Z} I - \mathcal{O} G \mathcal{J}$ Sampling Personnel: $\underline{1 \mathcal{L} \cdot I \mathcal{H} \mathcal{O} \mathcal{O}}$ Remarks (color, odor, etc.): $\underline{\mathcal{C} \mathcal{O} \mathcal{O}}$	Type:_ <u></u> Type: <u></u> DE/	Date: 12/7/2/ Date: 12/7/2/	Time: 1433 Time: 1443	Container # Container	s: <u>3</u> s: <u>3</u>
Time     (liters)     (ft btoc)       Stabilization Requirements     (±       14.01     -     7.65		$\begin{array}{c c} (mS/cm) & (NT) \\ \hline (mS/cm) & (11) \\ \hline (\pm 10\%) & (\pm 10\%) \\ \hline (\pm 10\%) & or < 0 \\ \hline (\pm $	<u>U) (mg/L)</u> 0% (± 10%	Salinity (% or ppt) ) (± 10%)	
1405 Begin purge 1413 1.2 7.75 13 1417 108 7.75 13 1421 2.4 7.73 13. 1429 3.8 7.73 13. 1429 3.8 7.73 13 5+cbillized	.2 6.36 -13.3 0 6.36 -18.9 0 6.34 -24.3 1 6.33 -24.	0.776 2.6 0.777 4.4 0.780 3.37 20.781 3.3	7 0.75 5 0.18 0.13 2 0.10	0.38 0.38 0.38 0.38 0.38 0.38	<u> </u>
Volume (it	ime Calculations for W		Tubing		
Volume (litersWell casing diameter (in) $\rightarrow$ Well casin2" $\rightarrow 0.6$ .4" $\rightarrow 2.5$	) = [Casing/tubing volum]	e (liters/ft)] x [Length of Discharge tubing diameter $1/4" \rightarrow 0.010$	water column (	rge tubing volun	ne (liters/f

- -.

7

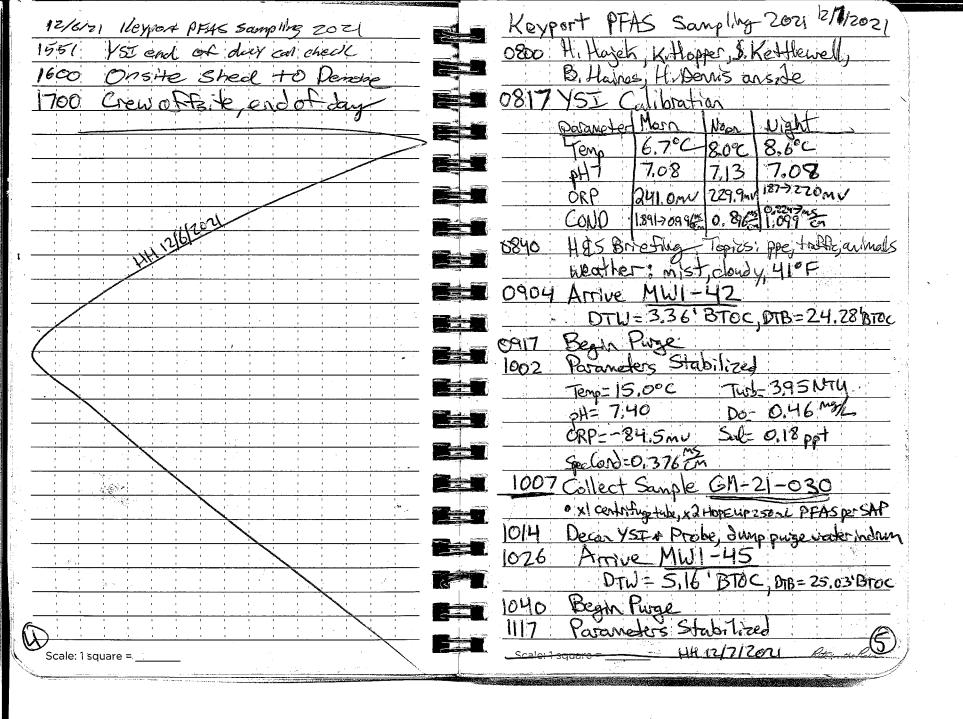
				Techn	eering, Scien ology, Inc., 1 , Suite 707 Seattle, V	PBC		Well In Purging, Aeasurer	and I	Fi
Contract Number:	144255-	<u>20-0-6a</u>	f Task Order:	: <u>Tozi F4076</u>	Naval Installation:/C	export		Site Jame:		
	Depth (ft bt Vater Colum Well Casin Volume (li od:Peristalt	oc): <u>//</u> nn in Well ng (in): <u></u> iters/ft): <u>/</u> äc/Submer	(ft): <u>/0</u> . ] 2 <u>, i 5</u> sible/Bail	Inner Casing Str 35 Exte Poolee Well Volu er/Other:	Well Data Il Head Locked: Y: raight and Clear: Y: erior Seal Good: Y: water in Head: Y: me (liters):, 5	<u>~</u> N: N: N: 	Depth to Produce Produce Purge F Volume Date W	o Water (ft bt Product (ft bt et Thickness Rate (liters/m e Purged (lite fell Purged:_	oc): (ft): in): rrs):3. / Z /	う。 う。 で、
	GM.	-71-0	X.	<u>v</u>	/ater Sample Data Date:_/Z/~_					
Sample ID:_		21 . 0	<u> </u>	pe: ENV	Date:_12/7	<u>/71</u> Time	: 1/44	# Contain	ners:	3
QC Sample II	):		Ty	/pe:	Date:	Time	e:	# Contain	ners:	
8					and the second se		·····			
Remarks (co	lor, odor, et	c.): <u> </u>	010-	less, odor	-1653			-		_
1120 1129 1133	Vol. (liters) (ation Requ Bezin 7, 2	uirements	s (± 10%	pH (± 0.2 ) units) - <u><u><u>h</u>5C</u> <u>6.74</u> - <u>1</u></u>	ORPCond. $(mv)$ $(mS/cm)$ $(\pm 10)$ $(\pm 10\%)$ Initial Depth $nL/r rin5.40.671$	(± 10% or <10) to Water (pr	(mg/L) (± 10% or ± 0,1 c-pumping	Salinity (% or pft) (± 10%)		
1141	2,4	6.59	12,7		8.5 0.673		0.21	0.33		Ľ
1145 -	3,0 3,2	<u>6.59</u> 7.00	12.4	6.83 -7	26.3 0.674	4.98	0.15	0.33		┢
Stakent			13.0	6.84 -2	28.9 0.675	4.20	0.13	0.33		Ļ
								<u> </u>	2	╞
•				17	121					Ţ
						_				
	$ \rightarrow $									t
									`	L
			Volume	Calculations fo	r Well Casings or I	Discharge Tu	bing			, 網
		volume (	(mers) = [	Casing/tubing v	olume (liters/ft)] x []	Length of wat	er column (	ft)]	<u> </u>	
2"	$\rightarrow 0.6$	$4" \rightarrow 2.5$	casing vo 6" –	lume (liters/ft)	Discharge tubing	g diameter (in	$) \rightarrow \text{Discha}$			te
		the second s			$1/4" \rightarrow 0$	<u>,010 3/</u>	$8" \rightarrow 0.022$			
ecorded by:	1C. Hoge H. Den	per	Date: 17	17/21	Page	of		Meter Model:	ISI	_
avianad b	2 X X X X X X X	15 (***	Data (1)	1-1-11						_
eviewed by:		<u>017</u>		710	File	name: Well Insp	ection, Purging	, and Field Mea	surement I	Fo.

Contract Number: N-M255-20-9-6000		Ave, Suite 7	7 <b>, Inc., P</b> 07 Seattle, W.	<b>BC</b> A 98121	N	Purging, ⁄Ieasurei	spection and Fiel nent For
	Task Order: <u>21540 K</u> o	Nava Installati	1 ion: Key pr	ort	N	Site Jame:(	1
Well ID: Pl-09			Data				
		Well Head	Locked: Y:	N:	Depth to	o Water (ft bt	oc):
Total Well Depth (ft btoc): <u>16.3</u>					Depth to I	Product (ft bt	oc):/
Length of Water Column in Well (	11		l Good: Y:		Produc	t Thickness	(ft): <u>八</u> 人
Diameter of Well Casing (in): $\frac{1}{2}$			n Head: Y:		Purge F	Rate (liters/m	in):
Well Casing Volume (liters/ft): 0.			rs): <u>1.52</u>			e Purged (lite	
Purge Method: Peristaltic Submers	ible/Bailer/Other:					ell Purged:	
<b>a</b>		Water Sa	mple Data				
Sample ID: <u>CM-21-066</u>	Type:_Ê∧∪	Date	12/6/2	<u> </u>	: 15 54	# Contai	ners: Z
	Type:	Date		Time		# Contai	ners:
Sampling Personnel:B · [+= ].	res						liers,
Remarks (color, odor, etc.):l				······································		· · · · · · · · · · · · · · · · · · ·	
		<u> </u>					
	AND REPORT OF THE PARTY OF	-	1 ALL TANK CONSISTENCY OF SUM SHOP		·		
Purge Depth to Vol. Water	Temp.	ORP	Spec.				
Time (liters) (ft btoc)	<u>(°C)</u> pH	(mv)	Cond. (mS/cm)	Turbidity (NTU)	2 CALLER PLACE	Salinity	
Stabilization Requirements	$(\pm 0.2)$			(±10%	(±10%	(% or ppt	<u>p inote</u>
1407 - 6.22	$(\pm 10\%)$ units)	<u>(± 10)</u> In	<u>(± 10%)</u>	or <10)	<u>or ± 0.1</u>	<u>) (±10%)</u>	MARK STOCKED IN CONTRACTOR
	. Set Flow	+0 0.2	-Inin	www.aterapre		) an an Anna Anna Anna 	
1514 1.0 6.22	11.6 7.89	31.1	0.245	0.15	6.45	0.12	Norting
1524 3.0 6.22	11.6 8.06	30.6	0.250	0.17	0.36	0,12	Tested Se
1529 4.0 6.22	11.4 8.09	45.2	0.253	0.12	0.35	51.0	6-sterie
1534 5.0 6.22	1.4 8.08	55.7	0.259	0,21	0.33	0,17,	before v new pun
1539 6:0 6.22 1544 7:0 6.22	11.4 8.07	63.9	0.260	0.19	0.32	0.12	
1549 8.0 622	11.4 8.06	70.5	0.261	0.17	6.32	0.12	
1554 collect Su	~pre			-2019	0.31	0.12	
ana tanàna kaominina dia ka	Martin Contraction of the State						
		Managers					
				CONSULTATION OF CONSULTATION OF CONSULTANCE		BA	
	Volume Calculation	s for Well (	Casings or Di	ischarge Tu	hing	And Alexandra Constraints	
	l(ers) = [Casing/tubin]	g volume (l	iters/ft)] x [Le	ength of wate	er column (	[ft)]	
Well casing diameter (in) $\rightarrow$ Well c $\sqrt{\frac{1}{2}}$ 2" $\rightarrow$ 0.6 4" $\rightarrow$ 2.5	casing volume (liters/) $6" \rightarrow 5.5$	ft) Disc	harge tubing o	diameter (in)	) → Dischar	rge tubing vo	olume (liters/
$\sim$	$v \rightarrow \gamma \gamma$	1	$1/4" \rightarrow 0.0$	010 0//	$3" \rightarrow 0.022$	1/2" –	

	CONTENTS		ACYPORT PEAS SAMPLING 2021
AGE	REFERENCE	DATE	0830 S. Kettlewell, B. Hames, H. Dennis, K. Hege
			H. Hajek Osite Keyport 0839 YSI Calibration =46376 sound 190104639
			0839 YSI Cal, bration =46376 sorial 190104839
			parameter Morn Wash Evening
			ORP 2263-7 240.5 243.3
			Тепр 17.0°С 7.5°С 7.2°С ону 3.957400
		<u>.</u>	PH10 9.91-740.00
			2
			$\frac{1}{2} \frac{1}{2} \frac{1}$
			0920 HES Briefing byssilo
		-	Weather: 37°F, partly cloudy
			Topics: ppe, weather contaninates, toutie
			1006 Arrive MW1-61
,		· · · · · ·	DTW= 4.82'BTOC
×: .	·		1020 Begin Purge, Periping stopped@ 1058 rosine@1110
			1135 Parameters Stabilized
		¥*	Temp=14.3°C Turb= 5.22 NTY
			pH= 7.03 DO= 0,48 Mg/L
			ORP=5.7mv Sal= 0.19ppt
			Spec Card= 0.390 2
			II40 Collect Sample GM-21-054
		-	*XI Centrifuge tube, x2 250mL LIP HOPE PFAS perSAP
ł		-	Scale. 1 square = HH 12/6/2021 Rite in the Rain

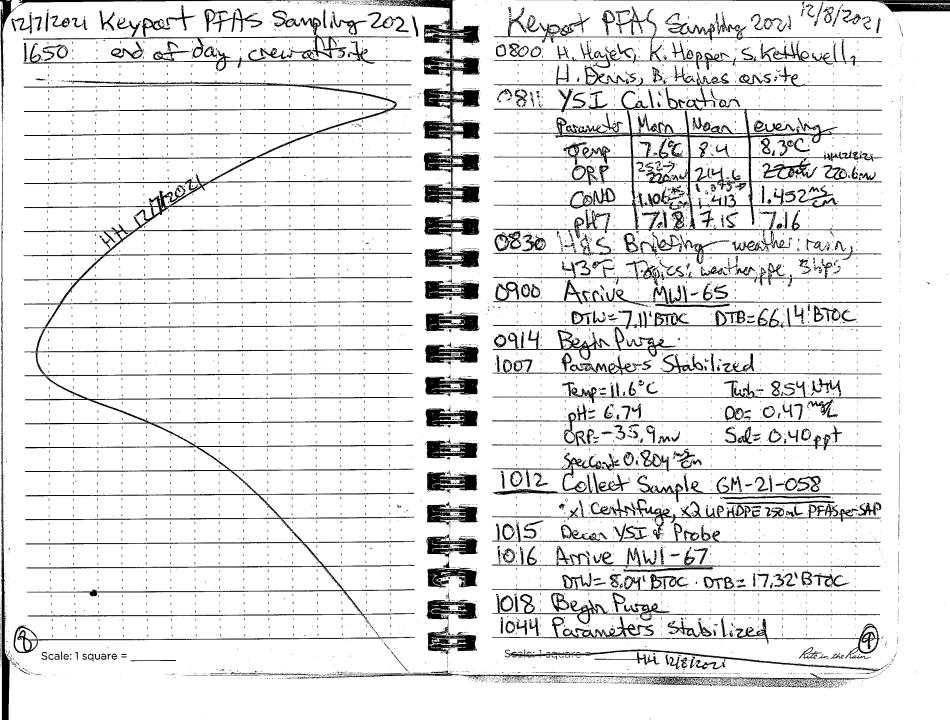
// 1/ land 2	
12/6/2021 Keyport PFAS Sampling 2021	
1148 Decon YSI	
1154 Arrive at MWI-48	
DTW = 5,35 BTOC	
1203 Begin Purge	
1243 Parameters Stabilized	
Temp=15.7°C Turbon 28.83 HT4	
0H= 6.32 DO= 0.37 M/L	
ORP=-40.1mv Sel=0.35ppt	
Spectoral= 0.705 the	
1248 Collect Sample GM-21-037	
*X ) Certrifuptube up, X 2 250mLupHOPF fr	
PFAS PErSAP	
1254 Decon YSI and Probe	
1256 YSI Midday Calcheck	
1358 Onsite MW1-44	
1258 ONSITE MWI-44 1258 HUIJERY DTW = 3.56 BTOC ]	
TATO - 77 (- 12)	
1303 Hueith Begin puge @ 150 ml/ml	
143 Parameters Stubilized	
1343 Temp=13,9°C Turb=3,00NTY	
pH = 8,65 $DO = 0.43$ mg/L	
OR1 = -59,5mJ Sal = 0,86 ppt	
\$1347 Sp. God = 1.690 m	
# 1447 Collect Sample GM-21-032	
Ix Centrifuge NP, XZ 250mL NP HDrE	
D Scale: 1 square	

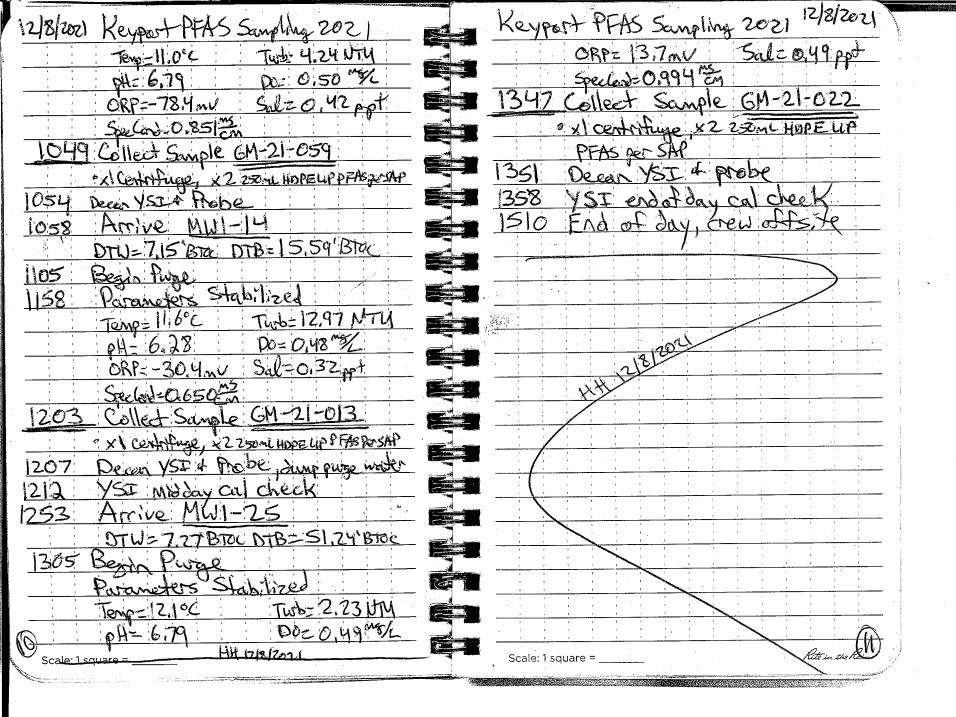
a 🛛 a change a chan
12/6/21 Keyport PFAS Sampling 2021
H50"Decon 1SI + Probe
1403 1356 Arrive MW1-17
1403 Begin Ruge
1448 Parameters Statilized
Temp=11,3°C Turb: 7.37 NTU
pH=6.82 De= 0,38 M8/L
ORP=-80.9 mV Sal= 0.22 ppt
Speclardz 0. 459 cm
1453 Collect Sample GM-21-015
°XI Centrifuge trube UP, XZ UP 250mL HOPE
1456 PFAS por SAP
1458 Decan YSI and probe
1 1457 Arrive MW1-43
DTW = [ 3.60'broc]
DTB = [ 25, 39' bloc ]
1459 Besin purge @ 150 mulmin
1527 Parameters Stabilize
Temp=12,7°C Turb=7.34UTY
+ + = 7.65 DO=0.45 Mg2
ORP = -116, 2mV Sal = 1.02ppt
Sp. God = 1.96275
1531 Collect Sample GM-21-031
· I'x Centrifige tube NP ZX Z50ML HOPE
PFAS per SAP
1535 Decon VSI + Probe
-12/6/21
Scale: 1 sequare = Rite in the Rail



12/1/200	el Keyport ØFAS Sa	mpling-2021
	Temp=14.2°C	Tuebe 6.66 NT4
1 1 1 1 1 1	Temp=14.2°C pH= 8.95	DO-0.42"3/L
1 1 1 1	ORP=-82,5 mi	Sal= 0,36pp+
1 1 1 1	Sour Candino, 725 3	
1122	Collect Sample G	M-21-033
	×1 Centrituge, × 22	SOML HOPE UP PEAS
1	per-SAP	
1127	Collect Sample GM	1-21-034 Dup
	× Lantrifuge, X2 Z	SOML HOPE UP PEAS
	op-SAP	
33	Decar VSI & Pro	be, Junp pirge
	writer in Soun	
1138	Midday YSI Cal	Check
1154	Arrive MWI-41	
1 1 1 1	DTW= 6.11 Broc D	TB= 24,32'BTOC
1210	Begin Pinge	
1243	Parameters Stabili	ized
1 1	Temp= 15,0°C T pH= 6,26	WB= 6.00 NTY
1 4 1 1	pH= 6.26	Do= 0.46 ms/2
	ORP=-29.1mi	oul=0.29 pt
	Sector = 0,592 Th	
1248	Collect Sample GM	-21-056
1 - 1 1 - 1 1	" Centrifuge, x225	ONLUPHOPE PPAS
(1	per SMP	
1255	Decon YSI + Abbe	- Junp purgenoder
Seale:1	square HR 12171	rey
يتورد <u>المحمد المحمد المحمد المحمد المحمد</u>		

,	Keyport PFAS Sampling 2021 12/7/2021
-1	
1	1317 Arrive MW1-46
	DTW=7.02'BTOC DTB= 32.74'BTOC
	1334 Begin Purge
	1403 Paraneters Stabilized
	Tenp=15.6°C Tub= 1.68 NTY
	pH= 7.13 Do= 0.47 M2
	ORP=-58, 4mu Sal=0, 59 pp+
	Specland=1,179 ms
	1408 Collect Sample GM-21-035
	× antrifuge tube, × 2 250mL HOPE UP
	FFAS per SAP
	1414 Decan YSI + Probe, Jumppinge water
	1434 Arrive MW1-15
	DTW=6,02'BTOC DTB= 12.78'BTOC
	1447 Reado Paras
	1521 Parameters Stabilized
	Temp=16.7°C Turbz 1.88 UTY pH=6.20 Do= 0.41 mg/L
	DO= 0.41 mg/L
	ORP=-36.0mu Sel= 0.32 pp-
	Spectord= 0,661 cm
	1532 Collect Sample GM-21-014
	*K. Centrifuge tube, X2 UP 250 aL HOPE
	PFAS per SAP
	1543 Decan VSI & probe, Juppingewater
	1557 YSI end of day cal check
	-Scale: 1-square - HK 12/2/2021 Rete in the Rain





		_	$-\frac{2021}{100000000000000000000000000000000$
	CONTENTS		Keypert PFHS Sampling 12/6/
GE	REFERENCE	DATE	0615 Arrive onstre, 39°, Cloudy
			0830 - Calibrate (Bimp check VSI
			pH 10 10.07-710.00 SPC -1 249-1:413
			pH 1 745-77.09 TU.b. 01 41-70 BC
			pH 4-4097 400 Temp 4.6C
	¥.		URP-2412-7240mv
			0920 Safty Meetry, B. Humes, S. Kethovell
			H Hujek, K Hopper, H. Dennis
			Ogys Arrive @ MW 1-69
			DTW 2716 BTOC
		[	DTB 50.17 BTOC- Soft be Hen
	<u>,</u>	<i>P</i>	1010 Begin purse
			1055-Well Subilized Final Ready
		· · · · · · · · · · · · · · · · · · ·	Temp 12.2°C TWS. 13, 28 NM
			pH 7.24 DO 3.82 ms/
	· · · · · · · · · · · · · · · · · · ·		ORP-118.9mv Sal 0.13 ppt
			SPL 0.275mS/cm
		÷	1057 MWI-68(Gmail-000) callection
			TEXHOPE 250mL, Ix centrifier
			1105- Anive @ MW1-52
		<b>[</b>	DTW - 7.89' BTOL
			DTB- 19.89' BTOC
			1140-Begin purse
			1170- ugin purse
			1220-Well Stabilized - Final Rouch (Next pase)
			Scale: 1 square = Scale:
			Scale: I square =

and the state of the	7	12/1/21
A-6-21 OULI Keypert 2021 PFAS Sampla		1348 OVI Keyport 2021 PFAS Samply
	•	352 Mid. Day lat thede or
		M. d- duy   Find of Day
		pH2 7,24-77.0 7.14 770
		Sper land 10 232-191.458 1.468 3/cm
Wish SPC 0.302mSfcm GAN 21-044		020 232. 4 MV 228->240~V
1233 - Sample Collection Gim-21-041		Ten 20° (- 48° c
[ZXHDPF 250ml, 1x rentri Fyze]		1348 Sample Collected 611-21-040
1238 Arrive @ MWI-53		(2x ITOPE 25U vi In centrilinge)
1245- B DTW- 4.30' BTUC		1405 Arrive @ MWI-S
DTB-15,29 BTDC		DTW-820' BTOL
1245-Begin purje		DTB = 14.25 BTDG
1305 - Well Stabilized - Final Readings		1425 - Begin Avrale
1000-11.5 C 1000 1.03 1000		1450- Well Stabilized-Final Ready
pH-8.04 DO- 3.93 mg/L		Temp-11.6 C Turd - 36.34 NTV
ORP. 17. Unv Sil-O. 17. ppt		pH-639 DO 387mg/L
SPC 0.350ms/cm		0RP46.9nv Sal-015
1308 Sample Collected GM 21-042		SPC- G 322mS/cm
[Zi HDPE ZSGNI, Ix rentrituse]		1455. Sample collected Giw-21-007
1315 Arrive @ MWI-SI		2x HDPE 252 mL, 1x centr. forz
DTN - 8.15 BTOC		$\Delta = \alpha i \Delta i a i i 2 \alpha$
DTB- 23.06 BTD/C		DTW- 5.31' BTOC
1320 - Begin purse		DT P- IVI 85 BICC
	1	
Tomp 114 2 SPC- 0. 285 ~ Janon 1.	ppt	1540 Begin purge - Well Stubilizer Final Reading
0H - 8.55N IVRB- 3.51 NIV		(Nort per)
ORP-10.5 NV DO-386 MS/L		Proventer 3)
(n scale: 1 square = Sta	- 45 13	Scale: 1 square =

.

12-6-21 12721 2021 OUL Key port 2021 PFAS Sumpla OUL Keyper APTAS Samply 0800 Onsite - S. Kettlavell, B. Haines K. Cooper Final Read MW1-49 H. Dannis, H. Hajek. Jemp -11 7.0 TUNG- 2.84 NTU - 41°, Cloudy DO - 3,88 mg/L pH - 7.38Calibration check Sal- 0.12 ppt ORP- -28.4m/ 12 Midday 0820 Morna Evening Spr. 0.256 uslow 7.08 41200 1100+ Simple G111-21-038 pHa C.97-: 6.68 27.00 62ms 1.559->1.413 UIS SPC ZXHP PF. 250ml, Ix rentricinge URP 229-7240 237.6 m 224.7m 1700-End ofday, CAPS, 8500 9.02 Temp: 0840. Safety Mety 0900- Arrive @ MW1-58 Champel O - DTW-6.05'BTOC DTB - 38.12' BTOC 0910 Begin purse 1000-Final Ready-Well Stub Jemp. - 12. 4. CO TWB- 46.50 NTU PH - 7.20 D. 3.67 mg/ ORP--127.UMV Sel-0.15ppt SPC- 0.322 ms/cm 1008-Collect Sample | GW-21-USD E2x HOPE 250mL, 1x centrilige 1030-Arrive @ MW1-SS (hannel Z DTW - 6 43' BTOC DTB- 19.951BTOC Scale: 1 square = Rite in the Scale: 1 square =

0-1-21	12.1.21 12.1.21
Wi-Keypert 2021 HAS Samply	UVI Reyport ZOZL Prits Damping
1030- Begin purse (MU 58, channel 2)	- (continged Mill-70)
the present survinceau timal react for	10-15- Well SILDITE 200 - Innal Kendung
	time - 19.3°C Tub - 11.17 MV
pH-660 DO-352ms/c	pH-6.45 DO-3.44 mg/L
ORP 59.5 m/ Sel - 0.15 ppt	ORP-N. Lemi Sal - 0.23 ppt
DPU- U DIMAS/CM	SPC-U, qqq m Stem
104-Sample Collected Gur-21-048	1248- Collect Sample IGW-21-018
ZxHDRE 250mL, 1x contridge	[2×HDPE 250ml, IN centrifuge]
1115-Arrive @ MW1-58, Channe T	1315-Arrive @ MWI-58 chaine I
DTOV- 6.50' BTOC	well recharged enough to collect
DTB 9.56'-BTOC	Sample
1120- Pezin purse	1320 Collect sample GW-21-049/
- pursing black much-hud to Luwer tubing because werit dry	1342 Collect Final Reading
Luver Whin because werit dry	1342 Collect Final Reading
WT' Continued lowery tuby	$\frac{1}{10000000000000000000000000000000000$
1134 - Well dry - could not take	pH - 636 Do . 7.49 ms/L
reading - Turbidity was ~ 140	ORP-158.1 my Sal-0.44 pt
	<u> </u>
- well has water in above well had	1416 Arrive @ MW1-27
-Bailed with -DTW - 3.63' BTOL	DTW-Z.91' BTOC
	DTB-11.03'BRC
DTB- 16 05' BTOC 1210- Brain Divice	1425 Bayin purse 1545- Well Stabilized / Final Reading
1210-Begin purge 0.2 purgerate	154) = Well Stabilized / Final Keading
()	lemp. 17 SCORP- 10,8 mV 1016. 459NTU Sala
6scale: 1 square =	- P.H - 5.89 SPC 0.140mS/cm DO 5.19 mc/ PTC Scale D. 1548-Cellert Simple [SW(-21-0237 ) FT
	Scale. 19

۶

	12/3/21
12-7-21 OVI Keyper & 2021 PEAS Sampling	Keypart 2021 PFAS Sampling
VISA Arous @ Marall-27	0800 Arnive asite, personel: S. hetarell,
NTW-4.60'BTD4	B. Haves, H. Hajek, H. Denis,
DTB-29.88 BTDC	K. Hoger,
500-Besin purse	weater 1. 42° raining
15 Well Stubilized /Final Reciding	0817 Cali 1 Lecy 451 # 205000312
temp-15.2 °C TUR6 - 2551 NTU	<u>Mumus Midday</u> eviny pHη Ω13 909 7.16
pH - 6 MG DO - 3.20m. /L	pH1 12 109 1.16
ORP81.4 mv Sal-0.08 ppt	ORP 221 2241 222.4
SPC - O. 164 ms/cm	SPC 1246-19913 162 1413
ORP81.4 mv Sul-0.08 ppt SPC-0.164ms/cm 1548-Sample (ollected GW-21-022) MS/MSD	Temp 9.2°C 8.5°C 18°C
	NEBO Safety Meetry
CX HODE ZSOML, Icentrifize)	0900 - Arnve @ MW-38.
1450-Crew off3.tc	DTW-2.30' BTCC
	DIB-50.25' BIDC
	0120. Begin purge
	1005- Well Stabilized / inc Reidy Tems-13.4 Turb-14,21 NTV
	Tema - 13.4 Turb-14.21 NTV pH - 7.66 DO - 3.34m./c
	0RP 10C.Sm/ Sal-0.37 ppt SPC - 0.76/w5/02
	1008 - Sampt Collected - 6M-21-637
	1000- AMPE CARCICA-JOINS
	[2xHppe 250ml, [x. centribise]
	Angeno C Sh
	Scale: 1 square = Scale: 1 square =
Scale: 1 square =	

	, 21
12-3-21 OUL Keyport 2021 PEAS Samply	123-21 OVI Keypert 2021 PFAS Sampl-
1030 - Arrive @ MW1-24	1228 - Arnive @ MW1-09
DTW-4.84 BTOC	DTB-60.88' BTOC
DTB-29.30'BTCC	DTW-6.05' BTOC
1050 - Begin purse	1230 Besin purse
- Well Stabilized / Final Reading	1305 - Well Stubilized / Final Reading
Temp - 14.6°C TURE- 101.76 NTU	Temp = 121°C Turb - SS.49NTU
01-318 AS/L	pH-7.03 DO-347ms/c
ORP-954 m/ Sal- Ollppt	ORP89,2 mv Sal- 0.38 ppt
$C \rho c + \delta \rho m + \epsilon / \epsilon$	SPC-0,764mS/cm
1123- Simple Collected 67M-ZI-020	1003 Collect armight process Collect
Dx HDPF 250 mL, I centritise	
1126- Sample Collected JGM-21-021-DVP	316- Arrive @ MW1-29
[Zx HDpEzsomi, Icentrifuse]	DTW - 8.45'BTOC
145 Arrive & MWI-10	DTB 39.63 BTOC
DTW- 4.71 / BTOC	1328- Begin Rirse
7TB-14.80' BTOC	1408- Well Stabilized/Final Keading
1155- Besin purse	Temp - 11.9°C Turb - 10.01 UTU
1220 - Well Sahlized	DH - 1.20 DU - 2140 ms 10
Temp-121 C 76-6-31.12 NTV	
pH-6.27 DO-4.87 ms/L	SPC-2.148 m from or a set
0RP-383ml Sal-0.09pt	1411-Sample Collected GM 21-025
SPC-U a vim)/m	LX TUPE ASUML, IX (ENTRINGE
1223 Collect Sample -GM-21-010	
[2xHD2F 250mL, Ix centurAise]	N 12821
Dan St B	
Scale: 1 square =	Scale: 1 square = Kite in the hain

	CONTENTS		Keyport PFAS Sampling 2021 12/6/2
AGE	REFERENCE	DATE	0900 K. Hopper on site soming
			B. Heines, H. Dennis, S. Icetterry, H.H.
			0905 Cal check whichber YSI
	3		Paraman Morning Mid-day Endolday
			Temple) 4.8 7 5.8
			<u>pH-7.04</u> 7.08
			Turb (ND) 0.05 121611 0.10
			DRP (mV) 239.5 / 236.2
	·		5 pland (5%) 1.413 [ 1.363
			allo 1775 brief, see sign in
			Sheet for topics the this
	5		a agra Onsite well MWI-6
· · · · · · · · · · · · · · · · · · ·		Be	DTW2 [ 8 19' btoc ] DTB-[70
		·	1004 Bestin purge @ 200milmin
· · ·	· · · · · · · · · · · · · · · · · · ·		Parameters Stabalize
	•		$\frac{1}{1} = \frac{13.5}{13.5}, PH = 6.37, GRP(mu) = 39.6$
			Sylon(Color)= 0.762 Turb (Ano)= 33,46 DO(-5/)=0.11
			$\frac{Sal(pp) = 0.38}{1000}$
	·		1045 Collect Sample GM-z1-008
			· ZX Z50mL HOPE, NP ~ PFAS
			· 1 × Centrituse tube, NP-
	· · · · · · · · · · · · · · · · · · ·		1049 Decon YSI + DTW probe
			1144 Onsite Well MWI-44
	<i>t</i> ,		$DTw = \begin{bmatrix} 3.56' & b + b \\ 570 & - b \\ 770 $
			$\frac{DTB = [27.65' b + oc]}{\frac{Scale: 1 + square}{1 + square}} = h - h - 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$

Neyport PFAS Sampling ZOZI 12/6/21 Keyport PFAS Sampling 2021 12/7/21 Bezin puze 150mc/min 1. Dennis, H. Najell, S. Kathenell, 12. Memor 1154 0800 Peristatic Pump failed, 1200 B. Huines ONSite begin more transiesnat, contact PINE Cal Check Muidbey YST 0815 Dovameter Morning | Mid-day PINE to replace pump 1 Evening by end of day, K. Hopper to Temp(") 9,0°C 5.2 6.8 assit H. Hayer nest of day 7.08 7.10 rH7 7.08 230,2m DRP(mU) 240.7 233.9 164 12/6/21 'SI end of day calcheck 1230 1.334 MS Sp Con (10%/m) - 06-1.414 End of day crew offs, te 1700 0840 Hts brief, see sign in Sheet for topsics twenther OGOZ Onsite well MNI-1 DTW= 5.00' 5+00 DTB = [17.43' broc 0905 Begin punge @ 150 ml/min 0941 Parameters Stabalize Temp= 12.8°C pH= 6.15 ORP = - 3.2ml Spland = 0.293-2 Turb = 7.97 NTO DO = 0.16 Mg/L Sal = 0.12 ppt 0995 Collect Sample GM-21-001 1x Centrifigent, 6 X Z50mL HOPENP (MS/MSD) PFAS per SAP 0952 Decon YST + Probe L 2 12/7/21 and a second sec Scale: 1 square = Scale: 1 square = Kite in the Ka

REYPOR PEAS Sampling 2021 12/2/21
1154 Decon YSI + Probe
1210 YSI Mid-day check
1238 Onsite well MWI-63
TDTB = 43.121  btoc
1242 Begin puge @ ZOOmL/min
Parameters Stabilize
$\frac{1 emp = 13.0 \ c}{ORp = -21.0 \ mV} \ s_{pGrd} = 0.950 \ mS_{pGrd}$
Turb = 10.07 NTO DO = 0.08 - 12/2
Sal = 0.4.74 0.47pm
EB14/7
1330 Collect Sample GM-21-056
• 1 × Centrifuge NP , 6 × 250 mL HORE NO
PFAS per SAP (MS/MSD)
1335 Decon YSI + Probe
1401 Onsite well PI-03
DTW = [7.65] btoc]
01B = L 18.00 670C ]
1405 Begin purse @ 200 m Umin
1429 Parameters Stabilize
Temp= 13.1°C ,04 = 6.34
ORP = -25.0  mV Splent = 0.781 mb/m
Turb = 4.11 NTO 100= 0.04 MAL Sal = 0.38 ppt
1433 Collect Sample GM-21-063
1× Centrifinge NP, ZX Z5DinL. HDPE NP
Scale: 1 square = has not not the first fi

Keyport PEAS Sampling 2021 12/8/21 Keyport PFAS Sampling 2021 12/2/21 0800 H. Hajek, K. Hopper, S. Kettlewell Becon YSI + Probe 1001212 1443 Collect Sample GM-21-064 H. Dennis, B. Haines ensite 0810 YSI Callbratton, whidebey 0 1x Centrifige NP · ZX 250ml APTE PFAS per Sap ( Field Duplicate) Parameter Morn Noan Leventry 1447 Decon YSI + Probe Temp(21 7.6% 83 8.1 Onsite well PI-02 ORP (10) 24.7 219.8 1459 CON42 1.307 1.349 1.352 DTW= [7.66'6+0C] DTB = [17.61'440c] PH7 7.15 7.1417.12 Begin Punge @ 150mL/min 0830 Hts briefing, see signin 1501 Parameters Stabilice + 3x Cash Sheet for topics + weather 1604 Temp = 11.5° ( 104= 6.38 0900 Onsite well Mul-64 ORP = -23.0 mV Spleid = 1-717 mg/m DTW= [ 7.49' bloc ] Turb = 32.23 NTO DO= 0.03 m3/L DTB = 1 57.75' broc Sal = 0.87 ppt 0907 Begin punge @ ZOOm Linta Collect Sample GM-21-062 0947 Parameters Stabilice 1610 Temp= 11.5°C p.H= 6.69 " IX Centrifuge NP 2X 250 mL HOPE NP PFASper SAP ORP= -11.2 mV Spland = 0.883-5/cm YSI end of day cal cleell Tun=6.64 NTU DO= 0.09-11/L 1630 1650 End of day desite Sal = 0.44 pp+ 0450 Collect Sample GM-21-057 0/x Centrifue NP, 2x 250ml HDMEAN PFAS per SAP 0954 Decon ISI torobe 12/8/24 (F) Scale: I squa Rite

Report PFAS Sampling ZOZI 12/8/21 Keyport PFAS Sampling ZOZI 12/8/21 0956 Onsite Well MWI-Z 1136 Decon YST + Probe DTW=1 6.95 "btor 1140 Onsite well MWI-41 DTB = [ 21.00 / btg 7 DTW= [7:42' btoc 7 0958 Begin purge @ 200 ml/mm DTB = [ 17.65' btoc ] 1026 Parameters Stabilizo 1145 Begin punge @ 200ml/min Temp=11.5 C pHz 6.78 parameters Stabilize ORP = 14.1mV Sycand = 0.671 % Temp= 12:3°C pH= 6.00 Turb = 14.26 NTO DO = 0.33mg/1 ORP = -38.0 mV Spland = 0.900+560 Sal = 0,33 ppt Turb = 5.47 NTU DO = 0.07-9/L 1028 Collect Sample GM-CI-CO4 Sal = 0.45 pt 1210 Collect Sample GM-ZI-029 · IX Centrifuge NP ZX 250mL HOPE MP PFAS per SAP · IX Contribuge NP, ZK 250mL HORE NP 1034 Decon YST + Probp PFAS por SAP 1050 Onsite well pl-ol 1212 Decon VSI + Probe DTW= [ 7.09' 6+00 ] 1215 YSI Mid-day Check DTB = [ 17.13 6toc 1253 Onsite well IMWI-4 1054 Besin puge @ 100ml/min DTW= [6.14 btc 1128 Parameters Stabilize DTB = [ 27.60 '6+0c ] Temp= 11.9°C pH= 6.36 1757 Begin purge a 150ml/min ORP = -44.3 mV Syland = 0.831 m/m 1329 parameters Stabilize Turb=13.89 NTU DO=0.06-19/L Temp = 13.0° pH= 7.03 Sal = 0.41 ppt ORP = - 41.9 mV Spland = 0.989 m/cm 1132 Collect Sample GM-21-061 Ture = 4.33 NOV DO = 0.09 mg/L · IX CENTIFUSE NP ZX Z50ML HOPE Sal = 0,49 ppt ALL CONTRACTOR PFAS per SAP 2/8/21 8) Seate I square = in in 12/8/21 Scale + square = Kite in the Ra

Keyport PFAS Sampling 12/8/21. 1333 Collect Sample GM-2-002 · IX Centrifuge NP ZX ESCALHOFENP PFAS per SAP 1340 Collect Sample GM-21-003 · 1 × Centrifiqe NP, ZX 250mL HPPE NP PFAS per SAP (Field Duplicate) 1341 Decon VSI + Probe 1342 Onsite well MWI-18 DTW = [ 6.15 16+00 DTB = [ 20.45 16+0c\_ **E**in 1346 Begin purge @ 150ml/min 1410 Parameters Stabilize Temp=10.9°C pH= 6.62 ORP = -12.8 . V. Sp Cand = 0.312 - 5/cm Turb = 89.98 NTU DO = 0, 15-9/L Salt O.15 ppt 45 Collect Sample GM-ZI-016 · 1 × Centrifuge NP, Tx Z50m HOPENT PFAS per SAP 1418 Decon YST + Probe 1427 Onsite to Demose YSI End of day calcheck 430 1455 11. Hopper + B. Hames offsite to Ship Samples end of day 12/3/20 Scale: 1 square = Rite in the Rain

24			12/6/21
	CONTENTS		Kepost ZozipFAS Sampling
PAGE	REFERENCE	DATĘ	0830 - Annue ansite. Personnel:
	· · · · · · · · · · · · · · · · · · ·		D. Haines S. Kettelweil
	1		weather: 37 of purtly cloudy
			CGI Check YSI # 44500
			Morning mid-Duy End of Day
			PH- 6.91 7.86-27.00 7.01
	×	:	Specond: 1.518-1.574~5/64 1.4733
	· · · · · · · · · · · · · · · · · · ·		DRP 260,2nv 262.9 248.7
			- TURBAL 121.76 NTU
			- Teme 4.2 6.9 5.7
			- 20 Health and sufety meeting
			Topics - Black berries, wildlife
		,	
			$- \mathbf{E} = \frac{1}{2957} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{294} \frac{1}{2957} \frac{1}{$
		· · · · · · · · · · · · · · · · · · ·	The brain burge
			- 1032 BH collect Sample mut 56 changel
			X2 250mL - HDPE, no presentive
		······	- PH- 7.25 ORP-121. 2mv, SPC-01490 Mycm
			TURG-38.11 NTV, DO-0.52 "31 SAL-0.23 PPT
			-
			DTR=12.68
			- Beg , Poras BIH
			- CGILEd DMa to CINFIEN MW1-56 Chunnel total destably
•	• :		
			Scale: 1 square =

12/6/22 11-11-12	12/6/21
1107 Nerfort 2021 PFA 3 Sumpling	Keypost 2021 pEAS Sumpling
1207 mwl-55	-1509 DN=6.22, DTB=16.37
119 $PTU = 41.92$ DTB = 34.33	Att 2 yr Begin punge
HZ+7 SNBCGIN Purge	1554 Collect Sumpe 6 mu-obb
11:23 collect Sample GM-21-644	X2 250 ML HOPE, no preservatie
X6 250mL HDPE, none preserved	Temp-11.4 Fo pH-8.08 ORP-70.1 mu
Temp-11.2 FO, PH-7.64, ORP-137.000	SPC-0.261 Mb/cm TW6-0.18 NTU,
Spc-0.252ins/cm, TUT6-12.14/NTU,	DO-0.31 M31, SAL-6.12PPY
Do -0.60 -3/L, Sal - 0.12 PPT	Thed Several batteries before
1211 MW1-04	Switching out pump. Finally
DTW= 6.31, DTB = 15.03	was affie to get water plow
1230 Begin purge	For well
1250 collect Simply 6 m-21-006	1700 packegingment into sted.
XZ 250 ML HDPE Unpreserved	CPDSite.
TEMP-11. 410 PH-8.46, ORP-147.000	
58C-0.256 ~3/cm, TUrb-5.48,	
Do - 2 39-9/2 SAU-0-121PT	
1302 mw1-54	
DTW=5.31, DTB= 39-1484 41.02	
1312 Begin purge	
1337 Collect Sample 6-21-043	
XZ 250ml HDPE, NO Preservative	
Temp-10 19, pH-7.66, oRp-158.7 mm;	
SPC-0.202~5/cm, JUF6-10.77 NTU	
DO-1-147-312, SAL-0-10 PPT	
1407 P1-69	
Scale: 1 square = B)}	Scale: 1 square =

	- 12/7/21
127/21 Kerpar7 2021 PFAS Simpling	Key post 2021 PEAS Sampling
0800 prive onsite. persanel B, Haines;	DTW=4,81, DTB=24.62
The Ketavell, H. Haven, N. Hopper	10/11 DEGIN purge
0815 callifration check # 44500	1049 collect Simple Gm-21-045
marning mid-day End-of Bay	XZ 250 mL HDPE, 10 preservative
947 6.76 6.91 6.89	T. 101 011-141 00 0.54.9
SPC-140 1.422 1.681 mg cm 1.430 cm	SPC-0.428-5100, TW6-11.43 NTV,
ORP210 261.9 ml 260.3 ml 255,5 ml	DO-0.30~3/L, 541=0.21987
weater - 41°, cloudy	
0840 Hearth and Safety neeting	DTW = 1.15, $DTB = 74.30$
TOPICS - Wild life, black berries,	1145 Begin punge
traffic, Lovid-19	1215 collect Sample 6m-21-051
0357 MW1-56 Ch. 0	X2 HDPE 250ml " no preservative
DTW=28.85, DTB=29.62	TCmp-10,10, pH-7.54, DRP-10318mu,
Screen interval Should 33,75-34.25	5PC-01243-5/cm, TURE-30,12 NTV,
screen is buried inot enough	DO-037-3/L ,541-0.128Pt
vator to sample	1227 mid - day cal - check
0859 mw1-56, ch. 1	1232 MW1-50
DTU25:53 DTB= 12.412	DTW=7.85, DTB=17.19
Besin purze	1233 Begin pinge
0945 collect simple 6-21-646	
X2 250 ml HDPE, so preservative	XZ 250ml HDPE no Peterlative
TEMO-115 P OH-6.73, OR -25.0-V	TC-n0-1166 0H=7.45 02P=83.8 mV
576-0.546 M3/0m, TURG- 8.77 NTU,	SPC -0-226 notion, Turb - 8.01 NTU
DO-0.41-3/L, SAL-0.27 PET	· Doro-29 ~5/L, Sal-0.11 ppt
0150 muj-56+ch-2	
Bcale: 1 square =	Societ Synore =

DI717021 Reyport 2021 PEAS Sampling	Keyport 2021 PFAS
1320 Help SK sample at MW1-58	
1405 Arrive @ MUVI-31	S. Kettelivell K. H
DTW=4.56'BTOC	H. Hewsen
DTB-23.08 BTDL	Weater: 42°, 1
1417 Rump on Begin purge	
1454 Collect sample: GM-21-026	Morning mid-d
22 HDPE, ix contribuse tribe no preservative	PH- 6.82 6.90
Temp=15.6 °C, pH=6.14, DED=25.0 mV	ORP 260 7 261.7
SPL= 0.228 =5/cm Turb = 17.69 NTU	101 1.10
PO=0.31 ng/L Sal=0.11 pst	TC+9 8.2 714
1510 mw1-11	0830 Hearth and Sal
DTW= 52.51, DTB= 60.77	Topics: Traffic
1517 Begin Purge.	
1557 collect Sample con-zi-oil	0100 nw1-23
	DTW= 2.49
1607 collect sample Gm-21-012	0915 Begin purge
XZ HDPE, 250-12 ronpresentle	600
Temp-14.60° PH-6.15 02P-90.8m	XZ 40PE 250-L
	Tenp-13,3° qH.
00-0.36 m3/L Sal - 0.11 PPT	5pc-0.370 ms/cm, TUro
1450 infactived earingment	Do-0.44-312, Sul
ottsite.	1017 MW1-23
	DTW=9.14 D
	1023 Begin purge
B	1108 collect sample
Scale: 1 square =	Scale. 1 square =

personal: B. Henres topper, H. Dennis, raining. W 451 # 44500 duy Evening 7,06 250.2 1.697 32: 2+7 trips/sips, A - J , DTB= 33.71 6m-21-028 L, inpeserved - 8:30, 02 P. 75.8 - 43 6-12,22 NTU, 1-0.18 PBT DTB=30.02

6-21-019

Pito

A

12/8/21

Sampling

12/8/21	VEXP 2 DOL ATIC TO - DOL															
	X2 250mL HADPE MPREServed		i. 1		г і Г. і	1	,			•		•	F I		, , ,	
	TCMP-13.2, PH-7.66, ORP-127.7 mV,		1 1	4 . I 4 I	 	· · · · · · · · · · · · · · · · · · ·		5 1	1 .r 1 1	· · · · · · · · · · · · · · · · · · ·	• • •		1 1 1		1	
	58C-0.258 M5/cm, Turb-20.04 NTU		, r	i i i i	1 1 1 1 1 1	1 1	1	1 . 1 . 1	1 1 1 1	· · ·		· · ·		1	4 3 1	
1 1 1 1	Do-0:49 -3/L, 54L-0:13 P8+	-	1	1 1 1 1	 	, i . i	1 1 1		1 1 1 1	1	1 1 1	· · ·		4		
11472	$m\omega = 6\sigma$		4 		1 1 1 1	1 1 1	, ,	1	ء ا ۽ ا	1	1 1 1		1 	1	1	
	DTW = 9.38, $DTB = 27.97$		1 1 1	+ 1 + 1	r i r , r		1	1 1 1	1 1 1 1	· · · · · · · · · · · · · · · · · · ·	· · · ·	1		\$i 1		
indi	Begin puise		ة. ادر 1	, ,	1           	· · · · · · · · · · · · · · · · · · ·	1 1 1	1 1		r F	. 1 1	4 		- 1 	1	2.
	Collect Shapir Gar-21-052		1 1	· ·	· ·		, ,	+  	1 1 1 1					4		
	XZ 250me HDPE non preserved			· · ·	, .i , , , , ,	· · ·	1 11 16 - 1	1 1 5	1 1 1 1	1 1 1	· ·	1 1 1	1 1 1	· · ·		
1231	collect Sumple Com-21-053			1. 1. 1.	• <u>•</u> ••		1 - 1 - 1	8 2 3 8	1 1 1 1		· · ·	<u> </u>	1 # 8	1 1 1	· .	<u></u>
	XZ ZSON LILDEE non prescrived		· · · · · ·	1 1	1 1 1 1 1 1	1 1 1	· · · ·	1 1	1 I		· · · ·	1 1- 1-	1 1 1	· · ·	!	
	-10-00-11.62, 814-7.66, ORP-116.1~V,		1 1	•	· · ·	1 1 1	1	1 <sup>1</sup> . 1			- I I K	, )   	· · · · · · ·			
1 1	Spc-0.300 45/cm, TU16-21.87 NTU		1 	1 · · ·		· · ·	· · ·	1 1 1 4	ь а ь з т т						F F	
	DO-0.53~3/L , SAL - (0.14) PT		1 1 1			1		4		. 1 . 1	1	1		1 1 1	- 1 - I	
	mw1-28			1 1 1 1	1   1 1   1 1   1			1	1 1 1 1	· · ·	· · · · · ·			1		
	DTW = 3.86 $DTB = 44.00$		· · · · · · · · · · · · · · · · · · ·	r 1	, , , ,	· .	4 1 1	i t	1				1 1	, , ,	•	
13/1	Begin puge			• : • •	1 1 1 1	ן אין 1 אין 1		• 1	1	1- 1 1 - 1 1 - 1	1		1	1 1 1	1	
	collect samply CM-21-024		1 1 1	1   .	1 1 1 1 1 1	1 1 1	k k	; ;	- - -	. r	+   			1		
	XZ HDPE 250 mi, inpreserved			1 1 1 ~ 3	· · · ·		E L	, ,	1 1 1	1 1 1	1		1	1 1 1 1		
	Irmp-11.76, PH-7.12, 012-52.7mg		1 1 1		1 <u>, 1</u> 1 1	) 	standard and a standa	1 1 1	1		1	1 1 1	· · · · · · · · · · · · · · · · · · ·	1 1 1	, i , i	
	Spc-1.403 45/cm, TUT6-1207 NTV,		1	<u> </u>	1 1 1 1 1 1	· · ·	1 1 1	1 4 4.	1 I	, , , ,	1 1 1	1 1 1	;	* *		
	DO-D-47-3/L, 5A1-2.71 PPT		1 1 1		1 - 1 1 - 1		3 1 4	1	1 1			1 1 1			· · ·	<u> </u>
	Pack Sangles. K. Hoper		1 1 1	1	, r r r , r	1 1 1		1	- 1 - 1 - 1	 	1 1 1	1		1	1 1 1	
	and B. Haires Affsite	-	1 1 1	1 1 1	1 r r :	1 1	1 1	1	: ;	· · ·		r 1				
			4	1	· · ·	1 - 1 - 1	1 1 1		1	1 1 1 1		1   		k J	1 5 1	
Scale: 1 squ		STL -	Capter	1.000	<u> </u>						. 1			24	the Rai	
	-D7T		Scale:	. i squ	are =		a al		,	an an a			Λi	le in 2	the Tai	n. 

Appendix B Data Quality Assessment Report This page intentionally left blank.

### APPENDIX B. DATA QUALITY ASSESSMENT REPORT

The purpose of this Data Quality Assessment Report, presented as an appendix to the 2021 Groundwater Monitoring Report, is to determine whether the data set collected in December 2021 at Naval Base Kitsap Keyport, Washington, meets the data quality objectives outlined in the Tier I Uniform Federal Policy Sampling and Analysis Plan (SAP) (Department of the Navy [DON] 2021).<sup>1</sup>

A quality assurance (QA)/quality control (QC) program was implemented during the field investigation to ensure the generation of data of adequate and defensible quality. The specifications for the QA/QC program are outlined in the SAP (DON 2021).1 The QA/QC program was designed to minimize error, provide early identification and correction of potential problems, control the data acquisition process, and evaluate the performance of the sampling program. The QA/QC procedures were followed in the field as well as at the offsite laboratories.

The data evaluation in this report focuses on environmental samples collected for offsite laboratory analysis. Field data (including measurements of water quality parameters in water) were collected using standard operating procedures and manufacturer-recommended procedures to provide reliable results.

### **B.1 TEST METHODS AND LABORATORY QUALIFICATIONS**

The groundwater and associated QC samples were collected in December 2021 and analyzed by Eurofins Lancaster Laboratories Environmental, LLC (ELLE) in Lancaster, Pennsylvania for per- and polyfluoroalkyl substances (PFAS) using an isotope dilution analytical technique of liquid chromatography with tandem mass spectrometry in compliance with Department of Defense Quality Systems Manual, Version 5.3, Table B-15. The samples collected are presented in Table B-1.

The laboratory holds current accreditation for the scope of testing through the Department of Defense and Washington Department of Ecology Environmental Laboratory Accreditation Programs.

### **B.2 FIELD QUALITY CONTROL SAMPLES**

In accordance with the SAP (DON 2021),<sup>1</sup> applicable field QC samples include field duplicates and field blanks. The required field QC samples were collected. Additional

<sup>&</sup>lt;sup>1</sup> Tier I Sampling and Analysis Plan for Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site at Naval Base Kitsap Keyport, Keyport, Washington. Prepared by EA Engineering, Science, and Technology, Inc., PBC. Final. October 2021.

volumes for the preparation of matrix spike (MS)/matrix spike duplicate (MSD) samples were also collected and are discussed in Section B.3. A description and evaluation of each field QC sample type is presented in the following sections.

#### **B.2.1 Field Duplicates**

A field duplicate set consists of two samples (an original and duplicate) of the same matrix collected at the same time and location, to the extent possible, using the same sampling technique. The purpose is to evaluate the precision of the overall sample collection and analysis process by comparing the results for the two samples, including the calculation of the relative percent differences (RPDs) for detected analytes. For the December 2021 sampling event, the following field duplicate sets were collected:

- Primary sample GM-21-002 and field duplicate sample GM-21-003
- Primary sample GM-21-011 and field duplicate sample GM-21-012
- Primary sample GM-21-020 and field duplicate sample GM-21-021
- Primary sample GM-21-033 and field duplicate sample GM-21-034
- Primary sample GM-21-052 and field duplicate sample GM-21-052
- Primary sample GM-21-063 and field duplicate sample GM-21-064

The results for the field duplicate set are summarized in Table B-2. When target analytes were detected at concentrations greater than the limits of quantitation (LOQs), the RPDs for the results of the field duplicate set are within QC limits, with the following exception. For the field duplicate set consisting of samples GM-21-033 and GM-21-034, the RPD for perfluorohexanesulfonic acid was above the QC limit of 30 percent. The detected results for this analyte in the field duplicate set were qualified as "J" during data assessment. The variance in results is attributed to results near the LOQ (more specifically, within a factor of three of the LOQ), where higher RPDs are common.

#### **B.2.2 Field Blanks**

Field blanks are samples of analyte-free water opened at the site and exposed to ambient conditions, collected each day and associated with samples collected the same day. Three field blank samples were collected during the 3-day sampling event. The field blank results are summarized in Table B-2. No target analytes were detected in the field blanks; thus, no associated sample results were qualified on the basis of field blank results.

#### **B.3 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL**

The chemical analyses were performed in accordance with the SAP (DON 2021)1 by ELLE.

MS/MSD sample pairs were prepared by the analytical laboratory using samples designated on the chain-of-custody records at an appropriate frequency and for each preparatory batch. At the laboratory, known concentrations of target analytes were added to the sample material to prepare the MS/MSD samples. The MS/MSD samples were carried through the preparation and analytical procedures in the same manner as the associated field samples. The percent recoveries (%Rs) and RPDs of the spiked analytes in the MS/MSD samples were used to evaluate the effect of the sample matrix on accuracy and precision.

Additional laboratory QC samples (method blanks and laboratory control samples [LCSs]) were prepared alongside samples and each sample and QC sample was spiked with internal standards during sample preparation and analyzed as required by the Department of Defense Quality Systems Manual, Version 5.3, Table B-15 and as specified within the SAP (DON 2021).1 These samples and spikes were used to perform the internal laboratory QC prior to the delivery of data. The laboratory's evaluation of the QC results includes comparison to the internal statistically generated control charts as well as the project limits presented in the SAP (DON 2021)1 to allow detections of trends or bias in the generated results.

### **B.4 DATA VALIDATION AND APPLIED DATA QUALIFIERS**

Data validation was performed in accordance with the SAP (DON 2021)1 by a thirdparty, Laboratory Data Consultants in Carlsbad, California, as described in the data validation reports presented in Attachment C-1. A minimum of 10 percent of sample data were validated at Stage 4 and the remaining data were validated at Stage 2B, as defined in the Department of Defense General Data Validation Guidelines (November 2019) and Module 3: Data Validation Procedures for PFAS Analysis by Quality Systems Manual Table B-15 (May 2020).

Associated sample results may be qualified when QC requirements are not achieved to determine the impact to associated sample results. Data were qualified during validation, as described below.

- Extraction and analytical holding times were met for the initial extractions and analyses performed on the samples. However, the 14-day extraction holding time specified in the SAP (DON 2021)<sup>1</sup> for PFAS was exceeded for 19 re-extracted samples. Detected and non-detected results reported from the re-extracted samples have been qualified "J" and "UJ," respectively.
- Perfluorooctanesulfonic acid (PFOS) was detected in two method blanks at a concentration below the limit of detection (LOD). A detectable PFOS result within five times the method blank concentration and equal to or slightly greater than

the LOQ was reported for associated samples GM-21-022, GM-21-026, GM-21-034, GM-21-058, and GM-21-065; these five sample results were qualified "J."

- The ion ratio was outside QC limits for one or more target analytes for several samples. There were 16 occurrences for this issue; impacted detected PFAS results have been qualified "J" on this basis.
- The %R was outside QC limits for one or more extracted internal standards (labeled compounds) for several samples. In accordance with the applicable data validation guidelines, results associated with these labeled compounds in associated samples have been qualified as follows.
  - The "R" qualifier was applied to detected and non-detected results when the %R was below 20%. There were 52 "R" qualifiers applied on this basis. Note the data validation applied "X" qualifiers in these instances; during data assessment these were updated to "R" qualifiers.
  - The "J" qualifier was applied to detected results when the %R was outside QC limits and greater than or equal to 20%. There were 9 occurrences for this issue;
  - The "UJ" qualifier was applied to non-detected results when the %R was less than the lower control limit and greater than or equal to 20%. There were 68 qualifiers applied on this basis.
- For one LCS, the %Rs for two analytes were 69 percent, which was slightly below the applicable lower QC limit. The non-detected results for these analyses in associated samples have been qualified "UJ" on this basis.
- GM-21-023 was used to prepare MS/MSD samples for PFAS. The %Rs for two analytes (perfluorotridecanoic acid and 11-chloroeicosafluoro-3-oxaundecane-1sulfonic acid) were below the lower QC limit in the MS and MSD and below 10 percent in the MSD. The non-detected results for these analyses in the primary sample have been qualified "R" on this basis.
- Sample GM-21-044 was used to prepare MS/MSD samples for PFAS. The %Rs for three analytes were slightly below the lower control limit in the MS and/or MSD; these %Rs ranged from 65 percent to 71 percent. The non-detected results for these analyses in the primary sample have been qualified "UJ" on this basis.
- Sample GM-21-056 was used to prepare MS/MSD samples for PFAS. The %Rs for two analytes were below the lower QC limit in the MS. The non-detected results for these analyses in the primary sample have been qualified "UJ" on this basis.

Additional qualifiers were applied during data assessment, as described below.

- Groundwater samples GM-21-033 and GM-21-034 were submitted as a primary and field duplicate pair. The RPD for the primary and field duplicate sample results were outside the QC limit for perfluorohexanesulfonic acid. The detected results for this analyte reported for the primary sample and associated field duplicate sample have been qualified "J."
- For one preparation batch of samples, it was observed that extracted internal standards had %Rs approximately double the expected values. Due to the possibility that the samples were double spiked with internal standards, the associated detected results were qualified as "J" during data assessment. This occurred for 15 detected results.

In addition, more than one analysis was performed and reported by the laboratory for most samples and target analytes. In these cases, the data validator selected a "best" result for each target analyte based on professional judgement. The results not selected as the "best" results in these cases are not discussed in the above bullets and are not presented in the 2021 Groundwater Monitoring Report.

No other qualifiers were added to the analytical results for project samples during validation. The qualifiers added to project data during data validation are summarized below.

- The "J" qualifier indicates that the reported result is an estimated value.
- The "R" qualifier indicates that the result is rejected.
- The "U" qualifier indicates that the analyte is not detected; the associated numerical value is the limit of detection or as qualified during data validation.
- The "UJ" qualifier indicates that the analyte is not detected; the associated numerical value is approximate.

Sample results as qualified are presented in the 2021 Groundwater Monitoring Report.

### **B.5 DATA QUALITY INDICATORS**

A discussion of data quality indicators for this project in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity is provided in the following sections.

### **B.5.1 Precision**

Precision is defined as the degree of agreement among repeated measurement of the same parameter. Precision also characterizes the natural variation of the matrix. Precision is evaluated through the use of field duplicate samples and MS/MSD sets to

assess the potential bias of field and laboratory conditions on the results. The quantitative indicator of precision is the RPD between the results of field duplicates and the associated primary samples and the MS/MSD pairs.

Field sample duplicate RPDs are within the SAP (DON 2021)1 QC limits, unless otherwise noted in Section B.2.1 and Section B.4. Field duplicate samples were generally within control limits and overall demonstrate that representative samples were adequately collected during field activities and that the laboratories were capable of evaluating the matrix consistently.

MS/MSD RPDs are within the SAP (DON 2021)1 QC limits, unless otherwise noted in Attachment B-1. No sample results were qualified on the basis of MS/MSD RPD.

#### B.5.2 Accuracy

An evaluation of accuracy monitors the agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or internal standard; accuracy is measured by the %R for spiked samples (LCS, MS/MSD) and internal standards. LCS and MS/MSD samples were analyzed in accordance with the SAP (DON 2021)1 specifications. LCS, MS/MSD, and internal standard %Rs were within acceptable project-specified QC limits, unless otherwise noted in Attachment B-1 and in Section B.4. In most cases, the project goal for accuracy was met.

#### **B.5.3 Representativeness**

Representativeness is a qualitative parameter that expresses the degree to which the sample data are characteristic of a population, parameter, or environmental condition.

Representativeness is most concerned with the proper design of a sampling system and careful selection of sampling locations. Representative data were obtained through selection of sampling locations, sampling procedure collection, handling of samples, and the use of established field and laboratory procedures as described in the SAP (DON 2021)1. These procedures were followed during the sampling event unless otherwise discussed in the 2021 Groundwater Monitoring Report, of which this report is an appendix. An appropriate analytical method was utilized to meet the data quality objectives of the project.

#### **B.5.4 Completeness**

Completeness is a measure of the amount of usable data obtained versus the total possible planned data. The evaluation includes a comparison of the number of valid results divided by the possible number of individual results, expressed in a percentage.

The data completeness is defined as the percentage of usable data (usable data divided by the total possible data):

% completeness = <u>100 \* number of valid results (i.e., non-R flagged)</u>

number of planned results

Completeness for the data set is less than 100 percent due to the following:

- The sample from well MW1-56 channel 0 (with a screen depth of 33.75 to 34.25 feet below ground surface) was not collected because the well screen was buried and there was no water to collect a sample. Thus, results for 18 PFAS analytes were not obtained.
- A quantity of 52 results were qualified as "R" (i.e., rejected) due to internal standard %R below 20%.
- A quantity of 2 results were qualified as "R" (i.e., rejected) due to %R below 10% for the MSD.

There was a total of 1,224 planned results for 18 PFAS target analytes for samples collected from the 59 well locations, 6 field duplicates, and 3 field blanks. As detailed in the bullets above, there are 1,152 valid results. The % completeness for this data set is 94.1%, which meets the 90% minimal acceptance criteria for completeness specified in the SAP (DON 2021).<sup>1</sup>

#### **B.5.5 Comparability**

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared with another. Sample results should be comparable with other measurements for similar samples and sample conditions. Comparability for the project was achieved by using standard protocols for sampling and analysis.

#### **B.5.6 Sensitivity**

Sensitivity was evaluated by comparing the screening levels with the LODs for each sample result. As presented in the SAP (DON 2021)<sup>1</sup> and as reported for the collected sample data, LODs are below the screening levels; therefore, the project goal for sensitivity was met.

#### **B.6 OVERALL ASSESSMENT OF DATA**

During data validation and assessment, 54 results were rejected and should not be used for any purpose. The remaining results are acceptable for use as qualified.

This page intentionally left blank

Tables

This page intentionally left blank

	Field Sample	Collected	QC			Laboratom	
Location ID	ID	Collected Date	Туре	Matrix	Primary Sample ID	Laboratory Sample ID	Laboratory
1MW-1	GM-21-001	7-Dec-2021	N	Groundwater		410-66194-6	ELLE
1MW-4	GM-21-002	8-Dec-2021	N	Groundwater		410-66184-1	ELLE
1MW-4	GM-21-002	8-Dec-2021	FD	Groundwater	GM-21-002	410-66184-2	ELLE
MW1-2	GM-21-004	8-Dec-2021	N	Groundwater		410-66173-3	ELLE
MW1-3	GM-21-005	7-Dec-2021	N	Groundwater		410-66189-9	ELLE
MW1-04	GM-21-006	6-Dec-2021	N	Groundwater		410-66202-11	ELLE
MW1-05	GM-21-007	6-Dec-2021	Ν	Groundwater		410-66202-3	ELLE
MW1-06	GM-21-008	6-Dec-2021	Ν	Groundwater		410-66202-7	ELLE
MW1-09	GM-21-009	8-Dec-2021	N	Groundwater		410-66184-3	ELLE
MW1-10	GM-21-010	8-Dec-2021	Ν	Groundwater		410-66184-4	ELLE
MW1-11	GM-21-011	7-Dec-2021	Ν	Groundwater		410-66189-4	ELLE
MW1-11	GM-21-012	7-Dec-2021	FD	Groundwater	GM-21-011	410-66189-5	ELLE
MW1-14	GM-21-013	8-Dec-2021	N	Groundwater		410-66173-6	ELLE
MW1-15	GM-21-014	7-Dec-2021	Ν	Groundwater		410-66194-14	ELLE
MW1-17	GM-21-015	6-Dec-2021	Ν	Groundwater		410-66202-13	ELLE
MW1-18	GM-21-016	8-Dec-2021	N	Groundwater		410-66184-5	ELLE
MW1-20	GM-21-018	7-Dec-2021	N	Groundwater		410-66189-2	ELLE
MW1-23	GM-21-019	8-Dec-2021	N	Groundwater		410-66173-5	ELLE
MW1-24	GM-21-020	8-Dec-2021	N	Groundwater		410-66184-6	ELLE
MW1-24	GM-21-021	8-Dec-2021	FD	Groundwater	GM-21-020	410-66184-7	ELLE
MW1-25	GM-21-022	8-Dec-2021	N	Groundwater		410-66184-8	ELLE
MW1-27	GM-21-023	7-Dec-2021	N	Groundwater		410-66189-11	ELLE
MW1-28	GM-21-024	8-Dec-2021	N	Groundwater		410-66184-9	ELLE
MW1-29	GM-21-025	8-Dec-2021	N	Groundwater		410-66184-10	ELLE
MW1-31	GM-21-026	7-Dec-2021	N	Groundwater		410-66194-10	ELLE
MW1-38	GM-21-027	8-Dec-2021	N	Groundwater		410-66173-8	ELLE
MW1-39	GM-21-028	8-Dec-2021	N	Groundwater		410-66173-4	ELLE
MW1-41	GM-21-029	8-Dec-2021	N	Groundwater		410-66173-7	ELLE
MW1-42	GM-21-030	7-Dec-2021	N	Groundwater		410-66194-5	ELLE
MW1-43	GM-21-031	6-Dec-2021	N	Groundwater		410-66202-15	ELLE
MW1-44	GM-21-032	6-Dec-2021	N	Groundwater		410-66202-16	ELLE
MW1-45	GM-21-033	7-Dec-2021	N	Groundwater		410-66194-13	ELLE
MW1-45	GM-21-034	7-Dec-2021	FD	Groundwater	GM-21-033	410-66194-8	ELLE
MW1-46	GM-21-035	7-Dec-2021	N	Groundwater		410-66194-3	ELLE
MW1-47	GM-21-036	7-Dec-2021	N	Groundwater		410-66194-2	ELLE
MW1-48	GM-21-037	6-Dec-2021	N	Groundwater		410-66202-2	ELLE
MW1-49	GM-21-038	6-Dec-2021	N	Groundwater		410-66202-6	ELLE
MW1-50	GM-21-039	7-Dec-2021	Ν	Groundwater		410-66194-11	ELLE
MW1-51	GM-21-040	6-Dec-2021	Ν	Groundwater		410-66202-17	ELLE
MW1-52	GM-21-041	6-Dec-2021	N	Groundwater		410-66202-4	ELLE
MW1-53	GM-21-042	6-Dec-2021	N	Groundwater		410-66202-1	ELLE
MW1-54	GM-21-043	6-Dec-2021	N	Groundwater		410-66202-8	ELLE
MW1-55	GM-21-044	6-Dec-2021	N	Groundwater		410-66202-9	ELLE
MW1-56	GM-21-045	7-Dec-2021	N	Groundwater		410-66189-8	ELLE
MW1-56	GM-21-046	7-Dec-2021	N	Groundwater		410-66189-3	ELLE
MW1-58	GM-21-048	7-Dec-2021	N	Groundwater		410-66189-7	ELLE
MW1-58	GM-21-049	7-Dec-2021	N	Groundwater		410-66189-13	ELLE
MW1-58	GM-21-050	7-Dec-2021	Ν	Groundwater		410-66189-1	ELLE

 TABLE B-1.
 Sample Summary

Location ID	Field Sample ID	Collected Date	QC Type	Matrix	Primary Sample ID	Laboratory Sample ID	Laboratory
MW1-59	GM-21-051	7-Dec-2021	N	Groundwater		410-66189-6	ELLE
MW1-60	GM-21-052	8-Dec-2021	Ν	Groundwater		410-66184-11	ELLE
MW1-60	GM-21-053	8-Dec-2021	FD	Groundwater	GM-21-052	410-66184-12	ELLE
MW1-61	GM-21-054	6-Dec-2021	Ν	Groundwater		410-66202-14	ELLE
MW1-62	GM-21-055	7-Dec-2021	Ν	Groundwater		410-66194-1	ELLE
MW1-63	GM-21-056	7-Dec-2021	Ν	Groundwater		410-66194-4	ELLE
MW1-64	GM-21-057	8-Dec-2021	Ν	Groundwater		410-66173-9	ELLE
MW1-65	GM-21-058	8-Dec-2021	Ν	Groundwater		410-66173-11	ELLE
MW1-67	GM-21-059	8-Dec-2021	Ν	Groundwater		410-66173-1	ELLE
MW1-68	GM-21-060	6-Dec-2021	Ν	Groundwater		410-66202-5	ELLE
P1-1	GM-21-061	8-Dec-2021	Ν	Groundwater		410-66173-10	ELLE
P1-2	GM-21-062	7-Dec-2021	Ν	Groundwater		410-66189-12	ELLE
P1-3	GM-21-063	7-Dec-2021	Ν	Groundwater		410-66194-9	ELLE
P1-3	GM-21-064	7-Dec-2021	FD	Groundwater	GM-21-063	410-66194-7	ELLE
P1-4	GM-21-065	7-Dec-2021	Ν	Groundwater		410-66194-12	ELLE
P1-9	GM-21-066	6-Dec-2021	Ν	Groundwater		410-66202-12	ELLE
	FB-120621	6-Dec-2021	FB	Field QC		410-66202-10	ELLE
	FB-120721	7-Dec-2021	FB	Field QC		410-66189-10	ELLE
	FB-120821	8-Dec-2021	FB	Field QC		410-66173-2	ELLE

**TABLE B-1.** Sample Summary

Notes:

ELLE = Eurofins Lancaster Laboratories EnvironmeN = normal (primary sample) QC = quality control

FD = field duplicate

ID = identification

L Field Sa	ocation mple ID	1MW-4 GM-21-002				1MW-4 GM-21-003		RPD
Analyte	Units	Result	Q	Result	Q			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00052	J	0.00046	J	NC		
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00088	U	0.00088	U	NC		
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0011	U	0.0011	U	NC		
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.0011	J	0.0012	J	NC		
Perfluorodecanoic acid (PFDA)	µg/L	0.00088	U	0.00088	U	NC		
Perfluorododecanoic acid (PFDoA)	µg/L	0.00089	U	0.00088	U	NC		
Perfluoroheptanoic acid (PFHpA)	µg/L	0.00099	J	0.00082	J	NC		
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.00067	J	0.00069	J	NC		
Perfluorohexanoic acid (PFHxA)	µg/L	0.0023		0.0023		0%		
Perfluorononanoic acid (PFNA)	µg/L	0.00088	U	0.00088	U	NC		
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.00088	U	0.00088	U	NC		
Perfluorooctanoic acid (PFOA)	µg/L	0.0035		0.0037		5.6%		
Perfluorotetradecanoic acid (PFTA)	µg/L		R	0.00088	UJ	NC		
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00089	U	0.00088	U	NC		
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00088	U	0.00088	U	NC		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	µg/L	0.00088	U	0.00088	U	NC		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00088	U	0.00088	U	NC		
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00088	U	0.00088	U	NC		

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualified during data validation.

L Field Sa	ocation mple ID			MW1-11 GM-21-01	2	RPD
Analyte	Units	Result	Q	Result	Q	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00091	U	0.00054	J	NC
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00091	U	0.00093	U	NC
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0011	U	0.0011	U	NC
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.00091	U	0.00093	U	NC
Perfluorodecanoic acid (PFDA)	µg/L	0.00091	U	0.00093	U	NC
Perfluorododecanoic acid (PFDoA)	µg/L	0.00091	U	0.00093	UJ	NC
Perfluoroheptanoic acid (PFHpA)	µg/L	0.00091	U	0.00093	U	NC
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.00091	U	0.00093	U	NC
Perfluorohexanoic acid (PFHxA)	µg/L	0.00091	U	0.00093	U	NC
Perfluorononanoic acid (PFNA)	µg/L	0.00091	U	0.00093	U	NC
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.00088	J	0.00096	J	NC
Perfluorooctanoic acid (PFOA)	µg/L	0.00091	U	0.00093	U	NC
Perfluorotetradecanoic acid (PFTA)	µg/L	0.00091	UJ		R	NC
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00091	U	0.00093	UJ	NC
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00091	U	0.00093	U	NC
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11Cl-PF3OUdS)	µg/L	0.00091	U	0.00093	U	NC
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00091	U	0.00093	U	NC
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00091	U	0.00093	U	NC

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualifie

L Field Sa	ocation mple ID					MW1-24 GM-21-02		RPD
Analyte	Units	Result	Q	Result	Q			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00086	U	0.00086	U	NC		
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00086	U	0.00086	U	NC		
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0010	U	0.0010	U	NC		
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorodecanoic acid (PFDA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorododecanoic acid (PFDoA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluoroheptanoic acid (PFHpA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorohexanoic acid (PFHxA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorononanoic acid (PFNA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorooctanoic acid (PFOA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluorotetradecanoic acid (PFTA)	µg/L		R	0.00086	UJ	NC		
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00086	U	0.00086	U	NC		
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00086	U	0.00086	U	NC		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	µg/L	0.00086	U	0.00086	U	NC		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00086	U	0.00086	U	NC		
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00086	U	0.00086	U	NC		

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualifie

Lo Field Sa	ocation mple ID	-				RPD
Analyte	Units	Result	Q	Result	Q	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00096	U	0.00094	UJ	NC
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00096	U	0.00094	UJ	NC
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0012	U	0.0011	UJ	NC
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.0011	J	0.0015	J	NC
Perfluorodecanoic acid (PFDA)	µg/L	0.00096	U	0.00094	UJ	NC
Perfluorododecanoic acid (PFDoA)	µg/L	0.00096	U	0.00094	UJ	NC
Perfluoroheptanoic acid (PFHpA)	µg/L	0.00068	J	0.00070	J	NC
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.0026	J	0.0055	J	72%
Perfluorohexanoic acid (PFHxA)	µg/L	0.0011	J	0.0015	J	NC
Perfluorononanoic acid (PFNA)	µg/L	0.00096	U	0.00094	UJ	NC
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.00065	J	0.0026	J	NC
Perfluorooctanoic acid (PFOA)	µg/L	0.0019	J	0.0027	J	NC
Perfluorotetradecanoic acid (PFTA)	µg/L	0.00096	U	0.00094	UJ	NC
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00096	U	0.00094	UJ	NC
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00096	U	0.00094	UJ	NC
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	µg/L	0.00096	U	0.00095	UJ	NC
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00096	U	0.00094	UJ	NC
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00096	U	0.00094	UJ	NC

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualifie

Lu Field Sa	ocation mple ID	MW1-60 GM-21-052				RPD
Analyte	Units	Result	Q	Result	Q	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00092	U	0.00093	U	NC
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00092	U	0.00093	UJ	NC
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0011	U	0.0011	UJ	NC
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.00092	U	0.00093	U	NC
Perfluorodecanoic acid (PFDA)	µg/L	0.00092	U	0.00093	U	NC
Perfluorododecanoic acid (PFDoA)	µg/L	0.00092	U		R	NC
Perfluoroheptanoic acid (PFHpA)	µg/L	0.00092	U	0.00093	U	NC
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.00092	U	0.00093	U	NC
Perfluorohexanoic acid (PFHxA)	µg/L	0.00092	U	0.00093	U	NC
Perfluorononanoic acid (PFNA)	µg/L	0.00092	U	0.00093	U	NC
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.00092	U	0.00093	U	NC
Perfluorooctanoic acid (PFOA)	µg/L	0.00092	U	0.00093	U	NC
Perfluorotetradecanoic acid (PFTA)	µg/L	0.00092	UJ		R	NC
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00092	U		R	NC
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00092	U	0.00093	UJ	NC
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	µg/L	0.00092	U	0.00093	U	NC
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00092	U	0.00093	U	NC
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00092	U	0.00093	U	NC

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualifie

	ocation	P1-3				
Field Sa	npie ID	GM-21-063		GM-21-06		
Analyte	Units	Result	Q	Result	Q	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	µg/L	0.00091	UJ	0.0017	J	NC
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.00091	UJ	0.00053	J	NC
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	µg/L	0.0011	UJ	0.0011	U	NC
Perfluorobutanesulfonic acid (PFBS)	µg/L	0.0014	J	0.0012	J	NC
Perfluorodecanoic acid (PFDA)	µg/L	0.00091	UJ	0.00089	U	NC
Perfluorododecanoic acid (PFDoA)	µg/L	0.00091	UJ		R	NC
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0031	J	0.0028	J	10%
Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.0038	J	0.0041	J	8%
Perfluorohexanoic acid (PFHxA)	µg/L	0.0053	J	0.0054	J	2%
Perfluorononanoic acid (PFNA)	µg/L	0.00095	J	0.00085	J	NC
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.0058	J	0.0062	J	7%
Perfluorooctanoic acid (PFOA)	µg/L	0.017	J	0.017	J	0%
Perfluorotetradecanoic acid (PFTA)	µg/L		R		R	NC
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.00091	UJ		R	NC
Perfluoroundecanoic acid (PFUnA)	µg/L	0.00091	UJ	0.00089	UJ	NC
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	µg/L	0.00091	UJ	0.00089	U	NC
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	µg/L	0.00091	UJ	0.00089	U	NC
4,8-dioxa-3H-perfluorononanoic acid (DONA)	µg/L	0.00091	UJ	0.00089	U	NC

Notes:

µg/L = microgram(s) per liter

NC - not calculated; one or more of the sample pair results are "U" qualified.

Q = qualifier

RPD - relative percent difference

Data Qualifiers:

J = The reported result is an estimated value.

R = The result is rejected.

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualifie

#### Table B-3. Summary of Field Blank Results

	Field Sample ID			FB-1206	21	FB-1207	21	FB-12082	1
	Sam	Sample Collection Date		6-Dec-20	7-Dec-2021		8-Dec-202	1	
Analyte	Analytical Method	CASRN	Units	Result	Q	Result	Q	Result	Q
Hexafluoropropylene oxide dimer acid (HFPO-DA)	QSM B15	13252-13-6	µg/L	0.00088	U	0.00091	U	0.00088	U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	QSM B15	2991-50-6	µg/L	0.00088	U	0.00091	U	0.00088	U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	QSM B15	2355-31-9	µg/L	0.0011	U	0.0011	U	0.0011	U
Perfluorobutanesulfonic acid (PFBS)	QSM B15	375-73-5	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorodecanoic acid (PFDA)	QSM B15	335-76-2	µg/L	0.00088	UJ	0.00091	U	0.00088	U
Perfluorododecanoic acid (PFDoA)	QSM B15	307-55-1	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluoroheptanoic acid (PFHpA)	QSM B15	375-85-9	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorohexanesulfonic acid (PFHxS)	QSM B15	355-46-4	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorohexanoic acid (PFHxA)	QSM B15	307-24-4	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorononanoic acid (PFNA)	QSM B15	375-95-1	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorooctanesulfonic acid (PFOS)	QSM B15	1763-23-1	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorooctanoic acid (PFOA)	QSM B15	335-67-1	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorotetradecanoic acid (PFTA)	QSM B15	376-06-7	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluorotridecanoic acid (PFTrDA)	QSM B15	72629-94-8	µg/L	0.00088	U	0.00091	U	0.00088	U
Perfluoroundecanoic acid (PFUnA)	QSM B15	2058-94-8	µg/L	0.00088	U	0.00091	U	0.00088	U
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonicacid (11CI-PF3OUdS)	QSM B15	763051-92-9	µg/L	0.00088	UJ	0.00091	U	0.00088	U
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CI-PF3ONS)	QSM B15	756426-58-1	µg/L	0.00088	U	0.00091	U	0.00088	U
4,8-dioxa-3H-perfluorononanoic acid (DONA)	QSM B15	919005-14-4	µg/L	0.00088	U	0.00091	U	0.00088	U

Notes:

µg/L = microgram(s) per liter

CASRN = Chemical Abstracts Service Registry No.

Q = qualifier

Data Qualifiers:

U = The analyte is not detected; the associated numerical value is the limit of detection or as qualified during data validation.

This page intentionally left blank.

Attachment B-1 Data Validation Reports This page intentionally left blank





EA Engineering, Science, & Technology, Inc. 2200 Sixth Ave., Suite 707 Seattle, WA 98121 ATTN: Ms. Sherri Wunderlich swunderlich@eaest.com

March 14, 2022

SUBJECT: Keyport LTM - Data Validation

Dear Ms. Wunderlich,

Enclosed is the final validation report for the fraction listed below. This SDG was received on January 11, 2022. Attachment 1 is a summary of the samples that were reviewed for the analysis.

#### LDC Project #53144\_RV2:

<u>SDG #</u>	Fraction
410-66173-1 410-66189-1 410-66194-1 410-66202-1	Perfluoroalkyl & Polyfluoroalkyl Substances

The data validation was performed under Stage 2B & 4 validation guidelines. The analysis was validated using the following documents and variances, as applicable to the method:

- Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021)
- NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015)
- U.S. Department of Defense (DoD) General Validation Guidelines (November 2019)
- DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020)

Please feel free to contact us if you have any questions.

Sincerely,

2. Fe

Pei Geng Project Manager/Senior Chemist pgeng@lab-data.com

r	232 pages-AD\	/											ŀ	Attac	hme	nt 1																			
	90/10 2B/4 E	DD				L	DC	<b># 5</b> 3	3144	4 (E	AE	ng	ine	erin	g -	Sea	attle	e, N	/A/	' Ke	уро	ort l	LTN	1)							I	PO# 2	23092	2	
LDC	SDG#	DATE REC'D	(2) DATE DUE	PF (53 <sup>-</sup> QSN	7M/		_		_		-				-		-		-		_						-		-						
Matr	ix: Water/Soil	T	T	W	s	W	s	W	s	W	s	W	S	W	s	W	s	W	s	W	S	W	s	W	s	W	s	W	s	W	S	W	S	W	s
А	410-66173-1	01/11/22	01/25/22	19																														⊢	
В	410-66189-1	01/11/22	01/25/22	22	0																													⊢	
С	410-66194-1	01/11/22	01/25/22	26	0																														
D	410-66202-1	01/11/22	01/25/22	20	0																														
D	410-66202-1	01/11/22	01/25/22	14	0																														
					1																														
		1	1																																
		1	1																														$\neg$		
		1																																	
Total	T/PG			101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	101

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Keyport LTM
LDC Report Date:	March 11, 2022
Parameters:	Perfluoroalkyl & Polyfluoroalkyl Substances
Validation Level:	Stage 2B
Laboratory:	Eurofins, Lancaster, PA

Sample Delivery Group (SDG): 410-66173-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GM-21-059	410-66173-1	Water	12/08/21
GM-21-059RE	410-66173-1RE	Water	12/08/21
FB-120821	410-66173-2	Water	12/08/21
GM-21-004	410-66173-3	Water	12/08/21
GM-21-004RE	410-66173-3RE	Water	12/08/21
GM-21-028	410-66173-4	Water	12/08/21
GM-21-019	410-66173-5	Water	12/08/21
GM-21-019RE	410-66173-5RE	Water	12/08/21
GM-21-013	410-66173-6	Water	12/08/21
GM-21-013RE	410-66173-6RE	Water	12/08/21
GM-21-029	410-66173-7	Water	12/08/21
GM-21-029RE	410-66173-7RE	Water	12/08/21
GM-21-027	410-66173-8	Water	12/08/21
GM-21-057	410-66173-9	Water	12/08/21
GM-21-057RE	410-66173-9RE	Water	12/08/21
GM-21-061	410-66173-10	Water	12/08/21
GM-21-061RE	410-66173-10RE	Water	12/08/21
GM-21-058	410-66173-11	Water	12/08/21
GM-21-058RE	410-66173-11RE	Water	12/08/21

#### Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021), the NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015), the U.S. Department of Defense (DoD) General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 3: Data Validation Procedure for Perand Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified and LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

## Codes

- H Holding times were exceeded.
- S Surrogate recovery was outside QC limits.
- C Calibration %RSD or %D were noncompliant.
- R Calibration RRF was <0.05.
- B Presumed contamination from preparation (method) blank.
- L Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.
- Q MS/MSD recovery was poor or RPD high.
- I Internal standard performance was unsatisfactory.
- M Tuning (BFB or DFTPP) was noncompliant.
- T Presumed contamination from trip blank.
- + False positive reported compound was not present. Not applicable.
- False negative compound was present but not reported.
- F Presumed contamination from FB, or ER.
- \$ Reported result or other information was incorrect.
- ? TIC identity or reported retention time has been changed.
- D The analysis with this flag should not be used because another more technically sound analysis is available.
- P Instrument performance for pesticides was poor.
- \*# Unusual problems found with the data that have been described in Section 2.2.3.3, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found.

## I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

#### II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

### III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

For each calibration standard, all analytes were within 70-130% of their true value.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

### **IV.** Continuing Calibration and Instrument Sensitivity Check

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes.

All analyte concentrations were at the limit of quantitation (LOQ) for the ISC standard.

#### V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Analyte	Concentration	Associated Samples
MB 410-205983/1-A	12/20/21	Perfluorooctanesulfonic acid	0.586 ng/L	GM-21-059 GM-21-004 GM-21-028 GM-21-019 GM-21-019 GM-21-029 GM-21-027 GM-21-027 GM-21-057 GM-21-058

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
GM-21-004	Perfluorooctanesulfonic acid	2.2 ng/L	2.2J ng/L
GM-21-057	Perfluorooctanesulfonic acid	2.5 ng/L	2.5J ng/L
GM-21-061	Perfluorooctanesulfonic acid	2.8 ng/L	2.8J ng/L
GM-21-058	Perfluorooctanesulfonic acid	1.9 ng/L	1.9J ng/L

### VI. Field Blanks

Sample FB-120821 was identified as a field blank. No contaminants were found.

#### VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

#### **VIII. Laboratory Control Samples**

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

### **IX. Field Duplicates**

No field duplicates were identified in this SDG.

# X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-059	13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS 13C2 PFTeDA 13C8 PFOS	0.4 (50-150) 3 (50-150) 4 (50-150) 2 (50-150) 10 (50-150) 17 (50-150) 0.3 (50-150) 17 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid Perfluorotetradecanoic acid Perfluoroctanesulfonic acid	x	Ρ
GM-21-059	13C9 PFNA	41 (50-150)	Perfluorononanoic acid	UJ (all non-detects)	Р
GM-21-059RE	13C2 PFTeDA	30 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-004	13C2 PFTeDA	14 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-004	13C2-PFDoDA	37 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-004RE	13C2 PFTeDA	27 (50-150)	Perfluorotetradecanoic acid	ŲJ (all non-detects)	Р
GM-21-019	13C2 PFTeDA	17 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-013	13C2-PFDoDA d3-NMeFOSAA 13C7 PFUnA	27 (50-150) 48 (50-150) 42 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-013	13C2 PFTeDA	7 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-013RE	13C2 PFTeDA	8 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-029	13C2 PFTeDA	12 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-029	13C2-PFDoDA	37 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-029RE	13C2 PFTeDA	7 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-029RE	13C2-PFDoDA	34 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-057	13C2 PFTeDA	13 (50-150)	Perfluorotetradecanoic acid	x	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-057	13C2-PFDoDA 13C7 PFUnA	25 (50-150) 37 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
GM-21-057RE	13C2 PFTeDA	13 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-057RE	13C2-PFDoDA 13C7 PFUnA	27 (50-150) 35 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-061	13C2 PFTeDA 13C2-PFDoDA	0.4 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р
GM-21-061	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	36 (50-150) 38 (50-150) 30 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-061RE	13C2 PFTeDA	10 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-061RE	13C2-PFDoDA	38 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-058	13C2 PFTeDA 13C2-PFDoDA	7 (50-150) 15 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	х	P
GM-21-058	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	39 (50-150) 39 (50-150) 25 (50-150) 40 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-058RE	13C2 PFTeDA 13C2-PFDoDA	22 (50-150) 48 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ

## XI. Target Analyte Quantitation

The laboratory indicated that PFAs are currently being reported as the sum of the branched and linear isomers so both peaks were integrated.

Raw data were not reviewed for Stage 2B validation.

## XII. Target Analyte Identification

All target analyte identifications were within validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
GM-21-058 GM-21-058RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ

Raw data were not reviewed for Stage 2B validation.

### XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

### XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
GM-21-059 GM-21-004 GM-21-013 GM-21-029 GM-21-057 GM-21-061	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-019	Perfluorotetradecanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-019RE	All analytes except Perfluorotetradecanoic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-058	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-058RE	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-

Due to labeled compound %R and ion ratio, data were qualified as estimated in thirteen samples.

Due to labeled compound %R, data were recommended for exclusion in four samples.

Due to laboratory blank contamination, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

## Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 410-66173-1

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-059RE	Perfluorotetradecanoic acid	UJ (all non-detects)	P	Labeled compounds (%R) (I)
GM-21-004RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-013RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-029RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-029RE	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-057RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-057RE	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-061RE	Perfluorotetradecanoic acid	×	Р	Labeled compounds (%R) (I)
GM-21-061RE	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-058RE	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-058	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Р	Target analyte identification (ion ratio) (*XII)
GM-21-059 GM-21-004 GM-21-013 GM-21-029 GM-21-057 GM-21-061	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-019	Perfluorotetradecanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-019RE	All analytes except Perfluorotetradecanoic acid	Not reportable	-	Overall assessment of data (*XIV)

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-058	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorobetanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-058RE	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)

# Keyport LTM

# Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 410-66173-1

Sample	Analyte	Modified Final Concentration	A or P	Code	
GM-21-058	Perfluorooctanesulfonic acid	1.9J ng/L	A	В	

## Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 410-66173-1

No Sample Data Qualified in this SDG

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date:	1/21	12
Page:_	fof	2
Reviewer:	M	
2nd Reviewer:	C	$\leq$

SDG #: <u>410-66173-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144A96

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
Ι.	Sample receipt/Technical holding times	AIA	
II.	LC/MS Instrument performance check	A	
Ш.	Initial calibration/ICV	A/X	RSD = 20 $TI/QI = 30$
IV.	Continuing calibration/ISC	A/A	$RSD = 20 \qquad TV/QI = 30$ $D = 30$
V.	Laboratory Blanks	SW	
V.I	Field blanks	ND	FB=>>
VII.	Matrix spike/Matrix spike duplicates	Ń	
VIII.	Laboratory control samples	A	1053
IX.	Field duplicates	N	
Х.	Labeled Compounds	SW	
XI.	Target analyte quantitation	N	
XII.	Target analyte identification	<b>SNN</b>	
XIII.	System performance	N	
XIV.	Overall assessment of data	SW	

Note:

N = Not provided/applicable SW = See worksheet

A = Acceptable

ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank SB=Source blank OTHER:

Clien	t ID	Lab ID	Matrix	Date
1 GM-2	1-059	410-66173-1	Water	12/08/21
2 <sup>3</sup> GM-2	1-059RE	410-66173-1RE	Water	12/08/21
3 <b>3</b> FB-12	0821	410-66173-2	Water	12/08/21
4   GM-2	1-004	410-66173-3	Water	12/08/21
5 <b>2</b> GM-2	1-004RE	410-66173-3RE	Water	12/08/21
6 <sup>1</sup> GM-2	1-028	410-66173-4	Water	12/08/21
7 <sup>I</sup> GM-2	1-019	410-66173-5	Water	12/08/21
8 <sup>2</sup> GM-2	1-019RE	410-66173-5RE	Water	12/08/21
9 <sup>1</sup> GM-2	1-013	410-66173-6	Water	12/08/21
10 <b>2</b> GM-2	1-013RE	410-66173-6RE	Water	12/08/21
11 GM-2	1-029	410-66173-7	Water	12/08/21
12 <sup>7</sup> GM-2	I-029RE	410-66173-7RE	Water	12/08/21
13 <b>I</b> GM-2 <sup>-</sup>	I-027	410-66173-8	Water	12/08/21
14 GM-2	I-057	410-66173-9	Water	12/08/21
15 GM-2	I-057RE	410-66173-9RE	Water	12/08/21

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B

SDG #: <u>410-66173-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144A96

Date:	1/2	31/22
Page:_	2	eof∑
Reviewer;	A	<u>r</u>
Reviewer: 2nd Reviewer		

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

	Client ID				Lab ID	Matrix	Date
16 <b>\</b>	GM-21-061				410-66173-10	Water	12/08/21
17 <b>2</b>	GM-21-061RE				410-66173-10RE	Water	12/08/21
18 I	GM-21-058				410-66173-11	Water	12/08/21
19 <b>~</b>	GM-21-058RE				410-66173-11RE	Water	12/08/21
20							
21							
22							
otes:							
7	205982						
2	207809						
7	208162						
+							

## TARGET COMPOUND WORKSHEET

#### **METHOD: PFAS**

A. Perfluorobutanoic acid	W. 6:2 Fluorotelomer sulfonate
B. Perfluoropentanoic acid	X. 8:2 Fluorotelomer sulfonate
C. Perfluorohexanoic acid	Y. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
D. Perfluoroheptanoic acid	Z. HFPO-DA (GenX)
E. Perfluorooctanoic acid	AA. 9CI-PF3ONS (F-53B Major)
F. Perfluorononanoic acid	BB. 11CI-PF3OUdS (F-53B Minor)
G. Perfluorodecanoic acid	CC. Hexafluoropropylene oxide dimer acid (HFPO-DA)
H. Perfluoroundecanoic acid	DD. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
I. Perfluorododecanoic acid	EE. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
J. Perfluorotridecanoic acid	FF. 4:2 Fluorotelomersulfonic acid
K. Perfluorotetradecanoic acid	GG. 6:2 Fluorotelomersulfonic acid
L. Perfluorobutanesulfonic acid	HH. 8:2 Fluorotelomersulfonic acid
M. Perfluoropentanesulfonic acid	II. 1H,1H,2H,2H-perfluorohexane sulfonic acid
N. Perfluorohexanesulfonic acid	JJ. 1H,1H,2H,2H- Perfluorooctanesulfonic acid
O. Perfluoroheptanesulfonic acid	KK. 1H, 1H, 2H, 2H-perfluorodecane sulfonic acid
P. Perfluorooctanesulfonic acid	LL. NMeFOSA
Q. Perfluorononanesulfonic acid	MM. 3:3 Fluorotelomer carboxylate
R. Perfluorodecanesulfonic acid	NN. 5:3 Fluorotelomer carboxylate
S. Perfluorooctanesulfonamide	OO. 7:3 Fluorotelomer carboxylate
T. NMeFOSAA	PP. Perfluorooctadecanoic acid
U. NEtFOSAA	
V. 4:2 Fluorotelomer sulfonate	

# VALIDATION FINDINGS WORKSHEET

## <u>Blanks</u>

Page:	of_	Ľ
Reviewer:_	r	

Method:	LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Blank extraction date: 1> Conc. units: 19/L	/20/21	Associate	ed Samples:_	1,4,6	7,9,	11, 13, 1	4,16,18	7	()	
Analyte	Blank ID				S	ample Identifica	ation			
MB 410	-201983/1	-A 5×	L	14	16	18				
P	0.96	2.93	2.2 J#	2.5/5	2.8/5	1.9/5				
			n							

#### Blank extraction date:\_\_\_\_\_

Conc. units:		Associated Sa	mples:				 	
Analyte	Blank ID			s	ample Identifica	ation		
							 	· ·

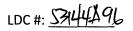
## VALIDATION FINDINGS WORKSHEET Labeled Compounds

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID	~	Compound	%R (50-150)	Qualifications
	GM-21-059 (ND	$\boldsymbol{\Sigma}$	13C2-PFDoDA	0.4	X/P (I,J)
			13C9 PFNA	41	J/UJ/P (F)
			d5-NEtFOSAA	3	X/P (U)
			d3-NMeFOSAA	4	X/P (T)
			13C7 PFUnA	2	X/P (H)
		ļ,	13C6 PFDA	10	X/P (G)
	(P-de	4)	13C8 PFOS	17	X/P (P,DD,EE)
	(ND		13C2 PFTeDA	0.3	Х/Р (К)
	GM-21-059RE (N\$)	<u>}</u>	13C2 PFTeDA	30	J/UJ/P (K)
	GM-21-004		13C2 PFTeDA	14	Х/Р (К)
			13C2-PFDoDA	37	J/UJ/P (I,J)
		$\vdash$			
	GM-21-004RE		13C2 PFTeDA	27	J/UJ/P (K)
	GM-21-019		13C2 PFTeDA	17	Х/Р (К)
	GM-21-013		13C2-PFDoDA	27	J/UJ/P (I,J)
	GWI-21-013		d3-NMeFOSAA	48	J/UJ/P (T)
			13C7 PFUnA		
				42	J/UJ/P (H)
		+	13C2 PFTeDA	7	Х/Р (К)
	GM-21-013RE		13C2 PFTeDA	8	Х/Р (К)
	GM-21-029		13C2 PFTeDA	12	Х/Р (К)
			13C2-PFDoDA	37	J/UJ/P (I,J)
		-	4202 DET-DA	7	
	GM-21-029RE	+	13C2 PFTeDA		X/P (K)
	+	-	13C2-PFDoDA	34	J/UJ/P (I,J)
	GM-21-057	$\vdash$	13C2 PFTeDA	13	Х/Р (К)
		1	13C2-PFDoDA	25	J/UJ/P (I,J)
		V	13C7 PFUnA	37	J/UJ/P (H)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD

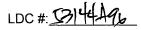


## VALIDATION FINDINGS WORKSHEET Labeled Compounds

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

		Labeled			
#	Sample ID	Compound	%R (50-150)	Qualifications	
	GM-21-057RE	13C2 PFTeDA	13	Х/Р (К)	
		13C2-PFDoDA	27	J/UJ/P (I,J)	
		13C7 PFUnA	35	J/UJ/P (H)	
	GM-21-061	13C2 PFTeDA	0.4	Х/Р (К)	
		13C2-PFDoDA	11	X/P (I,J)	
		d5-NEtFOSAA	36	J/UJ/P (U)	
		d3-NMeFOSAA	38	J/UJ/P (T)	
		13C7 PFUnA	30	J/UJ/P (H)	
	GM-21-061RE	13C2 PFTeDA	10	Х/Р (К)	
		13C2-PFDoDA	38	J/UJ/P (I), J	
	GM-21-058	13C2 PFTeDA	7	Х/Р (К)	
		13C2-PFDoDA	15	X/P (I,J)	
		d5-NEtFOSAA	. 39	J/UJ/P (U)	
		d3-NMeFOSAA	39	J/UJ/P (T)	
		13C7 PFUnA	25	J/UJ/P (H)	
		13C6 PFDA	40	J/UJ/P (G)	
	GM-21-058RE	13C2 PFTeDA	22	J/UJ/P (K)	
		13C2-PFDoDA	48	J/UJ/P (I,J)	



## VALIDATION FINDINGS WORKSHEET Target Analyte Identification

Page:	<u> </u>
Reviewer:	9

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 53

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

 $\frac{1}{2}$  N N/A Was the signal to noise (S/N) ratio for all analytes within the validation criteria?

N/A Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?

N/A Were ion ratios within QC limits?

	<b>.</b> .				
#	Date	Sample ID	Analyte	lon ratio (Limits)	Qualifications
		18,19		Results flagged "I" by the laboratory due to	Jdets/P (* XII)
		,		ion ratio outside QC limits.	

LDC #: 9144496

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:<u>l</u>of<u></u> Reviewer:<u></u>

#### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
		1,4,9,11,14,16	te	Restraction more	NR
				veable Chigher	
				Rentraction more verble (higher resulfs)	
				,	
		7	K	RE more varber a Labeled 22 - 20	
				Labely 2 220	
		8	fel xopt K Al except C, D, E, L, N, P	RAIGING IM DE ILALP.	
		0	for reapt 1	DE	·
		18	he ercer (. D. E. L. N. P	- Anginal more usale	Ro
				( higher sweet	
				Labeled 1/2 Rs out	-J
		19	Q, D, E, L, N, P	trig more usable (higher results)	
				(higher results)	
					Martin
					· · · · · · · · · · · · · · · · · · ·

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Keyport LTM
LDC Report Date:	March 4, 2022
Parameters:	Perfluoroalkyl & Polyfluoroalkyl Substances

Validation Level: Stage 2B

Laboratory: Eurofins, Lancaster, PA

Sample Delivery Group (SDG): 410-66189-1

	Laboratory Sample		Collection
Sample Identification	Identification	Matrix	Date
GM-21-050	410-66189-1	Water	12/07/21
GM-21-050RE	410-66189-1RE	Water	12/07/21
GM-21-018	410-66189-2	Water	12/07/21
GM-21-046	410-66189-3	Water	12/07/21
GM-21-046RE	410-66189-3RE	Water	12/07/21
GM-21-011	410-66189-4	Water	12/07/21
GM-21-011RE	410-66189-4RE	Water	12/07/21
GM-21-012	410-66189-5	Water	12/07/21
GM-21-012RE	410-66189-5RE	Water	12/07/21
GM-21-051	410-66189-6	Water	12/07/21
GM-21-051RE	410-66189-6RE	Water	12/07/21
GM-21-048	410-66189-7	Water	12/07/21
GM-21-048RE	410-66189-7RE	Water	12/07/21
GM-21-045	410-66189-8	Water	12/07/21
GM-21-045RE	410-66189-8RE	Water	12/07/21
GM-21-005	410-66189-9	Water	12/07/21
FB-120721	410-66189-10	Water	12/07/21
GM-21-023	410-66189-11	Water	12/07/21
GM-21-062	410-66189-12	Water	12/07/21
GM-21-062RE	410-66189-12RE	Water	12/07/21
GM-21-049	410-66189-13	Water	12/07/21
GM-21-049RE	410-66189-13RE	Water	12/07/21
GM-21-023MS	410-66189-11MS	Water	12/07/21
GM-21-023MSD	410-66189-11MSD	Water	12/07/21

#### Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021), the NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015), the U.S. Department of Defense (DoD) General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 3: Data Validation Procedure for Perand Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified and LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

## Codes

- H Holding times were exceeded.
- S Surrogate recovery was outside QC limits.
- C Calibration % RSD or %D were noncompliant.
- R Calibration RRF was <0.05.
- B Presumed contamination from preparation (method) blank.
- L Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.
- Q MS/MSD recovery was poor or RPD high.
- I Internal standard performance was unsatisfactory.
- M Tuning (BFB or DFTPP) was noncompliant.
- T Presumed contamination from trip blank.
- + False positive reported compound was not present. Not applicable.
- False negative compound was present but not reported.
- F Presumed contamination from FB, or ER.
- \$ Reported result or other information was incorrect.
- ? TIC identity or reported retention time has been changed.
- D The analysis with this flag should not be used because another more technically sound analysis is available.
- P Instrument performance for pesticides was poor.
- \*# Unusual problems found with the data that have been described in Section 2.2.3.3, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found.

# I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

## II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

## III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

For each calibration standard, all analytes were within 70-130% of their true value.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

## IV. Continuing Calibration and Instrument Sensitivity Check

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes.

All analyte concentrations were at the limit of quantitation (LOQ) for the ISC standard.

## V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

## VI. Field Blanks

Sample FB-120721 was identified as a field blank. No contaminants were found.

## VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
GM-21-023MS/MSD	Perfluorotridecanoic acid	16 (65-144)	5 (65-144)	X (all non-detects)	A
(GM-21-023)	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	19 (70-130)	3 (70-130)	X (all non-detects)	

### Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
GM-21-023MS/MSD (GM-21-023)	Perfluorotridecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	109 (≤30) 149 (≤30)	NA	-

### VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

### **IX. Field Duplicates**

Samples GM-21-011 and GM-21-012 and samples GM-21-011RE and GM-21-012RE were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

	Concentrat	Concentration (ng/L)					
Analyte	GM-21-011-12072021	GM-21-012-12072021	RPD (Limits)	Difference (Limits)	Flag	A or P	
Perfluorooctanesulfonic acid	1.0	0.95	-	0.046 (≤1.8)	-	-	

	Concentration (ng/L)		Concentration (ng/L)					
Analyte	GM-21-011-12072021RE	GM-21-012-12072021RE	RPD (Limits)	Difference (Limits)	Flag	A or P		
Perfluorooctanesulfonic acid	0.88	0.96	-	0.08 (≤1.9)	-	-		
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.91U	0.54	-	0.37 (≤2.8)	-	-		

## X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-050	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	1 (50-150) 6 (50-150) 18 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Р
GM-21-050	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	33 (50-150) 39 (50-150) 48 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-050RE	13C2 PFTeDA 13C2-PFDoDA	1 (50-150) 14 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р
GM-21-050RE	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	42 (50-150) 49 (50-150) 37 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-046	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.04 (50-150) 0.1 (50-150) 15 (50-150) 2 (50-150) 3 (50-150) 0.4 (50-150) 2 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	X	Ρ
GM-21-046	13C8 PFOA	40 (50-150)	Perfluorooctanoic acid	UJ (all non-detects)	Р
GM-21-046RE	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.1 (50-150) 2 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Р
GM-21-046RE	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	46 (50-150) 47 (50-150) 40 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	J (all detects) UJ (all non-detects)	Ρ
GM-21-011	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.04 (50-150) 2 (50-150) 9 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-011	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	28 (50-150) 31 (50-150) 31 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-011RE	13C2 PFTeDA	26 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-012	13C2 PFTeDA 13C2-PFDoDA	0.6 (50-150) 10 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-012	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	47 (50-150) 48 (50-150) 27 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-012RE	13C2 PFTeDA	7 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-012RE	13C2-PFDoDA	35 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-051	13C2 PFTeDA	2 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-051	13C2-PFDoDA 13C7 PFUnA	23 (50-150) 44 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-051RE	13C2 PFTeDA	6 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-051RE	13C2-PFDoDA d5-NEtFOSAA	35 (50-150) 47 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-048	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.1 (50-150) 2 (50-150) 8 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-048	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	33 (50-150) 34 (50-150) 34 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	J (all detects) UJ (all non-detects)	Ρ
GM-21-048RE	13C2 PFTeDA	6 (50-150)	Perfluorotetradecanoic acid	x	Ρ
GM-21-045	13C2 PFTeDA	10 (50-150)	Perfluorotetradecanoic acid	x	Ρ
GM-21-045	13C2-PFDoDA	47 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-045RE	13C2 PFTeDA	28 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-023	13C2 PFTeDA	6 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-023	13C2-PFDoDA 13C7 PFUnA	26 (50-150) 44 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-062	13C3 PFHxS 13C5 PFHxA 13C4 PFHpA 13C3 HFPO-DA	38 (50-150) 40 (50-150) 35 (50-150) 34 (50-150)	Perfluorohexanesulfonic acid Perfluorohexanoic acid Perfluoroheptanoic acid 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) Hexafluoropropylene oxide dimer acid (HFPO-DA)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	Ρ

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-062	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS 13C8 PFOA	0.008 (50-150) 0.002 (50-150) 2 (50-150) 0.2 (50-150) 0.2 (50-150) 0.01 (50-150) 0.1 (50-150) 2 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid Perfluorooctanoic acid	x	Ρ
GM-21-062RE	13C5 PFHxA 13C2 PFTeDA 13C3 HFPO-DA	44 (50-150) 30 (50-150) 38 (50-150)	Perfluorohexanoic acid Perfluorotetradecanoic acid Hexafluoropropylene oxide dimer acid (HFPO-DA)	J (all detects) UJ (all non-detects)	Р
GM-21-049	13C2 PFTeDA	10 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-049	13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	36 (50-150) 45 (50-150) 45 (50-150) 39 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	Ρ
GM-21-049RE	13C2 PFTeDA 13C3 HFPO-DA	46 (50-150) 42 (50-150)	Perfluorotetradecanoic acid Hexafluoropropylene oxide dimer acid (HFPO-DA)	J (all detects) UJ (all non-detects)	Р

## XI. Target Analyte Quantitation

The laboratory indicated that PFAs are currently being reported as the sum of the branched and linear isomers so both peaks were integrated.

Raw data were not reviewed for Stage 2B validation.

### XII. Target Analyte Identification

All target analyte identifications were within validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
GM-21-046RE GM-21-045 GM-21-005 GM-21-062RE GM-21-049RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ

Raw data were not reviewed for Stage 2B validation.

## XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

#### XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
GM-21-050 GM-21-011 GM-21-012 GM-21-051	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-046 GM-21-045 GM-21-049	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-048	All analytes except Perfluorooctanoic acid Perfluorodecanoic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-048RE	Perfluorooctanoic acid Perfluorodecanoic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-062	All analytes except Hexafluoropropylene oxide dimer acid (HFPO-DA)	Results from re-analyses were more usable.	Not reportable	-
GM-21-062RE	Hexafluoropropylene oxide dimer acid (HFPO-DA)	Results from original analyses were more usable.	Not reportable	-

Due to MS/MSD %R and labeled compound %R and ion ratio, data were qualified as estimated in eighteen samples.

Due to labeled compound %R, data were recommended for exclusion in six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Sample	Analyte	Flag	A or P	Reason (Code)	
GM-21-062	Hexafluoropropylene oxide dimer acid (HFPO-DA)	J (all detects)	Р	Labeled compounds (%R) (I)	
GM-21-062RE	Perfluorohexanoic acid	J (all detects)	Ρ	Labeled compounds (%R) (I)	
GM-21-062RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)	
GM-21-049RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)	
GM-21-049RE	Hexafluoropropylene oxide dimer acid (HFPO-DA)	J (all detects)	Р	Labeled compounds (%R) (I)	
GM-21-046RE GM-21-045 GM-21-005 GM-21-062RE GM-21-049RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ	Target analyte identification (ion ratio) (*XII)	
GM-21-050 GM-21-011 GM-21-012 GM-21-051 GM-21-046 GM-21-045 GM-21-049	All analytes	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-048	All analytes except Perfluorooctanoic acid Perfluorodecanoic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-048RE	Perfluorooctanoic acid Perfluorodecanoic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-062	All analytes except Hexafluoropropylene oxide dimer acid (HFPO-DA)	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-062RE	Hexafluoropropylene oxide dimer acid (HFPO-DA)	Not reportable	-	Overall assessment of data (*XIV)	

# Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 410-66189-1

# No Sample Data Qualified in this SDG

## Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 410-66189-1

No Sample Data Qualified in this SDG

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 2/22	_
Page: 1 of <b>1</b>	
Reviewer:_ 🧏	
2nd Reviewer:	-

SDG #: <u>410-66189-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144B96

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
١.	Sample receipt/Technical holding times	H.A	
١١.	LC/MS Instrument performance check	A_	
111.	Initial calibration/ICV	4/4	RSp = 20  TV/Q = 30
IV.	Continuing calibration/ISC	A/A	D=30
V.	Laboratory Blanks	Ă	
V.I	Field blanks	ND	$\neq \beta = 17$
VII.	Matrix spike/Matrix spike duplicates	ŚŴ_	
VIII.	Laboratory control samples	Ă	L05/3
IX.	Field duplicates	SW	b = b + 8, 7 + 9
Х.	Labeled Compounds	SW	
XI.	Target analyte quantitation	N	
XII.	Target analyte identification	ŞΝ	
XIII.	System performance	Ń	
XIV.	Overall assessment of data	SW	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank SB=Source blank OTHER:

Client ID	Lab ID	Matrix	Date
1 GM-21-050	410-66189-1	Water	12/07/21
2 GM-21-050RE	410-66189-1RE	Water	12/07/21
GM-21-018	410-66189-2	Water	12/07/21
4 GM-21-046	410-66189-3	Water	12/07/21
5 GM-21-046RE	410-66189-3RE	Water	12/07/21
6 GM-21-011	410-66189-4	Water	12/07/21
7 GM-21-011RE	410-66189-4RE	Water	12/07/21
8 GM-21-012	410-66189-5	Water	12/07/21
9 GM-21-012RE	410-66189-5RE	Water	12/07/21
10 GM-21-051	410-66189-6	Water	12/07/21
11 GM-21-051RE	410-66189-6RE	Water	12/07/21
12 GM-21-048	410-66189-7	Water	12/07/21
13 GM-21-048RE	410-66189-7RE	Water	12/07/21
14 GM-21-045	410-66189-8	Water	12/07/21
15 GM-21-045RE	410-66189-8RE	Water	12/07/21

# VALIDATION COMPLETENESS WORKSHEET

Stage 2B

SDG #: <u>410-66189-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144B96

Date: 242/22 Page: 20f 2 Reviewer: 40 2nd Reviewer: 40

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

	Client ID					Lab ID	Matrix	Date
16 <sup> </sup>	GM-21-005		410-66189-9	Water	12/07/21			
17 <sup>1</sup>	FB-120721					410-66189-10	Water	12/07/21
18	GM-21-023					410-66189-11	Water	12/07/21
19 <sup>I</sup>	GM-21-062 🖌					410-66189-12	Water	12/07/21
20	GM-21-062RE					410-66189-12RE	Water	12/07/21
21	GM-21-049					410-66189-13	Water	12/07/21
22	GM-21-049RE					410-66189-13RE	Water	12/07/21
23	GM-21-023MS					410-66189-11MS	Water	12/07/21
24	GM-21-023MSD			_		410-66189-11MSD	Water	12/07/21
25								
26								
27_								
Notes	·			·				
1	207022							
2	208135							
7	208162							

### TARGET COMPOUND WORKSHEET

#### **METHOD: PFAS**

A. Perfluorobutanoic acid	W. 6:2 Fluorotelomer sulfonate	
B. Perfluoropentanoic acid	X. 8:2 Fluorotelomer sulfonate	
C. Perfluorohexanoic acid	Y. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	
D. Perfluoroheptanoic acid	Z. HFPO-DA (GenX)	
E. Perfluorooctanoic acid	AA. 9CI-PF3ONS (F-53B Major)	
F. Perfluorononanoic acid	BB. 11CI-PF3OUdS (F-53B Minor)	
G. Perfluorodecanoic acid	CC. Hexafluoropropylene oxide dimer acid (HFPO-DA)	
H. Perfluoroundecanoic acid	DD. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	
I. Perfluorododecanoic acid	EE. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	
J. Perfluorotridecanoic acid	FF. 4:2 Fluorotelomersulfonic acid	
K. Perfluorotetradecanoic acid	GG. 6:2 Fluorotelomersulfonic acid	
L. Perfluorobutanesulfonic acid	HH. 8:2 Fluorotelomersulfonic acid	
M. Perfluoropentanesulfonic acid	II. 1H,1H,2H,2H-perfluorohexane sulfonic acid	
N. Perfluorohexanesulfonic acid	JJ. 1H,1H,2H,2H- Perfluorooctanesulfonic acid	
O. Perfluoroheptanesulfonic acid	KK. 1H, 1H, 2H, 2H-perfluorodecane sulfonic acid	
P. Perfluorooctanesulfonic acid	LL. NMeFOSA	
Q. Perfluorononanesulfonic acid	MM. 3:3 Fluorotelomer carboxylate	
R. Perfluorodecanesulfonic acid	NN. 5:3 Fluorotelomer carboxylate	
S. Perfluorooctanesulfonamide	OO. 7:3 Fluorotelomer carboxylate	
T. NMeFOSAA	PP. Perfluorooctadecanoic acid	
U. NEtFOSAA		
V. 4:2 Fluorotelomer sulfonate		

LDC #: 53144896

### VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: <u>1</u> of <u>1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 53

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. (Q) Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below. MS MSD Associated # MS/MSD ID RPD (≤30) Analyte %R (Limits) %R (Limits) Samples Qualifications 23/24 (6-144)T 6 (65-144) 18 (10) TXX 19 (70-170) ろ (70-170) EE 00 Taits/A 1 EE 149

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

	Concentra		Difference	Difference		
Analyte	GM-21-011-12072021	GM-21-012-12072021	RPD≤30	<5XLOQ	Limit: <loq< td=""><td>Qualification</td></loq<>	Qualification
Perfluorooctanesulfonic acid	1.0	0.95		0.046	1.8	

	Concentration (ng/L)			Difference	Difference	
Analyte	GM-21-011-12072021RE	GM-21-012-12072021RE	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorooctanesulfonic acid	0.88	0.96		0.08	1.9	
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.91U	0.54		0.37	2.8	

LDC #: 5314489C

# VALIDATION FINDINGS WORKSHEET Labeled Compounds

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-050	(ND)	13C2 PFTeDA	1	Х/Р (К)
		<u> </u>	13C2-PFDoDA	6	X/P (I,J)
			d5-NEtFOSAA	33	J/UJ/P (U)
			d3-NMeFOSAA	39	J/UJ/P (T)
			13C7 PFUnA	18	X/P (H)
			13C6 PFDA	48	J/UJ/P (G)
	GM-21-050RE	(ND)	13C2 PFTeDA	1	Х/Р (К)
			13C2-PFDoDA	14	X/P (I,J)
			d5-NEtFOSAA	42	J/UJ/P (U)
			d3-NMeFOSAA	49	J/UJ/P (T)
			13C7 PFUnA	37	J/UJ/P (H)
	GM-21-046	(ND)	13C2 PFTeDA	0.04	Х/Р (К)
			13C2-PFDoDA	0.1	X/P (I,J)
			13C9 PFNA	15	X/P (F)
			d5-NEtFOSAA	2	X/P (U)
			d3-NMeFOSAA	3	X/P (T)
			13C7 PFUnA	0.4	X/P (H)
			13C6 PFDA	2	X/P (G)
		P-det)	13C8 PFOS	11	X/P (P,DD,EE)
		(ND)	13C8 PFOA	40	X/P(E)-J(A)/P(E)
	GM-21-046RE	(ND)	13C2 PFTeDA	0.1	X/P (K) /
		Ţ	13C2-PFDoDA	2	X/P (I,J)
			d5-NEtFOSAA	46	J/UJ/P (U)
			d3-NMeFOSAA	47	J/UJ/P (T)
		V.	13C7 PFUnA	11	X/P (H)
		(aut)	13C6 PFDA	40	J/UJ/P (G)
	CN 21 011		1202 DETADA	0.04	Х/Р (К)
	GM-21-011	(ND)	13C2 PFTeDA		
	+		13C2-PFDoDA	2	X/P (I,J)
			d5-NEtFOSAA	28	J/UJ/P (U)
L	1		d3-NMeFOSAA	31	J/UJ/P (T)

# VALIDATION FINDINGS WORKSHEET Labeled Compounds

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-011 (cont'd) (H)		13C7 PFUnA	9	X/P (H)
		_Ľ_	13C6 PFDA	31	J/UJ/P (G)
	GM-21-011RE		13C2 PFTeDA	26	J/UJ/P (K)
	GM-21-012	_	13C2 PFTeDA	0.6	Х/Р (К)
		_	13C2-PFDoDA	10	X/P (I,J)
			d5-NEtFOSAA	47	J/UJ/P (U)
			d3-NMeFOSAA	48	J/UJ/P (T)
			13C7 PFUnA	27	J/UJ/P (H)
	GM-21-012RE		13C2 PFTeDA	7	Х/Р (К)
			13C2-PFDoDA	35	J/UJ/P (I,J)
	GM-21-051		13C2 PFTeDA	2	X/P (K)
			13C2-PFDoDA	23	J/UJ/P (I,J)
			13C7 PFUnA	44	J/UJ/P (H)
	GM-21-051RE		13C2 PFTeDA	6	Х/Р (К)
		_	13C2-PFDoDA	35	J/UJ/P (I,J)
			d5-NEtFOSAA	47	J/UJ/P (U)
	GM-21-048		13C2 PFTeDA	0.1	Х/Р (К)
			13C2-PFDoDA	2	X/P (I,J)
			d5-NEtFOSAA	33	J/UJ/P (U)
			d3-NMeFOSAA	34	J/UJ/P (T)
		×	13C7 PFUnA	8	X/P (H)
	(*	<u>ut)</u>	13C6 PFDA	34	J/UJ/P (G)
	GM-21-048RE	ND	13C2 PFTeDA	6	Х/Р (К)
	GM-21-045		13C2 PFTeDA	10	X/P (K)
		V	13C2-PFDoDA	47	J/UJ/P (I,J)

LDC #: 53144 1776

# VALIDATION FINDINGS WORKSHEET Labeled Compounds

#### Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

#### Percent recoveries (%R) were within QC limits with the exceptions identified below.

		Labeled		
#	Sample ID	Compound	%R (50-150)	Qualifications
	GM-21-045RE	13C2 PFTeDA	28	J/UJ/P (K)
	GM-21-023	13C2 PFTeDA	6	X/P (K)
	T	13C2-PFDoDA	26	J/UJ/P (I,J)
		13C7 PFUnA	44	J/UJ/P (H)
	GM-21-062 (aut	13C3 PFHxS	38	J/UJ/P (N)
		13C5 PFHxA	40	J/UJ/P (C)
		13C4 PFHpA	35	J/UJ/P (D, DONA)
	(Nb	13C2 PFTeDA	0.008	X/P (K)
	(dut	13C3 HFPO-DA	34	J/UJ/P (HFPO-DA)
	(NØ	13C2-PFDoDA	0.002	X/P (I,J)
	[ [ ]	13C9 PFNA	2	X/P (F)
		d5-NEtFOSAA	0.2	X/P (U)
		d3-NMeFOSAA	0.2	X/P (T)
		13C7 PFUnA	0.01	X/P (H)
		13C6 PFDA	0.1	X/P (G)
		13C8 PFOS	2	X/P (P,DD,EE)
	aut	13C8 PFOA	11	X.P (E)
	GM-21-062RE	13C5 PFHxA	44	J/UJ/P (C)
	(ND)	13C2 PFTeDA	30	J/UJ/P (K)
		13C3 HFPO-DA	38	J/UJ/P (HFPO-DA)
	GM-21-049	13C2 PFTeDA	10	X/P (K)
		13C2-PFDoDA	36	J/UJ/P (I,J)
		d5-NEtFOSAA	45	J/UJ/P (U)
		d3-NMeFOSAA	45	J/UJ/P (T)
		13C7 PFUnA	39	J/UJ/P (H)
	GM-21-049RE <b>V</b>	13C2 PFTeDA	46	J/UJ/P (K)
		) 13C3 HFPO-DA	42	J/UJ/P (HFPO-DA)

LDC #: 3144296

## VALIDATION FINDINGS WORKSHEET Target Analyte Identification

Page:_	of/
Reviewer:_	-A

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.1

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was the signal to noise (S/N) ratio for all analytes within the validation criteria?

Y N N/A Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?

Y N N/A Were ion ratios within QC limits?

	- /				
#	Date	Sample ID	Analyte	lon ratio (Limits)	Qualifications
		5,14,16,20,22	r	Results flagged "I" by the laboratory due to	Jdets/P (*XI()
				ion ratio outside QC limits.	/

### VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: <u>(</u>of <u></u> Reviewer: <u></u>

#### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
		1, 6, 8, 10, 14	fu	Reextruction more	NR
		Â.		vsable	
				(several Labels %RS	
				out in onin)	
		4,14,21	All	RE more uselle	
				(higher woulds)	
		12	All except E, G, N, P E, G, N, P	RE more usable	
				Nin in	stij)
		13	E, G, N, P	Remore usable	
	·····			(higher results)	
		19	ntt fil except CC	KE MOR HERBLE	
				Charger insulfs) (8	out in org
		70	not except cc	Upig more whole	
				(man results)	v
	<u></u>				

# Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:	Keyport LTM
--------------------	-------------

LDC Report Date: March 11, 2022

Perfluoroalkyl & Polyfluoroalkyl Substances Parameters:

Validation Level: Stage 2B

Eurofins, Lancaster, PA Laboratory:

Sample Delivery Group (SDG): 410-66194-1

	Laboratory Sample		Collection
Sample Identification	Identification	Matrix	Date
GM-21-055	410-66194-1	Water	12/07/21
GM-21-055RE	410-66194-1RE	Water	12/07/21
GM-21-036	410-66194-2	Water	12/07/21
GM-21-036RE	410-66194-2RE	Water	12/07/21
GM-21-035	410-66194-3	Water	12/07/21
GM-21-056	410-66194-4	Water	12/07/21
GM-21-030	410-66194-5	Water	12/07/21
GM-21-030RE	410-66194-5RE	Water	12/07/21
GM-21-001	410-66194-6	Water	12/07/21
GM-21-064	410-66194-7	Water	12/07/21
GM-21-064RE	410-66194-7RE	Water	12/07/21
GM-21-034	410-66194-8	Water	12/07/21
GM-21-034RE	410-66194-8RE	Water	12/07/21
GM-21-063	410-66194-9	Water	12/07/21
GM-21-063RE	410-66194-9RE	Water	12/07/21
GM-21-026	410-66194-10	Water	12/07/21
GM-21-026RE	410-66194-10RE	Water	12/07/21
GM-21-039	410-66194-11	Water	12/07/21
GM-21-039RE	410-66194-11RE	Water	12/07/21
GM-21-065	410-66194-12	Water	12/07/21
GM-21-065RE	410-66194-12RE	Water	12/07/21
GM-21-033	410-66194-13	Water	12/07/21
GM-21-033RE	410-66194-13RE	Water	12/07/21
GM-21-014	410-66194-14	Water	12/07/21
GM-21-014RE	410-66194-14RE	Water	12/07/21
GM-21-056REMS	410-66194-4REMS	Water	12/07/21

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GM-21-056REMSD	410-66194-4REMSD	Water	12/07/21
GM-21-001REMS	410-66194-6REMS	Water	12/07/21
GM-21-001REMSD	410-66194-6REMSD	Water	12/07/21
GM-21-056RE	410-66194-4RE	Water	12/07/21

#### Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021), the NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015), the U.S. Department of Defense (DoD) General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 3: Data Validation Procedure for Perand Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified and LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

# Codes

- H Holding times were exceeded.
- S Surrogate recovery was outside QC limits.
- C Calibration % RSD or %D were noncompliant.
- R Calibration RRF was <0.05.
- B Presumed contamination from preparation (method) blank.
- L Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.
- Q MS/MSD recovery was poor or RPD high.
- I Internal standard performance was unsatisfactory.
- M Tuning (BFB or DFTPP) was noncompliant.
- T Presumed contamination from trip blank.
- + False positive reported compound was not present. Not applicable.
- False negative compound was present but not reported.
- F Presumed contamination from FB, or ER.
- \$ Reported result or other information was incorrect.
- ? TIC identity or reported retention time has been changed.
- D The analysis with this flag should not be used because another more technically sound analysis is available.
- P Instrument performance for pesticides was poor.
- \*# Unusual problems found with the data that have been described in Section 2.2.3.3, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found.

# I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
GM-21-030RE GM-21-064RE GM-21-034RE GM-21-063RE GM-21-026RE GM-21-039RE GM-21-065RE GM-21-033RE GM-21-034RE	All analytes	16	14	J (all detects) UJ (all non-detects)	A

# II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

#### III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

For each calibration standard, all analytes were within 70-130% of their true value.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

# IV. Continuing Calibration and Instrument Sensitivity Check

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes.

All analyte concentrations were at the limit of quantitation (LOQ) for the ISC standard.

### V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Analyte	Concentration	Associated Samples
MB 410-207510/1-A	12/20/21	Perfluorooctanesulfonic acid	0.657 ng/L	GM-21-001
MB 410-208962/1-A	12/23/21	Perfluorooctanesulfonic acid	0.555 ng/L	GM-21-030RE GM-21-064RE GM-21-034RE GM-21-063RE GM-21-026RE GM-21-039RE GM-21-065RE GM-21-033RE GM-21-014RE

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
GM-21-034RE	Perfluorooctanesulfonic acid	2.6 ng/L	2.6J ng/L
GM-21-026RE	Perfluorooctanesulfonic acid	2.2 ng/L	2.2J ng/L
GM-21-065RE	Perfluorooctanesulfonic acid	2.5 ng/L	2.5J ng/L

#### VI. Field Blanks

Sample FB-120721 (from SDG 410-66189-1) was identified as a field blank. No contaminants were found.

#### VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
GM-21-056REMS/MSD (GM-21-056 GM-21-056RE)	Perfluorotridecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	30 (65-144) 50 (70-130)	-	UJ (all non-detects) UJ (all non-detects)	A
GM-21-056REMS/MSD (GM-21-056 GM-21-056RE)	Hexafluoropropylene oxide dimer acid (HFPO-DA)	151 (70-130)	152 (70-130)	NA	-

#### Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
GM-21-056REMS/MSD (GM-21-056 GM-21-056RE)	Perfluorotridecanoic acid	106 (≤30)	NA	-

### VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

#### **IX. Field Duplicates**

Samples GM-21-034 and GM-21-033, GM-21-034RE and GM-21-033RE, GM-21-064 and GM-21-063, and GM-21-064RE and GM-21-063RE were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

	Concentration (ng/L)					
Analyte	GM-21-033-12072021	GM-21-034-12072021	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	1.1	1.2	-	0.1 (≤1.9)	-	_
Perfluoroheptanoic acid	0.68	0.60	-	0.08 (≤1.9)	-	-
Perfluorooctanoic acid	1.9	1.8	-	0.1 (≤1.9)	-	-
Perfluorohexanoic acid	1.1	1.1	_	0.0 (≤1.9)	-	-
Perfluorohexanesulfonic acid	2.6	3.0	14 (≤30)	-	-	-
Perfluorooctanesulfonic acid	0.65	1.3	-	0.65 (≤1.9)	-	-

	Concentra					
Analyte	GM-21-033-12072021RE	GM-21-034-12072021RE	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	1.5	1.5	-	0 (≤2.0)	-	-
Perfluoroheptanoic acid	0.78	0.70	-	0.08 (≤2.0)	-	-
Perfluorooctanoic acid	2.6	2.7	4 (≤30)	-	-	-
Perfluorohexanoic acid	1.5	1.5	-	0 (≤2.0)	-	-
Perfluorohexanesulfonic acid	4.1	5.5	-	1.4 (≤2.0)	-	-
Perfluorooctanesulfonic acid	0.98U	2.6	-	1.62 (≤2.0)	-	-

	Concentra					
Analyte	GM-21-063-12072021	GM-21-064-12072021	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	0.77	0.71	-	0.1 (≤1.8)	-	_ ·
Perfluoroheptanoic acid	2.1	2.4	13 (≤30)	-	-	-
NEtFOSAA	0.45	0.53	-	0.1 (≤2.7)	-	-
Perfluorooctanoic acid	13	12	8 (≤30)	-	-	
Perfluorohexanoic acid	3.8	3.4	11 (≤30)	-	-	-
Perfluorohexanesulfonic acid	2.7	2.8	4 (≤30)	-	-	-
Perfluorooctanesulfonic acid	4.5	4.0	12 (≤30)	-	-	-
Perfluorononanoic acid	0.59	0.53	-	0.1 (≤1.8)	-	-

	Concentration (ng/L)					
Analyte	GM-21-063-12072021RE	GM-21-064-12072021RE	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	1.4	1.2	-	0.2 (≤1.8)	-	-
Perfluoroheptanoic acid	3.1	2.8	10 (≤30)	0.3 (≤1.8)	-	
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.91U	1.7	-	0.79 (≤1.8)	-	-
Perfluorooctanoic acid	17	17	0 (≤30)	-	-	-

	Concentration (ng/L)					
Analyte	GM-21-063-12072021RE	GM-21-064-12072021RE	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorohexanoic acid	5.3	5.4	2 (≤30)	-	-	-
Perfluorohexanesulfonic acid	3.8	4.1	8 (≤30)	-	-	-
Perfluorooctanesulfonic acid	5.8	6.2	7 (≤30)	-	-	-
Perfluorononanoic acid	0.95	0.85	-	0.1 (≤1.8)	-	-

# X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-055	13C2 PFTeDA 13C2-PFDoDA d3-NMeFOSAA	4 (50-150) 16 (50-150) 18 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NMeFOSAA	x	Ρ
GM-21-055	13C9 PFNA d5-NEtFOSAA 13C7 PFUnA 13C6 PFDA	33 (50-150) 21 (50-150) 21 (50-150) 21 (50-150) 24 (50-150)	Perfluorononanoic acid NEtFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-055	13C8 PFOS	30 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) UJ (all non-detects)	Ρ
GM-21-055RE	13C2 PFTeDA 13C2-PFDoDA	0.9 (50-150) 14 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ
GM-21-055RE	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	43 (50-150) 49 (50-150) 39 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-036	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.05 (50-150) 2 (50-150) 7 (50-150) 8 (50-150) 5 (50-150) 10 (50-150) 18 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid Perfluorooctanesulfonic acid	X	Ρ
GM-21-036	13C9 PFNA 13C8 PFOA	21 (50-150) 38 (50-150)	Perfluorononanoic acid Perfluorooctanoic acid	J (all detects) J (all detects)	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-056	13C2 PFTeDA	49 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-030	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	0.03 (50-150) 0.06 (50-150) 10 (50-150) 14 (50-150) 0.9 (50-150) 8 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	x	Ρ
GM-21-030	13C8 PFOS	43 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) UJ (all non-detects)	Ρ
GM-21-030RE	13C2 PFTeDA	6 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-030RE	13C2-PFDoDA	44 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-064	13C2 PFTeDA 13C2-PFDoDA	2 (50-150) 18 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ
GM-21-064	13C7 PFUnA	35 (50-150)	Perfluoroundecanoic acid	UJ (all non-detects)	Р
GM-21-064RE	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.5 (50-150) 5 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-064RE	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	24 (50-150) 28 (50-150) 28 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
GM-21-034	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	0.01 (50-150) 0.3 (50-150) 7 (50-150) 9 (50-150) 1 (50-150) 6 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NETFOSAA NMEFOSAA Perfluorodecanoic acid Perfluorodecanoic acid	Х	Ρ
GM-21-034	13C9 PFNA	25 (50-150)	Perfluorononanoic acid	UJ (all non-detects)	Р
GM-21-034	13C8 PFOS	21 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) UJ (all non-detects)	Р
GM-21-034RE	13C2 PFTeDA	34 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-063	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.07 (50-150) 3 (50-150) 12 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-063	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	28 (50-150) 29 (50-150) 34 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	J (all detects) UJ (all non-detects)	P
GM-21-063RE	13C2 PFTeDA	9 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-063RE	13C2-PFDoDA	43 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-026	13C2 PFTeDA	32 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-026RE	13C2 PFTeDA	8 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-026RE	13C2-PFDoDA	40 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-039	13C3 PFHxS 13C5 PFHxA 13C9 PFNA d5-NEtFOSAA 13C8 PFOA	157 (50-150) 158 (50-150) 151 (50-150) 155 (50-150) 158 (50-150)	Perfluorohexanesulfonic acid Perfluorohexanoic acid Perfluorononanoic acid NEtFOSAA Perfluorooctanoic acid	NA	-
GM-21-039	13C3 PFBS	151 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	A
GM-21-065	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	0.02 (50-150) 0.03 (50-150) 6 (50-150) 9 (50-150) 0.5 (50-150) 6 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NMeFOSAA NEtFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	X	Ρ
GM-21-065	13C9 PFNA	33 (50-150)	Perfluorononanoic acid	UJ (all non-detects)	Р
GM-21-065	13C8 PFOS	27 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) UJ (all non-detects)	Р
GM-21-065RE	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.1 (50-150) 3 (50-150) 12 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	х	Ρ
GM-21-065RE	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	36 (50-150) 37 (50-150) 36 (50-150)	NMeFOSAA NEtFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-033RE	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.004 (50-150) 0.02 (50-150) 4 (50-150) 0.6 (50-150) 0.8 (50-150) 0.07 (50-150) 0.5 (50-150) 3 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NMeFOSAA NEtFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	x	Ρ
GM-21-033RE	13C8 PFOA	25 (50-150)	Perfluorooctanoic acid	J (all detects)	Р
GM-21-014	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.4 (50-150) 7 (50-150) 19 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-014	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	35 (50-150) 36 (50-150) 49 (50-150)	NMeFOSAA NEtFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-014RE	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	0.05 (50-150) 3 (50-150) 16 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-014RE	13C3 HFPO-DA d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	47 (50-150) 30 (50-150) 30 (50-150) 37 (50-150)	Hexafluoropropylene oxide dimer acid (HFPO-DA) NMeFOSAA NEtFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-014RE	13C8 PFOS	39 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) J (all detects) J (all detects)	Ρ

# XI. Target Analyte Quantitation

The laboratory indicated that PFAs are currently being reported as the sum of the branched and linear isomers so both peaks were integrated.

Raw data were not reviewed for Stage 2B validation.

### XII. Target Analyte Identification

All target analyte identifications were within validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
GM-21-036 GM-21-036RE GM-21-034 GM-21-033 GM-21-014RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ

Raw data were not reviewed for Stage 2B validation.

#### XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

#### XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
GM-21-055 GM-21-036 GM-21-030 GM-21-063 GM-21-039 GM-21-065	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-056	All analytes except Perfluorooctanoic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-056RE	Perfluorooctanoic acid Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-064	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid Hexafluoropropylene oxide dimer acid (HFPO-DA)	Results from re-analyses were more usable.	Not reportable	-

0	Analuta	Reason	Flag	A or P
Sample GM-21-064RE	AnalyteReasonAll analytes exceptResults from original analyses were more usabPerfluorohexanoic acidPerfluorohexanoic acidPerfluorooctanoic acidPerfluorononanoic acidPerfluorobutanesulfonic acidPerfluorobutanesulfonic acidPerfluorobctanesulfonic acidPerfluorooctanesulfonic acidPerfluoroperpopylene oxide dimer acid (HFPO-DA)Results from original analyses were more usab		Not reportable	-
GM-21-026	All analytes except Perfluorotetradecanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-026RE	Perfluorotetradecanoic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-033RE	All analytes	Results from original analyses were more usable.	Not reportable	-
GM-21-014	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-014RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-034	All analytes except 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-034RE	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	Results from original analyses were more usable.	Not reportable	-

Due to technical holding time, MS/MSD %R, labeled compound %R, and ion ratio, data were qualified as estimated in twenty-four samples.

Due to labeled compound %R, data were recommended for exclusion in six samples.

Due to laboratory blank contamination, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

### Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 410-66194-1

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-030RE GM-21-064RE GM-21-034RE GM-21-063RE GM-21-026RE GM-21-039RE GM-21-065RE GM-21-014RE	All analytes	J (all detects) UJ (all non-detects)	A	Technical holding times (H)
GM-21-055RE	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ	Labeled compounds (%R) (I)
GM-21-055RE	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-030RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-030RE	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-064	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-064	Perfluoroundecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-034	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-063RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-063RE	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-026	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-026RE	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-065RE	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ	Labeled compounds (%R) (I)

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-065RE	NMeFOSAA NEtFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-014	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	X	Ρ	Labeled compounds (%R) (I)
GM-21-014	NMeFOSAA NEtFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-036RE GM-21-034 GM-21-033 GM-21-014RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ	Target analyte identification (ion ratio) (*XII)
GM-21-055 GM-21-036 GM-21-030 GM-21-063 GM-21-039 GM-21-065	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-056	All analytes except Perfluorooctanoic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-056RE	Perfluorooctanoic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-064	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid Hexafluoropropylene oxide dimer acid (HFPO-DA)	Not reportable	-	Overall assessment of data (*XIV)
GM-21-064RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid Hexafluoropropylene oxide dimer acid (HFPO-DA)	Not reportable	-	Overall assessment of data (*XIV)
GM-21-026	All analytes except Perfluorotetradecanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-026RE	Perfluorotetradecanoic acid	Not reportable	-	Overall assessment of data (*XIV)

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-033RE	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-014	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-014RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-034	All analytes except 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-034RE	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	Not reportable	-	Overall assessment of data (*XIV)

#### Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 410-66194-1

Sample	Analyte	Modified Final Concentration	A or P	Code
GM-21-034RE	Perfluorooctanesulfonic acid	2.6J ng/L	A	В
GM-21-026RE	Perfluorooctanesulfonic acid	2.2J ng/L	A	В
GM-21-065RE	Perfluorooctanesulfonic acid	2.5J ng/L	A	В

# Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 410-66194-1

No Sample Data Qualified in this SDG

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 2/2/22
Page:of_∽
Reviewer: <b>R</b>
2nd Reviewer:

SDG #: <u>410-66194-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144C96

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
Ι.	Sample receipt/Technical holding times	A , SN	
П.	LC/MS Instrument performance check	A	
- 111.	Initial calibration/ICV	1A	RSD = 20  TV/19 = 30
IV.	Continuing calibration/ISC	Ă/Ă	1=30
V.	Laboratory Blanks	SN	
V.I	Field blanks	ND	FB-120721 (410-66189-1)
VII.	Matrix spike/Matrix spike duplicates	ŚIJ	
VIII.	Laboratory control samples	4	LCSD
IX.	Field duplicates	Ŝ¥	D= 13+23, 14+24, 11+15, 12+16
Х.	Labeled Compounds	ŚW	
XI.	Target analyte quantitation	N.	
XII.	Target analyte identification	ςΝ	
XIII.	System performance	N	
XIV.	Overall assessment of data	SW	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank SB=Source blank OTHER:

	Client ID	Lab ID	Matrix	Date
1 <b>2</b>	GM-21-055	410-66194-1	Water	12/07/21
2 <b>6</b>	GM-21-055RE	410-66194-1RE	Water	12/07/21
37	GM-21-036	410-66194-2	Water	12/07/21
3 4 4	GM-21-036RE	410-66194-2RE	Water	12/07/21
<sub>5</sub>	GM-21-035	410-66194-3	Water	12/07/21
6 4	<del>GM-21-035RE</del>	410-66194-3RE	Water	12/07/21
1	GM-21-056	410-66194-4	Water	12/07/21
8 <b>3</b>	GM-21-030	410-66194-5	Water	12/07/21
<sub>9</sub> 7	GM-21-030RE	410-66194-5RE	Water	12/07/21
<b>4</b> 10	GM-21-001	410-66194-6	Water	12/07/21
11 <b>3</b>	GM-21-064	410-66194-7	Water	12/07/21
127	GM-21-064RE	410-66194-7RE	Water	12/07/21
13 <b>3</b>	GM-21-034	410-66194-8	Water	12/07/21
14 7 15 <b>3</b>	GM-21-034RE	410-66194-8RE	Water	12/07/21
15 <b>3</b>	GM-21-063	410-66194-9	Water	12/07/21

#### LDC #: 53144C96

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B

SDG #: 410-66194-1 Laboratory: Eurofins, Lancaster, PA

Date:2 Page: 2 of Reviewer: 2nd Reviewer:

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

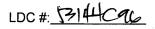
	Client ID				Lab ID	Matrix	Date
16	GM-21-063RE				410-66194-9RE	Water	12/07/21
17 <b>3</b>	GM-21-026				410-66194-10	Water	12/07/21
18 <b>7</b>	GM-21-026RE				410-66194-10RE	Water	12/07/21
19 <b>3</b>	GM-21-039				410-66194-11	Water	12/07/21
20 <b>7</b>	GM-21-039RE					Water	12/07/21
<b>3</b> 21	GM-21-065				410-66194-12	Water	12/07/21
<sub>22</sub> 1	GM-21-065RE				410-66194-12RE	Water	12/07/21
23 <b>7</b>	GM-21-033				410-66194-13	Water	12/07/21
<sub>24</sub> 7	GM-21-033RE				410-66194-13RE	Water	12/07/21
25 <b>3</b>	GM-21-014				410-66194-14	Water	12/07/21
26 <b>1</b>	GM-21-014RE				410-66194-14RE	Water	12/07/21
27 H	GM-21-056MS				410-66194-4MS	Water	12/07/21
28	GM-21-056MSD				410-66194-4MSD	Water	12/07/21
29 <sup>4</sup>					410-66194-6MS	Water	12/07/21
30 <b>#</b>	GM-21-001MSD				410-66194-6MSD	Water	12/07/21
바 31	GM-21-001RE-M						
532*	GM-21-056RE	GM-21-DS6RE					
33							
lotes:	: <u> </u>						
	206955	5	208135				
	707022	6	208162		······		
3	207407	7	208962				
11	4	1					

207510

#### TARGET COMPOUND WORKSHEET

#### **METHOD: PFAS**

A. Perfluorobutanoic acid	W. 6:2 Fluorotelomer sulfonate	
B. Perfluoropentanoic acid	X. 8:2 Fluorotelomer sulfonate	
C. Perfluorohexanoic acid	Y. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	
D. Perfluoroheptanoic acid	Z. HFPO-DA (GenX)	
E. Perfluorooctanoic acid	AA. 9CI-PF3ONS (F-53B Major)	
F. Perfluorononanoic acid	BB. 11CI-PF3OUdS (F-53B Minor)	
G. Perfluorodecanoic acid	CC. Hexafluoropropylene oxide dimer acid (HFPO-DA)	
H. Perfluoroundecanoic acid	DD. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	
I. Perfluorododecanoic acid	EE. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	
J. Perfluorotridecanoic acid	FF. 4:2 Fluorotelomersulfonic acid	
K. Perfluorotetradecanoic acid	GG. 6:2 Fluorotelomersulfonic acid	
L. Perfluorobutanesulfonic acid	HH. 8:2 Fluorotelomersulfonic acid	
M. Perfluoropentanesulfonic acid	II. 1H,1H,2H,2H-perfluorohexane sulfonic acid	
N. Perfluorohexanesulfonic acid	JJ. 1H,1H,2H,2H- Perfluorooctanesulfonic acid	
O. Perfluoroheptanesulfonic acid	KK. 1H, 1H, 2H, 2H-perfluorodecane sulfonic acid	
P. Perfluorooctanesulfonic acid	LL. NMeFOSA	
Q. Perfluorononanesulfonic acid	MM. 3:3 Fluorotelomer carboxylate	
R. Perfluorodecanesulfonic acid	NN. 5:3 Fluorotelomer carboxylate	
S. Perfluorooctanesulfonamide	OO. 7:3 Fluorotelomer carboxylate	
T. NMeFOSAA	PP. Perfluorooctadecanoic acid	
U. NEtFOSAA		
V. 4:2 Fluorotelomer sulfonate		



#### VALIDATION FINDINGS WORKSHEET <u>Technical Holding Times</u>

Page:_	<u>/</u> of
Reviewer:	57

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Affective dates have exceeded the technical holding times.  $\underline{M}$  N/A Were all cooler temperatures within validation criteria?

						HT-14	
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	(H) Qualifier
9,12,14,16,	W		12/7/2	12/23/21	12/28/21	16	JUJA
18 26 22 24							
26							
(aut/ND)							
		_					
	·····						
			ANT				
					· · · · · · · · · · · · · · · · · · ·		
						;	
			·				
							· · · · · · · · · · · · · · · · · · ·
					· · · · · · · · · · · · · · · · · · ·		
			······				

#### TECHNICAL HOLDING TIME CRITERIA

Water:Extracted within 14 days, analyzed within 28 days.Soil:Extracted within 28 days, analyzed within 28 days.

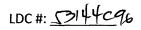
#### VALIDATION FINDINGS WORKSHEET

<u>Blanks</u>

Page:\_\_\_lof\_\_ Reviewer:\_\_\_**\*\_**\_\_

Method:	LC/MS/MS and Isotor	pe Dilution Com	pliant with Table	B-15 of DoD QSM 5.3

extraction date: . units:M/L Analyte	Blank ID				s	ample Identific	ation			
	207510/1-A	SX								
	0.657	3,285								
·····										
						1		1		
extraction date:	12/23/21 Blank ID	Associat	ted Samples	9, 12,	14,16,18 s	ample Identific			(B)	
Analyte	Blank ID		ted Samples	9, 12,					(B)	
Analyte					S				(B)	
Analyte	Blank ID 10-20896>/1-)		4	12	s کد				(B)	
Analyte	Blank ID 10-20896>/1-)		4	12	s کد				(B)	



#### VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: <u>1</u> of <u>1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. (Q) Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below. MS MSD Associated %R (Limits) # MS/MSD ID RPD (≤30) Analyte %R (Limits) Samples Qualifications 30(65-144) 27/28 7.32 (ND) T/UT/A EE 50 (70-130) 52 (70-130) de July A 06

LDC #: 314-1096

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

	Concentra	tion (ng/L)		Difference	Difference	
Analyte	GM-21-033-12072021	GM-21-034-12072021	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorobutanesulfonic acid	1.1	1.2		0.1	1.9	
Perfluoroheptanoic acid	0.68	0.60		0.08	1.9	
Perfluorooctanoic acid	1.9	1.8		0.1	1.9	
Perfluorohexanoic acid	1.1	1.1		0.0	1.9	
Perfluorohexanesulfonic acid	2.6	3.0	14	· · · · · · · · · · · · · · · · · · ·		
Perfluorooctanesulfonic acid	0.65	1.3		0.65	1.9	

	Concentra	Concentration (ng/L)			Difference	
Analyte	GM-21-033-12072021RE	GM-21-034-12072021RE	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorobutanesulfonic acid	1.5	1.5		0	2.0	
Perfluoroheptanoic acid	0.78	0.70		0.08	2.0	
Perfluorooctanoic acid	2.6	2.7	4			
Perfluorohexanoic acid	1.5	1.5		0	2.0	
Perfluorohexanesulfonic acid	4.1	5.5		1.4	2.0	
Perfluorooctanesulfonic acid	0.98U	2.6		1.62	2.0	

LDC #: 53144696

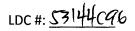
# VALIDATION FINDINGS WORKSHEET <u>Field Duplicates</u>

Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

	Concentration (ng/L)			Difference	Difference	
Analyte	GM-21-063-12072021	GM-21-064-12072021	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorobutanesulfonic acid	0.77	0.71		0.1	1.8	
Perfluoroheptanoic acid	2.1	2.4	13			
NEtFOSAA	0.45	0.53		0.1	2.7	
Perfluorooctanoic acid	13	12	8			
Perfluorohexanoic acid	3.8	3.4	11			
Perfluorohexanesulfonic acid	2.7	2.8	4			
Perfluorooctanesulfonic acid	4.5	4.0	12			
Perfluorononanoic acid	0.59	0.53		0.1	1.8	

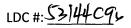
	Concentration (ng/L)			Difference	Difference	
Analyte	GM-21-063-12072021RE	GM-21-064-12072021RE	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorobutanesulfonic acid	1.4	1.2		0.2	1.8	
Perfluoroheptanoic acid	3.1	2.8	10			
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.91U	1.7		0.79	1.8	
Perfluorooctanoic acid	17	17	0			
Perfluorohexanoic acid	5.3	5.4	2			
Perfluorohexanesulfonic acid	3.8	4.1	8			
Perfluorooctanesulfonic acid	5.8	6.2	7			
Perfluorononanoic acid	0.95	0.85		0.1	1.8	



Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

		Labeled		
#	Sample ID	Compound	%R (50-150)	Qualifications
	GM-21-055 (ND)	13C2 PFTeDA	4	Х/Р (К)
		13C2-PFDoDA	16	X/P (I,J)
		13C9 PFNA	33	J/UJ/P (F)
		d5-NEtFOSAA	21	J/UJ/P (U)
		d3-NMeFOSAA	18	X/P (T)
		13C7 PFUnA	21	J/UJ/P (H)
	l k	13C6 PFDA	24	J/UJ/P (G)
	(P-det)	13C8 PFOS	30	J/UJ/P (P,DD,EE)
<u> </u>	GM-21-055RE	13C2 PFTeDA	0.9	Х/Р (К)
		13C2-PFDoDA	14	X/P (I,J)
		d5-NEtFOSAA	43	J/UJ/P (U)
		d3-NMeFOSAA	49	J/UJ/P (T)
		13C7 PFUnA	39	J/UJ/P (H)
	GM-21-036	13C2 PFTeDA	0.05	Х/Р (К)
	V.	13C2-PFDoDA	2	X/P (I,J)
	(let)	13C9 PFNA	21	J/UJ/P (F)
	(ND)	d5-NEtFOSAA	7	X/P (U)
	[ //	d3-NMeFOSAA	8	X/P (T)
		13C7 PFUnA	5	Х/Р (Н)
	(Lit)	13C6 PFDA	10	X/P (G)
		13C8 PFOS	18	X/P (P,DD,EE)
		13C8 PFOA	38	J/UJ/P (E)
	GM-21-056 (ND)	13C2 PFTeDA	49	J/UJ/P (K)
	GM-21-030	13C2 PFTeDA	0.03	Х/Р (К)
		13C2-PFDoDA	0.06	X/P (I,J)
		d5-NEtFOSAA	10	X/P (U)
		d3-NMeFOSAA	14	Х/Р (Т)
	,	13C7 PFUnA	0.9	X/P (H)
		13C6 PFDA	8	X/P (G)
	(Polit)	13C8 PFOS	43	J/UJ/P (P,DD,EE)



Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID GM-21-030RE	(ND)	Compound 13C2 PFTeDA	%R (50-150)	Qualifications
	GM-21-030RE	(NV)		6	Х/Р (К)
			13C2-PFDoDA	44	J/UJ/P (I,J)
	GM-21-064		13C2 PFTeDA	2	Х/Р (К)
			13C2-PFDoDA	18	X/P (I,J)
			13C7 PFUnA	35	J/UJ/P (H)
	GM-21-064RE		13C2 PFTeDA	0.5	Х/Р (К)
			13C2-PFDoDA	5	X/P (I,J)
			d5-NEtFOSAA	24	J/UJ/P (U)
			d3-NMeFOSAA	28	J/UJ/P (T)
			13C7 PFUnA	11	X/P (H)
			13C6 PFDA	28	J/UJ/P (G)
	GM-21-034		13C2 PFTeDA	0.01	Х/Р (К)
			13C2-PFDoDA	0.3	X/P (I,J)
			13C9 PFNA	25	J/UJ/P (F)
			d5-NEtFOSAA	7	X/P (U)
			d3-NMeFOSAA	9	X/P (T)
			13C7 PFUnA	1	X/P (H)
			13C6 PFDA	6	X/P (G)
		(P-24)	13C8 PFOS	21	J/UJ/P (P,DD,EE)
	GM-21-034RE	(ND)	13C2 PFTeDA	34	J/UJ/ P (K)
	GM-21-063		13C2 PFTeDA	0.07	Х/Р (К)
			13C2-PFDoDA	3	X/P (I,J)
		(ait)	d5-NEtFOSAA	28	J/UJ/P (U)
		(ND)	d3-NMeFOSAA	29	J/UJ/P (T)
			13C7 PFUnA	12	X/P (H)
			13C6 PFDA	34	J/UJ/P (G)
	GM-21-063RE		13C2 PFTeDA	9	Х/Р (К)
			13C2-PFDoDA	43	J/UJ/P (H)

LDC #: 53144C96

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-026	(ND)	13C2 PFTeDA	32	J/UJ/P (K)
	GM-21-026RE	$-\vee$	13C2 PFTeDA	8	Х/Р (К)
			13C2-PFDoDA	40	J/UJ/P (I,J)
		1.1.2			
	GM-21-039		13C3 PFHxS	157	Jdets/P (N)
			13C3 PFBS	151	Jdets/P (L)
		(ND)	13C5 PFHxA	158	Jdets/P (C)
		<u>'</u>	13C9 PFNA	151	Jdets/P (F)
			d5-NEtFOSAA	155	Jdets/P (U)
			13C8 PFOA	158	Jdets/P (E)
	GM-21-065		13C2 PFTeDA	0.02	Х/Р (К)
			13C2-PFDoDA	0.03	X/P (I,J)
			13C9 PFNA	33	J/UJ/P (F)
			d5-NEtFOSAA	. 6	X/P (T)
			d3-NMeFOSAA	9	X/P (U)
			13C7 PFUnA	0.5	X/P (H)
		V,	13C6 PFDA	6	X/P (G)
	(P-	-det)	13C8 PFOS	27	J/UJ/P (P,DD,EE)
		<u> </u>			
	GM-21-065RE	(ND)	13C2 PFTeDA	0.1	X/P (K)
			13C2-PFDoDA	3	X/P (1,J)
			d5-NEtFOSAA	36	J/UJ/P (T)
			d3-NMeFOSAA	37	J/UJ/P (U)
			13C7 PFUnA	12	X/P (H)
			13C6 PFDA	36	J/UJ/P (G)
		•	1		
	GM-21-033RE	(ND)	13C2 PFTeDA	0.004	Х/Р (К)
		- /	13C2-PFDoDA	0.02	X/P (I,J)
			13C9 PFNA	4	X/P (F)
			d5-NEtFOSAA	0.6	X/P (T)
			d3-NMeFOSAA	0.8	X/P (U)
			13C7 PFUnA	0.07	X/P (H)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD

# Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

#### Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-033RE (N	(0)	13C6 PFDA	0.5	X/P (G)
			13C8 PFOS	3	X/P (P,DD,EE)
	(*	ut)	13C8 PFOA	25	J/UJ/P (E)
	GM-21-014	10)	13C2 PFTeDA	0.4	Х/Р (К)
	Q	<b>'</b>	13C2-PFDoDA	7	X/P (I,J)
			d5-NEtFOSAA	35	J/UJ/P (T)
			d3-NMeFOSAA	36	J/UJ/P (U)
			13C7 PFUnA	19	X/P (H)
			13C6 PFDA	49	J/UJ/P (G)
	GM-21-014RE	-	13C2 PFTeDA	0.05	Х/Р (К)
			13C3 HFPO-DA	47	J/UJ/P (CC)
			13C2-PFDoDA	3	X/P (I,J)
			d5-NEtFOSAA	30	J/UJ/P (T)
			d3-NMeFOSAA	30	J/UJ/P (U)
			13C7 PFUnA	16	JUJACH - (H)
		√,	13C6 PFDA	37	J/UJ/P (G)
	(P-a	et?	13C8 PFOS	39	J/UJ/P (P,DD,EE)

LDC #: 57144C96

# VALIDATION FINDINGS WORKSHEET Target Analyte Identification

Page:_	lof_
Reviewer:_	R.

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.1

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was the signal to noise (S/N) ratio for all analytes within the validation criteria?

Y N N/A Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?

Y N N/A Were ion ratios within QC limits?

#	Date	, Sample ID	Analyte	lon ratio (Limits)	Qualifications
		3,4,13,23,26		Results flagged "I" by the laboratory due to	Jdets/P (X))
				ion ratio outside QC limits.	,
	-				
-					
-					
┣					
		· · · · · · · · · · · · · · · · · · ·			
	· · · · ·	1	1		

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:<u>≥</u>of<u>≥</u> Reviewer:<u>/∕</u>

### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

	Date	Sample ID	Analyte	Finding	Qualifications
十		9-3	CDELN	RE MOE WARE	NR
				thigher results	1
		24	for supply at we	Orig more usable.	
			,	(several tabled "Resont in RE)	
				% and in RE)	
				<b>2</b> - 10 + <b>D</b> 0 a	
		25	GD, E, F, L, P	RE more value	
				(higher results)	
		26	Ju except above	Drin more make	
		ρ		Orig more beable (gepual label) %R9 out in RE)	~ V
				%RS out in RE)	
		24	41 (x)	RE more worden	NF
		13	fel arcept EE	PE more acable	· · · · · · · · · · · · · · · · · · ·
			3		
		14	<u>22</u>	- l	J
	,				
	<u>.</u>				

LDC #: 53144096

# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:<u>1</u>of<u>2</u> Reviewer:<u>X</u>

### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
		1 3 8 13, 15, 19, 21, 2	fu	Reextraction	NR
		21, 20		more usable	
				(higher results	
				higher results + savenal called %RS out in orig)	
				1/2RS out in origh	
_		7	All except E, P	RE more usable	
			, ,	RE more usable (higher usults)	
				, , , , , , , , , , , , , , , , , , ,	
		32	EP	Orig more usable (higher results)	
				(higher results)	
	<u> </u>				
		8		(higher would)	
				(higher rosult)	
	·····				
			He except C.D.F.F.L.N. P.CC	KE more usable	
			Pcc	(higher results)	
		2	ful except ubore	Orig more usable (several labeled % PS out in RE)	
				(leveral choiled	
				/sks my in KE)	
		17	All a real of t	RE more usable (highe	
		!/	All except K	KI MOR VENCE L'Ugu	
		18	ł	Labeled 9.2 - 20	
		<u> '\$</u>	<b>└─</b> ∧	uning /or = 20	V

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Keyport LTM
LDC Report Date:	February 10, 2022
Parameters:	Perfluoroalkyl & Polyfluoroalkyl Substances
Validation Level:	Stage 2B & 4
Laboratory:	Eurofins, Lancaster, PA

Sample Delivery Group (SDG): 410-66202-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GM-21-042**	410-66202-1**	Water	12/06/21
GM-21-042RE**	410-66202-1RE**	Water	12/06/21
GM-21-037	410-66202-2	Water	12/06/21
GM-21-037RE	410-66202-2RE	Water	12/06/21
GM-21-007**	410-66202-3**	Water	12/06/21
GM-21-007RE**	410-66202-3RE**	Water	12/06/21
GM-21-041	410-66202-4	Water	12/06/21
GM-21-041RE	410-66202-4RE	Water	12/06/21
GM-21-060**	410-66202-5**	Water	12/06/21
GM-21-060RE**	410-66202-5RE**	Water	12/06/21
GM-21-038	410-66202-6	Water	12/06/21
GM-21-038RE	410-66202-6RE	Water	12/06/21
GM-21-008**	410-66202-7**	Water	12/06/21
GM-21-008RE**	410-66202-7RE**	Water	12/06/21
GM-21-043	410-66202-8	Water	12/06/21
GM-21-043RE	410-66202-8RE	Water	12/06/21
GM-21-044**	410-66202-9**	Water	12/06/21
GM-21-044RE**	410-66202-9RE**	Water	12/06/21
FB-120621	410-66202-10	Water	12/06/21
FB-120621RE	410-66202-10RE	Water	12/06/21
GM-21-006	410-66202-11	Water	12/06/21
GM-21-006RE	410-66202-11RE	Water	12/06/21
GM-21-066	410-66202-12	Water	12/06/21
GM-21-066RE	410-66202-12RE	Water	12/06/21
GM-21-015**	410-66202-13**	Water	12/06/21
GM-21-015RE**	410-66202-13RE**	Water	12/06/21

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GM-21-054	410-66202-14	Water	12/06/21
GM-21-054RE	410-66202-14RE	Water	12/06/21
GM-21-031**	410-66202-15**	Water	12/06/21
GM-21-031RE**	410-66202-15RE**	Water	12/06/21
GM-21-032	410-66202-16	Water	12/06/21
GM-21-032RE	410-66202-16RE	Water	12/06/21
GM-21-040	410-66202-17	Water	12/06/21
GM-21-040RE	410-66202-17RE	Water	12/06/21
GM-21-044MS	410-66202-9MS	Water	12/06/21
GM-21-044MSD	410-66202-9MSD	Water	12/06/21
GM-21-044REMS	410-66202-9REMS	Water	12/06/21
GM-21-044REMSD	410-66202-9REMSD	Water	12/06/21

\*\*Indicates sample underwent Stage 4 validation

#### Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021), the NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015), the U.S. Department of Defense (DoD) General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 3: Data Validation Procedure for Perand Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified and LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

# Codes

- H Holding times were exceeded.
- S Surrogate recovery was outside QC limits.
- C Calibration %RSD or %D were noncompliant.
- R Calibration RRF was <0.05.
- B Presumed contamination from preparation (method) blank.
- L Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.
- Q MS/MSD recovery was poor or RPD high.
- I Internal standard performance was unsatisfactory.
- M Tuning (BFB or DFTPP) was noncompliant.
- T Presumed contamination from trip blank.
- + False positive reported compound was not present. Not applicable.
- False negative compound was present but not reported.
- F Presumed contamination from FB, or ER.
- \$ Reported result or other information was incorrect.
- ? TIC identity or reported retention time has been changed.
- D The analysis with this flag should not be used because another more technically sound analysis is available.
- P Instrument performance for pesticides was poor.
- \*# Unusual problems found with the data that have been described in Section 2.2.3.3, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found.

# I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
GM-21-042RE** GM-21-037RE GM-21-037RE GM-21-041RE GM-21-060RE** GM-21-038RE GM-21-008RE** GM-21-043RE GM-21-044RE** FB-120621RE GM-21-006RE GM-21-006RE GM-21-005RE GM-21-054RE GM-21-054RE GM-21-031RE** GM-21-032RE GM-21-040RE	All analytes	15	14	J (all detects) UJ (all non-detects)	A

# II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

## III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

For each calibration standard, all analytes were within 70-130% of their true value.

The signal to noise (S/N) ratio was within validation criteria for all analytes associated to samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

Retention time windows were established as required by the method for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

# IV. Continuing Calibration and Instrument Sensitivity Check

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The signal to noise (S/N) ratio was within validation criteria for all analytes associated to samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes.

Raw data were not reviewed for Stage 2B validation.

All analyte concentrations were at the limit of quantitation (LOQ) for the ISC standard.

## V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

### VI. Field Blanks

Samples FB-120621 and FB-120621RE were identified as field blanks. No contaminants were found.

## VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
GM-21-044MS/MSD (GM-21-044**)	Perfluorodecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid Perfluorododecanoic acid	68 (71-129) 65 (70-130) 71 (72-134)	67 (71-129) 69 (70-130) -	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

Relative percent differences (RPD) were within QC limits.

## VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
LCS 410-205470 (GM-21-042** GM-21-037 GM-21-037 GM-21-041 GM-21-060** GM-21-038 GM-21-038 GM-21-043 GM-21-043 GM-21-044** FB-120621 GM-21-044 GM-21-066 GM-21-066 GM-21-054 GM-21-054 GM-21-031** GM-21-032 GM-21-040)	Perfluorodecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	69 (71-129) 69 (70-130)	-	UJ (all non-detects) UJ (all non-detects)	Ρ

Relative percent differences (RPD) were within QC limits.

# **IX. Field Duplicates**

No field duplicates were identified in this SDG.

# X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-042	13C3 PFBS	156 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	Р
GM-21-042RE	13C2 PFTeDA	11 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-042RE	13C2-PFDoDA d5-NEtFOSAA	40 (50-150) 46 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-037	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	7 (50-150) 3 (50-150) 9 (50-150) 13 (50-150) 8 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NETFOSAA NMeFOSAA Perfluoroundecanoic acid	x	Ρ
GM-21-037	13C6 PFDA	31 (50-150)	Perfluorodecanoic acid	UJ (all non-detects)	Р
GM-21-037	13C8 PFOS	36 (50-150)	Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	J (all detects) UJ (all non-detects)	Ρ

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-037RE	13C2 PFTeDA	27 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-007	13C3 PFBS	164 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	Р
GM-21-007RE	13C2 PFTeDA	6 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-007RE	13C2-PFDoDA	44 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-041	13C3 PFBS	152 (50-150)	Perfluorobutanesulfonic acid	NA	-
GM-21-041RE	13C2 PFTeDA	25 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-060	13C2 PFTeDA	47 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-060RE	13C2 PFTeDA	22 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-038	13C3 PFBS	152 (50-150)	Perfluorobutanesulfonic acid	NA	-
GM-21-038RE	13C2 PFTeDA	44 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-008	13C2 PFTeDA	7 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-008RE	13C2 PFTeDA	2 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-008RE	13C2-PFDoDA	32 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
FB-120621	13C3 PFBS	151 (50-150)	Perfluorobutanesulfonic acid	NA	-
GM-21-006	13C3 PFBS	151 (50-150)	Perfluorobutanesulfonic acid	NA	-
GM-21-066	13C3 PFBS 13C7 PFUnA 13C6 PFDA	156 (50-150) 152 (50-150) 153 (50-150)	Perfluorobutanesulfonic acid Perfluoroundecanoic acid Perfluorodecanoic acid	NA	-
GM-21-015	13C3 PFBS	161 (50-150)	Perfluorobutanesulfonic acid	NA	-
GM-21-015	13C2 PFTeDA	43 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-015RE	13C2 PFTeDA 13C2-PFDoDA	2 (50-150) 17 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	х	Р
GM-21-015RE	13C7 PFUnA	49 (50-150)	Perfluoroundecanoic acid	UJ (all non-detects)	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-054	13C3 PFBS	154 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	Р
GM-21-054RE	13C2 PFTeDA	19 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-031	13C3 PFBS	160 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	Р
GM-21-031RE	13C2 PFTeDA	21 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-032	13C3 PFBS	157 (50-150)	Perfluorobutanesulfonic acid	J (all detects)	Р
GM-21-032RE	13C2 PFTeDA 13C2-PFDoDA	0.6 (50-150) 18 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	×	Ρ
GM-21-040RE	13C2 PFTeDA 13C2-PFDoDA	0.6 (50-150) 19 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р
GM-21-040RE	d5-NEtFOSAA	47 (50-150)	NEtFOSAA	UJ (all non-detects)	Р

## XI. Target Analyte Quantitation

All target analyte quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

The laboratory indicated that PFAs are currently being reported as the sum of the branched and linear isomers so both peaks were integrated.

## XII. Target Analyte Identification

All target analyte identifications were within validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
GM-21-037RE GM-21-032 GM-21-032RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ

Sample	Analyte	lon Ratio (Limits)	Flag	A or P
GM-21-060**	Perfluorooctanesulfonic acid	6.81 (2.23-6.68)	J (all detects)	Р
GM-21-015**	NMeFOSAA	2.76 (0.86-2.57)	J (all detects)	Р

Sample	Analyte	lon Ratio (Limits)	Flag	A or P
GM-21-031**	Perfluorooctanesulfonic acid	6.96 (2.30-6.89)	J (all detects)	Ρ

Raw data were not reviewed for Stage 2B validation.

Manual integrations were reviewed and were considered acceptable. The laboratory provided before and after integration printouts.

#### XIII. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

#### XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
GM-21-042** GM-21-008** GM-21-031** GM-21-032	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-042RE** GM-21-008RE** GM-21-031RE** GM-21-032RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-037	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-041	Perfluorohexanoic acid Perfluorooctanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-041RE	All analytes except Perfluorohexanoic acid Perfluorooctanoic acid	Results from original analyses were more usable.	Not reportable	-

		_		
Sample	Analyte	Reason	Flag	A or P
GM-21-038	Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-038RE	All analytes except Perfluorooctanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-043	Perfluorob utanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-043RE	All analytes except Perfluorob utanesulfonic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-060RE** FB-120621RE GM-21-006RE GM-21-066RE GM-21-007RE** GM-21-044RE**	All analytes	Results from original analyses were more usable.	Not reportable	-
GM-21-015**	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid NMeFOSAA NEtFOSAA	Results from re-analyses were more usable.	Not reportable	-
GM-21-015RE**	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluoroctanesulfonic acid NMeFOSAA NEtFOSAA	Results from original analyses were more usable.	Not reportable	-
GM-21-054	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorodecanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-054RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorodecanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid	Results from original analyses were more usable.	Not reportable	-

Sample	Analyte	Reason	Flag	A or P
GM-21-040	Perfluorooctanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-040RE	All analytes except Perfluorooctanoic acid	Results from original analyses were more usable.	Not reportable	-

Due to technical holding time, MS/MSD %R, LCS/LCSD %R, labeled compound %R, and ion ratio, data were qualified as estimated in forty-five samples.

Due to labeled compound %R, data were recommended for exclusion in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

# Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 410-66202-1

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-042RE** GM-21-037RE GM-21-041RE GM-21-038RE GM-21-008RE** GM-21-043RE GM-21-043RE GM-21-054RE GM-21-031RE** GM-21-032RE GM-21-032RE GM-21-040RE	All analytes	J (all detects) UJ (all non-detects)	A	Technical holding times (H)
GM-21-044**	Perfluorodecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid Perfluorododecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (Q)
GM-21-042** GM-21-041 GM-21-060** GM-21-038 GM-21-038 GM-21-043 GM-21-043 GM-21-044** FB-120621 GM-21-006 GM-21-066 GM-21-066 GM-21-054 GM-21-031** GM-21-032 GM-21-040	Perfluorodecanoic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	UJ (all non-detects) UJ (all non-detects)	Ρ	Laboratory control samples (%R) (L)
GM-21-037RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-007	Perfluorobutanesulfonic acid	J (all detects)	Ρ	Labeled compounds (%R) (I)
GM-21-060	Perfluorotetradecanoic acid	UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-008	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-015	Perfluorotetradecanoić acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-037RE GM-21-032 GM-21-032RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ	Target analyte identification (ion ratio) (*XII)

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-042** GM-21-008** GM-21-031** GM-21-032	M-21-042** Perfluorohexanoic acid M-21-008** Perfluoroheptanoic acid M-21-031** Perfluorooctanoic acid		-	Overall assessment of data (*XIV)
GM-21-042RE** GM-21-008RE** GM-21-031RE** GM-21-032RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluoronanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-037	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-041	1 Perfluorohexanoic acid Not reportable Perfluorooctanoic acid		-	Overall assessment of data (*XIV)
GM-21-041RE	IRE All analytes except Not reportable Perfluorohexanoic acid Perfluorooctanoic acid		-	Overall assessment of data (*XIV)
GM-21-038	Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-038RE	All analytes except Perfluorooctanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-043	Perfluorobutanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-043RE	All analytes except Perfluorobutanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-060RE** FB-120621RE GM-21-006RE GM-21-066RE GM-21-007RE** GM-21-044RE**	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-015**	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid NMeFOSAA NEtFOSAA	Not reportable	-	Overall assessment of data (*XIV)

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-015RE**	All analytes except Perfluorohex anoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorobutanesulfonic acid Perfluorobutanesulfonic acid Perfluorooctanesulfonic acid NMeFOSAA NEtFOSAA	Not reportable	-	Overall assessment of data (*XIV)
GM-21-054	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorodecanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-054RE	GM-21-054RE All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorodecanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorooctanesulfonic acid		-	Overall assessment of data (*XIV)
GM-21-040	Perfluorooctanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-040RE	All analytes except Perfluorooctanoic acid	Not reportable	-	Overall assessment of data (*XIV)

### Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances – Laboratory Blank Data Qualification Summary – SDG 410-66202-1

No Sample Data Qualified in this SDG

Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 410-66202-1

No Sample Data Qualified in this SDG

### VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date:	2/3/	32
Page:_	<u>lof</u>	2
Reviewer:	K	<u></u>
2nd Reviewer:	(	
		<b>7</b>

SDG #: <u>410-66202-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u>

LDC #: 53144D96

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
<u>l.</u>	Sample receipt/Technical holding times	ASY	
11.	LC/MS Instrument performance check	A	
111.	Initial calibration/ICV	A/4	$RS_{b} = 20$ $TV/10/=70$
IV.	Continuing calibration/ISC	X/A	b = 30
V.	Laboratory Blanks	4	·
<u>V.I</u>	Field blanks	ND	FB = 19, 20
VII.	Matrix spike/Matrix spike duplicates	CW	
VIII.	Laboratory control samples	SW	LOSIS
IX.	Field duplicates	N	
Х.	Labeled Compounds	SW	
XI.	Target analyte quantitation	A	Not reviewed for Stage 2B validation.
XII.	Target analyte identification	ŚW	Not reviewed for Stage 2B validation.
XIII.	System performance	A	Not reviewed for Stage 2B validation.
XIV.	Overall assessment of data	SW	

Note: A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB=Source blank OTHER:

	0				
**	Indicates	sample	underwent	Stage 4	validation

	Client ID	Lab ID	Matrix	Date
1	GM-21-042**	410-66202-1**	Water	12/06/21
2	GM-21-042RE**	410-66202-1RE**	Water	12/06/21
31	GM-21-037	410-66202-2	Water	12/06/21
4	GM-21-037RE	410-66202-2RE	Water	12/06/21
5 <sup>1</sup>	GM-21-007**	410-66202-3**	Water	12/06/21
6	GM-21-007RE**	410-66202-3RE**	Water	12/06/21
7 ١	GM-21-041	410-66202-4	Water	12/06/21
8	GM-21-041RE	410-66202-4RE	Water	12/06/21
91	GM-21-060 <b>+ </b>	410-66202-5 + +	Water	12/06/21
10	GM-21-060RE ***	410-66202-5RE **	Water	12/06/21
11	GM-21-038	410-66202-6	Water	12/06/21
12	GM-21-038RE	410-66202-6RE	Water	12/06/21
13 <sup>1</sup>	GM-21-008**	410-66202-7**	Water	12/06/21
14	GM-21-008RE**	410-66202-7RE**	Water	12/06/21
15	GM-21-043	410-66202-8	Water	12/06/21

#### LDC #: 53144D96

### VALIDATION COMPLETENESS WORKSHEET

# Stage 2B/4

SDG #: <u>410-66202-1</u> Laboratory: <u>Eurofins, Lancaster, PA</u> Date: <del>//3/>></del> Page: <del>></del>of <del>></del> Reviewer: 7 2nd Reviewer: 7

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

	Client ID	Lab ID	Matrix	Date
16	GM-21-043RE	410-66202-8RE	Water	12/06/21
17	GM-21-044 <b>≯</b> ≯	410-66202-9	Water	12/06/21
<mark>ع</mark>	GM-21-044RE ★ ★	410-66202-9RE **	Water	12/06/21
19	FB-120621	410-66202-10	Water	12/06/21
20	FB-120621RE	410-66202-10RE	Water	12/06/21
21 ł	GM-21-006	410-66202-11	Water	12/06/21
22	GM-21-006RE	410-66202-11RE	Water	12/06/21
23 I	GM-21-066	410-66202-12	Water	12/06/21
24	GM-21-066RE	410-66202-12RE	Water	12/06/21
25	GM-21-015**	410-66202-13**	Water	12/06/21
26	GM-21-015RE**	410-66202-13RE**	Water	12/06/21
27 <sup>1</sup>	GM-21-054	410-66202-14	Water	12/06/21
28	GM-21-054RE	410-66202-14RE	Water	12/06/21
29 I	GM-21-031**	410-66202-15**	Water	12/06/21
30	GM-21-031RE**	410-66202-15RE**	Water	12/06/21
31 <sup> </sup>	GM-21-032	410-66202-16	Water	12/06/21
32	GM-21-032RE	410-66202-16RE	Water	12/06/21
33 <sup>)</sup>	GM-21-040	410-66202-17	Water	12/06/21
34	GM-21-040RE	410-66202-17RE	Water	12/06/21
<sub>35</sub>	GM-21-044MS	410-66202-9MS	Water	12/06/21
<sub>36</sub> 1	GM-21-044MSD	410-66202-9MSD	Water	12/06/21
37 <b>3</b>	GM-21-044REMS	410-66202-9REMS	Water	12/06/21
<sub>38</sub> 7	GM-21-044REMSD	410-66202-9REMSD	Water	12/06/21
39				
40				
41				
Notes:		·····		· · · · · · · · · · · · · · · · · · ·
	205470			
2	268135			
5	208162			

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?		V		
Were cooler temperature criteria met?	√			
II. LC/MS Instrument performance check	T			
Were the instrument performance reviewed and found to be within the validation criteria?	√			
III. Initial calibration and Initial calibration verification			1	
Did the laboratory perform a 5-point calibration prior to sample analysis?	V		 	
Were all percent relative standard deviations (%RSD) $\leq$ 20%?	V			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the coefficient of determination ( $r^2$ ) criteria of $\geq 0.990$ ?			V	
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	V			
Was the signal to noise (S/N) ratio for all analytes within the validation criteria?	1			
Were the retention time windows properly established?	V			
Was an initial calibration verification (ICV) standard analyzed after each initial calibration for each instrument?	1			
Were all ICV percent differences (%D) of the initial calibration verification $\leq 30\%$ ?	↓			
IV. Continuing calibration and Instrument sensitivity check				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	~			
Were all percent differences (%D) of the continuing calibration $\leq$ 30%?	V			
Were all the retention times within the acceptance windows?	V			
Was the signal to noise (S/N) ratio for all analytes within the validation criteria?	√			
Were all percent differences (%D) of the Instrument Sensitivity Check $\leq$ 30%?	√	No. of Street, or Stre		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	V			
Was there contamination in the laboratory blanks?		1		
VI. Field blanks				
Were field blanks identified in this SDG?	1			
Were target analytes detected in the field blanks?		1		
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	V			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		V		

# Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

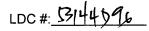
# VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	V			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		V		
IX. Field duplicates	1		I	
Were field duplicate pairs identified in this SDG?		V		
Were target analytes detected in the field duplicates?		50-60 (States of States of	√	
X. Labeled compounds			T	
Were labeled compound percent recoveries (%R) within the QC limits?		V		
Were retention times within 0.4 minutes of the associated calibration standard?	√			
XI. Target analyte quantitation			1	
Did the laboratory reporting limits (i.e. DL, LOD, LOQ) meet the QAPP?	√			
Did reported results include both branched and linear isomers?	√			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the analyte?	1			
Were analyte retention times within 0.1 minutes of the associated labeled compound for analytes with a labeled analog?	V			
Were analyte quantitation and reporting limits adjusted to reflect all sample dilutions and dry weight factors applicable to Stage 4 validation?	V			
XII. Target analyte identification				
Was the signal to noise (S/N) ratio for all analytes within the validation criteria?	V			
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	V			
Were ion ratios between 50-150%?		V		
Were manual integrations performed and found acceptable?	V			
Did the laboratory provide before and after printouts?	V			
XIII. System performance				
System performance was found to be acceptable.	√			
XIV. Overall assessment of Data				
Overall assessment of data was found to be acceptable.	V			

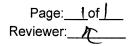
# TARGET COMPOUND WORKSHEET

#### **METHOD: PFAS**

A. Perfluorobutanoic acid	W. 6:2 Fluorotelomer sulfonate
B. Perfluoropentanoic acid	X. 8:2 Fluorotelomer sulfonate
C. Perfluorohexanoic acid	Y. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
D. Perfluoroheptanoic acid	Z. HFPO-DA (GenX)
E. Perfluorooctanoic acid	AA. 9CI-PF3ONS (F-53B Major)
F. Perfluorononanoic acid	BB. 11CI-PF3OUdS (F-53B Minor)
G. Perfluorodecanoic acid	CC. Hexafluoropropylene oxide dimer acid (HFPO-DA)
H. Perfluoroundecanoic acid	DD. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
I. Perfluorododecanoic acid	EE. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
J. Perfluorotridecanoic acid	FF. 4:2 Fluorotelomersulfonic acid
K. Perfluorotetradecanoic acid	GG. 6:2 Fluorotelomersulfonic acid
L. Perfluorobutanesulfonic acid	HH. 8:2 Fluorotelomersulfonic acid
M. Perfluoropentanesulfonic acid	II. 1H,1H,2H,2H-perfluorohexane sulfonic acid
N. Perfluorohexanesulfonic acid	JJ. 1H,1H,2H,2H- Perfluorooctanesulfonic acid
O. Perfluoroheptanesulfonic acid	KK. 1H, 1H, 2H, 2H-perfluorodecane sulfonic acid
P. Perfluorooctanesulfonic acid	LL. NMeFOSA
Q. Perfluorononanesulfonic acid	MM. 3:3 Fluorotelomer carboxylate
R. Perfluorodecanesulfonic acid	NN. 5:3 Fluorotelomer carboxylate
S. Perfluorooctanesulfonamide	OO. 7:3 Fluorotelomer carboxylate
T. NMeFOSAA	PP. Perfluorooctadecanoic acid
U. NEtFOSAA	
V. 4:2 Fluorotelomer sulfonate	



# VALIDATION FINDINGS WORKSHEET <u>Technical Holding Times</u>



Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Athcircled dates have exceeded the technical holding times.

						HT: 14	
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	, Total # of Days	(H) Qualifier
ful REG			12/6/21	12/21/21	12/22,23/51	15	JMJ/A
(dut ND)							
			· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·
							<u> </u>
				, , , ,			
			. <u>.</u>				
							# <u></u>

#### TECHNICAL HOLDING TIME CRITERIA

Water:Extracted within 14 days, analyzed within 28 days.Soil:Extracted within 28 days, analyzed within 28 days.

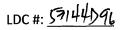
LDC #: 53144096

# VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: <u>1</u> of <u>1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Matrix Perce	Atrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample.         Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.							
#	MS/MSD ID	Analyte	MS %R (Limits)	MSD %R (Limits)	RPD (≤30)	Associated Samples	Qualifications	
	35/36							
$\vdash$		GEE		67 (71-29) 69 (70-120)			J/UJ/A	
		<u> </u>	65 (70-136). 71 (72-134)	01 (10-170)		in in	<u>                                     </u>	
┝──┾╸			1 (12-194)				<u> </u>	
	· · · · · · · · · · · · · · · · · · ·						<u> </u>	
	37/38	Win limits				18		
		/					T	
┣∔				· · · ·				
┣──┼								
╟──┼			· · · · · · · · · · · · · · · · · · ·					
╟──┼		<u>                                      </u>				<u> </u>		
╟──┼								
╟──┼								
┠──┼						+		
╟──┼						+		
╟──┼		+						
╟──┼					+			
╟──┼					······			



# VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: <u>1</u> of <u>1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) were analyzed in this SDG. Percent recoveries (%R) and %RPD were within QC limits with the exceptions identified below.

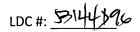
			LCS	LCSD		Associated	(L)
#	LCS/LCSD ID	Compound	%R (Limits) 69 (71-129) 69 (70-136)	%R (Limits)	RPD (≤30)	Samples 1,3,5,7,9,11, 13,15,17,19, 21,23,25,27 29,31,33	Qualifications J/J/P
	LC9 410-205470	G EE	69 (71-129)			1, 3, 5, 7, 9, 11,	J/W/P
		EE	69 (70-130)			13,15,17,19,	
						2, 73, 25, 27	
						29, 31, 37	
						(ND)	
						0 - 1	
╟							
<b></b>							
<b>  </b>							
<u> </u>							
<b> </b>						<u> </u>	
<b> </b>							
<b>  </b>						+	
<b> </b>					l		
⊫						+	
<b>  </b>		ļ				<u> </u>	
<b> </b>					<b> </b>		
∥	l		<u> </u>		<u> </u>		l
<b> </b>			ļ			<u> </u>	

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-042	(aut)	13C3 PFBS	156	Jdets/P (L)
	GM-21-042RE	(ND)	13C2 PFTeDA	11	Х/Р (К)
		- 7	13C2-PFDoDA	40	J/UJ/P (I,j)
			d5-NEtFOSAA	46	J/UJ/P (U)
	GM-21-037		13C2 PFTeDA	7	Х/Р (К)
			13C2-PFDoDA	3	X/P (I,J)
			d5-NEtFOSAA	9	X/P (U)
			d3-NMeFOSAA	13	X/P (T)
			13C7 PFUnA	8	X/P (H)
		✓	13C6 PFDA	31	J/UJ/P (G)
		(P-out)	13C8 PFOS	36	J/UJ/P (P,DD,EE)
	GM-21-037RE	(N)	13C2 PFTeDA	27	J/UJ/P (K)
	GM-21-007	(def)	13C3 PFBS	164	Jdets/P (L)
		.,			
	GM-21-007RE	(ND)	13C2 PFTeDA	6	Х/Р (К)
			13C2-PFDoDA	44	J/UJ/P (I,J)
	GM-21-041		13C3 PFBS	152	Jdets/P (L)
	GM-21-041RE		13C2 PFTeDA	25	J/UJ/P (K)
	-				
	GM-21-060		13C2 PFTeDA	47	J/UJ/P (K)
	GM-21-060RE		13C2 PFTeDA	22	J/UJ/P (K)
	GM-21-038		13C3 PFBS	152	Jdets/P (L)
	GM-21-038RE		13C2 PFTeDA	44	J/UJ/P (K)
					·
	GM-21-008	N	13C2 PFTeDA	7	Х/Р (К)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD



Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-008RE	(N0)	13C2 PFTeDA	2	Х/Р (К)
			13C2-PFDoDA	32	J/UJ/P (I,J)
	FB-120621		13C3 PFBS	151	Jdets/P (L)
	GM-21-006		13C3 PFBS	151	Jdets/P (L)
	GM-21-066		13C3 PFBS	156	Jdets/P (L)
			13C7 PFUnA 13C6 PFDA	<u>152</u> 153	Jdets/P (H) Jdets/P (G)
	GM-21-015		13C3 PFBS	161	Jdets/P (L)
			13C2 PFTeDA	43	J/UJ/P (K)
	GM-21-015RE		13C2 PFTeDA	2	Х/Р (К)
		/	13C2-PFDoDA	17	X/P (I,J)
		V	13C7 PFUnA	49	J/UJ/P (H)
	GM-21-054	(det)	13C3 PFBS	154	Jdets/P (L)
	GM-21-054RE	(1)	13C2 PFTeDA	19	Х/Р (К)
	GM-21-031	(det)	13C3 PFBS	160	Jdets/P (L)
	GM-21-031RE	(N)))	13C2 PFTeDA	21	J/UJ/P (K)
	GM-21-032	(def)	13C3 PFBS	157	Jdets/P (L)
	GM-21-032RE	(ND)	13C2 PFTeDA	0.6	Х/Р (К)
			13C2-PFDoDA	18	X/P (I,J)
	GM-21-040RE	(41)	13C2 PFTeDA	0.6	Х/Р (К)
		,	13C2-PFDoDA	19	X/P (I,J)
			d5-NEtFOSAA	47	J/UJ/P (U)

LDC #: 53144091

## VALIDATION FINDINGS WORKSHEET Target Analyte Identification

Page:_	<u>lof /</u>
Reviewer:_	R

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.1

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

N N/A Was the signal to noise (S/N) ratio for all analytes within the validation criteria?

N. N/A Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?

(N) N/A Were ion ratios within QC limits?

#	Date	Sample ID	Analyte	lon ratio (Limits)	Qualifications
		4,71,32	-	Results flagged "I" by the laboratory due to	Jdets/P (*X1)
				ion ratio outside QC limits.	
		9	Р	6. 11 (2.23-6.68)	
		25	Т	2.76 (0.86-2.57)	
		29	P	6.96 (2.30-6.89)	
			······································		

### VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: /of <u>3</u> Reviewer: <u></u>

### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
		1,12,29,76	C, D, E, F, L, N, P	Reextruction more	NR
		· /		usable (higher result	<u>(</u> )
				U	
		2,14,30, 72	All except above	Drig more waber	
			· · · · · · · · · · · · · · · · · · ·	(several Labeland %	28
		/		Orig more waber (several label?! out in RE)	
		3	fil	RE more usable (higher result a sweral labeled %	
				(higher result a	
				Sweral labeled %	9
				out in orig)	
		· · · · ·			
		.5	All except K, CC	RE MOR WARE	
				( thigher woulds)	
		6	* 000 72 (1)	Drin more verble	
				Orig more weable ( calcula /2R 220	
				in onin RE m-K	3
				Nom RELACE	Litree f)
		\$ 7	(,E	RE more usable	
		<b>*</b>		(higher result)	
				(	
		98	fel except C, E	Doin more makes	
				Orig more usable (RE outside HT	L
	<u> </u>			the man all	Y
L		l	l	<u> </u>	

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: 2 of 3 Reviewer: 7

### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

r.					
#	Date	Sample ID	Analyte	Finding	Qualifications
		10, 17n	fre	(higher results)	NR
				(higher results)	
				-	
			P	RE MOR usable.	
				(higher result)	
		2	fil except P	orig not usafer	_
			),	RE MOR vsable (higher result) Orig more vsabler (RE out HT)	
		13 15	L		
		, 			
		16	ful except L	Ŷ	
				•	
		18, 10, 22, 24, 32	Are	Drig more usable (RE out HT)	-
			- 4	(RE out HT)	
		25	C, D, E, F, L, N, P, T, K	RE more verble	
				(higher results)	
				0	
		76	fu except afore	Orig more usable (several vabiled	
			)	(several infiled	
				%R out is RE)	
			•		
		27	C, D, E, F, G, L, N, P	RE more mable	
				RE more usable (higher result)	
		•	_	Ū į	
		28	Al except above	Orig more usuble	-
				Orig more usuble (RE out HT)	

LDC #: 53144096

### VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: <u>3</u> of <u>3</u> Reviewer: <u>7</u>

#### METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
		291 33	1 L	RE mote usable (higher result) Drig mote usable (several labeled %Rs out in RE	NR
				(higher result)	
		34	AR except E	Drig more whalle	
				(several labeled	
				%Rs out in RE	
	-				
				· · · · · · · · · · · · · · · · · · ·	

LDC #: 57144090

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

#### Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$ average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)  $A_x$  = Area of Compound  $C_x$  = Concentration of compound S = Standard deviation of the RRFs  $A_{is}$  = Area of associated internal standard  $C_{is}$  = Concentration of internal standard X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound	Reported RRF (RRF 8.0/7.4)	Recalculated RRF (RRF 8.0/7.4)	Reported Average RRF	Recalculated Average RRF	Reported %RSD	Recalculated %RSD
1	ICAL	12/10/2021	PFOA (13C8-PFOA)	0.7734	0.7734	0.8005	0.8005	4.8	4.8
	30731		PFOS (13C8-PFOS)	1.0461	1.0461	1.0637	1.0637	3.0	3.0
2			PFOA (13C8-PFOA)						
			PFOS (13C8-PFOS)						
3			PFOA (13C8-PFOA)						
			PFOS (13C8-PFOS)						

LDC #:<u>53/4</u>

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF = (Ax)(Cis)/(Ais)(Cx) Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Ax = Area of compound

Cx = Concentration of compound, Ais = Area of associated internal standard Cis = Concentration of internal standard

<u>[</u>		Calibration			Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (IS)	True Conc	Conc	Conc	%D	%D
1	21DEC16-60	12/16/2021	PFOA (13C8-PFOA)	2.000	2.100	2.102	5.1	5.1
			PFOS (13C8-PFOS)	1.850	1.790	1.791	3.3	3.2
2	21DEC22-48	12/22/2021	PFOA (13C8-PFOA)	2.000	2.090	2.094	4.7	4.7
			PFOS (13C8-PFOS)	1.850	1.780	1.778	4.0	3.9
3			PFOA (13C8-PFOA)					
			PFOS (13C8-PFOS)					
4			PFOA (13C8-PFOA)					
			PFOS (13C8-PFOS)					
5			PFOA (13C8-PFOA)					
			PFOS (13C8-PFOS)					

LDC # 53144096

MS/MSD ID:

#### VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>

Page: <u>1 of 1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike)

%Recovery = 100 \* (SSC - SC)/SA

Where: SSC = Spiked concentration SA = Spike added MS = Matrix spike recovery SC = Sample concentration

MSD = Matrix spike duplicate recovery

RPD = | MS - MSD | \* 2/(MS + MSD)

35/36

	SA SC		S	SC	N	IS	M	SD	MS/	MSD	
Compound	(ng/L) (ng/L)		(ng/L)	(ng/L)		Percent	Recovery	Percent	Recovery	RF	PD
	MS	MSD		MS MSD		Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	24.1	24.4	0.00	18.1	17.7	75	75	73	73	2	2
PFOS	22.3	22.6	0.00	15.7	15.7 16.4		71 70		73	4	4
						1					

LDC #: 5344090

#### VALIDATION FINDINGS WORKSHEET LCS Results Verification

Page: <u>1 of 1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control duplicate were recalculated for the compounds identified below using the following calculation:

SSC = (Area spike) (Conc IS) / (Area IS) (average RRF spike) %Recovery = 100 \* SSC/SA Where:

SSC = Spiked concentration SA = Spike added

LCS = Laboratory control spike recovery LCSD = Laboratory control spike duplicate recovery

RPD = | LCS - LCSD | \* 2/(LCS + LCSD)

LCS/LCSD ID:

LCS 410-208135

	SA		SS	SC	LC	S	LC	SD	LCS/LCSD			
Compound	(n <u>(</u>	g/L)	(ng	ı/L)	Percent	Recovery	Percent	Recovery	RPD			
Real And	LCS LCSD		LCS	LCSD	Reported	Reported Recaic.		Recalc.	Reported	Recalc.		
PFOA	25.6		25.3		99	99						
PFOS	23.7		22.5		95	95						
										]		

#### VALIDATION FINDINGS WORKSHEET Sample Results Verification

Page: <u>1 of 1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Compound results for all Level IV samples reported with a positive detect were recalculated and verified using the following equation:

 $\frac{\text{Concentration} = (Ax) (Vt) (Df)}{(Ais) (RRF) (Wt) (\%S)}$ 

Where:

Ax = Area or height of the peak for the compound to be measured

Ais = Area or height of the peak for the internal standard

Cis = Concentration of the internal standard

DF = Dilution factor

Vt = Volume of extract in milliters (mL)

RRF = Average relative response factor

Wt = Weight of sample in grams (g)

Vo = Volume of sample in milliliters (mL)

										Calculated	Reported	
Sample	Compound	Ax	Ais	Cis	DF	RRF	Vt	Vo	%S	Concentration	Concentration	% Diff
#				(ng/mL)			(mL)	(mL)		(ng/L)	(ng/L)	
1	PFOA	331344	4971347	10.00	1	0.8005	1	277.60		3.0	3.0	
2 (1RE)	PFOA	292096	3315544	10.00	1	0.8005	1	278.80		3.9	3.9	





March 9, 2022

EA Engineering, Science, & Technology, Inc. 2200 Sixth Ave., Suite 707 Seattle, WA 98121 ATTN: Ms. Sherri Wunderlich <u>swunderlich@eaest.com</u>

SUBJECT: Keyport LTM - Data Validation

Dear Ms. Wunderlich,

Enclosed is the final validation report for the fraction listed below. This SDG was received on January 19, 2022. Attachment 1 is a summary of the samples that were reviewed for the analysis.

#### LDC Project #53180\_RV3:

<u>SDG #</u>	Fraction
410-66184-1	Perfluoroalkyl & Polyfluoroalkyl Substances

The data validation was performed under Stage 2B validation guidelines. The analysis was validated using the following documents and variances, as applicable to the method:

- Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021)
- NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015)
- U.S. Department of Defense (DoD) General Validation Guidelines (November 2019)
- DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020)

Please feel free to contact us if you have any questions.

Sincerely,

Fren

Pei Geng Project Manager/Senior Chemist pgeng@lab-data.com

	52 pages-ADV	52 pages-ADV Attachment 1																																	
	90/10 2B/4 E	DD				L	DC‡	<b># 5</b> 3	8180	) (E	A E	ng	inee	erin	g -	Sea	attle	e, N	/A/	Ke	урс	ort I	LTN	1)							F	PO# 2	23092	2	
LDC	SDG#	DATE REC'D	(2) DATE DUE		<sup>:</sup> As 7M/ /15.3)																														
Matr	x: Water/Soil		T	W		W	s	W	s	W	S	W	S	W	S	W	S	W	S	W	s	W	s	W	s	W	S	W	S	W	S	W	S	W	s
А	410-66184-1	01/19/22	02/02/22		1																											┢━━┫			
А	410-66184-1	01/19/22	02/02/22	3	0																											⊢		]	$\square$
																																┝──┤		]	$\vdash$
																																┢───┨	$ \rightarrow $	<b> </b>	
				-	-																														$\vdash$
																																<b></b>	$\rightarrow$		$\vdash$
				-	-																														$\vdash$
																																		-+	
Ì																							Ì												$\square$
																																	$\square$		
																																┢━━┫			$\square$
				_																												⊢		]	$\square$
																																┝──┤		]	$\vdash$
																																┢──┤	$ \rightarrow $		$\vdash$
																																┢──┤	$ \rightarrow $		$\vdash$
				-	-																											┢───┨			$\vdash$
			}	-	-																												-+	-	⊢
				-	-																												-+	-	$\vdash$
		1			$\mathbf{H}$																												-		$\vdash$
			1	1	1																														$\square$
Total	T/PG			22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Keyport L
------------------------------

LDC Report Date: March 8, 2022

Parameters: Perfluoroalkyl & Polyfluoroalkyl Substances

Validation Level: Stage 2B

Laboratory: Eurofins, Lancaster, PA

Sample Delivery Group (SDG): 410-66184-1

	Laboratory Sample		Collection
Sample Identification	Identification	Matrix	Date
GM-21-002	410-66184-1	Water	12/08/21
GM-21-002RE	410-66184-1RE	Water	12/08/21
GM-21-003	410-66184-2	Water	12/08/21
GM-21-003RE	410-66184-2RE	Water	12/08/21
GM-21-009	410-66184-3	Water	12/08/21
GM-21-010	410-66184-4	Water	12/08/21
GM-21-010RE	410-66184-4RE	Water	12/08/21
GM-21-016	410-66184-5	Water	12/08/21
GM-21-020	410-66184-6	Water	12/08/21
GM-21-020RE	410-66184-6RE	Water	12/08/21
GM-21-021	410-66184-7	Water	12/08/21
GM-21-021RE	410-66184-7RE	Water	12/08/21
GM-21-022	410-66184-8	Water	12/08/21
GM-21-022RE	410-66184-8RE	Water	12/08/21
GM-21-024	410-66184-9	Water	12/08/21
GM-21-024RE	410-66184-9RE	Water	12/08/21
GM-21-025	410-66184-10	Water	12/08/21
GM-21-025RE	410-66184-10RE	Water	12/08/21
GM-21-052	410-66184-11	Water	12/08/21
GM-21-052RE	410-66184-11RE	Water	12/08/21
GM-21-053	410-66184-12	Water	12/08/21
GM-21-053RE	410-66184-12RE	Water	12/08/21
GM-21-009RE	410-66184-3RE	Water	12/08/21

#### Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Tier I Sampling and Analysis Plan, Groundwater Sampling at Operable Unit 1, Area 1 Former Landfill and Long-Term Monitoring at Operable Unit 2, Area 2 Van Meter Road Spill/Drum Storage Site, Naval Base Kitsap Keyport, Keyport, Washington (October 2021), the NAVFAC Northwest Standard Operating Procedure: Field Procedures Manual (Naval Facilities Engineering Command Northwest, 2015), the U.S. Department of Defense (DoD) General Validation Guidelines (November 2019), and the DoD Data Validation Guidelines Module 3: Data Validation Procedure for Perand Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15 (2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified and LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

## Codes

- H Holding times were exceeded.
- S Surrogate recovery was outside QC limits.
- C Calibration %RSD or %D were noncompliant.
- R Calibration RRF was <0.05.
- B Presumed contamination from preparation (method) blank.
- L Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.
- Q MS/MSD recovery was poor or RPD high.
- I Internal standard performance was unsatisfactory.
- M Tuning (BFB or DFTPP) was noncompliant.
- T Presumed contamination from trip blank.
- + False positive reported compound was not present. Not applicable.
- False negative compound was present but not reported.
- F Presumed contamination from FB, or ER.
- \$ Reported result or other information was incorrect.
- ? TIC identity or reported retention time has been changed.
- D The analysis with this flag should not be used because another more technically sound analysis is available.
- P Instrument performance for pesticides was poor.
- \*# Unusual problems found with the data that have been described in Section 2.2.3.3, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found.

# I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

## II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

### III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

For each calibration standard, all analytes were within 70-130% of their true value.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

## **IV. Continuing Calibration and Instrument Sensitivity Check**

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes.

The percent differences (%D) of the instrument sensitivity check (ISC) were less than or equal to 30.0% for all analytes.

All analyte concentrations were at the limit of quantitation (LOQ) for the ISC standard.

### V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Analyte	Concentration	Associated Samples
MB 410-205983/1-A	12/16/21	Perfluorooctanesulfonic acid	0.586 ng/L	GM-21-002 GM-21-003 GM-21-009 GM-21-010 GM-21-016 GM-21-020 GM-21-021 GM-21-022 GM-21-022

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
GM-21-022	Perfluorooctanesulfonic acid	2.6 ng/L	2.6J ng/L

#### VI. Field Blanks

Sample FB-120821 (from SDG 410-66173-1) was identified as a field blank. No contaminants were found.

### VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

#### **VIII. Laboratory Control Samples**

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

### **IX. Field Duplicates**

Samples GM-21-002 and GM-21-003, GM-21-002RE and GM-21-003RE, GM-21-020 and GM-21-021, GM-21-020RE and GM-21-021RE, GM-21-052 and GM-21-053, and GM-21-052RE and GM-21-053RE were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

	Concentration (ng/L)					
Analyte	GM-21-002-12082021	GM-21-003-12082021	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	1.1	1.1	-	0 (≤1.8)	-	-
Perfluoroheptanoic acid	0.74	0.82	-	0.08 (≤1.8)	-	-
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.52	0.46	-	0.06 (≤1.8)	-	-
Perfluorooctanoic acid	3.4	3.7	8 (≤30)	-	-	-
Perfluorohexanoic acid	2.2	2.2	0 (≤30)	-	-	-

	Concentration (ng/L)					
Analyte	GM-21-002-12082021	GM-21-003-12082021	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorohexanesulfonic acid	0.67	0.67	-	0 (≤1.8)	-	-

	Concentration (ng/L)					
Analyte	GM-21-002-12082021RE	GM-21-003-12082021RE	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	0.96	1.2	-	0.24 (≤1.8)	-	-
Perfluoroheptanoic acid	0.99	0.81	-	0.18 (≤1.8)	-	-
Perfluorooctanoic acid	3.5	3.7	6 (≤30)	-	-	-
Perfluorohexanoic acid	2.3	2.3	0 (≤30)	-	-	-
Perfluorohexanesulfonic acid	0.65	0.69	-	0.04 (≤1.8)	-	-

Concentration (ng/L)						
Analyte	GM-21-020-12082021	GM-21-021-12082021	RPD (Limits)	Difference (Limits)	Flag	A or P
Perfluorobutanesulfonic acid	0.44	0.89U	-	0.45 (≤1.8)	-	-

# X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-002	13C2 PFTeDA	15 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-002	13C2 PFTeDA	33 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-002RE	13C2 PFTeDA	19 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-003	13C2 PFTeDA	16 (50-150)	Perfluorotetradecanoic acid	х	Р
GM-21-003	13C2 PFTeDA	40 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р
GM-21-003RE	13C2 PFTeDA	44 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-009	13C2 PFTeDA	5 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-009	13C2-PFDoDA 13C7 PFUnA	31 (50-150) 49 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-009RE	13C2 PFTeDA	26 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-010	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.03 (50-150) 0.1 (50-150) 7 (50-150) 2 (50-150) 0.4 (50-150) 2 (50-150) 2 (50-150) 5 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	x	Ρ
GM-21-010	13C8 PFOA	26 (50-150)	Perfluorooctanoic acid	J (all detects)	Р
GM-21-010RE	13C2 PFTeDA 13C2-PFDoDA	20 (50-150) 49 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
GM-21-016	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.05 (50-150) 0.06 (50-150) 8 (50-150) 0.7 (50-150) 1 (50-150) 0.2 (50-150) 1 (50-150) 4 (50-150)	Perfluorotetradecanoic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMEFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	X	Ρ
GM-21-016	13C8 PFOA	33 (50-150)	Perfluorooctanoic acid	J (all detects)	Р
GM-21-020	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA 13C7 PFUnA	0.05 (50-150) 1 (50-150) 19 (50-150) 6 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA Perfluoroundecanoic acid	x	Ρ
GM-21-020	13C9 PFNA d3-NMeFOSAA 13C6 PFDA 13C8 PFOS	48 (50-150) 22 (50-150) 23 (50-150) 43 (50-150)	Perfluorononanoic acid NMeFOSAA Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-020RE	13C2 PFTeDA	16 (50-150)	Perfluorotetradecanoic acid	х	Р

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-021	13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUNA 13C6 PFDA 13C8 PFOS	0.01 (50-150) 0.02 (50-150) 8 (50-150) 0.5 (50-150) 0.8 (50-150) 0.6 (50-150) 0.5 (50-150) 5 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	X	Ρ
GM-21-021	13C8 PFOA	42 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-021RE	13C2 PFTeDA	22 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-022	13C2 PFTeDA 13C2-PFDoDA	3 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ
GM-21-022	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	41 (50-150) 41 (50-150) 21 (50-150) 41 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-022RE	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	0.5 (50-150) 3 (50-150) 10 (50-150) 10 (50-150) 6 (50-150) 11 (50-150) 15 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMEFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	X	Ρ
GM-21-022RE	13C8 PFOS	15 (50-150)	Perfluorooctanesulfonic acid	X	Р
GM-21-022RE	13C9 PFNA	21 (50-150)	Perfluorononanoic acid	UJ (all non-detects)	Ρ
GM-21-022RE	13C8 PFOA	43 (50-150)	Perfluorooctanoic acid	J (all detects)	Ρ
GM-21-024	13C3 PFHxS 13C2 PFTeDA 13C2-PFDoDA 13C9 PFNA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA 13C8 PFOS	14 (50-150) 0.03 (50-150) 0.02 (50-150) 1 (50-150) 0.3 (50-150) 0.2 (50-150) 0.05 (50-150) 0.2 (50-150) 0.7 (50-150)	Perfluorohexanesulfonic acid Perfluorotetradecanoic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	X	Ρ
GM-21-024	13C8 PFOA	7 (50-150)	Perfluorooctanoic acid	x	P

Sample	Labeled Compound	%R (Limits)	Affected Analyte	Flag	A or P
GM-21-024	13C4 PFHpA	32 (50-150)	Perfluoroheptanoic acid 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	J (all detects) UJ (all non-detects)	Р
GM-21-024RE	13C2 PFTeDA	12 (50-150)	Perfluorotetradecanoic acid	x	Р
GM-21-024RE	13C2-PFDoDA 13C7 PFUnA	28 (50-150) 40 (50-150)	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
GM-21-025	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	4 (50-150) 9 (50-150) 13 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-025	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA 13C8 PFOS	20 (50-150) 25 (50-150) 26 (50-150) 44 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-025RE	13C2 PFTeDA	24 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-052	13C2 PFTeDA 13C2-PFDoDA 13C7 PFUnA	1 (50-150) 6 (50-150) 15 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	x	Ρ
GM-21-052	d5-NEtFOSAA d3-NMeFOSAA 13C6 PFDA	38 (50-150) 39 (50-150) 38 (50-150)	NEtFOSAA NMeFOSAA Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р
GM-21-052RE	13C2 PFTeDA	25 (50-150)	Perfluorotetradecanoic acid	UJ (all non-detects)	Р
GM-21-053	13C2 PFTeDA 13C2-PFDoDA d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA 13C6 PFDA	0.06 (50-150) 0.3 (50-150) 5 (50-150) 7 (50-150) 2 (50-150) 11 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	x	Ρ
GM-21-053	13C9 PFNA 13C8 PFOS	32 (50-150) 26 (50-150)	Perfluorononanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ
GM-21-053RE	13C2 PFTeDA 13C2-PFDoDA	2 (50-150) 19 (50-150)	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ
GM-21-053RE	d5-NEtFOSAA d3-NMeFOSAA 13C7 PFUnA	34 (50-150) 40 (50-150) 38 (50-150)	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ

## XI. Target Analyte Quantitation

The laboratory indicated that PFAs are currently being reported as the sum of the branched and linear isomers so both peaks were integrated.

Raw data were not reviewed for Stage 2B validation.

#### XII. Target Analyte Identification

All target analyte identifications were within validation criteria with the following exceptions:

Sample	Finding	Flag	A or P
GM-21-009RE GM-21-010RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Р

#### XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

#### XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
GM-21-002	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-002RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-003	Perfluorohexanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Results from re-analyses were more usable.	Not reportable	-

Sample	Analyte	Reason	Flag	A or P
GM-21-003RE	All analytes except Perfluorohexanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-009	Perfluorooctanoic acid Perfluorooctanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid Perfluoroundecanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-009RE	All analytes except Perfluorooctanoic acid Perfluorooctanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid Perfluoroundecanoic acid	Results from original analyses were more usable.	Not reportable	-
GM-21-010 GM-21-020 GM-21-021 GM-21-024 GM-21-025 GM-21-052 GM-21-053	All analytes	Results from re-analyses were more usable.	Not reportable	-
GM-21-022	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid	Results from re-analyses were more usable.	Not reportable	-
GM-21-022RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid	Results from original analyses were more usable.	Not reportable	-

Due to labeled compound %R and ion ratio data were qualified as estimated in twentyone samples.

Due to labeled compound %R, data were recommended for exclusion in six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

# Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 410-66184-1

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-002	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-003	Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-003RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-009	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-009RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-010RE	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)
GM-21-016	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluorononanoic acid NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid Perfluorooctanesulfonic acid 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	x	Ρ	Labeled compounds (%R) (I)
GM-21-016	Perfluorooctanoic acid	J (all detects)	Р	Labeled compounds (%R) (I)
GM-21-020RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-021RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)
GM-21-022	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Р	Labeled compounds (%R) (I)
GM-21-022	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid Perfluorodecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Р	Labeled compounds (%R) (I)

Sample	Analyte	Flag	A or P	Reason (Code)	
GM-21-022RE	Perfluorooctanesulfonic acid	x	Р	Labeled compounds (%R) (I)	
GM-21-024RE	Perfluorotetradecanoic acid	x	Р	Labeled compounds (%R) (I)	
GM-21-024RE	Perfluorododecanoic acid Perfluorotridecanoic acid Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)	
GM-21-025RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)	
GM-21-052RE	Perfluorotetradecanoic acid	UJ (all non-detects)	Р	Labeled compounds (%R) (I)	
GM-21-053RE	Perfluorotetradecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid	x	Ρ	Labeled compounds (%R) (I)	
GM-21-053RE	NEtFOSAA NMeFOSAA Perfluoroundecanoic acid	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	Ρ	Labeled compounds (%R) (I)	
GM-21-009RE GM-21-010RE	Results flagged "I" by the laboratory due to ion ratio outside QC limits.	J (all detects)	Ρ	Target analyte identification (ion ratio) (*XII)	
GM-21-002	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-002RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-003	Perfluorohexanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Not reportable	-	Overall assessment of data (*XIV)	
GM-21-003RE	All analytes except Perfluorohexanoic acid Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid	Not reportable	-	Overall assessment of data (*XIV)	

Sample	Analyte	Flag	A or P	Reason (Code)
GM-21-009	Perfluorooctanoic acid Perfluorooctanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid Perfluoroundecanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-009RE	All analytes except Perfluorooctanoic acid Perfluorooctanesulfonic acid Perfluorotetradecanoic acid Perfluorotridecanoic acid Perfluorododecanoic acid Perfluoroundecanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-010 GM-21-020 GM-21-021 GM-21-024 GM-21-025 GM-21-052 GM-21-053	All analytes	Not reportable	-	Overall assessment of data (*XIV)
GM-21-022	Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid	Not reportable	-	Overall assessment of data (*XIV)
GM-21-022RE	All analytes except Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid	Not reportable	-	Overall assessment of data (*XIV)

## Keyport LTM

Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 410-66184-1

No Sample Data Qualified in this SDG

Keyport LTM Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 410-66184-1

No Sample Data Qualified in this SDG

#### VALIDATION COMPLETENESS WORKSHEET

Stage 2B/A

Date: 2/3	3/22
Page:o	f <u>L</u>
Reviewer:	/
2nd Reviewer:	$\leq$

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
<u> </u>	Sample receipt/Technical holding times	AIX	
П.	LC/MS Instrument performance check	A	
<u> </u>	Initial calibration/ICV	4/4	$R0 \neq 20$ $TV/Q/=20$
IV.	Continuing calibration/ISC	X/A	\$ = 30
V.	Laboratory Blanks	äv	
. V.I	Field blanks	NÞ	FB-120821 (410-66173-1)
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples	A	1091
IX.	Field duplicates	SW	$\frac{1}{1} = \frac{1+3}{2+4}, \frac{9+1}{9+1}, \frac{10+12}{20+22}, \frac{19+21}{20+22}$
Х.	Labeled Compounds	SW	19+21 \$ 20+22\$
XI.	Target analyte quantitation	N	Not reviewed for Stage 2B validation.
XII.	Target analyte identification	SV	Not reviewed for Stage 2B validation.
XIII.	System performance	N_	Not reviewed for Stage 2B validation.
XIV.	Overall assessment of data	SW	

A = Acceptable N = Not provided/applicable Note:

LDC #: <u>53180A96</u> SDG #: <u>410-66184-1</u>

Laboratory: Eurofins, Lancaster, PA

plicable R

ND = No compounds detected
R = Rinsate
FB = Field blank

D	= Duplicate
TE	3 = Trip blank
EE	3 = Equipment blank

SB=Source blank OTHER:

~		-	٠.

SW = See worksheet FB = I
\*\* Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	GM-21-002	410-66184-1	Water	12/08/21
2 3	GM-21-002RE	410-66184-1RE	Water	12/08/21
31	GM-21-003	410-66184-2	Water	12/08/21
4 <b>3</b>	GM-21-003RE	410-66184-2RE	Water	12/08/21
<sub>5</sub> ۱	GM-21-009****	410-66184-3	Water	12/08/21
6 <b>`</b>	GM-21-010	410-66184-4	Water	12/08/21
7 <b>3</b>	GM-21-010RE	410-66184-4RE	Water	12/08/21
8 1	GM-21-016	410-66184-5	Water	12/08/21
9	-GM-21-020	410-66184-6	Water	12/08/21
10 <b>*</b>	GM-21-020RE	410-66184-6RE	Water	12/08/21
11	/GM-21-021	410-66184-7	Water	12/08/21
12 <b>3</b>	GM-21-021RE	410-66184-7RE	Water	12/08/21
13	GM-21-022***	410-66184-8	Water	12/08/21
14 <b>7</b>	GM-21-022RE***	410-66184-8RE**	Water	12/08/21
15	GM-21-024	410-66184-9	Water	12/08/21

LDC #: 53180A96 **VAL** SDG #: 410-66184-1 Laboratory: Eurofins, Lancaster, PA

## VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 73/22 Page: \_\_\_\_\_ Reviewer: \_\_\_\_\_ 2nd Reviewer: \_\_\_\_\_

METHOD: GC Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537M/QSM 5.3 B-15)

	Client ID		Lab ID	Matrix	Date
16 <b>3</b>	GM-21-024RE	410-66184-9RE	Water	12/08/21	
177	′GM-21-025		410-66184-10	Water	12/08/21
18 H	GM-21-025RE		410-66184-10RE	Water	12/08/21
19 <b>Z</b>	-GM-21-052		410-66184-11	Water	12/08/21
20¥	GM-21-052RE		410-66184-11RE	Water	12/08/21
212	GM-21-053		410-66184-12 Water		12/08/21
22	GM-21-053RE		410-66184-12RE	Water	12/08/21
23 <b>7</b>	GN-21-009RE				
24					
25					
Notes:				1 1	
	205983			· ·	
2	207022				
3	207809				
4	208162				

L:\EA\Keyport\53180A96W.wpd

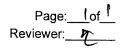
# TARGET COMPOUND WORKSHEET

#### METHOD: PFAS

A. Perfluorobutanoic acid	W. 6:2 Fluorotelomer sulfonate	
B. Perfluoropentanoic acid	X. 8:2 Fluorotelomer sulfonate	
C. Perfluorohexanoic acid	Y. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	
D. Perfluoroheptanoic acid	Z. HFPO-DA (GenX)	
E. Perfluorooctanoic acid	AA. 9CI-PF3ONS (F-53B Major)	
F. Perfluorononanoic acid	BB. 11CI-PF3OUdS (F-53B Minor)	
G. Perfluorodecanoic acid	CC. Hexafluoropropylene oxide dimer acid (HFPO-DA)	
H. Perfluoroundecanoic acid	DD. 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	
I. Perfluorododecanoic acid	EE. 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	
J. Perfluorotridecanoic acid	FF. 4:2 Fluorotelomersulfonic acid	
K. Perfluorotetradecanoic acid	GG. 6:2 Fluorotelomersulfonic acid	
L. Perfluorobutanesulfonic acid	HH. 8:2 Fluorotelomersulfonic acid	
M. Perfluoropentanesulfonic acid	II. 1H,1H,2H,2H-perfluorohexane sulfonic acid	
N. Perfluorohexanesulfonic acid	JJ. 1H,1H,2H,2H- Perfluorooctanesulfonic acid	
O. Perfluoroheptanesulfonic acid	KK. 1H, 1H, 2H, 2H-perfluorodecane sulfonic acid	
P. Perfluorooctanesulfonic acid	LL. NMeFOSA	
Q. Perfluorononanesulfonic acid	MM. 3:3 Fluorotelomer carboxylate	
R. Perfluorodecanesulfonic acid	NN. 5:3 Fluorotelomer carboxylate	_
S. Perfluorooctanesulfonamide	OO. 7:3 Fluorotelomer carboxylate	
T. NMeFOSAA	PP. Perfluorooctadecanoic acid	
U. NEIFOSAA		
V. 4:2 Fluorotelomer sulfonate		

# LDC #: 53180,496

#### VALIDATION FINDINGS WORKSHEET Blanks



Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

Blank extraction date:       12/16/21         Conc. units:       19/12         Associated Samples:       1,3,5,6,8,9,11,13,15										
Analyte			Sample Identification							
1997) - Antonio Caracteria 1997) - Antonio Caracteria 1997) - Antonio Caracteria	MB 410-205983/1-	-7 LX	TX 13							
Þ	0.586	2.93	2.6/5							
					·					
		<u> </u>								
							<u> </u>			

#### Blank extraction date:\_\_\_\_\_

Conc. units:

Associated Samples:

Analyte	Biank ID	Sample Identification							
								······	
					<u></u>	L			 

LDC #: 53180 194

## VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: <u>1</u> of <u>1</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

	Concentra	tion (ng/L)		Difference	Difference Limit: <loq< th=""><th rowspan="2">Qualification</th></loq<>	Qualification
Analyte	GM-21-002-12082021	GM-21-003-12082021	RPD≤30	<5XLOQ		
Perfluorobutanesulfonic acid	1.1	1.1		0	1.8	
Perfluoroheptanoic acid	0.74	0.82		0.08	1.8	
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	0.52	0.46	1 1	0.06	1.8	
Perfluorooctanoic acid	3.4	3.7	8			
Perfluorohexanoic acid	2.2	2.2	0			
Perfluorohexanesulfonic acid	0.67	0.67		0	1.8	

	Concentra	tion (ng/L)		Difference	Difference	
Analyte	GM-21-002-12082021RE	GM-21-003-12082021RE	RPD≤30	<5XLOQ	Limit: <loq< th=""><th>Qualification</th></loq<>	Qualification
Perfluorobutanesulfonic acid	0.96	1.2		0.24	1.8	
Perfluoroheptanoic acid	0.99	0.81		0.18	1.8	
Perfluorooctanoic acid	3.5	3.7	6			
Perfluorohexanoic acid	2.3	2.3	0			
Perfluorohexanesulfonic acid	0.65	0.69		0.04	1.8	

	Concentration (ng/L)			Difference	Difference	
Analyte	GM-21-020-12082021	GM-21-021-12082021	RPD≤30	<5XLOQ	Limit: <loq< td=""><td>Qualification</td></loq<>	Qualification
Perfluorobutanesulfonic acid	0.44	0.89U		0.45	1.8	

LDC #: 53/80 496

## VALIDATION FINDINGS WORKSHEET Labeled Compounds

Page: <u>1</u> of <u>4</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-002	$(\mathbf{N})$	13C2 PFTeDA	15	X/P (K)
			13C2-PFDoDA	33	J/UJ/P (I,J)
	GM-21-002RE		13C2 PFTeDA	19	Х/Р (К)
	GM-21-003		13C2 PFTeDA	16	Х/Р (К)
			13C2-PFDoDA	40	J/UJ/P (I,J)
	GM-21-003RE		13C2 PFTeDA	44	J/UJ/P (K)
	GM-21-009		13C2 PFTeDA	5	Х/Р (К)
			13C2-PFDoDA 13C7 PFUnA	31 49	J/UJ/P (I,J) J/UJ/P (H)
	GM-21-009RE		13C2 PFTeDA	26	J/UJ/P (K)
	GM-21-010		13C2 PFTeDA	0.03	Х/Р (К)
			13C2-PFDoDA 13C9 PFNA	0.1	X/P (I,J) X/P (F)
	· · · · · · · · · · · · · · · · · · ·		d5-NEtFOSAA	1	X/P (U)
			d3-NMeFOSAA	2	X/P (T)
			13C7 PFUnA	0.4	X/P (H)
			13C6 PFDA	2	X/P (G)
		(æf)	13C8 PFOS 13C8 PFOA	<u>5</u> 26	X/P (P,DD,EE) J/UJ/P (E)
	GM-21-010RE	(11)	13C2 PFTeDA	20	J/UJ/P (K)
			13C2-PFDoDA	49	J/UJ/P (I,J)
	GM-21-016		13C2 PFTeDA	0.05	Х/Р (К)
			13C2-PFDoDA 13C9 PFNA	0.06	X/P (I,J) X/P (F)
			d5-NEtFOSAA	0.7	X/P (F) X/P (U)
	1		d3-NMeFOSAA	1	X/P (T)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD

LDC #: 53/80496

## VALIDATION FINDINGS WORKSHEET Labeled Compounds

Page: <u>1</u> of <u>4</u> Reviewer: <u>SC</u>

#### Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled		
	Sample ID	<u> </u>	Compound	%R (50-150)	Qualifications
	GM-21-016 (cont'd)	(ND)	13C7 PFUnA	0.2	X/P (H)
		ľ,	13C6 PFDA	1	X/P (G)
		_√、	13C8 PFOS	4	X/P (P,DD,EE)
		(20)	13C8 PFOA	33	J/UJ/P (E)
	GM-21-020	(ND)	13C2 PFTeDA	0.05	Х/Р (К)
		1	13C2-PFDoDA	1	X/P (I,J)
			13C9 PFNA	48	J/UJ/P (F)
			d5-NEtFOSAA	19	X/P (U)
		-+	d3-NMeFOSAA	22	J/UJ/P (T)
			13C7 PFUnA	6	X/P (H)
			13C6 PFDA	23	J/UJ/P (G)
			13C8 PFOS	43	J/UJ/P (P,DD,EE)
	GM-21-020RE		13C2 PFTeDA	16	Х/Р (К)
	GM-21-021		13C2 PFTeDA	0.01	Х/Р (К)
			13C2-PFDoDA	0.02	X/P (I,J)
			13C9 PFNA	8	X/P (F)
			d5-NEtFOSAA	0.5	X/P (U)
			d3-NMeFOSAA	0.8	X/P (T)
			13C7 PFUnA	0.06	X/P (H)
			13C6 PFDA	0.5	X/P (G)
			13C8 PFOS	5	X/P (P,DD,EE)
			13C8 PFOA	42	J/UJ/P (E)
	GM-21-021RE		13C2 PFTeDA	22	J/UJ/P (K)
	GM-21-022		13C2 PFTeDA	3	Х/Р (К)
			13C2-PFDoDA	11	X/P (I,J)
			d5-NEtFOSAA	41	J/UJ/P (U)
			d3-NMeFOSAA	41	J/UJ/P (T)
		/	13C7 PFUnA	21	J/UJ/P (H)
_		¥	13C6 PFDA	41	J/UJ/P (G)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD

LDC #: 57180496

# VALIDATION FINDINGS WORKSHEET Labeled Compounds

Page: <u>3</u> of <u>4</u> Reviewer: <u>SC</u>

Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

Percent recoveries (%R) were within QC limits with the exceptions identified below.

	Labeled		
 Sample ID	Compound	%R (50-150)	Qualifications
 GM-21-022RE (N)	13C2 PFTeDA	0.5	X/P (K)
 La construction de la constructi	13C2-PFDoDA	3	X/P (I,J)
	13C9 PFNA	21	J/UJ/P (F)
	d5-NEtFOSAA	10	X/P (U)
	d3-NMeFOSAA	10	X/P (T)
	13C7 PFUnA	6	X/P (H)
	13C6 PFDA	11	X/P (G)
(P-&ef)	13C8 PFOS	15	X/P (P,DD,EE)
 (art)	13C8 PFOA	43	J/UJ/P (E)
 GM-21-024 ( WF) ( WF)	13C3 PFHxS	14	X/P (N)
 (D-det)	13C4 PFHpA	32	J/UJ/P (D, DONA)
(MD)	13C2 PFTeDA	0.03	Х/Р (К)
······································	13C2-PFDoDA	0.02	X/P (I,J)
	13C9 PFNA	1	X/P (F)
· · · · · ·	d5-NEtFOSAA	0.3	X/P (U)
	d3-NMeFOSAA	0.2	X/P (T)
	13C7 PFUnA	0.05	X/P (H)
	13C6 PFDA	0.2	X/P (G)
J.	13C8 PFOS	0.7	X/P (P,DD,EE)
(kr)	13C8 PFOA	7	X/P (E)
 GM-21-024RE (ND)	13C2 PFTeDA	12	Х/Р (К)
1	13C2-PFDoDA	28	J/UJ/P (I,J)
 	13C7 PFUnA	40	J/UJ/P (H)
 GM-21-025	13C2 PFTeDA	4	Х/Р (К)
	13C2-PFDoDA	9	X/P (I,J)
	d5-NEtFOSAA	20	J/UJ/P (U)
	d3-NMeFOSAA	25	J/UJ/P (T)
	13C7 PFUnA	13	X/P (H)
	13C6 PFDA	26	J/UJ/P (G)
	13C8 PFOS	44	J/UJ/P (P,DD,EE)

V:\DVR Worksheets\EA\53144\_53180\_Keyport\_LC\_FD

# LDC #: 5480496

## VALIDATION FINDINGS WORKSHEET Labeled Compounds

Page: <u>4</u> of <u>4</u> Reviewer: <u>SC</u>

#### Method: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DOD QSM 5.3

#### Percent recoveries (%R) were within QC limits with the exceptions identified below.

			Labeled	· · · · · · · · · · · · · · · · · · ·	
#	Sample ID		Compound	%R (50-150)	Qualifications
	GM-21-025RE	(N)	13C2 PFTeDA	24	J/UJ/P (K)
	GM-21-052	<u>_</u>	13C2 PFTeDA	1	X/P (K)
			13C2-PFDoDA	6	X/P (I,J)
·····			d5-NEtFOSAA	38	J/UJ/P (U)
			d3-NMeFOSAA	39	J/UJ/P (T)
			13C7 PFUnA	15	X/P (H)
			13C6 PFDA	38	J/UJ/P (G)
	GM-21-052RE		13C2 PFTeDA	25	-1/14/p(K)
	GM-21-053		13C2 PFTeDA	0.06	X/P (K)
			13C2-PFDoDA	0.3	X/P (I,J)
			13C9 PFNA	32	J/UJ/P (F)
			d5-NEtFOSAA	5	X/P (U)
			d3-NMeFOSAA	7	X/P (T)
			13C7 PFUnA	2	Х/Р (Н)
			13C6 PFDA	11	X/P (G)
			13C8 PFOS	26	J/UJ/P (P,DD,EE)
	GM-21-053RE		13C2 PFTeDA	2	Х/Р (К)
	· ·		13C2-PFDoDA	19	X/P (I,J)
			d5-NEtFOSAA	34	J/UJ/P (U)
			d3-NMeFOSAA	40	J/UJ/P (T)
		V	13C7 PFUnA	38	J/UJ/P (H)

LDC #: 53180796

#### VALIDATION FINDINGS WORKSHEET Target Analyte Identification

Page:	<u>) of [</u>
Reviewer:	M.

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.1

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was the signal to noise (S/N) ratio for all analytes within the validation criteria?

Y N N/A Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?

Y N N/A Were ion ratios within QC limits?

#	Date	Sample ID	Analyte	Ion ratio (Limits)	Qualifications
		23,7		Results flagged "I" by the laboratory due to	Jdets/P
				ion ratio outside QC limits.	
	_				
	-				

LDC #: 57180496

-

#### VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:\_\_\_lof Reviewer:

METHOD: LC/MS/MS and Isotope Dilution Compliant with Table B-15 of DoD QSM 5.3

#	Date	Sample ID	Analyte	Finding	Qualifications
			C, D, E, I, J	Ruxtination more	NR
			-	usable Chigher	1
				verde (higher resulfe)	
				)	
		2	ful except GD, E, IJ	Orig mor usable	(hiper)
			1		
		3	C, L, N, K, I, J	RE nor usable (h (K: Label 1 %R	igher (
				(K: Laterdia %R	2002 mig
		4	be except C, L, N, K, L	torig more vales	(high a)
┠────				Provide de	
<b> </b>		7	E, P, KK, H, I, J	RE more usable (h (K: harred %PZ	rgler)
			110 to at 12 DIVE		
+		23	ful except E. P.K.K.	Orig more uzable	(higher)
			Ft, 1,	formal labered 1 78R9 and - 1/R 29	as con K
-+				70 F3 CHG - /- /	
		10 10 9 11 15 1719		RE more useble	
		6, 10, 9, 11, 15, 17, 19		(Swaal Labeled	
				\$20 out in orig)	
		3	C, D, E, R	RE more usable	
				(higher resulte)	
		,			
		14	ful except above	Ong more usable	
				Several labeled	
				% Rs out in RE)	V.