

PART 1 OF 3



Naval Facilities Engineering Systems Command Northwest
Silverdale, Washington

Final

**Phase 2 Site Inspection Report
for Per- and Polyfluoroalkyl Substances
Ault Field**

Naval Air Station Whidbey Island
Oak Harbor, Washington

September 2021



Naval Facilities Engineering Systems Command Northwest
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Final

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Ault Field**

Naval Air Station Whidbey Island
Oak Harbor, Washington

September 2021

Prepared for NAVFAC Northwest
by CH2M HILL, Inc.
Bellevue, Washington
Contract N62470-16-D-9000
CTO 4041



Executive Summary

The Department of the Navy (Navy), Naval Facilities Engineering Systems Command Northwest Division, contracted CH2M HILL, Inc. (CH2M) to perform a Phase 2 Site Inspection (SI) at Naval Air Station Whidbey Island, Ault Field (**Figure 1**), in Oak Harbor, Washington, to evaluate the presence or absence of per- and polyfluoroalkyl substances (PFAS) in soil and groundwater at 30 of the 35 potential source areas (PSAs) (**Figure 2**) identified in the preliminary assessment (PA) for Ault Field, which was issued in November 2018 (Navy, 2018a). The remaining five sites are addressed under separate inspections. Figure 2 identifies the confirmed PFAS release areas among the 30 PSAs with color coding based on the findings of the PA. A Phase 1 SI was completed in 2018 near the eastern and southwestern boundaries of Ault Field, with a focus on collecting information to support the long-term solutions for two residential parcels near Ault Field, where PFAS have been detected in drinking water above the United States Environmental Protection Agency (USEPA) Lifetime Health Advisory. The Phase 1 SI was conducted in accordance with the *Final Sampling and Analysis Plan, Phase 1 Site Investigation for Per- and Polyfluoroalkyl Substances in Soil and Groundwater, Ault Field, Naval Air Station Whidbey Island, Oak Harbor, Washington* (Navy, 2018b) and the investigation conclusions are summarized in a technical memorandum prepared by CH2M and submitted to the Navy in March 2019 (Navy, 2019a).

This report describes the Phase 2 SI, which was conducted in four stages: Stages 2 and 3 were conducted in November and December 2019, and Stages 1 and 4 were conducted in July and August 2020. All work was performed in accordance with the *Final Sampling and Analysis Plan, Phase 2 Site Inspection Ault Field, Naval Air Station Whidbey Island Oak Harbor, Washington* (SAP), henceforth referred to as the SAP (Navy, 2019c), and three field change requests (FCRs). FCR 1 was completed in November 2019 (2019 FCR 1) for Stages 2 and 3 to adjust soil sampling and monitoring well installation based on lithology, FCR 2 (2019 FCR 2) was completed in December 2019 for Stages 2 and 3 to adjust the well development methods based on observed field conditions, and 2020 FCR 1 was completed in July 2020 to streamline Stages 1 and 4 of the Phase 2 SI and continue to meet the objectives of the SAP (the FCRs are included in **Appendix H**).

For ease of discussion, the sites investigated during each stage of the inspection have been grouped together based on their location and status as determined by the Phase 2 inspection. They are hereafter referred to as Group 1 through Group 5 (**Figure 2**) and defined as follows, except where noted:

- Group 1 – Wastewater Treatment Plant, Former Sewage Lagoons, and the Former Wastewater Treatment Plant (Building 420)
- Group 2 – Hardstand Area, 1985 EA-6B Crash Site, 1989 A-6 Crash Site, 1990 A-6 Crash Site, 1981 P-3A Crash Site, 2006 F-18 Crash Site, and the Runway Drainage Ditch System (Area 16), including Stormwater Outfall 2
- Group 3 – Former Avionics Facility (Building 2547), Former/Current Fire Station (Building 2897), Hangar 1 (Building 112), Hangar 5 (Building 386), Hangar 6 (Building 410), Hangar 7 (Building 2544), Hangar 8 (Building 2642), Hangar 9 (Building 2681), Hangar 10 (Building 2699), Hangar 11 (Building 2733), Hangar 12 (Building 2737), Hangar 14 (newly constructed), Indoor Wash Rack (Building 2903), P3 Wash Rack, and Stormwater Outfall 1 of the Runway Drainage Ditch System (Area 16)
- Group 4 – Former 1966 Fire School (Area 27) and Pesticide Rinsate Disposal Area (Area 14)
- Group 5 – 1976 EA-6 Crash Site, Former Clover Valley Fire School (Area 29), Fire School Can Disposal Area (Area 30), Gallery Golf Course

Group 1, Group 4, and Group 5 are sites associated with Stage 1 and Stage 4 of the Phase 2 SI field investigation, and Group 2 and Group 3 are sites associated with Stage 2 and Stage 3.

Investigations of potential PFAS releases at Ault Field began in 2015 and have included sampling of on-Base monitoring wells and off-Base drinking water wells; drilling, installation, and sampling for PFAS at new on-Base groundwater monitoring wells to better understand the aquifer system; and aquifer testing at residential parcels to determine the feasibility of using the newly installed wells as potential alternative water supply wells for the

affected residences. Details of the aquifer testing, including methodology and results, are presented in a technical memorandum prepared by CH2M and finalized in March 2019 (Navy,2019b). The overall objectives for the Phase 2 SI were defined in the SAP as:

- Identify the presence or absence of PFAS in the shallow portion of the aquifer at areas where surface releases are suspected that have not previously been investigated, or where the well network previously sampled was not sufficient to assess whether a surface release has occurred at or above the USEPA Lifetime Health Advisory for perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), or both.¹
- Identify the groundwater and surface water interaction and potential PFAS migration pathways.²
- Improve understanding of on-Base groundwater flow directions and potential for migration of PFAS from the PSAs identified in the PA.

Field activities during Stage 2 and Stage 3 of the Phase 2 SI consisted of sampling existing and newly installed monitoring wells, soil boring sampling, and installing new monitoring wells targeting both the shallow and intermediate aquifer³ (**Figure 3**). The Stage 1 and Stage 4 field activities consisted of sampling five existing wells, installing and sampling seven new on-Base monitoring wells, advancing and sampling 20 soil borings, and collecting grab groundwater samples at 12 of the 20 soil boring locations (**Figure 4**).

Groundwater elevation surveys were conducted on new and existing monitoring wells during the first half of the field investigation in 2019, and during the second half of the field investigation in 2020. Groundwater measurements are generally consistent with prior groundwater elevation data across Ault Field, including artesian conditions near the Runway Drainage Ditch System (Area 16), and where flow direction is generally to the east or northeast. Some variations were noted for monitoring wells near the western boundary of Ault Field, where groundwater flow direction was toward the northwest out to the Strait of Juan de Fuca. New information gathered from the groundwater elevation surveys, and from the drilling activities, were used to refine the conceptual site model and are discussed in this report in the Updated Conceptual Site Model Section 5. Project Action Levels (PALs) for this project, as established in the SAP and updated based on revised guidance issued after the SAP, are as follows:

¹ Although the SAP objective referred to the Lifetime Health Advisory, this report focuses on PAL exceedances, as established in the SAP and updated based on revised guidance issued after the SAP.

² This objective was specified in the SAP; however, it is not necessary for the SI phase of investigation and has been deferred to future remedial investigations.

³ The SAP for this project specifies that the soil borings advanced during Stage 3 would be completed as piezometers, essentially shallow monitoring wells. The construction, development, and sampling of the designated piezometers did not differ from the monitoring wells installed during Stages 2 and 4. To avoid confusion in this report by referring to both monitoring wells and piezometers, they will all be referred to as monitoring wells.

Project Action Levels¹

Analyte	Media (units)	Project Action Levels ²
PFOS	Soil (µg/kg)/	130
	Groundwater (ng/L)	40
PFOA	Soil (µg/kg)	130
	Groundwater (ng/L)	40
PFBS	Soil (µg/kg)	1,900
	Groundwater (ng/L)	600

Notes:

¹ While SSLs were included in the SAP to ensure data quality for assessment of leaching and screening against these values was completed to inform decision-making during future investigations, these values are not considered PALs for this project. Additionally, while the Lifetime Health Advisory was included in the SAP, it is not to be used for making CERCLA-related decisions, but may be used to determine and expand drinking water sampling areas and to determine whether drinking water receptors require response actions.

² PALs for PFOA and PFOS are based on a hazard quotient of 0.1 and were generated using the USEPA online calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). PALs for PFBS were generated similarly, but values were updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (PFBS) and Related Compound Potassium Perfluorobutane Sulfonate" (USEPA, 2021). The original value of 602 ng/L derived from the online calculator for PFBS was rounded to 600 ng/L, consistent with two significant figures included in the USEPA's RSL table.

--- = not applicable

µg/kg = micrograms(s) per kilogram

ng/L = nanograms per liter

CERCLA = Comprehensive Environmental Response,
Compensation, and Liability Act of 1980

PFBS = perfluorobutanesulfonic acid

RSL = regional screening level

SSL = soil screening level

Project action limits are currently not established for the remaining 15 PFAS compounds for soil or groundwater, nor are there any State of Washington regulatory screening levels or USEPA RSLs available (Navy, 2019c).

The laboratory analytical results for soil samples collected during the Phase 2 SI showed no detection of PFOA or PFBS in any sample, and detections of PFOS in three locations near the hangar area and in one location at the Former Sewage Lagoons that were all below the respective PALs (**Figure 5** through **Figure 9**).

Groundwater samples taken during Phase 2 were collected at depths ranging from 7 to 65 feet below ground surface (**Figure 10** through **Figure 14**). Laboratory analytical results for groundwater samples collected from the newly installed and existing monitoring wells found that PFBS was present in nearly every sample, but no detection was at a concentration exceeding the PAL. PFOS was detected above the PAL in the samples collected from Group 3 wells WI-AF-MW-620, WI-AF-MW-621, WI-AF-MW-624 along the taxiway, and well WI-AF-H6-B3 near Hangar 6 (**Figure 14**), and Group 1 wells WI-AF-MW-14, WI-AF-MW-20, and WI-AF-MW-21 at Building 420, and WI-AF-MW-630 at the Wastewater Treatment Plant (**Figure 10**). PFOA was detected above the PALs in the samples collected from Group 3 wells WI-AF-MW-618, WI-AF-MW-620, WI-AF-MW-621, and WI-AF-MW-624, all installed along the taxiway (**Figure 14**).

Group 2 dual completion monitoring well clusters were installed during Stage 3 at the Hardstand Area and various locations along and around the Area 16 drainage ditch system. The Group 3 dual completion monitoring well cluster installed at Stormwater Outfall 1, which joins to the Area 16 drainage ditch system, was also installed during Stage 3. The dual completion wells installed during Stage 3 were to investigate whether the runway ditch at each location is losing surface water to the underlying aquifer or gaining water from shallow groundwater discharge into the surface water system (**Figure 14**) (Navy, 2019c). Groundwater samples collected from the monitoring wells confirmed the presence of PFOS above the PAL at Group 3 well WI-AF-WT09, located at Stormwater Outfall 1, and Group 2 Hardstand Area wells WI-AF-WT01 and WI-AF-WT02, and WI-AF-WT05 (Area 16) (**Figure 13**). PFOA was detected above the PAL in the samples from Group 3 Stormwater Outfall wells WI-AF-WT09 and WI-AF-WT11 (featured on **Figure 14** with the Group 3 wells) and from Group 2 wells WI-AF-WT01 and WI-AF-WT02 (**Figure 13**).

Grab groundwater samples were collected from 12 Group 1, Group 4, and Group 5 soil borings advanced during Stage 4 (**Figure 10** through **Figure 12**). PFOS and PFOA above the PALs were detected in samples collected from Group 1 borings WI-AF-BH10 (at the Wastewater Treatment Plant) and WI-AF-BH12 (at the Former Sewage Lagoons) (**Figure 10**). The sample from Former Sewage Lagoons boring WI-AF-BH13 exceeded the PAL for PFOA, only.

Based on an assessment of data collected during Phase 2, the following recommendations are made for the PSAs investigated at Ault Field:

- Group 1 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater at the Former Sewage Lagoons, Wastewater Treatment Plant, and Building 420. And, conduct further investigation to assess the leaching potential for PFOS in soil at the Former Sewage Lagoons, where samples confirmed the presence of PFOS in soil at one location below the PAL of 130 µg/kg, and where the groundwater samples from the same location exceed PALs.
- Group 2 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater at the Hardstand Area, 2006 F-18 Crash Site, 1990 A-6 Crash Site, 1985 EA-6B Crash Site, the 1989 A-6 Crash Site, the Runway Drainage Ditch System (Area 16), and Stormwater Outfall 2.
- Group 3 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater near the Former Avionics Facility (Building 2547), Former/Current Fire Station (Building 2897), Hangar 1 (Building 112), Hangar 5 (Building 386), Hangar 6 (Building 410), Hangar 7 (Building 2544), Hangar 8 (Building 2642), Hangar 9 (Building 2681), Hangar 10 (Building 2699), Hangar 11 (Building 2733), Hangar 12 (Building 2737), Hangar 14 (newly constructed), Indoor Wash Rack (Building 2903), P3 Wash Rack, and Stormwater Outfall 1. And, conduct further investigation to assess the leaching potential for PFOS in soil to the east of Hangar 8 and the Indoor Wash Rack, to the east of Hangar 9, and at Stormwater Outfall 1 where PFOS were detected in soil samples in these areas, below the PAL of 130 µg/kg, and where the groundwater samples from the same locations exceed PALs.
- Group 4 – No further action planned for soil or groundwater at Area 14 or Area 27.
- Group 5 – No further action planned for soil or groundwater at the 1976 EA-6 Crash Site, Area 29, Area 30, or the Gallery Golf Course.

Contents

Executive Summary	iii
Acronyms and Abbreviations	xi
1 Introduction.....	1-1
2 Site Background and Physical Setting	2-1
2.1 Site Background	2-1
2.1.1 Regulatory Setting	2-1
2.1.2 Investigation History.....	2-2
2.2 Physical Setting.....	2-3
2.2.1 Physical Characteristics	2-3
2.2.2 Climate.....	2-3
2.2.3 Topography and Surface Drainage Features.....	2-3
2.2.4 Land Use	2-3
2.2.5 Geologic Setting	2-3
2.2.6 Hydrogeologic Setting	2-4
2.2.7 Hydrologic Setting	2-4
2.2.8 Water Use	2-4
3 Investigation Methodology.....	3-1
3.1 Investigation Objectives.....	3-1
3.2 Field Task Summary	3-1
3.2.1 Stage 2 and Stage 3	3-1
3.2.2 Stage 1 and Stage 4	3-1
3.2.3 Site Preparation and Utility Location	3-2
3.2.4 Soil Borings.....	3-2
3.2.5 Grab Groundwater Sampling	3-3
3.2.6 Monitoring Well Construction	3-4
3.2.7 Monitoring Well Development	3-4
3.2.8 Groundwater Sampling.....	3-5
3.2.9 Groundwater Elevation Survey	3-6
3.2.10 Surveying	3-6
3.3 Sample Analysis and Quality Control	3-6
3.4 Decontamination Procedures.....	3-7
3.5 Investigation-derived Waste Management.....	3-7
3.5.1 Stage 2 and Stage 3	3-7
3.5.2 Stage 1 and Stage 4	3-8
3.6 Deviations from the Sampling and Analysis Plan.....	3-8
3.7 Data Quality Evaluation.....	3-10
4 Phase 2 Site Inspection Results.....	4-1
4.1 Soil.....	4-1
4.1.1 Group 1	4-1
4.1.2 Group 2	4-2
4.1.3 Group 3	4-2
4.1.4 Group 4	4-2
4.1.5 Group 5	4-2
4.2 Groundwater Grab Sampling.....	4-2
4.2.1 Group 1	4-3
4.2.2 Group 4	4-3
4.2.3 Group 5	4-3

4.3	Groundwater Sampling	4-4
4.3.1	Group 1	4-4
4.3.2	Group 2	4-4
4.3.3	Group 3	4-5
4.3.4	Group 4	4-5
4.3.5	Group 5	4-6
5	Updated Site Conceptual Model	5-1
5.1.1	Group 1	5-1
5.1.2	Group 2	5-1
5.1.3	Group 3	5-2
5.1.4	Group 4	5-2
5.1.5	Group 5	5-3
5.1.6	Groundwater Flow	5-3
6	Conclusions and Proposed Actions	6-1
6.1	Conclusions.....	6-1
6.2	Proposed Actions	6-1
7	References	7-1

Appendixes

A	Utility Verification Forms
B	Soil Boring Logs and Well Completion Diagrams
C	Well Development Logs
D	Groundwater Sampling Data Sheets
E	Synoptic Water Level Data Sheets
F	Survey Report
G	Field Notes
H	Field Change Requests
I	Investigation-derived Waste Inventory
J	Data Validation Reports
K	Additional PFAS Analytes Raw Data

Tables

1	Ault Field Monitoring Well and Monitoring well Construction Details
2	Ault Field Groundwater Elevation Survey
3	Summary of PFAS Chemicals Detected in Soil – Stages 2 and 3
4	Summary of PFAS Chemicals Detected in Soil – Stage 4
5	Summary of PFAS Chemicals Detected in Groundwater – Stages 2 and 3
6	Summary of PFAS Chemicals Detected in Groundwater – Stages 1 and 4
7	Summary of PFAS Chemicals Detected in Grab Groundwater – Stage 4

Figures

1	Base Location Map
2	Site Layout with Potential PFAS Sources
3	Stage 2/Stage 3 Sampling Locations
4	Stage 1/Stage 4 Sampling Locations
5	Stage 4 Soil Sampling Results – Group 1 Sites

6	Stage 3 Soil Sampling Results – Group 2 Sites
7	Stage 2 Soil Sampling Results – Group 3 Sites
8	Stage 4 Soil Sampling Results – Group 4 Sites
9	Stage 4 Soil Sampling Results – Group 5 Sites
10	Stage 1/Stage 4 Monitoring Well and Grab Groundwater Sampling Results – Group 1 Sites
11	Stage 1/Stage 4 Monitoring Well and Grab Groundwater Sampling Results – Group 4 Sites
12	Stage 1/Stage 4 Monitoring Well and Grab Groundwater Sampling Results – Group 5 Sites
13	Stage 3 Monitoring Well Sampling Results – Group 2 Sites
14	Stage 2 Groundwater Sampling Results – Group 3 Sites
15	Surface Aquifer Groundwater Elevation Map – Group 3 Sites
16	Surface Aquifer Groundwater Elevation Map – Group 2 and Group 3 Sites
17	Deep Aquifer Groundwater Elevation Map – Group 2 and Group 3 Sites
18	Surface Aquifer Groundwater Elevation Map – Group 1 Sites
19	Surface Aquifer Groundwater Elevation Map – Group 4 Sites

Acronyms and Abbreviations

µg/kg	micrograms(s) per kilogram
APS	Applied Professional Services
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CH2M	CH2M HILL, Inc.
CLEAN	Comprehensive Long-term Environmental Action – Navy
CTO	Contract Task Order
DI	deionized
DoD	Department of Defense
FCR	field change request
FD	field duplicate
HQ	hazard quotient
IDW	investigation-derived waste
LC-MS/MS	liquid chromatography – tandem mass spectrometer
msl	mean sea level
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
ng/L	nanograms per liter
NTU	nephelometric turbidity units
PA	Preliminary Assessment
PAL	project action level
PFAS	per- and polyfluorinated alkyl substances
PFBS	perfluorobutane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PPE	personal protective equipment
ppt	parts per trillion
PQO	project quality objective
PSA	potential source area
PVC	polyvinyl chloride
QC	quality control
QSM	Quality Systems Manual
RSL	regional screening level
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
SI	Site Inspection
SOP	standard operating procedures
SSL	soil screening level
SVOC	semivolatile organic compounds
UCMR3	third Unregulated Contaminant Monitoring Rule
USEPA	United States Environmental Protection Agency

VOC volatile organic compound

WQP water quality parameters

Introduction

CH2M HILL, Inc. (CH2M) was contracted by Naval Facilities Engineering Systems Command (NAVFAC) Northwest to perform a Phase 2 Site Inspection (SI) for per- and polyfluoroalkyl substances (PFAS) at Ault Field (**Figure 1**). A Phase 1 SI was performed in 2018 near the eastern and southwestern boundaries of Ault Field, with a focus on collecting information to support the long-term solutions for two residential parcels near Ault Field, where PFAS have been detected in drinking water above the United States Environmental Protection Agency (USEPA) Lifetime Health Advisory. The results of the Phase 1 SI are summarized in a technical memorandum prepared by CH2M and submitted to the Department of the Navy (Navy) in March 2019 (Navy, 2019a). This Phase 2 SI Report presents the data and findings obtained during the Phase 2 SI field activities. For ease of discussion, the sites investigated during each stage of the inspection have been grouped together based on their location and status as determined by the Phase 2 SI. They are hereafter referred to as Group 1 through Group 5 (**Figure 2**) and defined as follows:

- Group 1 – Wastewater Treatment Plant, Former Sewage Lagoons, and the Former Wastewater Treatment Plant (Building 420)
- Group 2 – Hardstand Area, 1990 A-6 Crash Site, 1981 P-3A Crash Site, 2006 F-18 Crash Site, and the Runway Drainage Ditch System (Area 16), including Stormwater Outfall 2
- Group 3 – Former Avionics Facility (Building 2547), Former/Current Fire Station (Building 2897), Hangar 1 (Building 112), Hangar 5 (Building 386), Hangar 6 (Building 410), Hangar 7 (Building 2544), Hangar 8 (Building 2642), Hangar 9 (Building 2681), Hangar 10 (Building 2699), Hangar 11 (Building 2733), Hangar 12 (Building 2737), Hangar 14 (newly constructed), Indoor Wash Rack (Building 2903), P3 Wash Rack, and Stormwater Outfall 1 of the Runway Drainage Ditch System (Area 16)
- Group 4 – Former 1966 Fire School (Area 27) and Pesticide Rinsate Disposal Area (Area 14)
- Group 5 – 1976 EA-6 Crash Site, Former Clover Valley Fire School (Area 29), Fire School Can Disposal Area (Area 30), Gallery Golf Course

Group 1, Group 4, and Group 5 are sites associated with Stage 1 and Stage 4 of the Phase 2 SI field investigation, and Group 2 and Group 3 are sites associated with Stage 2 and Stage 3.

The overall objectives for the Phase 2 SI were defined in the *Final Sampling and Analysis Plan, Phase 2 Site Inspection Ault Field, Naval Air Station Whidbey Island Oak Harbor, Washington* (SAP), henceforth referred to as the SAP (Navy, 2019c). Changes to the SAP to streamline the summer 2020 Stage 1 and Stage 4 activities, while still achieving the project quality objectives (PQOs), were approved via 2020 Field Change Request (FCR) 1 (included in **Appendix H**). The overall objectives were:

- Identify the presence or absence of PFAS in the shallow aquifer at areas where surface releases are suspected but have not previously been investigated, or where the well network previously sampled was not sufficient to assess whether a surface release has occurred at or above the Lifetime Health Advisory concentrations for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).
- Identify the groundwater and surface water interaction and potential PFAS migration pathways.¹
- Improve understanding of on-Base groundwater flow directions and potential for migration of PFAS from the potential source areas (PSAs) identified in the preliminary assessment (PA).

This Phase 2 SI Report outlines the approach taken to achieve the listed objectives and provides conclusions based on data collected and recommendations for further study. This report was prepared for NAVFAC Northwest under

1 This objective was specified in the SAP; however, it is not necessary for the SI phase of investigation and has been deferred to future remedial investigations.

the Comprehensive Long-term Environmental Action – Navy (CLEAN) 9000 Contract N62470-16-D-9000, Contract Task Order (CTO) 4041.

The Phase 2 SI Report is organized as follows:

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

Tables, figures, and appendixes follow Section 6.

1.1 Per- and Polyfluoroalkyl Substances

PFAS are manufactured chemicals that have been used since the 1950s in many household and industrial products because of their stain- and water-repellant properties. Within Navy operations, PFAS are most commonly associated with aqueous film-forming foam used primarily for firefighting (including emergency response, equipment testing and/or training, and fire suppression systems in buildings). PFAS can also be present in other industrial and household materials, in vapor suppression systems, and in waste streams. PFAS are now present virtually everywhere in the world because of the large amounts that have been manufactured and used. Once these compounds are released to the environment, they break down very slowly. PFAS are considered an “emerging chemical”, which do not have Safe Drinking Water Act (SDWA) regulatory standards or routine water quality testing requirements. The USEPA is studying PFAS to determine if national regulation is needed. The State of Washington does not have an established state standard or promulgated screening value for any PFAS constituent in either groundwater or drinking water.

USEPA issued the third Unregulated Contaminant Monitoring Rule (UCMR3)² in May 2012. The UCMR3 required monitoring of all large public water systems serving more than 10,000 people and 800 representative public water systems serving 10,000 or fewer people between 2013 and 2015, for 30 substances. Six PFAS compounds were included in the UCMR3 list; of these six PFAS, USEPA issued health advisories³ for only two, PFOA and PFOS. USEPA has also published toxicity values for PFOA and PFOS, as well as another PFAS compound, perfluorobutane sulfonate (PFBS). Health advisory levels are not regulatory standards; they are health-based concentrations which should offer a margin of protection for all Americans throughout their lives from adverse health effects resulting from exposure to PFOA and PFOS in drinking water. The USEPA Lifetime Health Advisory level is 70 parts per trillion⁴ (ppt; also equivalent to 70 nanograms per liter [ng/L]) for PFOA, and 70 ppt for PFOS. When both PFOA and PFOS are found in groundwater, the combined concentration should not exceed 70 ppt (USEPA, 2016a, 2016b).

² The 1996 SDWA amendments require that once every 5 years USEPA issue a new list of no more than 30 unregulated chemicals to be monitored by public water systems.

³ USEPA issued a Lifetime Health Advisory level for PFOS and PFOA in May 2016, superseding the 2009 provisional health advisory. USEPA has not issued a health advisory for any other PFAS compounds.

⁴ 70 ppt is equal to 70 ng/L or 0.07 microgram per liter.

Site Background and Physical Setting

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

2.1 Site Background

Ault Field occupies approximately 4,300 acres and is located three miles northwest of the City of Oak Harbor, Washington (**Figure 1**). It was commissioned on September 21, 1942 as one of three Naval Air Station Whidbey Island installations. Ault Field was formerly used for the rearming and refueling of Navy patrol planes and other tactical aircraft operating in the Puget Sound region. Currently, Ault Field supports Navy tactical electronic attack squadrons flying the EA-18G Growler, the P-3 Orion Maritime Patrol squadrons, and two Fleet Reconnaissance squadrons flying the EP-3E Aries (Navy, 2019c).

2.1.1 Regulatory Setting

PFAS have been identified by the USEPA as an “emerging chemical”, which is defined by the Department of Defense (DoD) as a chemical that has a perceived or real threat to human health or the environment, and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways (DoD, 2019). As detailed in the NAVFAC Interim PFAS Site Guidance (Navy, 2020), there are no SDWA federal regulations or Clean Water Act Ambient Water Quality Human Health Criteria for any PFAS. For chemicals not subject to national primary drinking water regulation, the SDWA authorized the USEPA to publish nonregulatory lifetime health advisories and risk-based regional screening levels (RSLs) to assist state and local officials in evaluating risks from PFAS in drinking water. Only the Project Action Levels (PALs) specified herein are applicable for groundwater samples collected during the Phase 2 investigation; the Lifetime Health Advisory is applicable for drinking water. For soil, the PALs are applicable for soil samples collected during the Phase 2 investigation (Navy, 2018b). The U.S. protection of groundwater soil screening levels (SSLs) are not considered official PALs for this project and are instead used to represent generalized screening criteria for evaluation of the presence of PFAS vadose zone source areas. The soil screening level values are not intended for use in remedial action or risk assessment decision-making. The PALs for this project, as established in the SAP and updated based on current guidance, are tabulated as follows:

Project Action Levels¹

Analyte	Media (units)	Project Action Levels ²
PFOS	Soil (µg/kg)	130
	Groundwater (ng/L)	40
PFOA	Soil (µg/kg)	130
	Groundwater (ng/L)	40
PFBS	Soil (µg/kg)	1,900
	Groundwater (ng/L)	600

Notes:

¹ While SSLs were included in the SAP to ensure data quality for assessment of leaching and screening against these values was completed to inform decision-making during future investigations, these values are not considered PALs for this project. Additionally, while the Lifetime Health Advisory was included in the SAP, it is not to be used for making CERCLA-related decisions, but may be used to determine and expand drinking water sampling areas and to determine whether drinking water receptors require response actions.

² PALs for PFOA and PFOS are based on a HQ of 0.1 and were generated using the USEPA online calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). PALs for PFBS were generated similarly, but values were updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (PFBS) and Related Compound Potassium Perfluorobutane Sulfonate" (USEPA, 2021). The original value of 602 ng/L derived from the online calculator for PFBS was rounded to 600 ng/L, consistent with two significant figures included in the USEPA's RSL table.

--- = not applicable

HQ = hazard quotient

µg/kg = micrograms(s) per kilogram

Project action limits are currently not established for the remaining 15 PFAS compounds for soil or groundwater, nor are there any State of Washington regulatory screening levels or USEPA RSLs available.

In accordance with Navy policy, all samples collected for this Phase 2 SI were analyzed for PFAS by liquid chromatography – tandem mass spectrometry (LC-MS/MS) compliant with DoD Quality Systems Manual (QSM) 5.1.1 Table B-15 (Navy, 2019c).

2.1.2 Investigation History

Groundwater investigations for PFAS at Ault Field have been conducted over the past five years. In September of 2015, the Navy conducted shallow groundwater sampling at Area 16, Area 31, and Hangar 5 (**Figure 2**). Neither PFOS nor PFOA were detected above the method detection limit in the samples from Area 16. Minor detections of PFOS (maximum concentration of 35 ng/L) and PFOA (maximum concentration of 7 ng/L) were found in the Hangar 5 samples, and the samples from Area 31 detected PFOS above the USEPA RSL and the USEPA Lifetime Health Advisory (PFOS maximum concentration of 2,370 ng/L and PFOA maximum concentration of 58,500 ng/L) (Navy, 2019c). The 2015 investigation concluded that further investigation was recommended to assess the potential for PFAS contamination in the shallow aquifer, and suggested that the deeper portion of the aquifer at the central drainage ditch portion of Area 16 had not been impacted by PFAS (Navy, 2018a). It was also concluded that investigation of the area to the north and northwest of Hangar 5 was not warranted; however, additional review of records revealed that the well network sampled at Hangar 5 was not sufficient to assess if a PFAS release had occurred at or above the USEPA RSL or Lifetime Health Advisory for either PFOS, PFOA, or both, and the installation of additional wells was recommended (Navy, 2019c).

A Phase 1 SI was conducted from January to March 2018 to refine the understanding of groundwater flow at Ault Field, to confirm the presence of PFAS in groundwater and characterize their nature, if present, and to gather information to support the evaluation of long-term solutions for two off-Base residential parcels near Ault Field (one to the east and one to the southwest of the Base) where PFAS have been detected in drinking water above the USEPA Lifetime Health Advisory for PFOS, PFOA, or both (Navy, 2019a). Nine on-Base monitoring wells and two off-Base potential alternative water supply wells were installed between the eastern and southern portions of the Base, within the shallow, intermediate, and deep zones of the aquifer. Soil samples collected during drilling

were non-detect for PFBS, and the detections of PFOA and PFOS were below the sample quantitation limit. All detections of PFOS and PFOA were below the Life Health Advisory, and the detections of PFBS were below USEPA RSL (Navy, 2019a). Groundwater sample results from the nine newly installed groundwater monitoring wells were non-detect for PFOS and PFOA. Only one of the off-Base potential alternative water supply wells had PFAS detections, of which the PFOS and PFOA detections were below the Lifetime Health Advisory, and PFBS was below the USEPA RSL (Navy, 2019a). In addition to the new wells, groundwater samples for PFAS analysis were collected from 17 existing on-Base wells that had no prior PFAS sampling history: 1959-1969 Landfill (Area 2), Areas 3, 4, 29, and the Current Fire Training Area (Area 2 and the Current Fire Training Area are located in between the Phase 2 sites in Group 4 and Group 5) (**Figure 2**). The results confirmed that groundwater samples from 9 of the 17 wells had detections of PFOS and PFOA above the USEPA Lifetime Health Advisory (Navy, 2019a).

2.2 Physical Setting

2.2.1 Physical Characteristics

Ault Field is situated on the northern end of Whidbey Island in the Puget Lowland (**Figure 1**). The central and most developed portion of Ault Field, which includes operations buildings, runways, taxiways, and barracks, is relatively flat with elevations ranging from approximately 10 to 50 feet above mean sea level (msl) (Navy, 2018b).

2.2.2 Climate

Whidbey Island has a temperate climate with mild, dry summers, and cool, wet winters. On average, January is the coolest month and August is the hottest. The mean temperature for Whidbey Island is 50 degrees Fahrenheit. Whidbey island has a mean annual precipitation of 19 inches per year, which is lower than most locations in western Washington due to a “rain shadow” effect as storm systems move over the Olympic Mountain Range (Navy, 2018b).

2.2.3 Topography and Surface Drainage Features

The far eastern and western extents of Ault Field are bounded by Dugualla Bay and the Strait of Juan de Fuca, respectively. Steep slopes and coastal bluffs occur mainly along the shoreline along the western side of Ault Field (Navy, 2018b).

2.2.4 Land Use

The area surrounding Ault Field is a low-density residential area, used for a combination of residential and commercial purposes (Navy, 2019c).

2.2.5 Geologic Setting

Whidbey Island lies within the Puget Lowland, a topographic and structural depression between the Olympic Mountains and the Cascade Range (**Figure 1**). The geology of the area is heavily influenced by glacial advances and retreats. At the height of the most recent glaciation, ice is estimated to have reached a thickness of about 4,500 feet in the Oak Harbor area. The geologic units on Whidbey Island thus consist of a sequence of Quaternary-age (less than 2 million years old) glacial and interglacial deposits that may be over 3,000 feet thick (USGS, 2005) with near-surface deposits being mostly glacial sediment of the Fraser glaciation (20,000 to 10,000 years old) (Navy, 2018b).

The Everson and Vashon units of the Fraser glaciation, post-glacial sediment, and artificial fill make up most of the surface and near-surface soil underlying Ault Field. In general, stratigraphic units up to 100 feet thick, consisting of relatively impermeable clay, silt, and silty fine sand (Everson glaciomarine drift and Vashon till), form the near-surface layers. Underlying the Vashon Outwash in most places are sand, silt, and clay of the Whidbey Formation (Navy, 2018b).

Three parallel active fault zones exist at Ault Field that are regionally significant. The Devil's Mountain, Strawberry Point, and Utsalady Point fault zones trend from southeast to northwest across Ault Field. Fault movement is oblique with both horizontal and vertical components. In general, the horizontal component is left-lateral, while the vertical component is normal with the north wedge up (Navy, 2018b).

2.2.6 Hydrogeologic Setting

The United States Geological Survey has identified five major hydrogeologic units on Whidbey Island. Only two units are present at Ault Field, and are termed intermediate and shallow aquifers, respectively. Locally perched zones may exist over discontinuous areas of till or other clay-rich units (Navy, 2018b).

The shallow aquifer is a locally discontinuous unconfined aquifer consisting of sand and gravel with an average groundwater elevation of 20 feet msl. At Ault Field, the shallow aquifer is found in the Vashon Outwash deposits at or near the surface. The intermediate aquifer is a moderately continuous sandy unit that is generally confined. Potentiometric surface elevations vary from 10 to 75 feet msl (Navy, 2018a).

Groundwater beneath Ault Field is recharged by infiltration of precipitation. Groundwater flow in specific regions of Ault Field has been studied in previous environmental investigations and groundwater flow is generally to the northeast toward Dugualla Bay, and it mimics the topography of the Clover Valley. A groundwater divide extends southwest to northeast along the topographic high of the coastal bluff in the southwestern part of Ault Field. Groundwater to the northwest of the divide flows west toward the Strait of Juan de Fuca, and groundwater to the southeast of the divide flows east toward the interior of the island and eventually out toward Dugualla Bay (Navy, 2018a).

2.2.7 Hydrologic Setting

Surface water on Whidbey Island occurs in soils with low infiltration rates, resulting from surficial clays, or at locations with high water tables. Streams tend to be shallow and flow is reduced significantly during the summer months. The primary surface water feature on Ault Field, the Clover Valley Stream, flows northeast toward Dugualla Bay (**Figure 1**). Stormwater from the central and southeastern portions of Ault Field is diverted into a complex system of drainage ditches and culverts adjacent to the runways and taxiways (referred to as Runway Drainage Ditch System [Area 16]) and eventually discharges into Clover Valley Stream east of Ault Field. Stormwater from the northern and southwestern portions of Ault Field is captured by the stormwater system which discharges into the Strait of Juan de Fuca (Navy, 2018b).

2.2.8 Water Use

The Ault Field water supply is sourced from the drinking water treatment plant facility at Mount Vernon 16 miles to the northwest, which is owned and operated by the City of Anacortes. Water from the Skagit River is pumped into the Mount Vernon water treatment plant and transported to Naval Air Station Whidbey Island via pipeline. The pipeline was constructed in 1942 to service the newly developed installation at Ault Field and was extended to Oak Harbor in 1970 to supplement the city water supply; however, residences surrounding Ault Field are mainly supplied by private or community drinking water wells (Navy, 2018b).

A seasonal water supply well used to water the golf course exists in the southeastern portion of Ault Field. The well is operated by the Navy on an as-needed basis in cooperation with surrounding private well owners to ensure limited drawdown in adjacent wells (Navy, 2018b).

The USEPA has designated the Whidbey Island aquifer system as a sole-source aquifer as it is the only potable water source for half the island's residents. The aquifer boundaries have been clearly defined and there is no alternative source for drinking water on the island (Navy, 2018b).

Investigation Methodology

This section describes the methodology used in the Phase 2 SI to accomplish the stated objectives and is discussed by the stage of the investigation. Stage 1 and Stage 4 activities are associated with Group 1, Group 4, and Group 5, and Stage 2 and Stage 3 are sites associated with Group 2 and Group 3.

3.1 Investigation Objectives

The field activities discussed in this report were performed in accordance with the SAP (Navy, 2019c). Deviations from the SAP are discussed in Section 3.5. Field activities were conducted in four stages and included sampling of existing on-Base wells, soil boring sampling, grab groundwater sampling, installing and sampling new on-Base monitoring wells, and measuring synoptic water levels.

3.2 Field Task Summary

3.2.1 Stage 2 and Stage 3

Field work for Stages 2 and 3 of the Phase 2 SI was performed during a combined field event from November 6 to December 15, 2019. Field notes are provided in **Appendix G**; sampling locations are provided on **Figure 3**.

Stage 2 of the Phase 2 SI focused on areas associated with potential releases or drainage from hangar facilities or other associated PSAs in the immediate vicinity of the hangars (at or downgradient of the Indoor Wash Rack), Former Avionics Facility, Former/Current Fire Station, Hardstand Area, Hangars 1, 5 through 12, and 14, P3 Washrack, and Stormwater Outfalls 1 and 2 (part of the Runway Drainage Ditch System [Area 16]). Stage 2 activities were modified from the SAP via 2019 FCRs 1 and 2 (while still achieving the PQOs) and consisted of the following:

- Sampling of five existing monitoring wells located downgradient of the hangar facilities area, for PFAS
- Drilling of eight boreholes and completion of seven of those as monitoring wells at approximately 30 feet below ground surface (bgs) along the taxiway to the east/northeast of the hangars
- Soil sampling at the soil/water table interface for PFAS
- Groundwater sampling of all newly installed monitoring wells for PFAS

Stage 3 of the Phase 2 SI focused on areas associated with potential releases at or near the Runway Drainage Ditch System (Area 16), including the 1981 P-3A Crash Site, 1985 EA-6B Crash Site, 1989 A-6 Crash Site, 1990 A-6 Crash Site, 2006 F-18 Crash Site, Former Avionics Facility, and P3 Washrack. Stage 3 activities were modified from the SAP via 2019 FCRs 1 and 2 (while still achieving the PQOs) and consisted of the following:

- Drilling of 12 soil boreholes in six clusters of two, advanced to the soil/water table interface.
- Completion of the boreholes as monitoring wells in six clusters of dual completion sets (total of 12 monitoring wells) screened at two intervals (approximately 15 and 30 feet bgs).
- Soil sampling at the soil/water table interface for PFAS.
- Groundwater sampling of all newly installed monitoring wells for PFAS.

3.2.2 Stage 1 and Stage 4

Field work for Stages 1 and 4 of the SI was performed during a combined field event from July 13 to September 9, 2020. Stage 4 was performed prior to Stage 1. Field notes are provided in **Appendix G**; sampling locations are provided on **Figure 4**.

Stage 1 of the Phase 2 SI focused on collecting groundwater samples from existing monitoring wells and the associated activities consisted of the following:

- Sampling of five existing monitoring wells in close proximity to three PSAs (the Pesticide Rinsate Disposal Area [Area 14], the Former Wastewater Treatment Plant [Building 420], and the Gallery Golf Course) to assess the presence or absence of PFAS in groundwater.

Stage 4 of the Phase 2 SI focused on on-Base areas where known data gaps for PFAS in soil and groundwater existed: 1976 EA-6 Crash Site, Area 14, Area 27, Area 29, Area 30, Building 420, Wastewater Treatment Plant, and the Former Sewage Lagoons. Stage 4 activities were modified from the SAP via 2020 FCR 1 (while still achieving the PQOs) and consisted of the following:

- Drilling of 20 boreholes and completion of seven of those as monitoring wells with total depths ranging from 40 to 70 feet bgs.
- Soil sampling at the soil/water table interface for PFAS at all 20 borings.
- Grab groundwater sampling for PFAS was conducted at the soil/water table interface at eight borings and at both the soil/water table interface and the total depth of the boring at four borings. Wells were not installed at Area 14, 1976 EA-6 Crash Site, and the Former Sewage Lagoons. Only soil and groundwater grab sampling was completed for the boreholes at these locations, to assess the locations for PFAS.
- Groundwater sampling of all newly installed monitoring wells for PFAS.
- Survey of synoptic water level of wells sampled during the Stage 1 and Stage 4 field effort.

3.2.3 Site Preparation and Utility Location

Prior to any ground disturbing activities, proposed drilling locations were demarcated, and an 811 call-before-you-dig ticket was submitted for public utility providers. Each drilling location was also scanned for utilities by Applied Professional Services (APS), a licensed third-party utility locating company. APS scanned a 30-foot radius around each location using a combination of ground-penetrating radar and radio frequency instruments. Third-party utility location activities were performed October 21-22, 2019 for Stage 2 and Stage 3, and July 13-14, 2020 for Stage 1 and Stage 4 (**Appendix A**). During the third-party utility location, the following locations were moved due to utilities identified within 5 feet of the proposed locations and/or for greater ease of access for drilling equipment:

Stage 2 and Stage 3

- WI-AF-MW-616 was moved 18 feet east of the proposed location from the SAP
- WI-AF-MW-618 was moved 20 feet east of the proposed location from the SAP
- WI-AF-MW-619 was moved 6 feet east of the proposed location from the SAP
- WI-AF-MW-620 was moved 23 feet east of the proposed location from the SAP
- WI-AF-MW-621 was moved 18 feet north of the proposed location from the SAP

Stage 1 and Stage 4

- WI-AF-WT11/WI-AF-WT12 was moved 7 feet south of the proposed location from the SAP
- WI-AF-BH09 was moved 5 feet north of the proposed location from the SAP
- WI-AF-BH10 was moved within 5 feet east of the proposed location from the SAP
- WI-AF-BH19 was moved within 5 feet east of the proposed location from the SAP
- WI-AF-BH20 was moved within 5 feet east of the proposed location from the SAP

3.2.4 Soil Borings

Sonic drilling operations for Stage 2 and Stage 3 were conducted from November 6-23, 2019, and from July 13-29, 2020 for Stage 4. A total of 40 soil borings (20 soil borings during Stage 2 and Stage 3, and 20 soil borings during

Stage 4) (**Figure 5** through **Figure 9**) were advanced by a Washington-licensed driller using sonic drilling techniques in accordance with applicable standard operating procedures (SOPs) included in the SAP (Navy, 2019c). Each drilling location was hand cleared to a depth of 5 feet bgs using non-invasive methods prior to drilling to ensure that no undetected buried utilities were present. No materials containing PFAS were used during drilling.

Continuous soil cores were collected for lithologic classification and screened for volatile organic compounds (VOCs) using a photoionization detector. Soil cores were closely examined for signs of saturation and the presence of fine-grained beds that could indicate the presence of perched groundwater or confining conditions. Lithology observed in the soil cores was classified according to the Unified Soil Classification System and logged in accordance with applicable SOPs included in the SAP. Soil boring logs are included in **Appendix B**. All boreholes were drilled according to the SAP, with the exception of Stage 2 monitoring well location WI-AF-MW-617. This drilling location was inaccessible due to recent heavy precipitation; therefore, the borehole was not drilled, and a well was not installed.

Soil Sampling

Soil samples were collected from the soil cores at the soil/water table interface in accordance with applicable SOPs in the SAP. Twenty-seven soil samples (24 primary samples and 3 field duplicate [FD] samples) were collected from the 20 soil borings advanced during Stage 2 and Stage 3. The four additional primary samples were collected from three Stage 2 borings: WI-AF-MW-620, to aid with vertical profiling of PFAS contamination, and locations WI-AF-MW-619 and WI-AF-MW-624, to assist with vertical delineation due to a potential seasonal perched groundwater layer encountered at 2 feet bgs at each location. Twenty primary samples were collected from the 20 soil borings advanced during Stage 4.

Soil samples were sent to Battelle Analytical Services in Norwell, Massachusetts to be analyzed for the 18 PFAS compounds listed in USEPA Method 537.1 via LC-MS/MS compliant with the QSM v. 5.1.1 Table B-15.

3.2.5 Grab Groundwater Sampling

Grab groundwater samples were collected at soil borings advanced during Stage 4 that were not completed as monitoring wells to gather groundwater quality data and to improve the understanding of PFAS migration in groundwater (**Figure 10** through **Figure 12**) (Navy, 2019c). The SAP called for two grab groundwater samples to be collected from each Stage 4 soil boring and the samples be sent for expedited analytical turnaround time; based on these results, monitoring wells were to be installed at the locations with PFAS detections (Navy, 2019c). In order to meet the PQOs of the 2019 SAP and perform the Stage 4 field work without a task order modification, 2020 FCR 1 (**Appendix H**) was submitted and approved by the Navy. The FCR reduced the number of borings with grab groundwater samples from 20 to 13 and eliminated the need for expedited analytical turnaround time, with the exception of the Area 29 and Area 30 boring samples. When drilling activities were initiated at Area 30, the targeted shallow groundwater zone was not encountered in the three borings at the site (WI-AF-BH06, WI-AF-BH07, and WI-AF-BH08) and only one grab groundwater sample from the total depth of each boring could be collected. The same groundwater condition observed at Area 30 was seen at two of the three Area 29 borings (WI-AF-BH03 and WI-AF-BH04), and the third boring (WI-AF-BH05) was dry to the total depth of 50 feet bgs and no sample could be collected (**Figure 12**). Due to these groundwater conditions, only two wells were installed between Area 29 and Area 30, both at Area 29, eliminating the need for expedited analytical turnaround time. In addition to the Area 29 and Area 30 borings, a shallow water bearing zone was also not encountered at Crash Site borings WI-AF-BH01 and WI-AF-BH02 (**Figure 12**), and Area 14 borings WI-AF-BH19 and WI-AF-BH20 (**Figure 11**), and only one sample from the total depth of each boring was collected. One grab groundwater sample was collected from the soil/water interface at Wastewater Treatment Plant location WI-AF-BH09 (**Figure 10**), but the boring was terminated after sample collection due to misinterpretation of the field project instructions, and a second grab groundwater sample was not collected. Two grab groundwater samples each were collected from Wastewater Treatment Plant boring WI-AF-BH10, and Former Sewage Lagoon borings WI-AF-BH12, WI-AF-BH13, and WI-AF-BH14. In total, 18 samples were collected from 12 borings (16 primary samples and 2 FD samples).

Soil boring purging and grab groundwater sample collection from each boring was accomplished using PFAS-free equipment: either a Geotech GeoSquirt purge pump, a disposable bailer, or a Hydropunch in-situ sampling tool, as described in the subsequent paragraph. An attempt to purge one borehole casing volume was made prior to grab groundwater sample collection at each soil boring. During purging, the depth to water was measured with a water level indicator, and water quality parameters (WQPs) were measured using a water quality meter, calibrated daily at a minimum. One set of WQPs, including pH, temperature, conductivity, and turbidity, was recorded immediately prior to collecting the sample. If excess drawdown was observed in the soil boring, all groundwater was evacuated from the boring and sampling was performed once the water level had recovered to a minimum of 90 percent of the initial water level. Groundwater sampling data sheets are provided in **Appendix D**.

Groundwater sampling with the Geotech GeoSquirt purge pump or disposable bailer was conducted by placing the sampling equipment directly into the open soil boring to first purge and then obtain the groundwater sample. The disposable bailer was used when a minimal amount of groundwater was present in the soil boring and the Geotech GeoSquirt purge pump could not draw water to the surface for sample collection; the Hydropunch was used as an alternative to the GeoSquirt. The sampling procedure for using the Hydropunch required using sonic drilling techniques to advance the boring to the desired sampling depth. Once the soil boring was advanced to depth, the Hydropunch was connected to a small-diameter drive pipe and driven to a discrete interval into the undisturbed formation by the sonic drilling rig. Once in the formation, the screen was exposed inside the Hydropunch by pulling the drive pipe up approximately 2 feet, allowing groundwater to fill the sample chamber (Edge, et al., 1989). When the Hydropunch was extracted to the surface, the groundwater trapped in the sample chamber was then transferred to a groundwater sample container.

3.2.6 Monitoring Well Construction

Monitoring well construction was done following advancement of each associated soil boring (except where noted). Seven borings were completed as monitoring wells during Stage 2, six borings were completed as dual set completion monitoring wells during Stage 3, and seven borings were completed as monitoring wells during Stage 4. As stated in Section 3.2.5, only grab groundwater sampling, with no monitoring well installation, was conducted during Stage 4 at Area 14, 1976 EA-6 Crash Site, and the Former Sewage Lagoons in accordance with 2020 FCR 1. All monitoring wells were constructed with a Schedule 40 polyvinyl chloride (PVC) riser connected to a 5- or 10-foot, factory slotted 0.020-inch PVC screen with a bottom cap. A sand filter pack (12/20 washed silica) was placed around the annular space of the screen from the bottom of the boring extending to a minimum height of 2 feet above the top of the screen. A bentonite seal, at least 2 feet thick, was placed above the top of the sand pack. After the bentonite had been hydrated, a cement-bentonite grout was placed in the remaining annular space. All construction materials were free of fluorine; no fluorine containing greases, bentonite, or other materials were used. Monitoring wells were finished with flush-mount completions that included a metal vault and concrete pad. A locking watertight cap was placed on the top of the PVC casing. The monitoring wells were labeled on the exterior of the vault with a metal stamp indicating the identification. Monitoring well construction information is provided in **Table 1**, and completion diagrams are provided in **Appendix B**. Each newly constructed monitoring well was allowed to sit for at least 24 hours before being developed.

Location WI-AF-MW-616 was not constructed as a monitoring well because no productive interval was identified during drilling. The boring was backfilled with bentonite chips from 0.5 to 30 feet bgs, and the top 0.5 feet was backfilled with native soil and grass.

3.2.7 Monitoring Well Development

After construction, each newly installed monitoring well was developed using a combination of bailing, surging, and pumping throughout the screen in accordance with the applicable SOP included in the SAP and the 2019 FCR 2 for Stages 2 and 3 wells. Wells greater than 40 feet bgs were developed by the drilling subcontractor, and wells less than 40 feet bgs were developed by CH2M field staff. Development activities occurred November 24 to December 10, 2019 for Stages 2 and 3, and August 10 to August 13 and August 18, 2020 for Stage 4. During development, the CH2M field staff measured field WQPs, including potential of Hydrogen (pH), temperature,

conductivity, and turbidity with a water quality meter. Development continued until either turbidity readings were below 10 nephelometric turbidity units (NTU) (or 20 NTU in accordance with 2019 FCR 2) and water was free of visible sediment, measurements for three consecutive WQP readings stabilized, a minimum of 10 well casing volumes had been purged, or until four hours of total development time (including the surge and bail period) had been reached, whichever occurred first. All wells were developed as described above with the exception of the following Stage 4 wells:

- WI-AF-MW-627 did not achieve stabilization within the four-hour development time limit and development was terminated. The total purge volume required for development was removed from the well; the final turbidity reading was 47.5 NTU, and the other parameters were generally within range.
- WI-AF-MW-628 was purged dry when development started, and recharge was very slow. After continually purging dry, development was terminated. Water quality measurements were collected when able to, but they did not stabilize. The final turbidity reading was out of range.
- WI-AF-MW-631 purged dry three times before development was terminated. Groundwater quality measurements were collected, but they did not stabilize before termination. The final turbidity reading was out of range.
- WI-AF-MW-630 had a minor obstruction in the casing which prevented lowering a pump into the screen. The well was surged and manually bailed, 42 gallons of water were bailed before development was terminated due to reaching the 4-hour development time limit. Turbidity was approximately 400 NTU at the time of termination.

Wells that ran dry during development due to low recharge rates were allowed to recharge to ensure the full screen interval was surged and bailed and then purged to the extent practicable (up to three total purges). Surge blocks and pumps with Teflon parts were not used during development. Development logs are provided in **Appendix C**.

3.2.8 Groundwater Sampling

Groundwater sampling activities occurred December 7-12, 2019 for Stage 2 and Stage 3, and August 13-19, 2020 for Stage 1 and Stage 4 (**Figures 10 through 14**). During Stage 2, 13 samples (12 primary samples and 1 FD sample) were collected from 7 newly installed monitoring wells (WI-AF-MW-618 to WI-AF-MW-624) and 5 existing monitoring wells (MW4-B3, MW10-B8, MW15-B23, 16-26B, and H6-B3) (**Figure 14**). Stage 3 groundwater sampling consisted of collecting 14 samples (12 primary samples and 2 FD samples) from 12 newly installed monitoring wells (**Figures 13 and 14**; WI-AF-WT01 to WI-AF-WT12). Stage 1 and Stage 4 groundwater sampling consisted of sampling 5 existing monitoring wells (MW-14, MW-20, MW-21 [**Figure 10**], 14-MW-2 [**Figure 11**], and Ault Field Well 1 [**Figure 12**]) and 7 newly installed monitoring wells (WI-AF-MW-625 to WI-AF-MW-631) (**Figure 10 through Figure 12**). The newly installed monitoring wells were sampled approximately 24 hours after completion of development.

Groundwater samples were collected under low flow/low stress conditions using a PFAS-free submersible pump or peristaltic pump with the pump intake placed at the middle of the screen interval. Purging was conducted at a rate such that drawdown in the well was less than 0.3 foot. During purging, depth to water readings and WQPs were measured and recorded at regular time intervals of at least 3 minutes. Depth to water was measured with a water level indicator, and WQPs were measured using a water quality meter, calibrated daily at a minimum. Purging continued until WQPs stabilized for three consecutive readings according to the following stabilization criteria:

- Temperature within 0.1 degree Celsius
- pH within 0.1 pH units
- Conductivity within 0.01 millisiemens per centimeter
- Oxidation-reduction potential within 10 millivolts

- Dissolved oxygen within 0.05 milligram per liter
- Turbidity measurements are within 10 percent or less than 10 NTU

If excess drawdown was observed with the minimum achievable purge rate, the purge rate was increased to evacuate all the water. Sampling was performed once the water level had recovered to a minimum of 90 percent of the static water level within a 24-hour period. One set of WQPs was recorded immediately prior to collecting the sample. Groundwater sampling data sheets are provided in **Appendix D**.

In most cases, sampling was conducted at least 24 hours after development. Access to Stage 3 monitoring wells WI-AF-WT01 and WI-AF-WT02 required temporary shutdown of a runway; therefore, to minimize the number of times the area was accessed, these wells were sampled immediately following development.

3.2.9 Groundwater Elevation Survey

A groundwater elevation study of existing and newly installed wells was conducted on December 15, 2019 for Stages 2 and 3 and September 9, 2020 for Stage 1 and Stage 4. Depth to water was measured with a water level indicator from the top of the survey point on the PVC riser casing and recorded to the nearest 0.01 foot, following applicable SOPs in the SAP. The elevation surveys were conducted at least 24 hours after well installation and development had been completed for newly installed wells for each respective phase (**Appendix E**). Groundwater contour maps were constructed using these data and are provided as **Figure 15** through **Figure 19**. These data will be discussed in the Updated Conceptual Site Model section later in this report.

3.2.10 Surveying

All existing monitoring wells that were sampled and new monitoring wells that were installed during the Phase 2 field events were horizontally and vertically surveyed by a Washington-licensed surveyor, in December 2019 for Stages 2 and 3, and in September 2020 for Stages 1 and 4. The surveyor provided easting and northing horizontal coordinates according to Washington State Plane North Zone based on the North American Datum of 1983. Horizontal coordinates were provided to the nearest 0.01 foot. The surveyor provided vertical elevations in feet above mean sea level based on the North American Vertical Datum of 1988. Vertical coordinates were provided to the nearest 0.001 foot. The survey reports are provided in **Appendix F**.

3.3 Sample Analysis and Quality Control

Groundwater and soil samples for all stages of the Phase 2 SI field effort were collected according to the applicable SOPs referenced in the SAP. Groundwater and soil samples were sent to Battelle Analytical Services in Norwell, Massachusetts to be analyzed for the 18 PFAS compounds listed in USEPA Method 537.1. Samples were analyzed using LC-MS/MS compliant with the QSM v. 5.1.1 Table B-15.

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

- **Equipment Rinsate Blank (decontaminated equipment):** Equipment blanks were collected at the frequency of one per day of sampling. These samples were obtained by running certified PFAS-free laboratory-grade deionized (DI) water over or through decontaminated sample collection equipment.
- **Equipment Rinsate Blank (disposable equipment):** Equipment blanks were collected at the frequency of one per lot. These samples were obtained by running certified PFAS-free laboratory-grade DI water over or through unused sample collection equipment.
- **Field Blank:** Field blanks were collected at the frequency of one per week. These samples were collected by pouring the certified PFAS-free laboratory-provided blank water into the blank container.

- **Duplicate Sample:** FD samples were collected at the same time and under identical conditions as their respective associated sample at the frequency of one per 10 field samples of similar matrix.

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

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

3.4 Decontamination Procedures

Decontamination activities for all stages of the Phase 2 SI field effort were conducted in accordance with the applicable SOPs included in the SAP. Non-disposable equipment was decontaminated using the following solutions in this order:

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

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

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

3.5 Investigation-derived Waste Management

3.5.1 Stage 2 and Stage 3

Investigation-derived waste (IDW) management activities were conducted in accordance with the Final Waste Management Plan and Environmental Protection Plan (Navy, 2019d). IDW generated during Stages 2 and 3 included soil cuttings, disposable PPE, well development groundwater, groundwater sampling purge water, disposable sampling equipment, and decontamination rinse water from non-disposable sampling equipment and heavy equipment. Specific wastes were handled as follows:

- Solid IDW, including soil cuttings and spent PPE, was placed in a 25-cubic yard roll-off container.
- Aqueous IDW was placed in 275-gallon polyethylene totes.

All IDW containers were properly labeled (project name, accumulation start date, contents, source location of contents, and point of contact information) and staged with secondary containment in the designated IDW area off of Aries Rd east of the flight line gate. IDW containers were inspected weekly during the Stage 2 and Stage 3 field event and monthly thereafter until their removal.

Prior to disposal, CH2M field staff collected waste characterization samples from the totes and the roll-off container. Solid and aqueous IDW samples were analyzed for PFAS, VOCs, semivolatile organic compounds (SVOCs), total metals, reactivity, corrosivity, and ignitability. The waste characterization profiles are provided in **Appendix I**. Waste characterization analytical results indicated that Stage 2 and Stage 3 IDW was nonhazardous. PFAS soil results from sample WI-AF-IDW-SO02-1219 had low detections of PFOS and PFOA; PFAS aqueous results

were less than the USEPA Lifetime Health Advisory of 70 ng/L for the combined sum of PFOA and PFOS with the exception of the following samples:

- WI-AF-IDW-AQ01-1219:
 - PFOS – 118 ng/L
 - PFOA – 65.7 ng/L
- WI-AF-IDW-AQ02-1219
 - PFOS – 76 ng/L
- WI-AF-IDW-AQ03-1219
 - PFOA – 349 D ng/L
 - PFOS – 276 D ng/L
- WI-AF-IDW-AQ06-1219
 - PFOS – 130 ng/L
 - PFOA – 113 ng/L
- WI-AF-IDW-AQ10-1219
 - PFOS – 365 D ng/L
 - PFOA – 67.3 D ng/L

All IDW was transported offsite and disposed of as nonhazardous PFAS containing waste, by Clean Harbors on April 22, 2020.

3.5.2 Stage 1 and Stage 4

IDW generated during Stages 1 and 4 included soil cuttings, disposable PPE, well development groundwater, groundwater sampling purge water, disposable sampling equipment, and decontamination rinse water from non-disposable sampling equipment and heavy equipment. Specific wastes were handled as follows:

- Solid IDW, including soil cuttings and spent PPE, were placed in 55-gallon drums.
- Aqueous IDW was placed in 275-gallon polyethylene totes.

All IDW containers were properly labeled (project name, accumulation start date, contents, source location of contents, and point of contact location) and staged with secondary containment in the designated IDW area off of Clover Valley Road. IDW containers were inspected weekly during the Stage 1 and Stage 4 field events and are currently inspected monthly until they are removed.

Prior to disposal, CH2M field staff collected waste characterization samples from the 55-gallon drums and 275-gallon polyethylene totes. Solid and aqueous IDW samples were analyzed for PFAS, VOCs, SVOCs, total metals, reactivity, corrosivity, and ignitability.. Waste characterization analytical results indicated that Stage 1 and Stage 4 solid IDW was nonhazardous, and PFAS aqueous results were less than the USEPA Lifetime Health Advisory of 70 ng/L for the combined sum of PFOA and PFOS in one of two samples, and in exceedance of 70 ng/L in the second sample. IDW disposal and container removal is currently in being coordinated.

3.6 Deviations from the Sampling and Analysis Plan

The lists in the following sub-sections summarize the deviations from the SAP (Navy, 2019c) during the investigation activities, and justification for those deviations. All deviations were approved by the Navy via direct communication or via 2019 FCRs 1 and 2 for Stages 2 and 3 and 2020 FCR 1 for Stage 4. A copy of the approved FCRs are included in **Appendix H**. Data quality and usability were not affected by these deviations:

Stage 2 and Stage 3

- Group 2 (Figure 13):

- The location of monitoring wells WI-AF-WT05 and WI-AF-WT06 were removed from the Phase 2 SI scope due to an archaeological find near the proposed location of the monitoring well pair. The standard buffer for an archaeological site is 30 meters (approximately 100 feet). To meet the investigation goals, this monitoring well location could only be moved within 25 feet of the proposed location, and a management decision was made to exclude the monitoring well pair from the scope. The PQOs for the SI were still achieved with this exclusion. Other wells installed in the area provide information regarding the presence or absence of PFAS in the Area 16 Drainage Ditch System. To maintain a consistent naming convention, proposed monitoring wells WI-AF-WT13 and WI-AF-WT14 were renamed WI-AF-WT05 and WI-AF-WT06, respectively. Figure 11-7 in the SAP displays the proposed monitoring well locations (identified as PZ-05 and PZ-06 on SAP Figure 11-7) before exclusion (Navy, 2019c).
- Monitoring wells WI-AF-WT01 and WI-AF-WT02 were sampled immediately after development rather than waiting 24 hours as required by the SAP. This was done in accordance with 2019 FCR 2 for logistical reasons as access to the well location required temporary shutdown of a runway. The combined well development and groundwater sampling forms for these locations are included in Appendix D.

- Group 3 (Figure 14):

- Due to the lack of a productive interval encountered during drilling of the taxiway borehole WI-AF-MW-616, a monitoring well was not constructed at that location and the borehole was abandoned.
- Taxiway monitoring well WI-AF-MW-617 was not drilled or installed due to inaccessibility of the drilling location as a result of recent heavy precipitation.

Stage 1 and Stage 4

- Group 1 (Figure 10):

- Prior to the start of drilling, 2020 FCR 1 directed that only one well would be installed at the Wastewater Treatment Plant, and the other two locations would be sampled for grab groundwater samples only. The well was to be placed closest to the recent foam-over event that occurred after the PA was conducted (**Appendix H**).
- One grab groundwater sample was collected from soil boring WI-AF-BH09 at 9.5 feet bgs, and due to misinterpretation of the field project instructions, the boring was terminated without advancing it further to the intended total depth of 40 feet bgs and collecting an additional grab groundwater sample (**Appendix D**).
- Groundwater was encountered before 40 feet bgs in soil boring WI-AF-BH11 and the boring was completed as monitoring well WI-AF-MW-630. The screen was set from 9 to 13 feet bgs (**Appendix B**).
- To complete the field event within the daily work window, newly installed monitoring well, WI-AF-MW-630 was sampled four minutes before completing a 24-hour cycle after well development, on the last day of sampling activities (**Appendix D**).

- Group 4 (Figure 11):

- Groundwater was not encountered at 40 feet bgs in Area 14 soil boring WI-AF-BH19 as was anticipated, and the boring was advanced to a total depth of 50 feet bgs (**Appendix B**).
- The anticipated depth to water at Area 27 was 40 feet bgs; however, each soil boring location (WI-AF-BH15, WI-AF-BH16, and WI-AF-BH17) was advanced to a total depth of 60 feet bgs before reaching groundwater and completing each boring as a monitoring well (**Appendix B**).

- Group 5 (Figure 12):

- Groundwater was not encountered in Area 29 soil boring WI-AF-BH03 by 40 feet bgs as was anticipated. The boring was advanced further until groundwater was encountered, and monitoring well WI-AF-MW-629 was installed. The screen was set from 60 to 70 feet bgs. (**Appendix B**).
- Due to the conditions encountered while advancing soil boring WI-AF-BH03, grab groundwater sample collection was omitted at soil boring WI-AF-BH04, the borehole was advanced to groundwater and monitoring well WI-AF-MW-628 was installed. The screen was set from 55 to 65 feet bgs. (**Appendix B**).
- Groundwater was not encountered at 40 feet bgs as was anticipated at the location of soil boring WI-AF-BH05, and it was advanced to 50 feet bgs and allowed to sit for recharge. Groundwater did not infiltrate the boring during the approximately 48 hours it was allowed to sit undisturbed, so the soil boring was abandoned by backfilling with bentonite chips. (**Appendix D**).
- The FCR (2020 FCR 1) approved prior to the start of drilling (**Appendix H**) reduced the number of wells between Area 30 and nearby Area 29 to three wells total, to be spread across and shared between the two PSAs. During the investigation, field conditions where the target shallow groundwater zone was not encountered, reduced the number of monitoring wells installed to two, both installed at Area 29.
- Soil borings WI-AF-BH06, WI-AF-BH07, and WI-AF-BH08 (Area 30) did not have a shallow water bearing zone, and only one grab groundwater sample from the total depth of each boring could be collected (**Appendix D**).
- Soil boring WI-AF-BH08 was advanced to a total depth of 50 feet bgs for grab groundwater sample collection when groundwater was not encountered at the anticipated depth of 40 feet bgs (**Appendix D**).

3.7 Data Quality Evaluation

The data quality evaluation and data validation were performed on the soil and groundwater samples collected during the Phase 2 SI at Ault Field, using a multitiered approach. The process begins with an internal laboratory review, continues with an independent review by a third-party validator, and ends with an overall review by the CH2M project chemistry team. The data validation included a review for systematic errors or patterns that are found in the distribution of data qualifiers. The data validation reports are included in **Appendix J**.

Select PFAS were analyzed by DoD method PFASk_QSM5.1, an analytical method that is compliant with DoD QSM v 5.1.1 Table B-15, as specified in the SAP (Navy, 2019c). The data packages were then reviewed by an independent data validator on the basis of the criteria outlined by the DoD Consolidated QSM for Environmental Laboratories (DoD, 2019). Excluding field QC samples, 88 distinct data points were generated, and select results were qualified with J, J-, or J+ qualifiers (because of the low or high sample concentrations) or U (non-detect) or UJ-qualified (because of blank contamination).

All results are usable as qualified. The overall conclusion is that the dataset generated is acceptable and appropriate for its intended use.

Phase 2 Site Inspection Results

This section presents the results of the investigation described in **Section 3**. Group 1, Group 4, and Group 5 are associated with Stage 1 and Stage 4 of the Phase 2 SI field investigation, and Group 2 and Group 3 are associated with Stage 2 and Stage 3.

To meet the objectives of the Phase 2 SI, the PFAS analytical data were screened against the PALs as prescribed by the SAP. The PALs for this investigation are summarized in the following table:

Project Action Levels¹

Analyte	Media (units)	Project Action Levels ²
PFOS	Soil (µg/kg)	130
	Groundwater (ng/L)	40
PFOA	Soil (µg/kg)	130
	Groundwater (ng/L)	40
PFBS	Soil (µg/kg)	1,900
	Groundwater (ng/L)	600

Notes:

- ¹ While SSLs were included in the SAP to ensure data quality for assessment of leaching and screening against these values was completed to inform decision-making during future investigations, these values are not considered PALs for this project. Additionally, while the Lifetime Health Advisory was included in the SAP, it is not to be used for making CERCLA-related decisions, but may be used to determine and expand drinking water sampling areas and to determine whether drinking water receptors require response actions.
- ² PALs for PFOA and PFOS are based on a HQ of 0.1 and were generated using the USEPA online calculator as described in the Assistant Secretary of Defense October 15, 2019 memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program" (DoD, 2019). PALs for PFBS were generated similarly, but values were updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (PFBS) and Related Compound Potassium Perfluorobutane Sulfonate" (USEPA, 2021). The original value of 602 ng/L derived from the online calculator for PFBS was rounded to 600 ng/L, consistent with two significant figures included in the USEPA's RSL table.

Screening criteria do not exist for the remaining 15 PFAS compounds for soil or groundwater; therefore, PALs were not developed for these compounds. Data for compounds other than PFBS, PFOA, and PFOS are presented in **Appendix K**. These data may be further evaluated in the future if criteria are established.

4.1 Soil

This section presents the analytical results for PFAS in soil samples collected for the Phase 2 SI at Ault Field. Table 4 presents a summary of PFAS in soil samples collected from Group 1, Group 4, and Group 5 borings, and Table 5 presents a summary of PFAS in soil samples collected from Group 2 and Group 3 borings. Comprehensive laboratory results and data validation summaries are presented in **Appendix J**, the raw data are presented in **Appendix K**.

4.1.1 Group 1

The following is a summary of the soil sampling results for borings in Group 1 (Wastewater Treatment Plant, Former Sewage Lagoons, and the Former Wastewater Treatment Plant (Building 420)):

- **PFBS** – PFBS was not detected in any samples.
- **PFOS** – PFOS was only detected in the sample from WI-AF-BH12 (13.2 µg/kg), but below the PAL of 130 µg/kg. WI-AF-BH12 is located at the Former Sewage Lagoons.
- **PFOA** – PFOA was not detected in any sample.

Figure 5 shows the analysis results for PFBS, PFOS, and PFOA in soil samples from Group 1 borings.

4.1.2 Group 2

The following is a summary of the soil sampling results for borings in Group 2 (Hardstand Area, 1990 A-6 Crash Site, 1981 P-3A Crash Site, 2006 F-18 Crash Site, the Runway Drainage Ditch System (Area 16), including Stormwater Outfall 2):

- **PFBS** – PFBS was not detected in any sample.
- **PFOS** – PFOS was not detected in any sample.
- **PFOA** – PFOA was not detected in any sample.

Figure 6 shows the analysis results for PFBS, PFOS, and PFOA in soil samples from Group 2 borings.

4.1.3 Group 3

The following is a summary of the soil sampling results for borings in Group 3 (Former Avionics Facility (Building 2547), Former/Current Fire Station (Building 2897), Hangar 1 (Building 112), Hangar 5 (Building 386), Hangar 6 (Building 410), Hangar 7 (Building 2544), Hangar 8 (Building 2642), Hangar 9 (Building 2681), Hangar 10 (Building 2699), Hangar 11 (Building 2733), Hangar 12 (Building 2737), Hangar 14 (newly constructed), Indoor Wash Rack (Building 2903), P3 Wash Rack, and Stormwater Outfall 1 of the Runway Drainage Ditch System (Area 16)):

- **PFBS** – PFBS was not detected in any sample.
- **PFOS** – PFOS was detected in the soil samples from three locations: WI-AF-MW-621 (1.05 J µg/kg), the shallow sample from WI-AF-MW-624 (1.41 J µg/kg), and at WI-AF-WT09 (6.3 µg/kg). WI-AF-MW-621 is located east of Hangar 8 and the Indoor Wash Rack, WI-AF-MW-624 is located east of Hangar 9, and WI-AF-WT09 is part of a co-located well pair at Stormwater Outfall 1. All of the PFOS detections were below the PAL of 130 µg/kg.
- **PFOA** – PFOA was not detected in any sample.

Figure 7 shows the analysis results for PFBS, PFOS, and PFOA in soil samples from Group 3 borings.

4.1.4 Group 4

The following is a summary of the soil sampling results for borings in Group 4 (Former 1966 Fire School (Area 27) and Pesticide Rinsate Disposal Area (Area 14)):

- **PFBS** – PFBS was not detected in any sample.
- **PFOS** – PFOS was not detected in any sample.
- **PFOA** – PFOA was not detected in any sample.

Figure 8 shows the analysis results for PFBS, PFOS, and PFOA in soil samples from Group 4 borings.

4.1.5 Group 5

The following is a summary of the soil sampling results for borings in Group 5 (1976 EA-6 Crash Site, Former Clover Valley Fire School (Area 29), Fire School Can Disposal Area (Area 30), Gallery Golf Course):

- **PFBS** – PFBS was not detected in any sample.
- **PFOS** – PFOS was not detected in any sample.
- **PFOA** – PFOA was not detected in any sample.

Figure 9 shows the analysis results for PFBS, PFOS, and PFOA in soil samples from Group 5 borings.

4.2 Groundwater Grab Sampling

This section presents the results for PFAS in grab groundwater samples collected during Stage 4 of the Phase 2 SI borehole drilling activities at Ault Field. The borings selected for grab groundwater collection were located in Group 1, Group 4, and Group 5. **Table 7** presents a summary of PFAS in grab groundwater samples, and

comprehensive laboratory results and data validation summaries are presented in **Appendix J**; the raw data are presented in **Appendix K**.

4.2.1 Group 1

The following is a summary of the grab groundwater sampling results for the five borings that were sampled in Group 1:

- **PFBS** – PFBS was detected in the samples from all five borings, ranging from an estimated 2.99 J- ng/L in the shallow sample collected from WI-AF-BH09 (Wastewater Treatment Plant), to an estimated 216 J- ng/L from the shallow sample collected from WI-AF-BH13 (Former Sewage Lagoons). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in the samples from four of the five borings ranging from an estimated 10.7 J- ng/L in the shallow sample collected from WI-AF-BH13 (Former Sewage Lagoons), to an estimated 225 J- ng/L in the shallow sample collected from WI-AF-BH10 (Wastewater Treatment Plant). The following borings had samples with concentrations of PFOS exceeding the PAL of 40 ng/L for PFOS in groundwater:
 - 225 J- ng/L at WI-AF-BH10 (estimated) – Wastewater Treatment Plant
 - 89.7 J- ng/L at WI-AF-BH12 (estimated) – Former Sewage Lagoons
- **PFOA** – PFOA was detected in the samples from four of the five borings ranging from an estimated 0.82 J- ng/L in the deeper sample collected from WI-AF-BH13, to an estimated 119 J- ng/L in the shallow sample collected from WI-AF-BH13. The following borings had samples with concentrations of PFOA exceeding the PAL of 40 ng/L for PFOA in groundwater:
 - 70.2 J- ng/L at WI-AF-BH10 (estimated) – Wastewater Treatment Plant
 - 97.1 J- ng/L at WI-AF-BH12 (estimated) – Former Sewage Lagoons
 - 119 J- ng/L at WI-AF-BH13 (estimated) – Former Sewage Lagoons

Figure 10 shows the concentrations of PFOS, PFOA, and PFBS in the grab groundwater samples collected from Group 1 borings.

4.2.2 Group 4

The following is a summary of the grab groundwater sampling results for the two borings at Area 14, where grab groundwater samples were collected in Group 4:

- **PFBS** – PFBS was detected in the samples from both locations, at an estimated 0.46 J- ng/L in the sample collected from WI-AF-BH19, to an estimated 1.4 J- ng/L in the sample collected from WI-AF-BH20. No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in the samples from both borings, at an estimated 0.82 J- ng/L in the sample from WI-AF-BH19, to an estimated 5.21 J- ng/L in the sample collected from WI-AF-BH20. No PFOS detection exceeded the PAL of 40 ng/L for PFOS in groundwater.
- **PFOA** – PFOA was detected in the samples from both borings, at an estimated 1.81 J- ng/L in the sample collected from WI-AF-BH19, to an estimated 3.13 J- ng/L in the sample collected from WI-AF-BH20. No PFOA detection exceeded the PAL of 40 ng/L for PFOA in groundwater.

Figure 11 shows the concentrations of PFOS, PFOA, and PFBS in the grab groundwater samples collected from Group 4 borings.

4.2.3 Group 5

The following is a summary of the grab groundwater sampling results for the five borings that were sampled in Group 5:

- **PFBS** – PFBS was not detected in any sample.

- **PFOS** – PFOS was detected in the samples from two of the five borings, at an estimated 0.77 J ng/L in the sample collected from WI-AF-BH06 (Area 30), to an estimated 5.18 J- ng/L in the sample collected from WI-AF-BH01 (1976 EA-6 Crash Site). No PFOS detection exceeded the PAL of 40 ng/L for PFOS in groundwater.
- **PFOA** – PFOA was detected in the samples from two of the five locations, at an estimated 0.57 J ng/L in the sample collected from WI-AF-BH06 (Area 30), to an estimated 1.29 J- ng/L in the sample collected from WI-AF-BH01 (1976 EA-6 Crash Site). No PFOA detection exceeded the PAL of 40 ng/L for PFOA in groundwater.

Figure 12 shows the concentrations of PFOS, PFOA, and PFBS in the grab groundwater samples collected from Group 5 borings.

4.3 Groundwater Sampling

This section presents the results for PFAS in groundwater samples collected from monitoring wells during the Phase 2 SI at Ault Field. **Table 6** presents a summary of PFAS in groundwater samples collected from Group 1, Group 4, and Group 5 wells; **Table 5** presents a summary of PFAS in groundwater samples collected from Group 2 and Group 3 wells. Comprehensive laboratory results and data validation summaries are presented in **Appendix J**, raw data are presented in **Appendix K**.

4.3.1 Group 1

The following is a summary of the groundwater sampling results for the five monitoring wells that were sampled in Group 1:

- **PFBS** – PFBS was detected in the samples from all five wells, ranging from an estimated 1.69 J ng/L in the sample collected from WI-AF-MW-631 (Building 420), to 12.3 ng/L in the sample collected from existing well MW-21 (Building 420). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in the samples from four of the five wells, ranging from an estimated 40.9 J ng/L in the sample from existing well MW-14 (Building 420), to 553 ng/L in the sample from WI-AF-MW-630 (Wastewater Treatment Plant). The following wells had samples with concentrations of PFOS exceeding the PAL of 40 ng/L for PFOS in groundwater:
 - 40.9 J ng/L (estimated) at existing well MW-14 – Building 420
 - 125 ng/L at existing well MW-20 – Building 420
 - 118 ng/L at existing well MW-21 – Building 420
 - 553 ng/L at WI-AF-MW-630 – Wastewater Treatment Plant
- **PFOA** – PFOA was detected in the samples from all five wells, ranging from an estimated 1.61 J ng/L in the sample from WI-AF-MW-631 (Building 420), to 39 ng/L in the sample from existing well MW-21 (Building 420). No PFOA detection exceeded the PAL of 40 ng/L for PFOA in groundwater.

Figure 10 shows the concentrations of PFBS, PFOS, and PFOA in groundwater samples from monitoring wells in Group 1.

4.3.2 Group 2

The following is a summary of the groundwater sampling results for the eight monitoring wells that were sampled in Group 2:

- **PFBS** – PFBS was detected in the samples from four of the eight wells, ranging from an estimated 2.06 J+ ng/L in the sample collected from WI-AF-WT03 (Runway Drainage Ditch Outfall), to 8.94 ng/L in the sample collected from WI-AF-WT02 (Runway Drainage Ditch System/Hardstand Area). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in the samples from five of the eight wells, ranging from an estimated 0.8 J ng/L in the sample from WI-AF-WT06 (Stormwater Outfall 2), to 564 ng/L in the sample from WI-AF-WT02 (Runway

Drainage Ditch System/Hardstand Area). The following wells had samples with concentrations of PFOS exceeding the PAL of 40 ng/L for PFOS in groundwater:

- 164 ng/L at WI-AF-WT01 - Runway Drainage Ditch System/Hardstand Area
- 564 ng/L at WI-AF-WT02 - Runway Drainage Ditch System/Hardstand Area
- 65.3 ng/L at WI-AF-WT05 - Runway Drainage Ditch System/Stormwater Outfall 2
- **PFOA** – PFOA was detected in the samples from four of the five wells ranging from an estimated 0.7 J- ng/L in the sample collected from WI-AF-WT04 (Runway Drainage Ditch Outfall), to 238 ng/L in the sample collected from WI-AF-WT01 (Runway Drainage Ditch System/Hardstand Area). The following wells had samples with concentrations of PFOA exceeding the PAL of 40 ng/L for PFOA in groundwater:
 - 238 ng/L at WI-AF-WT01- Runway Drainage Ditch System/Hardstand Area
 - 45.5 ng/L at WI-AF-WT02- Runway Drainage Ditch System/Hardstand Area

Figure 13 shows the concentrations of PFBS, PFOS, and PFOA in groundwater samples from the monitoring wells in Group 2.

4.3.3 Group 3

The following is a summary of the groundwater sampling results for the 16 monitoring wells that were sampled in Group 3:

- **PFBS** – PFBS was detected in the samples from 14 of the 16 wells, ranging from an estimated 0.26 J ng/L in the sample collected from existing well 16-26B (east of Hangar 10), to 256 ng/L in the sample collected from WI-AF-MW620 (east of Hangar 10). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in the samples from 14 of the 16 wells, ranging from an estimated 1.25 J ng/L in the sample from WI-AF-MW-618 (east of Hangar 5), to 842 ng/L in the sample from WI-AF-MW-621 (east of Hangar 8 and Indoor Wash Rack). The following wells had samples with concentrations of PFOS exceeding the PAL of 40 ng/L for PFOS in groundwater:
 - 46.5 J- ng/L at H6-B3 (estimated) – south of Hangar 6
 - 128 ng/L at WI-AF-MW-624 – east of Hangar 7
 - 456 J- ng/L at WI-AF-WT09 – Stormwater Outfall 1
 - 677 ng/L at WI-AF-MW-620 – east of Hangar 10
 - 842 ng/L at WI-AF-MW-621 - east of Hangar 8 and Indoor Wash Rack
- **PFOA** – PFOA was detected in the samples from 14 of the 16 wells ranging from an estimated 3.38 J- ng/L in the sample collected from WI-AF-MW-622 (east of Hangar 6), to an estimated 407 J- ng/L in the sample collected from WI-AF-WT09 (Stormwater Outfall 1). The following wells had samples with concentrations of PFOA exceeding the PAL of 40 ng/L for PFOS in groundwater:
 - 92.7 ng/L at WI-AF-MW-624 – east of Hangar 7 and Hangar 9
 - 407 J- ng/L at WI-AF-WT09 - Stormwater Outfall 1
 - 42.8 J- ng/L at WI-AF-WT11 – Runway Drainage Ditch System
 - 48.6 ng/L at WI-AF-MW-618 – east of Hangar 5
 - 60.7 J- ng/L at WI-AF-MW-620 – east of Hangar 10
 - 56.5 ng/L at WI-AF-MW-621 - east of Hangar 8 and Indoor Wash Rack

Figure 14 shows the concentrations of PFBS, PFOS, and PFOA in groundwater samples from the monitoring wells in Group 3.

4.3.4 Group 4

The following is a summary of the groundwater sampling results for the four monitoring wells that were sampled in Group 4:

- **PFBS** – PFBS was detected in the samples from all four wells, ranging from an estimated 0.99 J ng/L in the sample collected from WI-AF-MW-627 (Area 27), to 5.02 ng/L in the sample collected from existing well 14-MW-2 (Area 14). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was not detected in any sample.
- **PFOA** – PFOA was detected in the samples from all four wells, ranging from an estimated 1.87 J ng/L in the sample collected from WI-AF-MW-627 (Area 27), to 12.7 ng/L in the sample collected from existing well 14-MW-2 (Area 14). No PFOA detection exceeded the PAL of 40 ng/L for PFOA in groundwater.

Figure 11 shows the concentrations of PFBS, PFOS, and PFOA in groundwater samples from the monitoring wells in Group 4.

4.3.5 Group 5

The following is a summary of the groundwater sampling results for the three monitoring wells that were sampled in Group 5:

- **PFBS** – PFBS was detected in the samples from two of the three wells, at an estimated 0.28 J ng/L in the sample collected from WI-AF-MW-628 (Area 29), to an estimated 0.65 J ng/L in the sample collected from WI-AF-MW-629 (Area 29). No PFBS detection exceeded the PAL of 600 ng/L for PFBS in groundwater.
- **PFOS** – PFOS was detected in a sample from one of the three wells, at an estimated 2.77 J ng/L in the sample from WI-AF-MW-628 (Area 29). The PFOS detection did not exceed the PAL of 40 ng/L for PFOS in groundwater.
- **PFOA** – PFOA was not detected in any sample.

Figure 12 shows the concentrations of PFBS, PFOS, and PFOA in groundwater samples from the monitoring wells in Group 5.

Updated Site Conceptual Model

Drilling conducted during this Phase 2 SI provided additional information on lithology and groundwater conditions in the areas of Ault Field where the monitoring wells and soil borings were located (**Figure 3** and **Figure 4**). These data were used to refine the conceptual site model in the areas where investigative work was conducted.

For ease of discussion, the sites investigated during each stage of the investigation have been grouped together (as defined in Section 1) based on their location and status as determined by the Phase 2 investigation. They are referred to as Group 1 through Group 5 (**Figure 2**). Group 1, Group 4, and Group 5 are sites associated with Stage 1 and Stage 4 of the Phase 2 SI field investigation, and Group 2 and Group 3 are sites associated with Stage 2 and Stage 3.

5.1.1 Group 1

PFOS was the only PFAS analyte detected in soil at any Group 1 boring. The detection (13.2 µg/kg) was in the sample from Former Sewage Lagoons boring WI-AF-BH12, and it was below the PAL (130 µg/kg).

The grab groundwater sample collected from WI-AF-BH12 detected PFOS and PFOA above the PAL of 40 ng/L (PFOS: 89.7 J- ng/L [estimated]; PFOA: 97.1 J- ng/L [estimated]), and the boring south of WI-AF-BH12, WI-AF-BH13, had a PAL exceedance for PFOA (119 J- ng/L [estimated]), confirming the presence of PFAS above the PAL in shallow groundwater (11 feet bgs) at the Former Sewage Lagoons. The lithology observed in each of the Former Sewage Lagoons borings was generally interbedded well-graded and poorly graded sands with gravel and some silt.

The grab groundwater sample collected from boring WI-AF-BH10 (PFOS: 225 J- ng/L [estimated]; PFOA: 70.2 J- ng/L [estimated]) and the groundwater sampled collected south of the WI-AF-BH10 from monitoring well WI-AF-MW-630 (former boring WI-AF-BH11) (PFOS: 553 ng/L) confirmed that PFAS in exceedance of the PALs is present in shallow groundwater (11 to 11.5 feet bgs) at the Wastewater Treatment Plant. The lithology observed in the Wastewater Treatment Plant borings was well-graded sand with silt and gravel interbedded with poorly graded sands for the entire depth of each boring.

PFOS, PFOA, and PFBS in exceedance of PALs were not present in the soil or groundwater samples collected from co-located boring WI-AF-BH18 and monitoring well WI-AF-MW-631, at Building 420, south of the Former Sewage Lagoons (**Figure 5** and **Figure 10**). A definitive water bearing zone was not present in the lithology during soil boring advancement, but a 2.5-foot section of poorly graded sand at 37.5 feet bgs was productive enough to install the monitoring well. The upper 35 feet of the boring was a mixture of silty sand with gravel and poorly graded sands; this combination also continued below 37.5 feet bgs to the total depth of the boring. The three existing wells north and northwest of Building 420 (MW-14, MW-20, and MW-21) had PFOS detections (40.9 J ng/L [estimated], 125 ng/L, and 118 ng/L, respectively) above the PALs; the lithologies of these borings are unknown.

5.1.2 Group 2

PFOS, PFOA, and PFBS were not detected in any soil sample collected from a Group 2 boring.

The dual monitoring wells installed at the Hardstand Area (WI-AF-WT01 and WI-AF-WT02), one well in the pair of wells installed in the eastern portion of the Area 16 drainage ditch system along the Clover Valley Stream (WI-AF-WT03), and one well from a pair installed near Stormwater Outfall 2 along the Area 16 drainage ditch system (WI-AF-WT05) confirmed the presence of PFOS and PFOA in groundwater (**Figure 13**). Groundwater samples collected from WI-AF-WT01 and WI-AF-WT02 had exceedances of both PFOS (164 ng/L and 564 ng/L, respectively) and PFOA (238 ng/L and 45.5 ng/L, respectively) above the PALs; only the detection of PFOS in the groundwater sample from WI-AF-WT05 (65.3 ng/L) exceeded the PAL.

During drilling at WI-AF-WT05 companion well WI-AF-WT06, the air/water interface was encountered at 7 feet bgs but the lithology remained clay with sands until approximately 38 feet bgs, where it transitioned to a poorly graded sand that persisted to the total depth of the boring. The bottom of the monitoring well screen was set at 45 feet bgs. The lithology observed in the Group 2 borings for well pairs WI-AF-WT01 and WI-AF-WT02, WI-AF-WT03 and WI-AF-WT04, WI-AF-WT07 and WI-AF-WT08, and well WI-AF-WT05 was generally well-graded sand and gravel, with interbedded fat or lean clay, and silt.

5.1.3 Group 3

PFOS was the only PFAS analyte detected in soil at any Group 3 boring. Soil samples from monitoring well locations WI-AF-MW-621 and WI-AF-MW-624, located along the taxiway, and well WI-AF-WT09, at Stormwater Outfall 1, had detections of PFOS (1.05 J $\mu\text{g}/\text{kg}$, 1.41 J $\mu\text{g}/\text{kg}$ [estimated], and 6.3 J $\mu\text{g}/\text{kg}$, respectively), but no detection was above the PAL (**Figure 7**).

PFOS and PFOA was detected above the PAL in shallow groundwater samples (7 to 15 feet bgs) collected from 7 of the 11 newly installed Group 3 monitoring wells. The three existing monitoring wells that were sampled downgradient of Hangar 12 (MW10-B8, MW4-B3, and MW15-B23), and one existing monitoring well that was sampled downgradient of Hangar 10 (16-26B), did not have PFOS, PFOA, or PFBS detections in exceedance of the PALs. The fifth existing monitoring well sampled, downgradient of Hangar 6 (H6-B3), had a detection of PFOS (46.5 J- ng/L [estimated]) above the PAL for PFOS in groundwater (40 ng/L) (**Figure 14**).

PFOS and PFOA were detected above the PAL in the samples from taxiway monitoring wells WI-AF-MW-620, WI-AF-MW-621, WI-AF-MW-624, and Stormwater Outfall 1 well WI-AF-WT09; detections of only PFOA above the PAL were found in the samples collected from taxiway monitoring well WI-AF-MW-618 and Stormwater Outfall 1 well WI-AF-MW-WT11. Monitoring well WI-AF-MW-620, located south of Stormwater Outfall 1, had the highest concentration of PFOS at 677 ng/L (estimated). The sample collected from Stormwater Outfall 1 well WI-AF-MW-WT09 had the highest concentration of PFOA at 407 J- ng/L (estimated); WI-AF-WT09 also had a high concentration of PFOS: 456 J- ng/L (estimated).

Monitoring well WI-AF-WT11 is located approximately 1,200 feet east of WI-AF-WT09 in a separate dual completion monitoring well set and the two locations are along a common stretch of the drainage ditch. The groundwater sample collected from WI-AF-WT11 (42.8 J- ng/L [estimated]) exceeded the PAL for PFOA in groundwater (40 ng/L).

The lithology observed in the Group 3 borings was generally silt and sand interbedded with fat or lean clay, and well-graded gravel.

5.1.4 Group 4

PFOS, PFOA, and PFBS were not detected in soil at any Group 4 boring.

Groundwater was found to be greater than 40 feet bgs in each of the three Area 27 soil borings (WI-AF-BH15, WI-AF-BH16, and WI-AF-BH17), and the new wells installed at each boring location (WI-AF-MW-627, WI-AF-MW-626, and WI-AF-MW-625, respectively) were completed with the bottom of each screen set at 59 to 60 feet bgs. The upper 30 to 40 feet of soil at each location was composed primarily of clay, with thin layers of interbedded silt; deeper than 40 feet bgs was a mix of sands and gravels. The aquifer in this area was encountered at 47 feet bgs in the southern most soil boring, WI-AF-BH15, but was not encountered until 53 feet bgs in both soil borings WI-AF-BH16 and WI-AF-BH17, which are north and northeast of WI-AF-BH15, respectively.

PFOS, PFOA, and PFBS were not detected above the PAL in the groundwater samples collected from the three newly installed Area 27 soil borings, or in the grab groundwater samples collected from the two borings advanced at Area 14 (WI-AF-BH19 and WI-AF-BH20). Area 14 boring WI-AF-BH19 was advanced to 50 feet bgs before a grab groundwater sample could be collected (at 49 feet bgs). The upper 30 feet of soil was composed primarily of clay, with thin layers of interbedded sands; deeper than 40 feet bgs was a mix of sands and gravels.

5.1.5 Group 5

PFOS, PFAS, and PFOA were not detected in soil at any Group 5 boring.

PFOS, PFAS, and PFOA were not detected above the PAL in any grab groundwater sample or monitoring well sample collected from a Group 5 location.

The lithology at the Crash Site borings (WI-AF-BH01 and WI-AF-BH02) observed in the area consisted of clays until about 10 feet bgs, where it transitioned to sand with silt and gravel. The lithology of Ault Field Well 1 is unknown.

A shallow aquifer was not encountered in any of the three Area 29 soil borings (WI-AF-BH03, WI-AF-BH04, and WI-AF-BH05), and each was advanced past 40 feet bgs until reaching groundwater (**Figure 12**). WI-AF-BH03 was advanced to 70 feet bgs before being completed as a monitoring well (WI-AF-MW-629) with the bottom of the screen at 70 feet bgs, and boring WI-AF-BH04 was advanced to 60 feet bgs before being completed as a monitoring well (WI-AF-MW-628) with the bottom of the screen at 60 feet bgs. The total depth of WI-AF-BH05, the northernmost of the three borings, was 50 feet bgs; however, groundwater at this location was not confirmed as it was not encountered during drilling and did not infiltrate the boring after it had been sitting for 48 hours. The lithology observed in the Area 29 borings was primarily clay with gravel.

Approximately 600 feet north of WI-AF-BH05, Area 30 boring WI-AF-BH08 was advanced to a total depth of 50 feet bgs before termination. Pulverized rock, which was believed to be part of a shallow bedrock ridge that has previously been observed in the area, was seen in the soil core at approximately 37 feet bgs, prompting the decision for boring termination. Above the pulverized bedrock was clay with areas of sand and gravel. The boring was allowed to sit overnight for groundwater infiltration, and sufficient groundwater was present the next morning for collection of a grab groundwater sample. The lithology observed in the other two Area 30 borings (WI-AF-BH06 and WI-AF-MW-BH07) was generally sandy clay with gravel.

5.1.6 Groundwater Flow

Groundwater levels were collected at all new monitoring wells and at the select existing groundwater monitoring wells sampled during each stage of the investigation, as discussed in the Groundwater Elevation Surveys in Sections 3.2.6 and 3.3.7. These data were used to assess the degree of hydraulic connection between aquifer units at the site and to estimate groundwater flow directions. Estimates of groundwater flow directions in the areas investigated as part of this field program are summarized on the figure(s) for each area; potentiometric maps are shown on **Figure 15** through **Figure 19**. Group 3 monitoring wells WI-AF-WT09 and WI-AF-WT10 are included with Group 2 on **Figure 16** and **Figure 17** for determining groundwater flow because they are part of the dual completion monitoring wells installed during Stage 3 that monitor both shallow and deep groundwater.

Groundwater flow patterns at Ault Field are generally to the east or northeast. Some variation from this was seen north of Runway 07-25, near the Hardstand Area, where groundwater was observed flowing from the north and then joining the west to east flow pattern south of Runway 07-25, and another variation was seen around Building 420 where groundwater was observed to flow from the south-east to the north-west, going from the site out to the Strait of Juan de Fuca. Artesian conditions were encountered during the installation of well pairs (in the deeper well of the respective pair) in the Runway Drainage Ditch System (Area 16) at WI-AF-WT06, WI-AF-WT08, WI-AF-WT10, and WI-AF-WT12. These observations are consistent with artesian conditions observed at existing Area 16 well 16-26B.

Conclusions and Proposed Actions

Based on the data collected during the Phase 2 SI field investigation, the following section presents conclusions that have been made regarding each Group, and the proposed actions that are recommended.

6.1 Conclusions

- The Phase 2 SI was divided into four stages of work to gather information on PFAS contamination in soil and groundwater at Ault Field. Stage 1 and Stage 4 activities are associated with Group 1, Group 4, and Group 5, and Stage 2 and Stage 3 are sites associated with Group 2 and Group 3. Only existing wells were sampled for Stage 1. Stage 2 included installing and sampling eight monitoring wells along the taxiway to the east/northeast of the hangars. Six dual completion monitoring well clusters were installed east of the new taxiway wells during Stage 3. Twenty soil borings were advanced, and seven were completed and sampled as monitoring wells, during Stage 4. Twelve of the remaining 13 soil borings were sampled for grab groundwater samples, taken from at least one depth (a maximum of two).
- PFAS in soil did not exceed the PAL in any soil boring sample.
- The Group 1 grab groundwater samples and monitoring well samples collected during Stage 1 and Stage 4 confirmed the presence of PFOS and PFOA in exceedance of the PALs in shallow groundwater at the Wastewater Treatment Plant and the Former Sewage Lagoons.
- The Group 2 monitoring wells installed during Stage 3 confirmed the presence of PFOS and PFOA in exceedance of the PALs in groundwater, particularly at the Hardstand Area.
- The Group 3 monitoring wells installed along the taxiway during Stage 2 confirmed the presence of PFOS and PFOA in exceedance of the PALs along the taxiway, in the vicinity of the hangars upgradient of the taxiway, and at Stormwater Outfall 1.
- Groundwater samples collected from Group 4 borings and monitoring wells did not exceed the PALs.
- Groundwater samples collected from Group 5 borings and monitoring wells did not exceed the PALs.
- Lithologic and groundwater elevation data were generally consistent with what have previously been seen at Ault Field, including artesian conditions near the Runway Drainage Ditch System (Area 16). However, the shallow zone of the aquifer was not encountered in Group 4 borings at Area 14 and Area 27, or Group 5 borings at Area 29 and Area 30. Locally perched zones have been previously observed at Ault Field and a perched groundwater zone was identified at the Building 420 boring location for WI-AF-MW-631, in the western portion of the investigation area.
- Some variation from the general east or northeast groundwater flow pattern seen at Ault Field was observed north of Runway 07-25, near the Hardstand Area, where groundwater was observed to flow from the north then joining the east-west flow pattern south of Runway 07-25, and around Building 420 where it was observed to flow from the south-east to the north-west, going from the site out to the Strait of Juan de Fuca.

6.2 Proposed Actions

Based on an assessment of data collected during Phase 2, the following recommendations are made for the PSAs investigated at Ault Field:

- Group 1 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater at the Former Sewage Lagoons, Wastewater Treatment Plant, and Building 420. And, conduct further investigation to assess the leaching potential for PFOS in soil at the Former Sewage Lagoons, where samples confirmed the

presence of PFOS in soil at one location below the PAL of 130 µg/kg, and where the groundwater samples from the same location exceed PALs.

- Group 2 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater at the Hardstand Area, 2006 F-18 Crash Site, 1990 A-6 Crash Site, 1985 EA-6B Crash Site, the 1989 A-6 Crash Site, Stormwater Outfall 2, and the Runway Drainage Ditch System (Area 16).
- Group 3 – Conduct further investigation to delineate the nature and extent of PFAS in groundwater near the Former Avionics Facility (Building 2547), Former/Current Fire Station (Building 2897), Hangar 1 (Building 112), Hangar 5 (Building 386), Hangar 6 (Building 410), Hangar 7 (Building 2544), Hangar 8 (Building 2642), Hangar 9 (Building 2681), Hangar 10 (Building 2699), Hangar 11 (Building 2733), Hangar 12 (Building 2737), Hangar 14 (newly constructed), Indoor Wash Rack (Building 2903), P3 Wash Rack, and Stormwater Outfall 1,. And, conduct further investigation to assess the leaching potential for PFOS in soil to the east of Hangar 8 and the Indoor Wash Rack, to the east of Hangar 9, and at Stormwater Outfall 1 where PFOS were detected in soil samples in these areas, below the PAL of 130 µg/kg, and where the groundwater samples from the same locations exceed PALs.
- Group 4 – No further action planned for soil or groundwater at Area 14 or Area 27.
- Group 5 – No further action planned for soil or groundwater at the 1976 EA-6 Crash Site, Area 29, Area 30, or the Gallery Golf Course.

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Tables

Table 1. Ault Field Monitoring Well and Piezometer Construction Details

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Location ID	Installation Date	Ground Elevation (feet NAVD88)	TOC Elevation (feet NAVD88)	Total Depth (feet btoc)	Well Casing Diameter (inches)	Completion	Screen Length (feet)	Top of Screen Depth (feet bgs)	Screen Top Elevation (feet NAVD88)	Bottom of Screen Depth (feet bgs)	Screen Bottom Elevation (feet NAVD88)	Northing (feet NAD83)	Easting (feet NAD83)
WI-AF-MW-618	11/17/2019	19.801	19.368	14.89	2	Flush	5.00	10.00	9.368	15.00	4.368	496967.91	1194695.95
WI-AF-MW-619	11/19/2019	14.903	14.556	15.37	2	Flush	5.00	11.00	3.556	16.00	-1.444	496227.49	1195171.36
WI-AF-MW-620	11/11/2019	12.834	12.412	8.67	2	Flush	5.00	4.00	8.412	9.00	3.412	495358.31	1195723.73
WI-AF-MW-621	11/10/2019	12.998	12.585	9.59	2	Flush	5.00	5.00	7.585	10.00	2.585	494574.28	1196246.58
WI-AF-MW-622	11/9/2019	12.159	11.756	11.78	2	Flush	5.00	7.00	4.756	12.00	-0.244	493662.97	1196181.80
WI-AF-MW-623	11/23/2019	16.956	16.559	7.05	2	Flush	5.00	4.00	12.559	9.00	7.559	493640.40	1196835.13
WI-AF-MW-624	11/23/2019	14.518	14.069	12.44	2	Flush	5.00	7.66	6.409	12.66	1.409	492880.61	1197461.02
WI-AF-WT01	11/16/2019	28.563	28.002	14.95	2	Flush	5.00	10.00	18.002	15.00	13.002	498728.67	1198139.25
WI-AF-WT02	11/16/2019	28.316	27.880	29.95	2	Flush	5.00	25.00	2.880	30.00	-2.120	498728.94	1198149.80
WI-AF-WT03	11/20/2019	13.611	13.243	9.90	2	Flush	5.00	5.00	8.243	10.00	3.243	497674.02	1201883.27
WI-AF-WT04	11/20/2019	13.060	12.540	29.31	2	Flush	5.00	25.00	-12.460	30.00	-17.460	497667.78	1201870.65
WI-AF-WT05	11/14/2019	12.491	12.002	9.84	2	Flush	5.00	5.50	6.502	10.50	1.502	494154.15	1196696.47
WI-AF-WT06*	11/13/2019	12.657	12.474	45.00	2	Flush	5.00	40.00	-27.526	45.00	-32.526	494143.98	1196700.02
WI-AF-WT07	11/11/2019	11.142	10.808	15.25	2	Flush	5.00	10.00	0.808	15.00	-4.192	496945.15	1199048.86
WI-AF-WT08*	11/17/2019	11.072	10.850	40.00	2	Flush	5.00	34.50	-23.650	39.50	-28.650	496945.00	1199058.50
WI-AF-WT09	11/22/2019	13.277	13.028	15.37	2	Flush	10.00	4.66	8.368	14.66	-1.632	495819.01	1195690.23
WI-AF-WT10*	11/22/2019	13.258	13.182	45.00	2	Flush	5.00	39.66	-26.478	44.66	-31.478	495822.65	1195676.41
WI-AF-WT11	11/15/2019	9.480	9.010	9.14	2	Flush	5.00	4.00	5.010	9.00	0.010	495462.73	1196867.23
WI-AF-WT12*	11/15/2019	9.662	9.536	26.00	2	Flush	5.00	21.00	-11.464	26.00	-16.464	495466.55	1196883.86
WI-AF-MW-625	7/25/2020	54.849	54.518	59.60	2	Flush	10.00	50.00	4.518	60.00	-5.482	493823.75	1191426.38
WI-AF-MW-626	7/27/2020	50.339	50.113	58.20	2	Flush	10.00	49.00	1.113	59.00	-8.887	493848.59	1191363.63
WI-AF-MW-627	7/27/2020	59.098	58.790	58.59	2	Flush	10.00	49.00	9.790	59.00	-0.210	493762.09	1191378.75
WI-AF-MW-628	7/17/2020	96.092	95.668	64.80	2	Flush	10.00	55.00	40.668	65.00	30.668	489175.66	1188474.02
WI-AF-MW-629	7/18/2020	98.407	98.056	69.45	2	Flush	10.00	60.00	38.056	70.00	28.056	489238.69	1188272.09
WI-AF-MW-630	7/22/2020	13.012	12.604	12.81	2	Flush	5.00	8.00	4.604	13.00	-0.396	501230.4	1193964.12
WI-AF-MW-631	7/29/2020	18.715	18.399	39.66	2	Flush	10.00	30.00	-11.601	40.00	-21.601	496852.43	1192022.05

Notes:

bgs = below ground surface

btoc = below top of casing

ID = identification assigned during well installation

NAVD88 = North American Vertical Datum of 1988

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

TOC = top of casing

* = indicates Artesian Well. The TOC elevations for these wells are to the top of the nut/nipple.

Table 2. Ault Field Groundwater Elevation Survey*Phase 2 Site Inspection Report**Ault Field, Naval Air Station Whidbey Island**Oak Harbor, Washington*

Well ID	Elevation Survey Date	Top of Casing Elevation (feet NAVD88)	Measurement Date	Measured Total Depth (feet btoc)	Depth to Water (feet btoc)	Groundwater Elevation (feet NAVD88)	Artesian Wellhead Presure (PSI)
WI-AF-MW-618	Dec 2019	19.368	12/15/2019	14.89	6.81	12.56	N/A
WI-AF-MW-619	Dec 2019	14.556	12/15/2019	15.37	5.92	8.64	N/A
WI-AF-MW-620	Dec 2019	12.412	12/15/2019	8.67	4.38	8.03	N/A
WI-AF-MW-621	Dec 2019	12.585	12/15/2019	9.59	4.06	8.53	N/A
WI-AF-MW-622	Dec 2019	11.756	12/15/2019	11.78	1.69	10.07	N/A
WI-AF-MW-623	Dec 2019	16.559	12/15/2019	7.05	4.82	11.74	N/A
WI-AF-MW-624	Dec 2019	14.069	12/15/2019	12.44	2.16	11.91	N/A
WI-AF-WT01	Dec 2019	28.002	12/15/2019	14.95	11.68	16.32	N/A
WI-AF-WT02	Dec 2019	27.880	12/15/2019	29.95	11.55	16.33	N/A
WI-AF-WT03	Dec 2019	13.243	12/15/2019	9.90	8.35	4.89	N/A
WI-AF-WT04	Dec 2019	12.540	12/15/2019	29.31	7.88	4.66	N/A
WI-AF-WT05	Dec 2019	12.002	12/15/2019	9.84	5.59	6.41	N/A
WI-AF-WT06*	Dec 2019	12.474	12/15/2019	45.00	N/A	14.32	0.80
WI-AF-WT07	Dec 2019	10.808	12/15/2019	15.25	9.29	1.52	N/A
WI-AF-WT08*	Dec 2019	10.850	12/15/2019	40.00	N/A	15.26	1.91
WI-AF-WT09	Dec 2019	13.028	12/15/2019	15.37	11.82	1.21	N/A
WI-AF-WT10*	Dec 2019	13.182	12/15/2019	45.00	N/A	14.57	0.60
WI-AF-WT11	Dec 2019	9.010	12/15/2019	9.14	3.28	5.73	N/A
WI-AF-WT12*	Dec 2019	9.536	12/15/2019	26.00	N/A	11.73	0.95
MW10-B8	Dec 2019	22.297	12/15/2019	14.96	4.56	17.74	N/A
MW15-B23	Dec 2019	24.945	12/15/2019	18.53	7.63	17.32	N/A
16-26B*	Dec 2019	12.319	12/15/2019	UNK	N/A	14.63	1.00
MW4-B3	Dec 2019	25.505	12/15/2019	17.64	5.58	19.93	N/A
H6-B3	Dec 2019	13.630	12/15/2019	16.99	2.83	10.80	N/A
WI-AF-MW-625	Sept 2020	54.518	9/9/2020	59.60	33.94	20.58	N/A
WI-AF-MW-626	Sept 2020	50.113	9/9/2020	58.20	29.47	20.64	N/A
WI-AF-MW-627	Sept 2020	58.790	9/9/2020	58.59	38.12	20.67	N/A

Table 2. Ault Field Groundwater Elevation Survey

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Well ID	Elevation Survey Date	Top of Casing Elevation (feet NAVD88)	Measurement Date	Measured Total Depth (feet btoc)	Depth to Water (feet btoc)	Groundwater Elevation (feet NAVD88)	Artesian Wellhead Pressure (PSI)
WI-AF-MW-628	Sept 2020	95.668	9/9/2020	64.80	53.98	41.69	N/A
WI-AF-MW-629	Sept 2020	98.056	9/9/2020	69.45	43.06	55.00	N/A
WI-AF-MW-630	Sept 2020	12.604	9/9/2020	12.81	7.00	5.60	N/A
WI-AF-MW-631	Sept 2020	18.399	9/9/2020	39.66	9.28	9.12	N/A
14-MW-2	Sept 2020	32.841	9/9/2020	45.51	14.95	17.89	N/A
Ault Field Well #1	Sept 2020	143.136	9/9/2020	176.00	129.36	13.78	N/A
MW-14	Sept 2020	17.709	9/9/2020	17.61	12.07	5.64	N/A
MW-20	Sept 2020	16.470	9/9/2020	15.13	11.90	4.57	N/A
MW-21	Sept 2020	13.918	9/9/2020	13.25	8.22	5.70	N/A

Notes:

btoc = below top of casing

Dec = December

ID = identification assigned in the field

N/A = not applicable

NAVD88 = North American Vertical Datum of 1988

PSI = pound-force per square inch

Sept = September

UNK = unknown

* = Indicates Artesian Well. The top of casing elevations for these wells are on the top of the nut/nipple.

Equation used to calculate groundwater elevation at artesian wells: Groundwater elevation (feet) = (PSI at well head x 2.31) + top of casing elevation (feet)

Table 3. Summary of PFAS Chemicals Detected in Soil - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-WT07	WI-AF-WT08	WI-AF-MW-622	WI-AF-MW-621		WI-AF-MW-616	WI-AF-MW-620		
	Sample ID	WI-AF-WT07-SB-12	WI-AF-WT08-SB-13	WI-AF-MW-622-SB-02	WI-AF-MW-621P-SB-05	WI-AF-MW-621-SB-05	WI-AF-MW-616-SB-07	WI-AF-MW-620-SB-06	WI-AF-MW-620-SB-15	WI-AF-MW-620-SB-20
	Sample Depth (feet bgs)	12	13	2	5	5	7	6	15	20
	Sample Date	11/8/19	11/8/19	11/9/19	11/10/19	11/10/19	11/10/19	11/11/19	11/11/19	11/11/19
Project Action Levels										
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.47 U	2.78 U	2.37 U	2.29 U	1.05 J	2.67 U	3.01 U	3.01 U	3.13 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.47 U	2.78 U	2.37 U	2.29 U	2.26 U	2.67 U	3.01 U	3.01 U	3.13 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.23 U	1.39 U	1.18 U	1.14 U	1.13 U	1.33 U	1.5 U	1.5 U	1.56 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

--- = not available

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = sample identification assigned during sample collection

J = Analyte present: value may or may not be accurate or precise.

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 3. Summary of PFAS Chemicals Detected in Soil - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-WT06	WI-AF-WT05	WI-AF-WT12	WI-AF-WT11	WI-AF-WT01	WI-AF-WT02	WI-AF-MW-618	WI-AF-MW-619	
	Sample ID	WI-AF-WT06-SB-07	WI-AF-WT05-SB-08	WI-AF-WT12-SB-05	WI-AF-WT11-SB-05	WI-AF-WT01-SB-13	WI-AF-WT02-SB-11	WI-AF-MW-618-SB-11	WI-AF-MW-619-SB-02	WI-AF-MW-619-SB-11
	Sample Depth (feet bgs)	7	8	5	5	13	11	11	2	11
	Sample Date	11/13/19	11/14/19	11/14/19	11/15/19	11/16/19	11/16/19	11/17/19	11/17/19	11/19/19
Project Action Levels										
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.7 U	2.38 U	2.56 U	2.29 U	2.17 U	2.06 U	2.25 U	2.58 U	2.41 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.7 U	2.38 U	2.56 U	2.29 U	2.17 U	2.06 U	2.25 U	2.58 U	2.41 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.35 U	1.19 U	1.28 U	1.14 U	1.09 U	1.03 U	1.12 U	1.29 U	1.2 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

--- = not available

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = sample identification assigned during sample collection

J = Analyte present: value may or may not be accurate or precise.

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 3. Summary of PFAS Chemicals Detected in Soil - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-MW-623	WI-AF-WT03		WI-AF-WT04	WI-AF-WT09		WI-AF-WT10	WI-AF-MW-624	
	Sample ID	WI-AF-MW-623-SB-03	WI-AF-WT03P-SB-08	WI-AF-WT03-SB-08	WI-AF-WT04-SB-08	WI-AF-WT09P-SB-06	WI-AF-WT09-SB-06	WI-AF-WT10-SB-06	WI-AF-MW-624-SB-02	WI-AF-MW-624-SB-10
	Sample Depth (feet bgs)	3	8	8	8	6	6	6	2	10
	Sample Date	11/19/19	11/20/19	11/20/19	11/20/19	11/21/19	11/21/19	11/21/19	11/22/19	11/22/19
Project Action Levels										
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.17 U	2.01 U	2.14 U	2.14 U	6.3	5.57 J	2.8 U	1.41 J	2.4 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.17 U	2.01 U	2.14 U	2.14 U	2.21 U	2.52 U	2.8 U	2.76 U	2.4 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.09 U	1.01 U	1.07 U	1.07 U	1.1 U	1.26 U	1.4 U	1.38 U	1.2 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

--- = not available

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = sample identification assigned during sample collection

J = Analyte present: value may or may not be accurate or precise.

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 4. Summary of PFAS Chemicals Detected in Soil - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-BH01	WI-AF-BH02	WI-AF-BH03	WI-AF-BH04	WI-AF-BH05	WI-AF-BH06	WI-AF-BH07
	Sample ID	WI-AF-BH01-SB-29	WI-AF-BH02-SB-13	WI-AF-BH03-SB-47	WI-AF-BH04-SB-54	WI-AF-BH05-SB-44	WI-AF-BH06-SB-35	WI-AF-BH07-SB-36
	Sample Depth (feet bgs)	29	13	47	54	44	35	36
	Sample Date	7/20/20	7/20/20	7/16/20	7/16/20	7/15/20	7/15/20	7/14/20
	Project Action Levels							
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.2 U	2.29 U	2.3 U	2.42 U	2.21 U	2.07 U	2.38 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.2 U	2.29 U	2.3 U	2.42 U	2.21 U	2.07 U	2.38 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.1 U	1.14 U	1.15 U	1.21 U	1.1 U	1.04 U	1.19 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard quotient of 0.1.

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = identification assigned at the time of sample collection

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 4. Summary of PFAS Chemicals Detected in Soil - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-BH08	WI-AF-BH09	WI-AF-BH10	WI-AF-BH11	WI-AF-BH12	WI-AF-BH13	WI-AF-BH14	
	Sample ID	WI-AF-BH08-SB-34	WI-AF-BH09-SB-9.5	WI-AF-BH10-SB-9.5	WI-AF-BH11-SB-9	WI-AF-BH12-SB-9.5	WI-AF-BH13-SB-9.5	WI-AF-BH14-SB-11	WI-AF-BH14-SBP-11
	Sample Depth (feet bgs)	34	9.5	9.5	9	9.5	9.5	11	11
	Sample Date	7/14/20	7/21/20	7/22/20	7/22/20	7/23/20	7/24/20	7/24/20	7/24/20
	Project Action Levels								
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.11 U	2.19 U	2.09 U	2.23 U	13.2	2.42 U	2.55 U	2.41 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.11 U	2.19 U	2.09 U	2.23 U	2.16 U	2.42 U	2.55 U	2.41 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.05 U	1.09 U	1.05 U	1.12 U	1.08 U	1.21 U	1.27 U	1.2 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard quotient of 0.1.

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = identification assigned at the time of sample collection

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 4. Summary of PFAS Chemicals Detected in Soil - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (µg/kg)	Location	WI-AF-BH15	WI-AF-BH16	WI-AF-BH17		WI-AF-BH18	WI-AF-BH19	WI-AF-BH20
	Sample ID	WI-AF-BH15-SB-47	WI-AF-BH16-SB-53	WI-AF-BH17-SB-53	WI-AF-BH17-SBP-53	WI-AF-BH18-SB-34	WI-AF-BH19-SB-37	WI-AF-BH20-SB-30
	Sample Depth (feet bgs)	47	53	53	53	34	37	30
	Sample Date	7/27/20	7/25/20	7/25/20	7/25/20	7/29/20	7/28/20	7/28/20
	Project Action Levels							
Perfluorooctane Sulfonate (PFOS)	130 ¹	2.4 U	2.13 U	2.65 U	2.63 U	2.45 U	2.17 U	2.34 U
Perfluorooctanoic acid (PFOA)	130 ¹	2.4 U	2.13 U	2.65 U	2.63 U	2.45 U	2.17 U	2.34 U
Perfluorobutanesulfonic acid (PFBS)	1,900 ²	1.2 U	1.06 U	1.32 U	1.32 U	1.23 U	1.09 U	1.17 U

Notes:

¹ Derived from the USEPA online calculator for direct contact (residential exposure) based on a hazard quotient of 0.1.

² Derived from the USEPA online calculator for residential soil based on a hazard quotient of 0.1, updated in April 2021.

µg/kg = microgram(s) per kilogram

bgs = below ground surface

ID = identification assigned at the time of sample collection

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Table 5. Summary of PFAS Chemicals Detected in Groundwater - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-MW-620	WI-AF-MW-621	WI-AF-MW-622	WI-AF-WT01		WI-AF-WT02	WI-AF-WT01		WI-AF-WT02
	Sample ID	WI-AF-MW-620-1219	WI-AF-MW-621-1219	WI-AF-MW-622-1219	WI-AF-WT01-GW-1219	WI-AF-WT01-GWP-1219	WI-AF-WT02-GW-1219	WI-AF-WT01-GW-1219	WI-AF-WT01-GWP-1219	WI-AF-WT02-GW-1219
	Sample Depth (feet btoc)	7	7	10	NA	NA	NA	NA		NA
	Sample Date	12/7/19	12/7/19	12/7/19	12/7/19	12/7/19	12/7/19	12/7/19	12/7/19	12/7/19
	Project Action Levels ¹									
Perfluorooctane Sulfonate (PFOS)	40	677	842	6.64 U	164	143	564	164	143	564
Perfluorooctanoic acid (PFOA)	40	60.7 J-	56.5	3.38 J-	238	216	45.5	238	216	45.5
Perfluorobutanesulfonic acid (PFBS)	600	256	17.6	0.72 J-	5.66	5.46	8.94	5.66	5.46	8.94

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = Not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J- = Analyte present; value may be biased low or value may be higher.

J = Analyte present: value may or may not be accurate or precise.

J+ = Analyte present: value may be biased high or the actual value may be lower.

NA = not available

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 5. Summary of PFAS Chemicals Detected in Groundwater - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (ng/L)	Location	16-268		H6-B3	WI-AF-MW-624	WI-AF-WT03	WI-AF-WT04	WI-AF-WT05	WI-AF-WT06	WI-AF-WT05
	Sample ID	WI-A16-16-268-1219	WI-A16-16-268P-1219	WI-A16-H6-B3-1219	WI-AF-MW-624-1219	WI-AF-WT03-GW-1219	WI-AF-WT04-GW-1219	WI-AF-WT05-GW-1219	WI-AF-WT06-GW-1219	WI-AF-WT05-GW-1219
	Sample Depth (feet btoc)	Artesian	Artesian	15	11	9.5	27	8	Artesian	8
	Sample Date	12/8/19	12/8/19	12/8/19	12/8/19	12/11/19	12/11/19	12/8/19	12/8/19	12/8/19
	Project Action Levels ¹									
Perfluorooctane Sulfonate (PFOS)	40	0.94 U	0.94 U	46.5 J-	128	1.74 J	0.98 UJ	65.3	0.8 J	65.3
Perfluorooctanoic acid (PFOA)	40	1.42 U	1.42 U	1.5 UJ	92.7	21.2	0.7 J-	13.6	1.34 U	13.6
Perfluorobutanesulfonic acid (PFBS)	600	0.26 J	0.15 J	0.5 UJ	37.1	2.06 J+	0.49 UJ	6.68	0.45 U	6.68

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = Not applicable

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ID = identification assigned at the time of sample collection

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ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 5. Summary of PFAS Chemicals Detected in Groundwater - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-WT06	MW10-B8	WI-AF-MW-619	MW15-B23	MW4-B3	WI-AF-WT07	WI-AF-WT08	WT09	WT10
	Sample ID	WI-AF-WT06-GW-1219	WI-AF-MW10-B8-1219	WI-AF-MW-619-1219	WI-AF-MW15-B23-1219	WI-AF-MW4-B3-1219	WI-AF-WT07-GW-1219	WI-AF-WT08-GW-1219	WI-AF-WT09-GW-1219	WI-AF-WT10-GW-1219
	Sample Depth (feet btoc)	Artesian	12	NA	16	15	14	Artesian	14	Artesian
	Sample Date									
	Project Action Levels ¹	12/8/19	12/10/19	12/10/19	12/11/19	12/11/19	12/12/19	12/12/19	12/13/19	12/12/19
Perfluorooctane Sulfonate (PFOS)	40	0.8 J	11.4	2.11 J	24.1 J-	3.37 J	0.96 U	0.93 U	456 J-	0.89 U
Perfluorooctanoic acid (PFOA)	40	1.34 U	10.3	20.0	33.5 J-	32.8	0.93 J	1.49 J	407 J-	1.34 U
Perfluorobutanesulfonic acid (PFBS)	600	0.45 U	6.64	1.41 J	39.3 J	14.2	0.48 UJ	0.46 U	13.9 J-	0.45 U

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = Not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J- = Analyte present; value may be biased low or value may be higher.

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ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 5. Summary of PFAS Chemicals Detected in Groundwater - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-WT11	WI-AF-WT12		WI-AF-WT03	WI-AF-WT04	WI-AF-WT12		WI-AF-WT07	WI-AF-WT08
	Sample ID	WI-AF-WT11-GW-1219	WI-AF-WT12-GW-1219	WI-AF-WT12-GWP-1219	WI-AF-WT03-GW-1219	WI-AF-WT04-GW-1219	WI-AF-WT12-GW-1219	WI-AF-WT12-GWP-1219	WI-AF-WT07-GW-1219	WI-AF-WT08-GW-1219
	Sample Depth (feet btoc)	8	Artesian	Artesian	9.5	27	Artesian		14	Artesian
	Sample Date									
	Project Action Levels ¹	12/12/19	12/11/19	12/11/19	12/11/19	12/11/19	12/11/19	12/11/19	12/12/19	12/12/19
Perfluorooctane Sulfonate (PFOS)	40	19.0 J-	5.33	5.39	1.74 J	0.98 UJ	5.33	5.39	0.96 U	0.93 U
Perfluorooctanoic acid (PFOA)	40	42.8 J-	4.96	4.59 J	21.2	0.7 J-	4.96	4.59 J	0.93 J	1.49 J
Perfluorobutanesulfonic acid (PFBS)	600	5.04 J-	3.26 J+	3.29 J+	2.06 J+	0.49 UJ	3.26 J+	3.29 J+	0.48 UJ	0.46 U

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = Not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J- = Analyte present; value may be biased low or value may be higher.

J = Analyte present: value may or may not be accurate or precise.

J+ = Analyte present: value may be biased high or the actual value may be lower.

NA = not available

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 5. Summary of PFAS Chemicals Detected in Groundwater - Stages 2 and 3

Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-WT10	WI-AF-WT11	WI-AF-MW-618	WI-AF-MW-623	WI-AF-WT09
	Sample ID	WI-AF-WT10-GW-1219	WI-AF-WT11-GW-1219	WI-AF-MW-618-1219	WI-AF-MW-623-1219	WI-AF-WT09-GW-1219
	Sample Depth (feet btoc)	Artesian	8	12	6	14
	Sample Date					
	Project Action Levels ¹	12/12/19	12/12/19	12/12/19	12/12/19	12/13/19
Perfluorooctane Sulfonate (PFOS)	40	0.89 U	19.0 J-	1.25 J	16.1	456 J-
Perfluorooctanoic acid (PFOA)	40	1.34 U	42.8 J-	48.6	30.3	407 J-
Perfluorobutanesulfonic acid (PFBS)	600	0.45 U	5.04 J-	2.06 J	9.29 J+	13.9 J-

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = Not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J- = Analyte present; value may be biased low or value may be higher.

J = Analyte present: value may or may not be accurate or precise.

J+ = Analyte present: value may be biased high or the actual value may be lower.

NA = not available

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 6. Summary of PFAS Chemicals Detected in Groundwater - Stages 1 and 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (ng/L)	Location	MW-21	14-MW-2	MW-14	MW-20		WI-AF-MW-626	WI-AF-MW-625
	Sample ID	WI-A52-MW-21-0820	WI-A14-MW-2-0820	WI-A52-MW-14-0820	WI-A52-MW-20-0820	WI-A52-MW-20P-0820	WI-AF-MW-626-0820	WI-AF-MW-625-0820
	Sample Depth (feet btoc)	10	NA	15	12.5	12.5	54	54
	Sample Date	8/13/20	8/14/20	8/14/20	8/14/20	8/14/20	8/14/20	8/15/20
	Project Action Levels ¹							
Perfluorooctane Sulfonate (PFOS)	40	118	0.89 U	40.9 J	101	125	1.12 U	0.89 U
Perfluorooctanoic acid (PFOA)	40	39.0	12.7	16.0 J	30.5	29.5	2.29 J	2.1 J
Perfluorobutanesulfonic acid (PFBS)	600	12.3	5.02	7.65 J	10.0	10.4	1.95 J	2.67 J

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = not available

btoc = below top of casing

ID = identification assigned at the time of sample collection

J = Analyte present; value may or may not be accurate or precise.

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 6. Summary of PFAS Chemicals Detected in Groundwater - Stages 1 and 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-MW-627		Ault Field Well #1	WI-AF-MW-628	WI-AF-MW-629	WI-AF-MW-631	WI-AF-MW-630
	Sample ID	WI-AF-MW-627-0820	WI-AF-MW-627P-0820	WI-GC-W1-0820	WI-AF-MW-628-0820	WI-AF-MW-629-0820	WI-AF-MW-631-0820	WI-AF-MW-630-0820
	Sample Depth (feet btoc)	54	54	NA	60	65	35	11.5
	Sample Date	8/15/20	8/15/20	8/15/20	8/18/20	8/18/20	8/18/20	8/19/20
	Project Action Levels ¹							
Perfluorooctane Sulfonate (PFOS)	40	0.89 U	0.88 U	0.91 U	2.77 U	0.99 U	5.83 U	553
Perfluorooctanoic acid (PFOA)	40	1.87 J	1.78 J	1.36 U	1.36 UJ	1.36 UJ	1.61 J	37.2
Perfluorobutanesulfonic acid (PFBS)	600	0.99 J	0.93 J	0.45 U	0.28 J	0.65 J	1.69 J	6.46

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = not available

btoc = below top of casing

ID = identification assigned at the time of sample collection

J = Analyte present; value may or may not be accurate or precise.

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 7. Summary of PFAS Chemicals Detected in Grab Groundwater - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-BH01	WI-AF-BH02	WI-AF-BH06		WI-AF-BH07	WI-AF-BH08	WI-AF-BH09	
	Sample ID	WI-AF-BH01-GW-40	WI-AF-BH02-GW-35	WI-AF-BH06-GW-31	WI-AF-BH06-GWP-31	WI-AF-BH07-GW-24	WI-AF-BH08-GW-35	WI-AF-BH09-GW-11	WI-AF-BH09-GWP-11
	Sample Depth (feet btoc)	40	35	31	31	24	35	11	11
	Sample Date	7/20/20	7/20/20	7/16/20	7/16/20	7/14/20	7/15/20	7/21/20	7/21/20
	Project Action Levels ¹								
Perfluorooctane Sulfonate (PFOS)	40	5.18 J-	0.96 UJ	0.69 J	0.77 J	0.88 U	0.88 U	4.21 U	4.17 U
Perfluorooctanoic acid (PFOA)	40	1.29 J-	1.44 UJ	0.54 J	0.57 J	1.32 UJ	1.32 UJ	14.6 J-	14.0 J-
Perfluorobutanesulfonic acid (PFBS)	600	0.81 UJ	0.48 UJ	0.62 U	0.55 U	0.44 UJ	0.53 U	2.99 J-	2.66 J-

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J = Analyte present; value may or may not be accurate or precise.

J- = Analyte present; value may be biased low or value may be higher.

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 7. Summary of PFAS Chemicals Detected in Grab Groundwater - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-BH10		WI-AF-BH12		WI-AF-BH13		WI-AF-BH14	
	Sample ID	WI-AF-BH10-GW-11.5	WI-AF-BH10-GW-41	WI-AF-BH12-GW-11	WI-AF-BH12-GW-39	WI-AF-BH13-GW-11	WI-AF-BH13-GW-41	WI-AF-BH14-GW-21	WI-AF-BH14-GW-40
	Sample Depth (feet btoc)	11.5	41	11	39	11	41	21	40
	Sample Date	7/22/20	7/23/20	7/23/20	7/23/20	7/24/20	7/24/20	7/24/20	7/24/20
	Project Action Levels ¹								
Perfluorooctane Sulfonate (PFOS)	40	225 J-	1.18 U	89.7 J-	2.2 U	10.7 J-	0.85 U	33.4 J-	0.86 U
Perfluorooctanoic acid (PFOA)	40	70.2 J-	1.78 J	97.1 J-	2.06 J	119 J-	0.82 J	24.7 J-	1.29 U
Perfluorobutanesulfonic acid (PFBS)	600	5.06 J-	4.41 J	174 J-	1.4 U	216 J-	0.42 U	32.7 J-	0.43 U

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J = Analyte present; value may or may not be accurate or precise.

J- = Analyte present; value may be biased low or value may be higher.

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Table 7. Summary of PFAS Chemicals Detected in Grab Groundwater - Stage 4

Phase 2 Site Inspection Report

Ault Field, Naval Air Station Whidbey Island

Oak Harbor, Washington

Analyte (ng/L)	Location	WI-AF-BH19	WI-AF-BH20
	Sample ID	WI-AF-BH19-GW-49	WI-AF-BH20-GW-41
	Sample Depth (feet btoc)	49	41
	Sample Date	7/28/20	7/28/20
	Project Action Levels ¹		
Perfluorooctane Sulfonate (PFOS)	40	0.82 J-	5.21 J-
Perfluorooctanoic acid (PFOA)	40	1.81 J-	3.12 J-
Perfluorobutanesulfonic acid (PFBS)	600	0.46 J-	1.4 J-

Notes:

¹ Tap water project action level derived from USEPA's online calculator, based on a target hazard quotient of 0.1; PFBS updated in April 2021.

--- = not applicable

btoc = below top of casing

ID = identification assigned at the time of sample collection

J = Analyte present; value may or may not be accurate or precise.

J- = Analyte present; value may be biased low or value may be higher.

ng/L = nanogram(s) per liter

PFAS = per- and polyfluoroalkyl substances

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

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

USEPA = U.S. Environmental Protection Agency

Bold indicates the analyte was detected.

Shading indicates the result exceeded screening criteria.

Figures



Legend

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

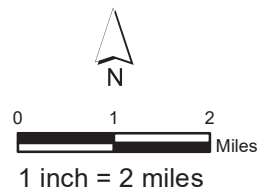
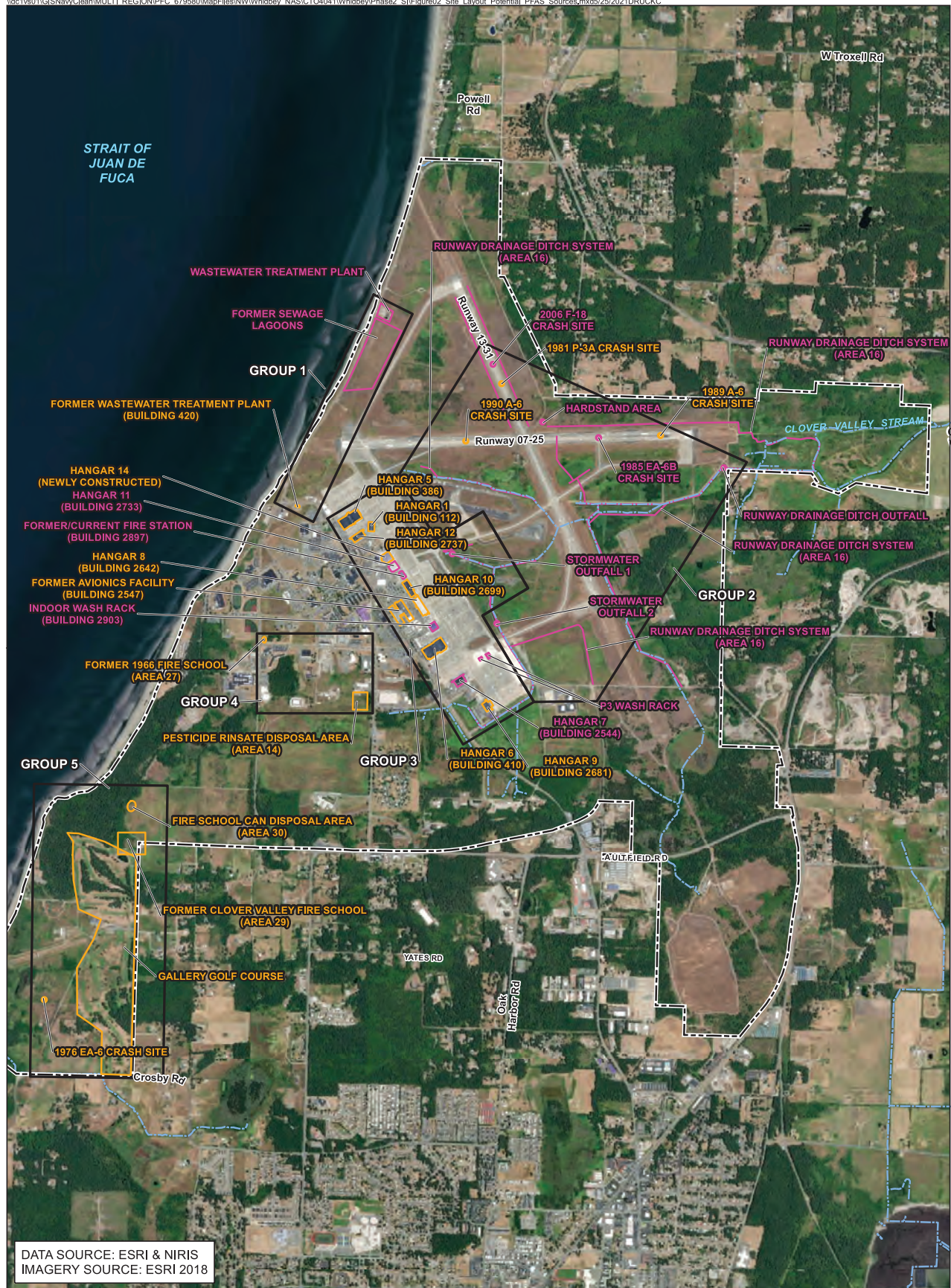


Figure 1
Base Location Map
Phase 2 Site Inspection Report
Naval Air Station Whidbey Island
Oak Harbor, Washington



Legend

- Surface Water
- Drainage Ditch
- Confirmed PFAS Release Area
- Potential PFAS Source Area
- PFAS Source Area Group
- Base Boundary

Note:
PFAS = Per- and Polyfluoroalkyl Substances

Confirmed PFAS Release Area color coding is based on the findings of the Preliminary Assessment (Navy, 2018a)

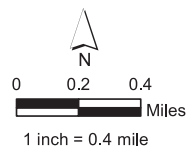


Figure 2
Site Layout with Potential PFAS Sources
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Legend

- Legend
- Stage 2 Existing Monitoring Well Sampled
 - Stage 2 Soil Borings
 - Stage 2 Monitoring Well Installation
 - Stage 3 Soil Boring and Shallow/Deep Monitoring Well Pair Installation
 - Surface Water
 - Drainage Ditch
 - Confirmed PFAS Release Area
 - Potential PFAS Source Area
 - Base Boundary

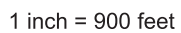


Figure 3
Stage 2/Stage 3 Sampling Locations
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

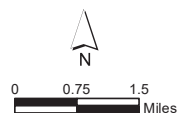
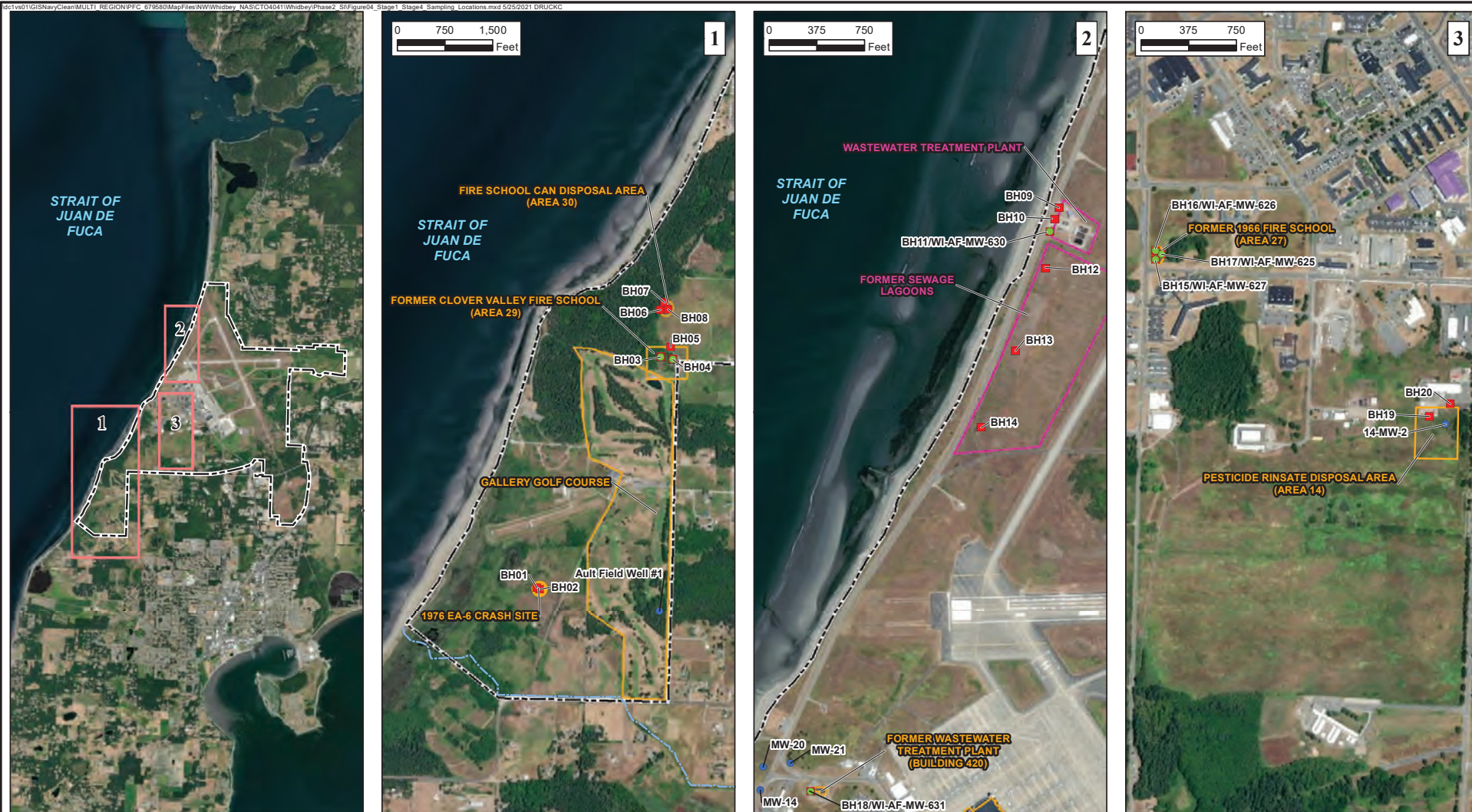
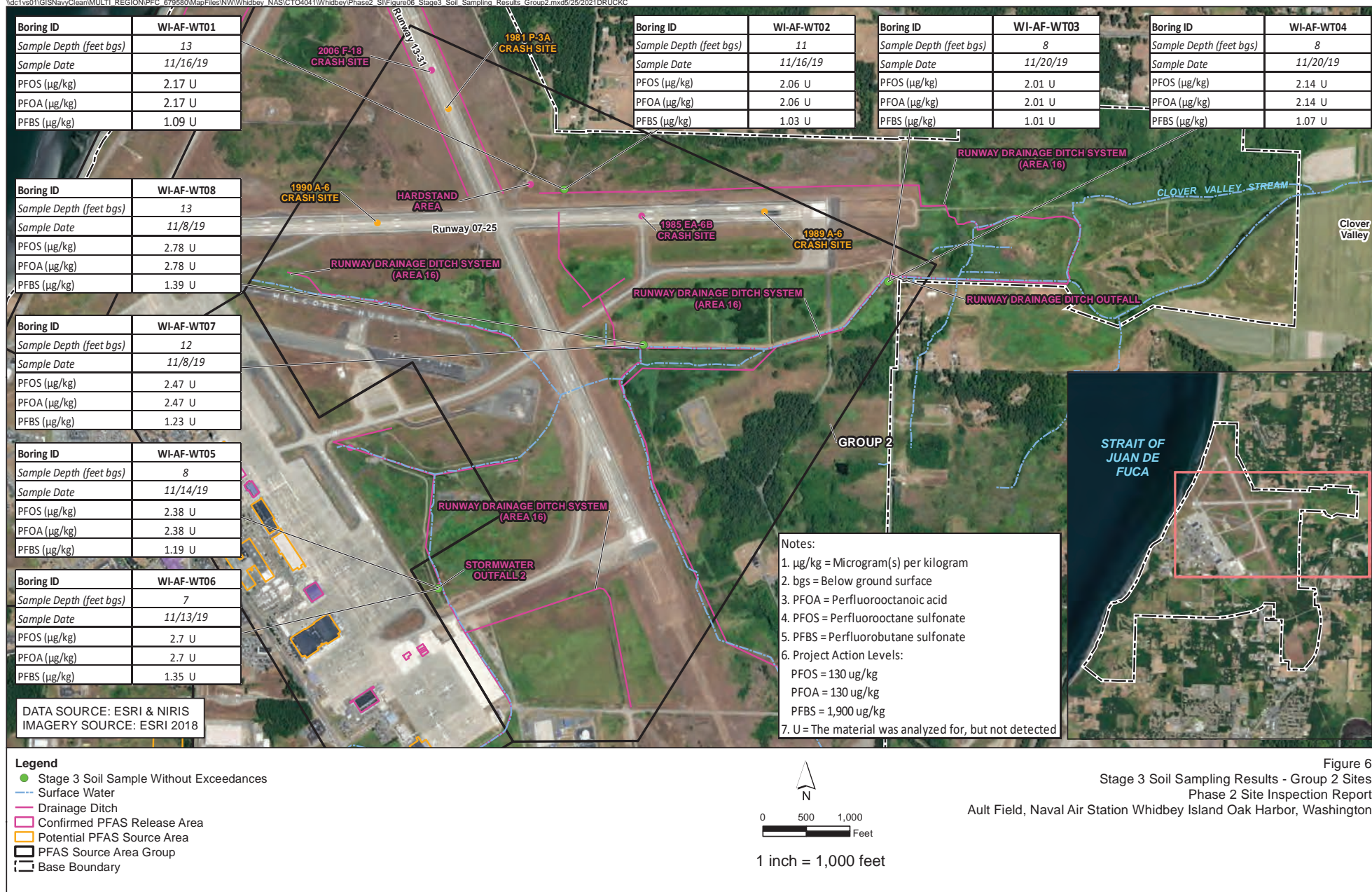
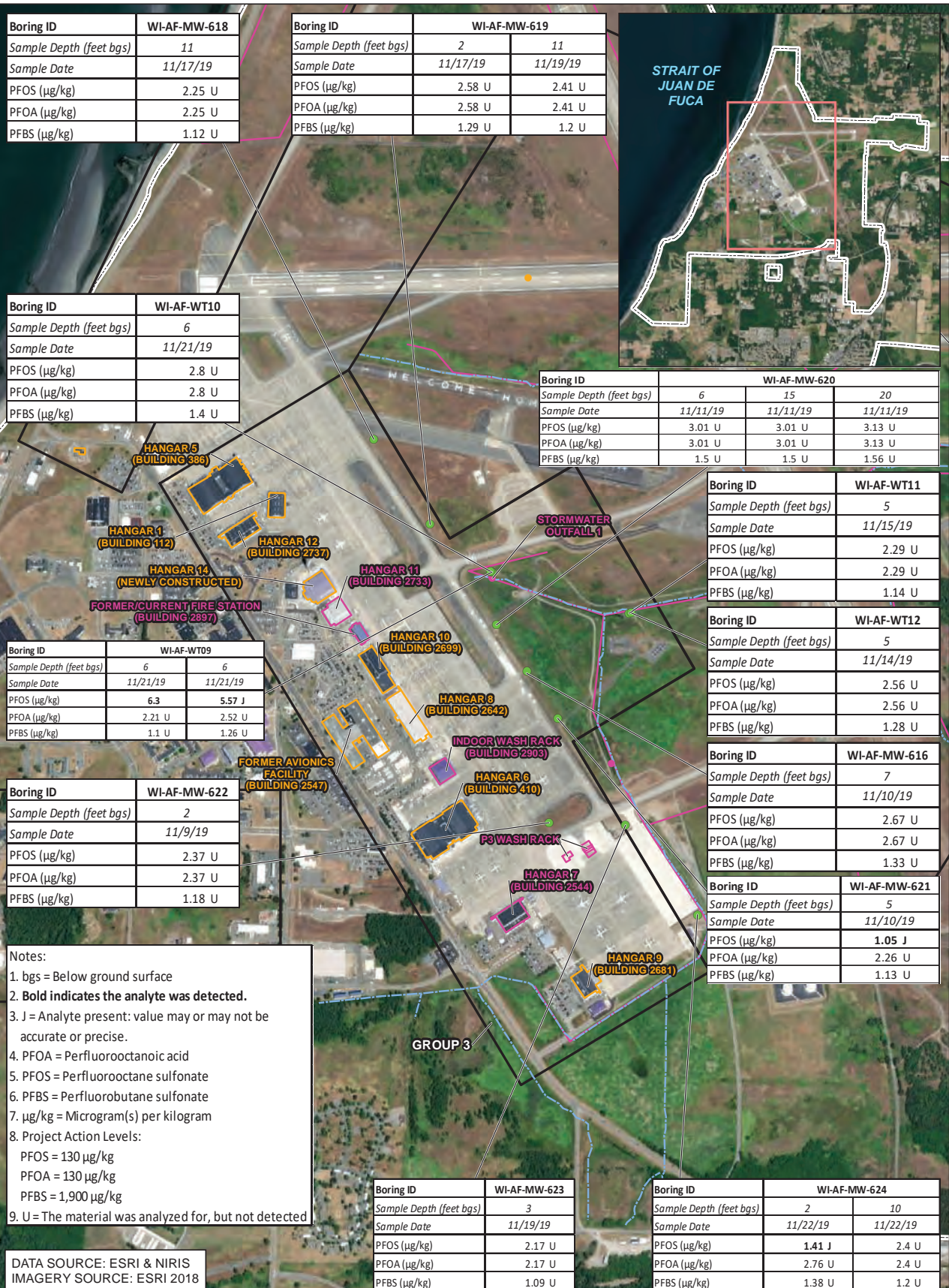


Figure 4
Stage 1/Stage 4 Sampling Locations
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington





Boring ID	WI-AF-BH15
Sample Depth (feet bgs)	47
Sample Date	7/27/20
PFOS (µg/kg)	2.4 U
PFOA (µg/kg)	2.4 U
PFBS (µg/kg)	1.2 U

Boring ID	WI-AF-BH16
Sample Depth (feet bgs)	53
Sample Date	7/25/20
PFOS (µg/kg)	2.13 U
PFOA (µg/kg)	2.13 U
PFBS (µg/kg)	1.06 U

Boring ID	WI-AF-BH17
Sample Depth (feet bgs)	53
Sample Date	7/25/20
PFOS (µg/kg)	2.63 U
PFOA (µg/kg)	2.63 U
PFBS (µg/kg)	1.32 U



- Notes:
1. µg/kg = Microgram(s) per kilogram
 2. bgs = Below ground surface
 3. PFOA = Perfluorooctanoic acid
 4. PFOS = Perfluorooctane sulfonate
 5. PFBS = Perfluorobutane sulfonate
 6. Project Action Levels:
PFOA: 130 µg/kg
PFOS: 130 µg/kg
PFBS: 1,900 µg/kg
 7. U = The material was analyzed for, but not detected

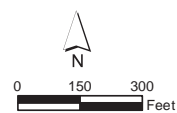
DATA SOURCE: ESRI & NIRIS
IMAGERY SOURCE: ESRI 2018

Boring ID	WI-AF-BH19
Sample Depth (feet bgs)	37
Sample Date	7/28/20
PFOS (µg/kg)	2.17 U
PFOA (µg/kg)	2.17 U
PFBS (µg/kg)	1.09 U

Boring ID	WI-AF-BH20
Sample Depth (feet bgs)	30
Sample Date	7/28/20
PFOS (µg/kg)	2.34 U
PFOA (µg/kg)	2.34 U
PFBS (µg/kg)	1.17 U

Legend

- Stage 4 Soil Sample With No Exceedances
- Potential PFAS Source Area
- PFAS Source Area Group
- Base Boundary



1 inch = 300 feet

Figure 8
Stage 4 Soil Sampling Results - Group 4 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Boring ID	WI-AF-BH07
Sample Depth (feet bgs)	36
Sample Date	7/14/20
PFOS (µg/kg)	2.38 U
PFOA (µg/kg)	2.38 U
PFBS (µg/kg)	1.19 U

Boring ID	WI-AF-BH06
Sample Depth (feet bgs)	35
Sample Date	7/15/20
PFOS (µg/kg)	2.07 U
PFOA (µg/kg)	2.07 U
PFBS (µg/kg)	1.04 U

Boring ID	WI-AF-BH08
Sample Depth (feet bgs)	34
Sample Date	7/14/20
PFOS (µg/kg)	2.11 U
PFOA (µg/kg)	2.11 U
PFBS (µg/kg)	1.05 U

Boring ID	WI-AF-BH03
Sample Depth (feet bgs)	47
Sample Date	7/16/20
PFOS (µg/kg)	2.3 U
PFOA (µg/kg)	2.3 U
PFBS (µg/kg)	1.15 U

Boring ID	WI-AF-BH04
Sample Depth (feet bgs)	54
Sample Date	7/16/20
PFOS (µg/kg)	2.42 U
PFOA (µg/kg)	2.42 U
PFBS (µg/kg)	1.21 U

Boring ID	WI-AF-BH01
Sample Depth (feet bgs)	29
Sample Date	7/20/20
PFOS (µg/kg)	2.2 U
PFOA (µg/kg)	2.2 U
PFBS (µg/kg)	1.1 U

Boring ID	WI-AF-BH05
Sample Depth (feet bgs)	44
Sample Date	7/15/20
PFOS (µg/kg)	2.21 U
PFOA (µg/kg)	2.21 U
PFBS (µg/kg)	1.1 U

Boring ID	WI-AF-BH02
Sample Depth (feet bgs)	13
Sample Date	7/20/20
PFOS (µg/kg)	2.29 U
PFOA (µg/kg)	2.29 U
PFBS (µg/kg)	1.14 U

Notes:

1. µg/kg = Microgram(s) per kilogram
2. bgs = Below ground surface
3. PFOA = Perfluorooctanoic acid
4. PFOS = Perfluorooctane sulfonate
5. PFBS = Perfluorobutane sulfonate
6. Project Action Levels:
 - PFOA = 130 µg/kg
 - PFOS = 130 µg/kg
 - PFBS = 1,900 µg/kg
7. U = The material was analyzed for, but not detected

DATA SOURCE: ESRI & NIRIS
IMAGERY SOURCE: ESRI 2018

Legend

- Stage 4 Soil Sample Without Exceedances
- Surface Water
- Potential PFAS Source Area
- Area 29 Burn Pad
- Mobile Turret Tower Range/Machine Gun Range
- PFAS Source Area Group
- Base Boundary

0 300 600 Feet
1 inch = 600 feet

Figure 9
Stage 4 Soil Sampling Results - Group 5 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Boring ID	WI-AF-BH09
Sample Depth (feet bgs)	11
Sample Date	7/21/20
PFOS (ng/L)	4.21 U
PFOA (ng/L)	14.6 J-
PFBS (ng/L)	2.99 J-

Boring ID	WI-AF-BH10	
Sample Depth (feet bgs)	11.5	41
Sample Date	7/22/20	7/23/20
PFOS (ng/L)	225 J-	1.18 U
PFOA (ng/L)	70.2 J-	1.78 J
PFBS (ng/L)	5.06 J-	4.41 J

Well ID	WI-AF-MW-630
Sample Depth (feet bgs)	11.5
Sample Date	8/19/20
PFOS (ng/L)	553
PFOA (ng/L)	37.2
PFBS (ng/L)	6.46

Boring ID	WI-AF-BH12	
Sample Depth (feet bgs)	11	39
Sample Date	7/23/20	7/23/20
PFOS (ng/L)	89.7 J-	2.2 U
PFOA (ng/L)	97.1 J-	2.06 J
PFBS (ng/L)	174 J-	1.4 U

Boring ID	WI-AF-BH13	
Sample Depth (feet bgs)	11	41
Sample Date	7/24/20	7/24/20
PFOS (ng/L)	10.7 J-	0.85 U
PFOA (ng/L)	119 J-	0.82 J
PFBS (ng/L)	216 J-	0.42 U

Boring ID	WI-AF-BH14	
Sample Depth (feet bgs)	21	40
Sample Date	7/24/20	7/24/20
PFOS (ng/L)	33.4 J-	0.86 U
PFOA (ng/L)	24.7 J-	1.29 U
PFBS (ng/L)	32.7 J-	0.43 U

Well ID	MW-14
Sample Depth (feet bgs)	15
Sample Date	8/14/20
PFOS (ng/L)	40.9 J
PFOA (ng/L)	16.0 J
PFBS (ng/L)	7.65 J

Well ID	MW-20
Sample Depth (feet bgs)	12.5
Sample Date	8/14/20
PFOS (ng/L)	125
PFOA (ng/L)	30.5
PFBS (ng/L)	10.4

Well ID	MW-21
Sample Depth (feet bgs)	10
Sample Date	8/13/20
PFOS (ng/L)	118
PFOA (ng/L)	39.0
PFBS (ng/L)	12.3

Well ID	WI-AF-MW-631
Sample Depth (feet bgs)	35
Sample Date	8/18/20
PFOS (ng/L)	5.83 U
PFOA (ng/L)	1.61 J
PFBS (ng/L)	1.69 J

Notes:

1. **Bold** = the analyte was detected.
2. **Bold and Shaded** = Exceedance
3. btoc = Below top of casing
4. J = Analyte present: value may or may not be accurate or precise.
5. J- = Analyte present: value may be biased low or the actual value may be higher.
6. ng/L = Nanograms per liter
7. PFOA = perfluorooctanoic acid
8. PFOS = perfluorooctane sulfonate
9. PFBS = perfluorobutane sulfonate
10. Project Action Levels:
PFOS: 40 ng/L
PFOA: 40 ng/L
PFBS: 600 ng/L
11. U = The material was analyzed for, but not detected

Legend

- Stage 4 Groundwater Sample Without Exceedances
- Stage 1 / Stage 4 Groundwater Sample With Exceedances
- Confirmed PFAS Release Area
- Potential PFAS Source Area
- PFAS Source Area Group
- Base Boundary

DATA SOURCE: ESRI & NIRIS
IMAGERY SOURCE: ESRI 2018

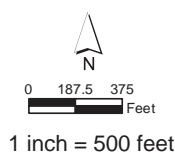


Figure 10
Stage 1 / Stage 4 Monitoring Well and Grab Groundwater
Sampling Results - Group 1 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Boring ID	WI-AF-BH07
Sample Depth (feet bgs)	24
Sample Date	7/14/20
PFOS (ng/L)	0.88 U
PFOA (ng/L)	1.32 UJ
PFBS (ng/L)	0.44 UJ

Boring ID	WI-AF-BH06
Sample Depth (feet bgs)	31
Sample Date	7/16/20
PFOS (ng/L)	0.77 J
PFOA (ng/L)	0.57 J
PFBS (ng/L)	0.55 U

Well ID	WI-AF-MW-629
Sample Depth (feet bgs)	65
Sample Date	8/18/20
PFOS (ng/L)	0.99 U
PFOA (ng/L)	1.36 UJ
PFBS (ng/L)	0.65 J

Well ID	WI-AF-MW-628
Sample Depth (feet bgs)	60
Sample Date	8/18/20
PFOS (ng/L)	2.77 U
PFOA (ng/L)	1.36 UJ
PFBS (ng/L)	0.28 J

Boring ID	WI-AF-BH01
Sample Depth (feet bgs)	40
Sample Date	7/20/20
PFOS (ng/L)	5.18 J-
PFOA (ng/L)	1.29 J-
PFBS (ng/L)	0.81 UJ

Notes:

1. **Bold** = the analyte was detected
2. btoc = Below top of casing
3. J = Analyte present; value may or may not be accurate or precise.
4. J- = Analyte present; value may be biased low or the actual value may be higher.
5. ng/L = Nanogram(s) per liter
6. PFOA = Perfluorooctanoic acid
7. PFOS = Perfluorooctane sulfonate
8. PFBS = Perfluorobutane sulfonate
9. Project Action Levels:
PFOS: 40 ng/L
PFOA: 40 ng/L
PFBS: 600 ng/L
10. U = The material was analyzed for, but not detected
11. UJ = The analyte was not detected; the quantitative limit may be inaccurate.
12. BH05 was dry and could not be sampled.

Boring ID	WI-AF-BH08
Sample Depth (feet bgs)	35
Sample Date	7/15/20
PFOS (ng/L)	0.88 U
PFOA (ng/L)	1.32 UJ
PFBS (ng/L)	0.53 U

Boring ID	WI-AF-BH02
Sample Depth (feet bgs)	35
Sample Date	7/20/20
PFOS (ng/L)	0.96 UJ
PFOA (ng/L)	1.44 UJ
PFBS (ng/L)	0.48 UJ

Well ID	Ault Field Well #1
Sample Depth (feet bgs)	NA
Sample Date	8/15/20
PFOS (ng/L)	0.91 U
PFOA (ng/L)	1.36 U
PFBS (ng/L)	0.45 U

- Legend**
- Stage 1 / Stage 4 Groundwater Sample Without Exceedances
 - Stage 4 Boring Location
 - Surface Water
 - Potential PFAS Source Area
 - Area 29 Burn Pad
 - Mobile Turret Tower Range/Machine Gun Range
 - PFAS Source Area Group
 - Base Boundary

DATA SOURCE: ESRI & NIRIS
IMAGERY SOURCE: ESRI 2018

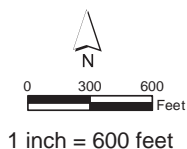
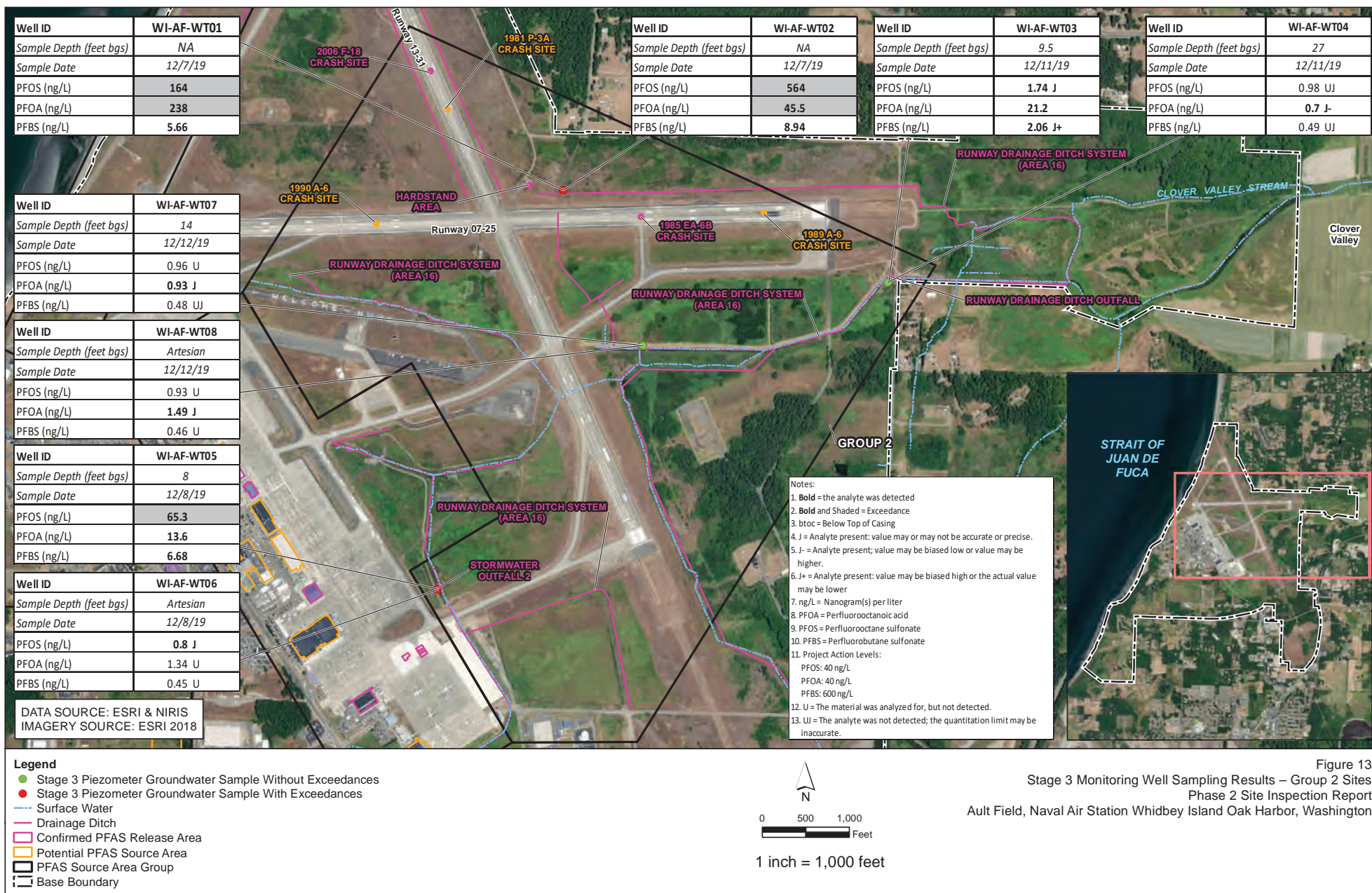
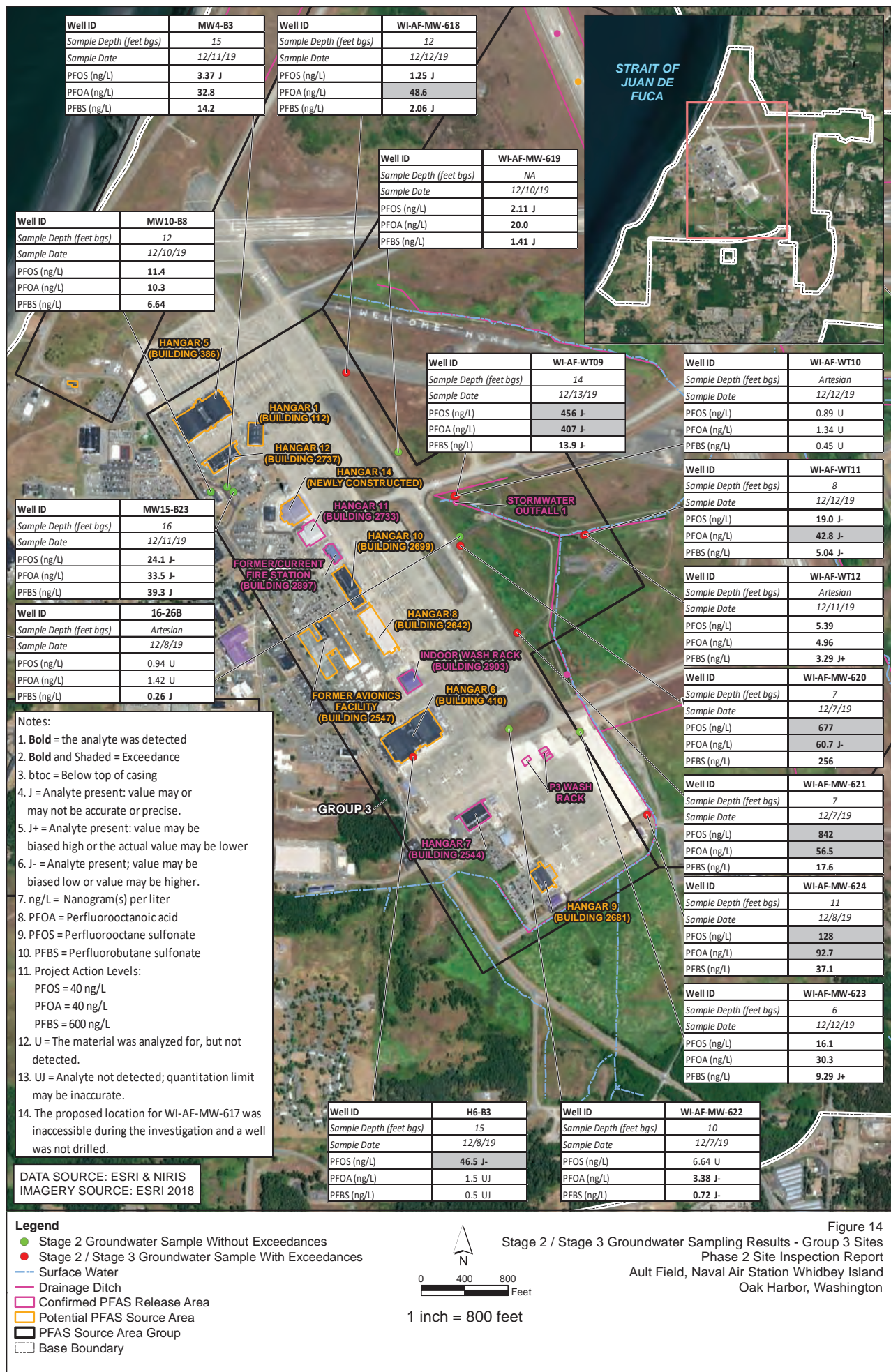


Figure 12
Stage 1 / Stage 4 Monitoring Well and Grab Groundwater
Sampling Results - Group 5 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington







Legend

- Stage 2 Surface Aquifer Monitoring Well
- Stage 1 Surface Aquifer Monitoring Well
- Surface Water
- Groundwater Elevation Contour (dashed where inferred)
- Inferred Groundwater Flow Direction (dashed)
- Drainage Ditch
- Confirmed PFAS Release Area
- Potential PFAS Source Area
- Base Boundary

Notes:

Groundwater elevation listed below well name (feet NAVD88)
19.33 = Anomalous reading, not used for contouring

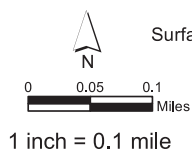
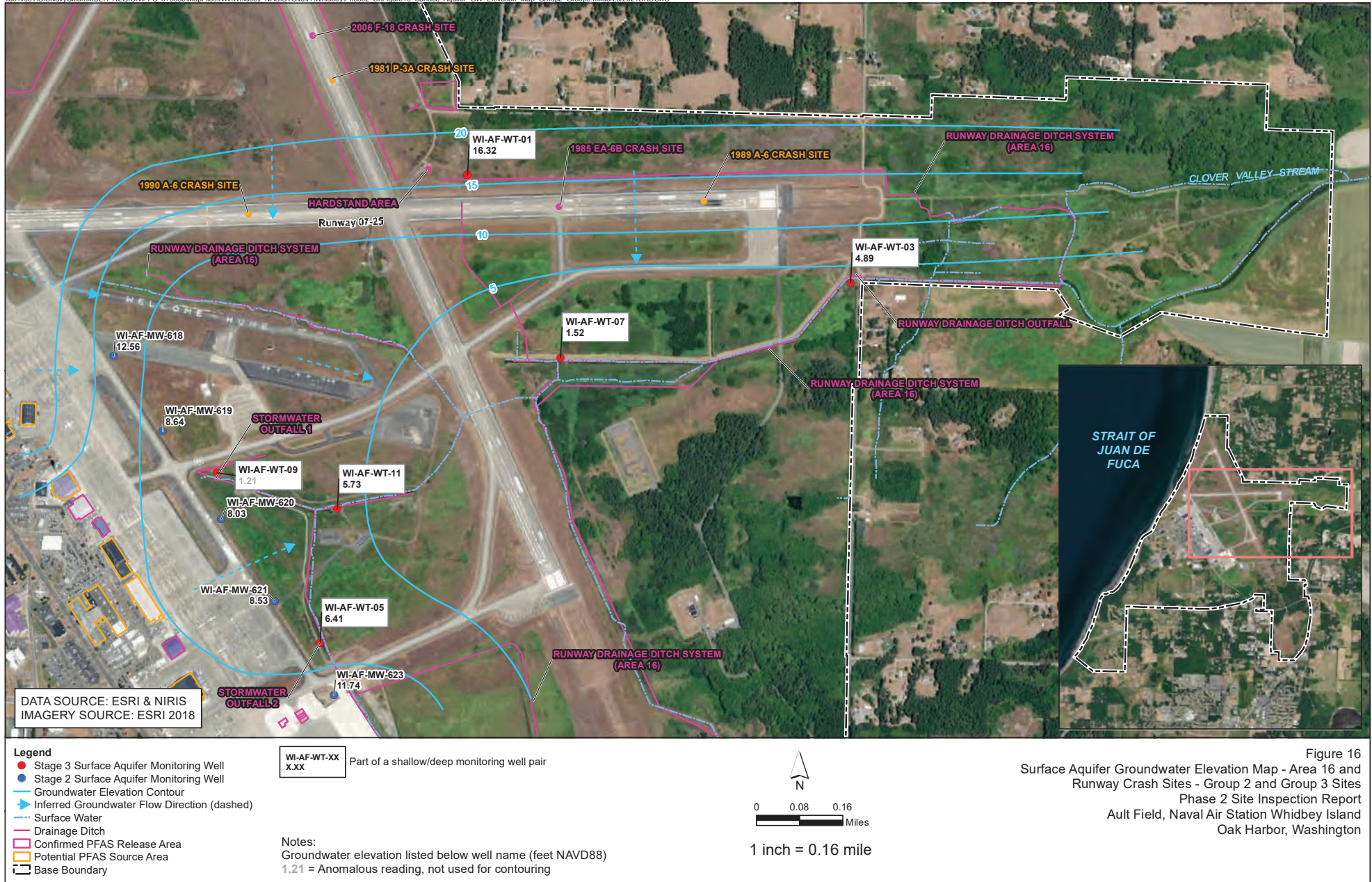
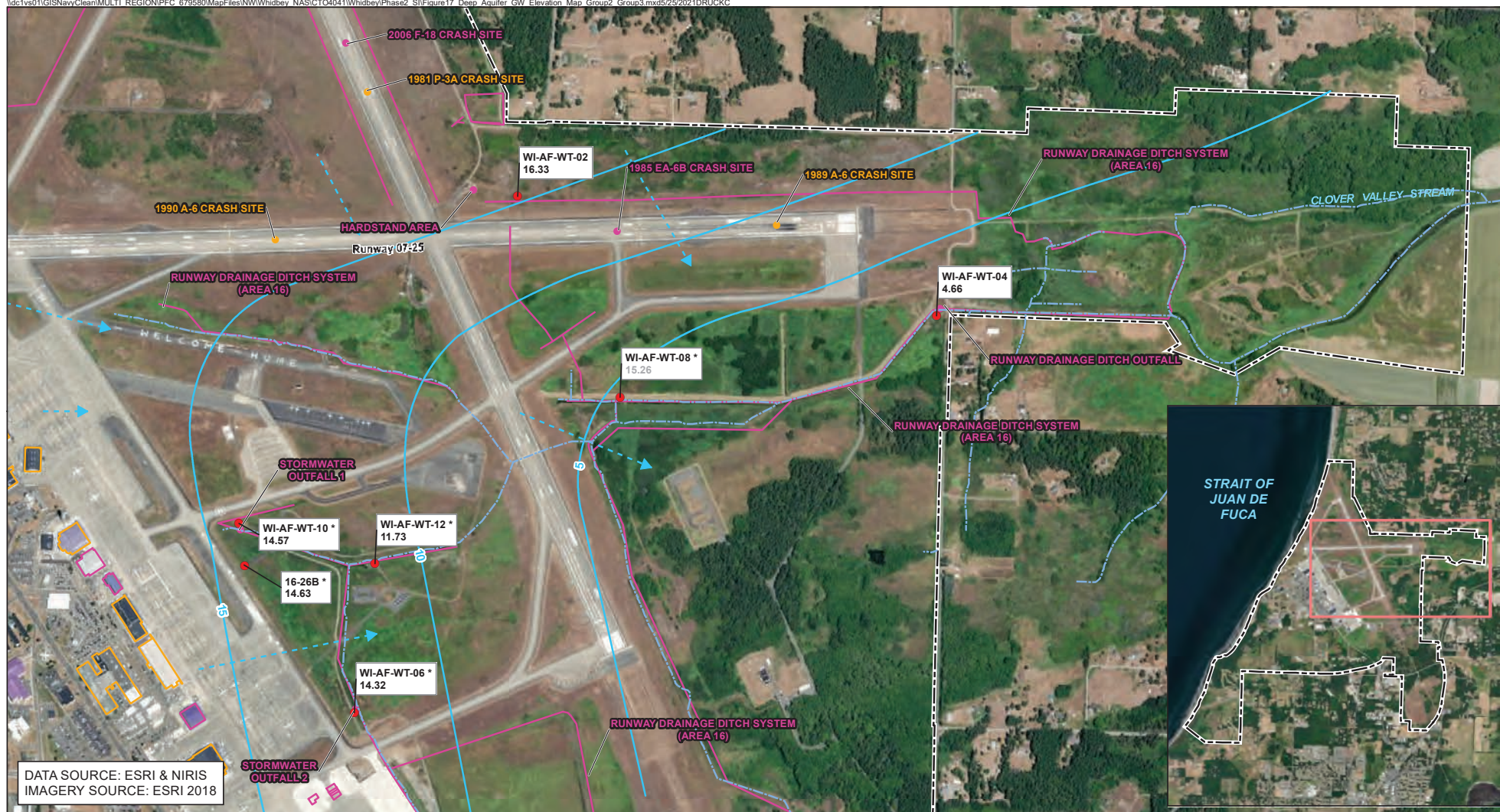


Figure 15
Surface Aquifer Groundwater Elevation Map - Group 3 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington



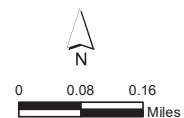


Legend

- Stage 3 Deep Aquifer Monitoring Well
- ➔ Inferred Groundwater Flow Direction (dashed)
- Groundwater Elevation Contour
- Surface Water
- Drainage Ditch
- Confirmed PFAS Release Area
- Potential PFAS Source Area
- Base Boundary

WI-AF-WT-XX
X.XX Part of a shallow/deep monitoring well pair

Notes:
 * = artesian well
 Groundwater elevation listed below well name (feet NAVD88)
 15.26 = Anomalous reading, not used for contouring



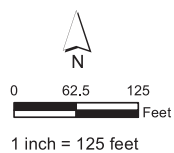
1 inch = 0.16 mile

Figure 17
 Deep Aquifer Groundwater Elevation Map - Area 16 and
 Runway Crash Sites - Group 2 and Group 3 Sites
 Phase 2 Site Inspection Report
 Ault Field, Naval Air Station Whidbey Island
 Oak Harbor, Washington



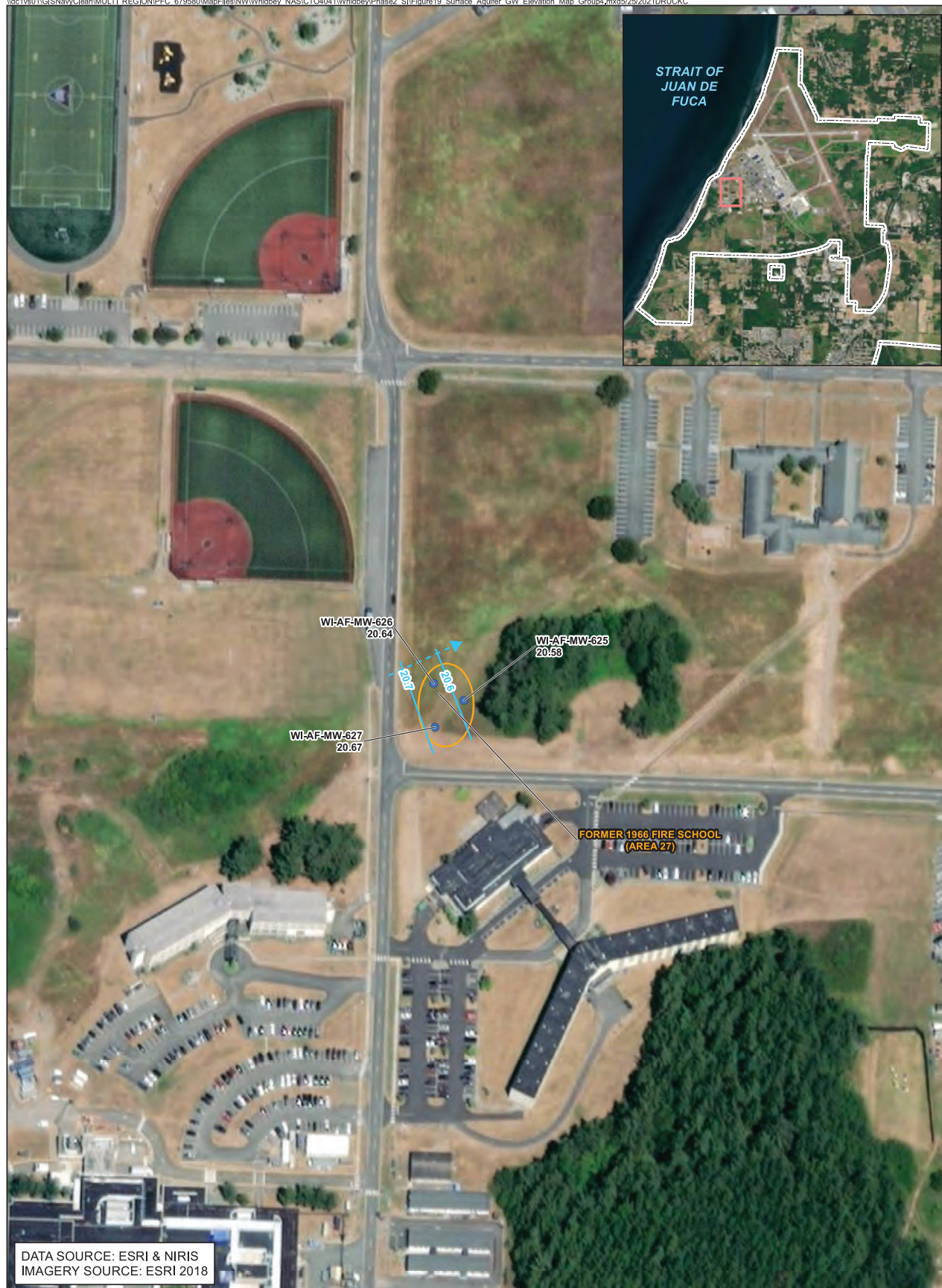
Legend

- Stage 1 Surface Aquifer Monitoring Well
- Groundwater Elevation Contour
- - - Inferred Groundwater Flow Direction (dashed)
- Potential PFAS Source Area
- Base Boundary

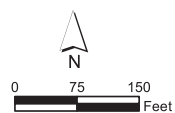


Notes:
Groundwater elevation listed below well name (feet NAVD88)

Figure 18
Surface Aquifer Groundwater Elevation Map - Group 1 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington



- Legend**
- Stage 4 Surface Aquifer Monitoring Well
 - Groundwater Elevation Contour
 - Inferred Groundwater Flow Direction (dashed)
 - Potential PFAS Source Area
 - ▬ Base Boundary



1 inch = 150 feet

Figure 19
Surface Aquifer Groundwater Elevation Map - Group 4 Sites
Phase 2 Site Inspection Report
Ault Field, Naval Air Station Whidbey Island
Oak Harbor, Washington

Note:
Groundwater elevation listed below well name (feet NAVD88)

Appendix A

Utility Verification Forms

ch2m Undergound Utility Verification

Project No.:	695610CH	Project Name:	NASWI Ault Field PFAS Inv. Phase 3
Site Address:	Whidbey Island Naval Air Station, Oak Harbor, WA		
Date:	7-13 to 7-14-2020	PM:	Jennifer Madsen
Utility Locator:	APS	Field Personnel:	L. Baumann, N. Parish, E. Hillburn
Ground Disturbance Scope and Equipment (drill rig, backhoe, or other):			

	Description	Yes	No*	NA/Notes
1	Obtained and reviewed available utility diagrams or as-built drawings for facility.	✓		
2	A facility contact with knowledge of utility locations was met onsite. Facility contact reviewed and approved proposed locations of intrusive work. Facility Contact: _____ Phone Number: _____		✗	N/A
3	Proposed ground disturbance areas are "white lined" by project team. White-lined areas should be a 20-foot minimum radius around the proposed ground disturbance location, unless buildings or hazards prohibit marking a 20-foot radius. White paint or pin flags should be used.	✗	✓	
4	Contacted the designated local utility notification service (such as 811) and notification ticket is current (according to state/provincial law, typically 10 to 15 days).	✓		
5	Public utility companies have been contacted and utilities located and marked. <div> <div>Present</div> <div>Not present</div> <div>Response method (mark, phone, email) & notes</div> </div> <div> <div>High-Voltage Electric</div> <div>Low-voltage Electric</div> <div>Gas</div> <div>Process/Fuel</div> <div>Water</div> <div>Storm</div> <div>Sewer</div> <div>Telecommunication</div> <div>Irrigation</div> </div>	✓		
6	Client- or facility-specific permit or procedure complete (such as dig permit).			N/A
7	A qualified, independent field survey provider performed a field survey to identify, locate, and mark potential subsurface utilities in the work area.	✓		
8	Independent field survey provider used appropriate instrumentation and geophysical technologies (for example, radio frequency [RF], electromagnetic [EM], ground-penetrating radar [GPR]). Describe methods: <u>GPR, RF, EM</u> RF, EM, and GPR are typically necessary. If one of these is not used, mark "No" and explain rationale in Utility SOP Deviation Request at the bottom of Page 2.	✓		
9	Oversight staff were present during independent utility survey.	✓		
10	A "360-degree" assessment has been performed, including walking the area and inspecting for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, light standards, drains, and vent risers.	✓		
11	Utilities have been properly identified and marked. Utilities are marked within a minimum 20-foot radius around the proposed drilling or excavation location, anticipating step out locations.	✓		
12	Utility marks are the appropriate color (red – electrical, yellow – gas; green – sewer; blue – water; orange – communication; purple – irrigation). Pink should be used for unknown/temporary.		✓	only color they had was white

ch2m Underground Utility Verification

	Description	Yes	No*	NA/Notes
13	Utility marks can be protected and preserved until no longer required (use whiskers or pin flags if necessary). If the utility location markings are destroyed or removed before intrusive work commences or is completed, the Project Manager (PM), Safety Coordinator, or designee must notify the independent field survey provider or the designated utility locating service to resurvey and remark the area.	✓		
14	Utility clearances are provided in writing and signed by the party conducting the clearance on the Buried Utility Tracking Form. See Page 3.	✓		
15	Private or public utilities within 5 feet of proposed locations are documented on the Buried Utility Tracking Form. See Page 3.	✓		
16	Documentation of the utility survey (report, updated utility site map, photo log) is complete.	✓		
17	When aggressive intrusive activities will be conducted within 5 feet, either laterally or vertically, of an underground utility, or when there is uncertainty about utility locations, drilling locations must be physically verified by non-aggressive means such as air or water knitting or hand digging. Describe planned clearance method and depth: _____			N/A
18	For drilling, non-aggressive clearance will be greater than the outside diameter of drill tooling.	✓		
19	When underground utility is within 5 feet of intrusive work, then non-aggressive means must be used to physically locate (daylight) the utility before a drill rig, backhoe, excavator, or other aggressive method is used. This step of daylighting is in addition to clearance of the borehole.			N/A
20	When an underground utility is within 5 feet of intrusive work, check to see if the utility can be isolated (locked out/tagged out and de-energized [purged as necessary] or blocked) during the subsurface activity. Hazardous utilities (gas, electrical) will be de-energized whenever possible. Verify with facility contact that isolation is completed according to the Lock Out Tag Out Standard Operating Procedure (SOP).			N/A
21	Only non-aggressive means may be used within 2 feet of an identified utility.			N/A
22	The following documentation will be available onsite during ground disturbance: <ul style="list-style-type: none"> • Available utility diagrams or as-built drawings • 811 notification • Facility-specific permit or procedure (dig permit) • Utility survey information (e.g. report, updated utility site map, photo log) 	✓		

Prepared by:

Lindsey Baumann
Field Personnel

Verified by:

PM

Instructions:

- 1) Complete and submit Underground Utility Verification Checklist to Health and Safety Manager (HSM) and PM.
- 2) Ensure that documentation is communicated to other field staff and available at the site during ground disturbance activities.
- 3) For items marked "No" above, complete the following utility SOP deviation request. Approvals may be provided via email or phone.

Utility SOP Deviation Request

Items Marked "No" above: #12 No Colored Marking Paint

Rationale for Deviation: APS team didn't have other paint colors

PM Approval: _____

Approved Date: _____

HSM Approval: _____

Approved Date: _____

ch2m Underground Utility Verification

Buried Utility Tracking Form

Check each box using an "X" if a buried utility is present within 5 feet of a marked location identification (ID).

[illegible]

The findings of the buried utility location activities summarized herein were conducted in accordance with the scope of work.

Matthew Pomeroy
Utility Locate Subcontractor's
Signature

7/14/2020
Date

ch2m Underground Utility Verification

Project No.:	695610.04.FI.UL	Project Name:	Ault Field PFAS Investigation
Site Address:	Ault Field, Oak Harbor, WA		
Date:	12/19/17	PM:	Janice Horton
Utility Locator:	APS	Field Personnel:	David Butler
Ground Disturbance Scope and Equipment (drill rig, backhoe, or other): Sonic drill rig			

	Description	Yes	No*	NA/Notes																																								
1	Obtained and reviewed available utility diagrams or as-built drawings for facility.	✓																																										
2	A facility contact with knowledge of utility locations was met onsite. Facility contact reviewed and approved proposed locations of intrusive work. Facility Contact: <u>Charlie Escola</u> Phone Number: <u>503-201-5020</u>	✓																																										
3	Proposed ground disturbance areas are "white lined" by project team. White-lined areas should be a 20-foot minimum radius around the proposed ground disturbance location, unless buildings or hazards prohibit marking a 20-foot radius. White paint or pin flags should be used.		✓																																									
4	Contacted the designated local utility notification service (such as 811) and notification ticket is current (according to state/provincial law, typically 10 to 15 days).	✓																																										
5	Public utility companies have been contacted and utilities located and marked. <table><thead><tr><th></th><th>Present</th><th>Not present</th><th>Response method (mark, phone, email) & notes</th></tr></thead><tbody><tr><td>High-Voltage Electric</td><td><input type="checkbox"/></td><td>✓</td><td><u>PSE / 811</u></td></tr><tr><td>Low-voltage Electric</td><td><input type="checkbox"/></td><td>✓</td><td><u>PSE / 811</u></td></tr><tr><td>Gas</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr><tr><td>Process/Fuel</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr><tr><td>Water</td><td>✓</td><td><input type="checkbox"/></td><td><u>City of Oak Harbor / Email</u></td></tr><tr><td>Storm</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr><tr><td>Sewer</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr><tr><td>Telecommunication</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr><tr><td>Irrigation</td><td><input type="checkbox"/></td><td>✓</td><td></td></tr></tbody></table>		Present	Not present	Response method (mark, phone, email) & notes	High-Voltage Electric	<input type="checkbox"/>	✓	<u>PSE / 811</u>	Low-voltage Electric	<input type="checkbox"/>	✓	<u>PSE / 811</u>	Gas	<input type="checkbox"/>	✓		Process/Fuel	<input type="checkbox"/>	✓		Water	✓	<input type="checkbox"/>	<u>City of Oak Harbor / Email</u>	Storm	<input type="checkbox"/>	✓		Sewer	<input type="checkbox"/>	✓		Telecommunication	<input type="checkbox"/>	✓		Irrigation	<input type="checkbox"/>	✓		✓		
	Present	Not present	Response method (mark, phone, email) & notes																																									
High-Voltage Electric	<input type="checkbox"/>	✓	<u>PSE / 811</u>																																									
Low-voltage Electric	<input type="checkbox"/>	✓	<u>PSE / 811</u>																																									
Gas	<input type="checkbox"/>	✓																																										
Process/Fuel	<input type="checkbox"/>	✓																																										
Water	✓	<input type="checkbox"/>	<u>City of Oak Harbor / Email</u>																																									
Storm	<input type="checkbox"/>	✓																																										
Sewer	<input type="checkbox"/>	✓																																										
Telecommunication	<input type="checkbox"/>	✓																																										
Irrigation	<input type="checkbox"/>	✓																																										
6	Client- or facility-specific permit or procedure complete (such as dig permit).			No permit. Contacted Navy personnel.																																								
7	A qualified, independent field survey provider performed a field survey to identify, locate, and mark potential subsurface utilities in the work area.	✓																																										
8	Independent field survey provider used appropriate instrumentation and geophysical technologies (for example, radio frequency [RF], electromagnetic [EM], ground-penetrating radar [GPR]). Describe methods: <u>RF, EM, GPR</u> RF, EM, and GPR are typically necessary. If one of these is not used, mark "No" and explain rationale in Utility SOP Deviation Request at the bottom of Page 2.	✓																																										
9	Oversight staff were present during independent utility survey.	✓																																										
10	A "360-degree" assessment has been performed, including walking the area and inspecting for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, light standards, drains, and vent risers.	✓																																										
11	Utilities have been properly identified and marked. Utilities are marked within a minimum 20-foot radius around the proposed drilling or excavation location, anticipating step-out locations.	✓																																										
12	Utility marks are the appropriate color (red – electrical; yellow – gas; green – sewer; blue – water; orange – communication; purple – irrigation). Pink should be used for unknown/temporary.	✓																																										

ch2m: Underground Utility Verification

	Description	Yes	No*	NA/Notes
13	Utility marks can be protected and preserved until no longer required (use whiskers or pin flags if necessary). If the utility location markings are destroyed or removed before intrusive work commences or is completed, the Project Manager (PM), Safety Coordinator, or designee must notify the independent field survey provider or the designated utility locating service to resurvey and remark the area.	✓		
14	Utility clearances are provided in writing and signed by the party conducting the clearance on the Buried Utility Tracking Form. See Page 3.	✓		
15	Private or public utilities within 5 feet of proposed locations are documented on the Buried Utility Tracking Form. See Page 3.	✓		No utilities
16	Documentation of the utility survey (report, updated utility site map, photo log) is complete.	✓		
17	When aggressive intrusive activities will be conducted within 5 feet, either laterally or vertically, of an underground utility, or when there is uncertainty about utility locations, drilling locations must be physically verified by non-aggressive means such as air or water knifing or hand digging. Describe planned clearance method and depth: <u>vac truck to 5-7ft</u>	✓		Not within 5ft
18	For drilling, non-aggressive clearance will be greater than the outside diameter of drill tooling.	✓		
19	When underground utility is within 5 feet of intrusive work, then non-aggressive means must be used to physically locate (daylight) the utility before a drill rig, backhoe, excavator, or other aggressive method is used. This step of daylighting is in addition to clearance of the borehole.			Not within 5ft
20	When an underground utility is within 5 feet of intrusive work, check to see if the utility can be isolated (locked out/tagged out and de-energized [purged as necessary] or blocked) during the subsurface activity. Hazardous utilities (gas, electrical) will be de-energized whenever possible. Verify with facility contact that isolation is completed according to the Lock Out Tag Out Standard Operating Procedure (SOP).			Not within 5ft
21	Only non-aggressive means may be used within 2 feet of an identified utility.			Not within 2ft
22	The following documentation will be available onsite during ground disturbance: <ul style="list-style-type: none"> • Available utility diagrams or as-built drawings • 811 notification • Facility-specific permit or procedure (dig permit) • Utility survey information (e.g. report, updated utility site map, photo log) 	✓		

Prepared by:

David Ball

Field Personnel

Verified by:

PM

Instructions:

- 1) Complete and submit Underground Utility Verification Checklist to Health and Safety Manager (HSM) and PM.
- 2) Ensure that documentation is communicated to other field staff and available at the site during ground disturbance activities.
- 3) For items marked No" above, complete the following utility SOP deviation request. Approvals may be provided via email or phone.

Utility SOP Deviation Request

Items Marked "No" above: 3) white line area

Rationale for Deviation: 20ft was measured from staked boring location. Ground conditions (high grass and hummocks) not conducive to painting/flagging.

PM Approval: _____

Approved Date: _____

HSM Approval: _____

Approved Date: _____

Buried Utility Tracking Form

Check each box using an "X" if a buried utility is present within 5 feet of a marked location identification (ID).

[illegible]

The findings of the buried utility location activities summarized herein were conducted in accordance with the scope of work.

Utility Locate Subcontractor's
Signature

Date _____

Appendix B
Soil Boring Logs with Well Completion
Diagrams



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH01

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/20/2020

END : 7/20/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	
5.0			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), loose, dry to slightly moist, fine- to coarse-grained, sub-angular to rounded SAND, with Gravel up to 1".	Hand cleared to 5 ft bgs. Breathing zone normal. Core screening normal.	Bentonite backfill.
			LEAN CLAY (CL) olive brown (2.5Y 4/3), stiff, dry.		
3.0			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), loose, dry, fine- to coarse-grained, sub-angular to rounded SAND, with Gravel up to 1".		
10.0			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), SAME AS ABOVE.		
15.0	10.0				
20.0					

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH01

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : *pending*

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : *pending*

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/20/2020

END : 7/20/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25.0	10.0		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
30.0			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), SAME AS ABOVE.	Sample WI-AF-BH01-SB-29 collected at 0950. Very loose.	
35.0	10.0			Increase in density.	
40.0					

Boring terminated at 40 ft bgs.

NEW SOIL BORING LOG; PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



2R1 PEVT NJ UBER:

Y69Y56VH

B1 RING NJ UBER:

BH0F

SHEET 5 10 F

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/20/2020

END : 7/20/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			WELL GRADED SAND WITH VLA(AND GRA- EL MWC)SVC olive brown (2.5Y 4/3), loose, dry, fine- to medium-grained, sub-round to round SAND, with low-plasticity Clay and fine-grained Gravel up to 1".		Bentonite backfill.
			LEAN VLA(WITH SAND MWC olive brown (2.5Y 4/3), stiff, dry CLAY, with coarse-grained Sand.	Spots of orange/red iron oxidation. Hand cleared to 5 ft bgs.	
5.0			WELL GRADED SAND WITH VLA(AND GRA- EL MWC)SVC olive brown (2.5Y 4/3), loose, moist, fine-grained SAND.	Breathing zone normal. Core screening normal.	
3.0					
10.0			WELL GRADED SAND WITH GRA- EL MWC olive brown (2.5Y 4/3), loose, moist, fine- to coarse-grained, sub-round to round SAND.		
			LEAN VLA(WITH GRA- EL MWC olive brown (2.5Y 4/3), stiff CLAY, with Gravel up to 2".		
15.0	10.0		WELL GRADED SAND WITH GRA- EL MWC olive brown (2.5Y 4/3), loose, moist, fine- to coarse-grained, sub-round to round SAND.	Sample WI-AF-BH02-SB-13 collected at 0950. Soft, low-plasticity clays observed. Breathing zone normal. Core screening normal.	
20.0					

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



2R1 PEVT NJ UBER:

Y69Y56VH

B1 RING NJ UBER:

BH0F

SHEET F 10 F

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : *pending*

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : *pending*

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/20/2020

END : 7/20/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25.0	10.0		WELL GRADED SAND WITH SILT AND GRA- EL (W)SUC olive brown (2.5Y 4/3), to olive gray (5Y 4/2), loose to slightly dense, moist, fine- to medium-grained SAND, with Gravel up to 2".	Increase in fine-grained sands. Breathing zone normal. Core screening normal.	
30.0			WELL GRADED SAND WITH SILT AND GRA- EL (W)SUC olive brown (2.5Y 4/3), SAME AS ABOVE.		
35.0	10.0			GW Sample WI-AF-BH02-GW-35 collected at 1100.	
40.0					

Boring terminated at 40 ft bgs.

NEW SOIL BORING LOG; PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH03/MW-629

SHEET 1 OF 3

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : 98.056 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 489238.69, E 1188272.09

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 43.1 ft bgs

START : 7/16/2020

END : 7/16/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
5	7.0		SANDY LEAN CLAY WITH GRAVEL (CL) olive brown (2.5Y 4/3), soft, dry to slightly moist, low-plasticity CLAY, with fine- to medium-grained Sand and fine-grained Gravel up to 1".	Sparse iron oxidation staining. Hand cleared to 5 ft bgs. Breathing zone normal. Core screening normal.	8 in steel flush mount well completion. Bentonite seal/fill.
10			LEAN CLAY (CL) olive brown (2.5Y 4/3), stiff, dry to slightly moist, low-plasticity CLAY.		
15	10.0				
20			LEAN CLAY (CL) olive gray (5Y 4/2), medium-stiffness, slightly moist CLAY, with sparse fine- to medium-grained, round Gravel.		
25	10.0				

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH03/MW-629

SHEET 2 OF 3

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : 98.056 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 489238.69, E 1188272.09

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 43.1 ft bgs

START : 7/16/2020

END : 7/16/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	
10.0				Breathing zone normal. Core screening normal.	
30			LEAN CLAY (CL) olive gray (5Y 4/2), SAME AS ABOVE.		
35	10.0				
40			LEAN CLAY (CL) olive gray (5Y 4/2), SAME AS ABOVE.		
45	10.0			Poorly-sorted, fine-grained sands observed.	
50					

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH03/MW-629

SHEET 3 OF 3

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : 98.056 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 489238.69, E 1188272.09

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 43.1 ft bgs

START : 7/16/2020

END : 7/16/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
55	10.0		LEAN CLAY (CL) olive gray (5Y 4/2), SAME AS ABOVE.	Breathing zone normal. Core screening normal. Increase in gravel volume and size up to 1.5".	
60			LEAN CLAY (CL) olive gray (5Y 4/2), SAME AS ABOVE.		Filter pack. 10 ft screen.
65	10.0				
70					
			Boring terminated at 70 ft bgs.		
75					

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH04/MW-628

SHEET 1 OF 3

Borehole Log

ROJ ETHz : NLAWI L8mFfi e R5pH (_ T/i an(

- J h Lz IJ N : J pSPgqxq WL

T- Tk Lz IJ N : 9d dM7 tnpB H z J h

DOI- - ING h J Nz OL h z J O LND DOI- - OIG : 2i e u EpsPi n) z d sPB x8an

h J J ODINLz TA : N Y7916d dM) T 1177Y6Yd(





DOI- - ING QTz SJ D LND TUVIRQTnz : OxrxHkafs

WLz TO - Tk T- : dYd tng. H

Az LOz : 6w dMw(0(0

TND : 6w dMw(0(0

- J GGTO : LcAi p,

DTRz S I T- J W GOJ VND AV OFL h T v8	OT h J k TO2 v8	GOL RSh - J G	AJ I- DTA h OIRz IJ N AJ I- NLQT) VA h A GOJ VRA2QI J -) h J - J O) QJ I Az VOT h J Nz TNz) OT- Lz I k T DTNAI z 2 J O h J NAI Az TNh 2) AJ I- Az OV h z VOT) QINTOL- J G2	h J QQTNz A DTRz S J F h LAING) DOI- - ING DTz LI- A) IN Az OVQTNz Lz IJ N	WT- - DTz LI- A	
d	7d		SANDY LEAN CLAY WITH GRAVEL (CL) x d/ i goxua v (d2 Yw3 Hktr) r q rx H e. 5r e B x f h) e u y n p H f s f n h - L2) u f f5 u i e y q r i r) t f a i y n x B i r f8 B y. q f a i r) H8 g y p a. 8 q o A p a r) t f a i y. q f a i r G q/ i e8 m r x 0 e t" p a r g e s P x o p a f s t b	Spar s e p d r r x d t n g. H b I d p r f a. b x a i a x d B p e h x d H d i a f a. a x d B p e z q p s i H x r h x t x p a. i f o x a x G r p r f x a c	 	7 f a H i i e t d H5 B x8 a n u i e s x B m e r f x a c I i a r x a f n i H p a f e
			LEAN CLAY (CL) x d/ i goxua v (d2 Yw3 Hktr) r q rx H e. 5r e B x f h) e u y n p H f s f n h - L2 c			
1d	10d		LEAN CLAY (CL) x d/ i . q, v d2 Yw3 B i r f8 B y Hktr) r q) e u y n p H f s f n h - L2) u f f5 H p d H t f a i y n x B i r f8 B y. q f a i r) a8 a r G q/ i e			
(0						
(d	10d					

NTW AJ I- I J OING - J G: Rz Qh INz2 OT d s- I : NLAWI LF_RSLAT(_ 019dGRE hS(Q GTJ zThS_1(dDz: 11w dMw(0



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH04/MW-628

SHEET 2 OF 3

Borehole Log

ROJ ETHz : NLAWI L8mFfi & R5pH (_T/i an(- J h Lz IJ N : J p PSpq xq WL

T- Tk Lz IJ N : 9d dM7 tnpB H z J h

DOI- - ING h J Nz OL h z J O LND DOI- - OIG : 2i & u EpsPi n z d sPB x8an

h J J ODINLz TA : N Y7916d dM T 1177Y6Yd(

DOI- - ING QTz SJ D LND TUVIRQTNz : OxrxHkafs

WLz TO - TkT- : dYd tng. H

Az LOz : 6v dMw 0(0

TND : 6v dMw 0(0

- J GGTO : LcAi p,

DTRz S I T- J W GOJ VND AV OF Lh T v8	OT h J k TO2 v8	GOL RSh - J G	AJ I- DTA h OIRz IJ N AJ I- NLQT) VA h A GOJ VRA2QI J -) h J - J O) QJ I Az VOT h J Nz TNz) OT- Lz Ik T DTNAIz 2 J O h J NAIAz TNh 2) AJ I- Az OVh z VOT) QINTOL- J G2	h J QQT N z A DTRz S J F h LAING) DOI- - ING DTz LI- A) IN Az OVQTNz Lz IJ N	WT- - DTz LI- A
	10d			I d pr6fa. bxai axdB pæ hxd H d i afa. axdB pæ	
40			LEAN CLAY (CL) xæ i . q, vd2 Yw3 ALQT LA LI J kTc		
4d	10d				
Y0			LEAN CLAY (CL) xæ i . q, vd2 Yw3 ALQT LA LI J kTc		
Yd	10d				
d0					

NTW AJ I- I J OING - J G: Rz Qh INz 2 OT d s- I : NLAWI LF_RSLAT(_019G GRE hS(Q GTJ zThS _1(dDz: 11v dMw 0



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH04/MW-628

SHEET 3 OF 3

Borehole Log

ROJ ETHz : NLAWI L8mFfi & R5pH (_T/i an(- J hLzIJ N : J pSPgqj WL

T-TkLzIJ N : 9ddM7 tnpBHj zJ h DOI- - ING hJ Nz OLhzJ O LND DOI- - OIG : 2i &u EpsPi nj z&sPBx8an




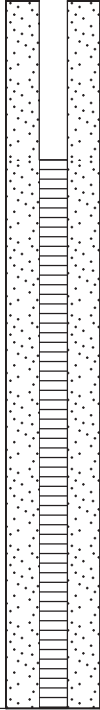
hJ J ODINLzTA : N Y7916ddM T 1177Y6Yd(DOI- - ING QTzSJ D LND TUVIRQTNz : OxrxHkafs

WLzTO - TkT- : dYd tng. H

Az LOz : 6vMw0(0

TND : 6vMw0(0

- J GGTO : LcAi p,

DTRzS I T-JW GOJ VND AV OFLhT v&	OT hJ k TO2 v&	GOL RSh - J G	AJ I- DTAh OIRz IJ N AJ I- NLQT) VAh A GOJ VRA2QI J -) hJ - J O) QJ I Az VOT hJ Nz TNz) OT- LzlkT DTNAIz2 J O hJ NAI Az TNh2) AJ I- Az OVh z VOT) QINTOL- J G2	hJ QQT N z A DTRzS J F h LAING) DOI- - ING DTz LI- A) IN Az OVQTNz Lz IJ N	WT- - DTz LI- A
dd	10d		LEAN CLAY (CL) x&/i . q, vd2 Yw3 ALQT LA LI J kTc	I d pr&fa. bxai axdB p&e hxd H&d i afa. axdB p&e	
			CLAYEY SAND WITH GRAVEL (SP-SC) x&/i . q, vd2 Yw3 B xfi h) nxx&e y. q r i r) B i r f8B y. qfai r ALND) ufr& &u y n& H i s f i h h q,) &x8ar Gq/i & par Af&e	Apar Hbi r i s& pH Hrx tfai y. qfai r c las& pH fa . q/i e/ x&B i par Hbi gi sxBi Htfai yrx B i r f8B y. qfai r c Apar . qpr pr&xa gi sxBi HB x& ui & qpr i r c Wi rc	F&ai ompsP&e 10 tnH&d i ac 
Md			I x&fa. n i &B fapi r pnM tng. H&		
6d					

NTW AJ I- I J OING - J G: RzQh INz2 OT&s- I : NLAWI LF_RSLAT(_O19GRE hS(Q GTJ zThS_1(&Dz: 11vMw0

Borehole Log

NDG" L 1 b PRk HO Jk (fnElr ft NFpxr l TLBr onl

vG1 k bJGR PGp3 SpadgawO k

LvL7kbJGR P N/A

: DJvJRY 1GRbDk1bGD kR: : DJv DJY Pmr ffg9 "ps3r rwb a(s3 2 g(on

1 GGD: JRk bLHP N/A

: DJvJRY LbSG: kR: LMQN LRb PDgrxgols

OkbLD vL7Lv P yy

Hbk Db P) ~~We~~W4I 4

LR: P) WeW4I 4

vGYYLD Pk. Hr ph

: LNbS ALvGO YDGOR: HODEK1L zfr		DL1 G7 LDmzfr	YDkNSJf vGY	HGJv : LH1 D.Nb.JGR HGJv Rk LwQH1HYDGQN.Hm AGvw 1 GvGDw G.HbQDL 1 GRbLRbWDLvkbJL : LRHbmdGD 1 GRHJbLR1 mWHGJv HbDQ1bQDLw JRLDkvGYm	1 G LRbH : LNbS GE1kHRYw : DJvJRY : LbkJvHw JRHbDQ LRbkbJGR	O Lvv : LbkJvH	
e.4	U4.4	Ue.4	I4.4	Ie.4	Ar orgolm dps3/lff.	<p>SANDY LEAN CLAY WITH GRAVEL (CL) gflBr dag9o d .emCvW-wxrl/vt ah rg 2 glxrwfg9ycfpxrlslrh 1 vk mw 9lrF /lor yrg 2 rti (2 yi aplort wx(dyag(ot rg ag(ot Hpot wpot /lor yi aplort YapBf f(c rg 4.) eu</p>	<p>Spot sfr part rg e/ndi x.</p> <p>Hcpaxr gapoi r lago g5lt prlgo xrploloi . bapsr x g/ gflBr i aph zemCvW- sfph. Aaprfloi Ogor oga2 pf. 1 gar xsar r oloi oga2 pf.</p>
						<p>LEAN CLAY (CL) gflBr dag9o d .emCvW-wxrl/vt ah rg xfli Frth 2 glxrwfg9ycfpxrlslrh 1 vkm</p>	<p>Hcpaxr xcgrx g/ gapoi r lago g5lt prlgo.</p> <p>Aaprfloi Ogor oga2 pf. 1 gar xsar r oloi oga2 pf.</p>
						<p>LEAN CLAY (CL) gflBr i aph zemCvW-wxrl/vt ahwfg9ycfpxrlslrh 1 vkmw9lrF xcpaxr /lor yrg 2 rti (2 yi aplort wag(ot YapBf f.</p>	<p>Aaprfloi Ogor oga2 pf. 1 gar xsar r oloi oga2 pf.</p>



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH05

SHEET 2 OF 2

Borehole Log

NDG" L1 b PRk HO Jk (fnElr ft NFpxr l TLBr onl

vG1 kbJGR PGp3 SpadgawO k

LvL7 kbJGR P pending

: DjrvJRY 1 GRbDk 1 bGD kR: : Djrv DjR Pmr ffg9 "ps3r mba s3 2 g(on

1 GGD: JkblHP pending

: DjrvJRY LbSG: kR: LMQN LRb PDgrxgols

OkbLD vL7Lv P yy

HbkDb Pj WwW4I 4

LR: Pj WwW4I 4

vGYLD Pk. Hr ph

LNbS ALvGO YDGOR: HQDEK 1L zfr	DL1 G7LDmzfr	YDKNSJ vGY	HGJv: LH1 DJNbJGR HGJv Rk LwQH1 HYDQON Hm AGvw 1 GvGDw GJHbQDL 1 GRbL RbwDLvkbJL : LRHbmGD 1 GRHJHbLR1 mwHGJv HbDQ1 bQDLw JRLDkvGYm	1G LRbH : LNbS GE1 kHRYw : DjrvJRY: LbkJHw JRHbDQ LRbkbJGR	OLvv: LbkJH
				Aa prFloI Ogor oga2 pf. 1 ga xsar oloi oga2 pf.	
4.4			LEAN CLAY (CL) gflBr i aph zemQW-wHk_L kH kAG7L.	Aa prFloI Ogor oga2 pf. 1 ga xsar oloi oga2 pf. Hr/r ox xflI Frth.	
e.4					
			LEAN CLAY WITH SAND AND GRAVEL (CL) gflBr i aph zemQW-wxg/mwflI Frth 2 glxn1 vkmw9lrF cggaHy apt rt wlor yi aplort wq(ot Hpot wpot /lor yng 2 rti(2 yi aplort YpBrf(c rg 4.) eu	Aa prFloI Ogor oga2 pf. 1 ga xsar oloi oga2 pf. Jbsa pxx lo i pBr fBg(2 r. Hpot i apt prigo dr sg2 rx 2 ga 9 rfyi apt rt 9lrF po losa pxx lo /lor yng 2 rti(2 yi aplort wq(ot xpot x. Hp2 cfr O Jk EyAS4eyHAYCC sgfrrsrt pnUCC4.	
C4.4					
Oe.4					
e4.4					

Agdoi n a2 loprt pne4/ndi x.



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH06

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/15/2020

END : 7/15/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	
5.0	9.5		SANDY LEAN CLAY WITH GRAVEL (CL) olive brown (2.5Y 4/3), soft, dry top slightly moist, low-plasticity CLAY, with poorly-graded, fine- to medium-grained Sand, and fine-grained, round Gravel up to 0.75".	Iron oxidation spots, roots. Hand cleared to 5 ft bgs. Stiff. Micas. No roots. Breathing zone normal. Core screening normal.	Bentonite backfill.
			SANDY LEAN CLAY WITH GRAVEL (CL) olive gray (5Y 4/2), SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
10.0			SANDY LEAN CLAY WITH GRAVEL (CL) olive gray (5Y 4/2), SAME AS ABOVE.	Moist	
15.0	10.0			Increase in gravel volume and size up to 1.5". Well-graded, fine- to medium-grained sand lens.	
20.0					

NEW SOIL BORING LOG; PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH06

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : pending

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : pending

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/15/2020

END : 7/15/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	
25.0	9.5		SANDY LEAN CLAY WITH GRAVEL (CL) olive gray (5Y 4/2), SAME AS ABOVE.	Soft/loose. Increase in sand and moisture.	
30.0			SANDY LEAN CLAY WITH GRAVEL (CL) olive gray (5Y 4/2), SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
35.0	10.0			Sample WI-AF-BH06-SB-35 collected at 1050.	
40.0					

Boring terminated at 40 ft bgs.

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH07

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/13/2020

END : 7/13/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
5.0	10.0		SANDY LEAN CLAY WITH GRAVEL (CL) olive brown (2.5Y 4/3), soft, dry, low-plasticity CLAY.	Hand cleared to 5 ft bgs. Breathing zone normal. Core screening normal.	Bentonite backfill.
10.0			GRAVELLY LEAN CLAY (CL) olive brown (2.5Y 4/3), dense, moist, low-plasticity CLAY, with Gravel up to 1.5", and fine-grained Sand.	Traces of iron oxide and black organic material. Decrease in organic material. Decrease in gravel size down to 0.75".	
15.0	10.0		GRAVELLY LEAN CLAY (CL) olive brown (2.5Y 4/3), SAME AS ABOVE.	Decrease in gravel size down to 0.25". Breathing zone normal. Core screening normal. Cobble ~4" diameter. Dry sand lens. Cobble ~4" diameter. Increase in gravel size up to 3". Dry fine-grained sand lens.	
20.0					

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH07

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : pending

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : pending

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/13/2020

END : 7/13/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25.0	10.0		SANDY FAT CLAY WITH GRAVEL (CH) Blueish gray (GLEY 2-6/SB), dense, dry to slightly moist CLAY, with loose, fine- to medium-grained Sand, and Gravel up to 2".	Breathing zone normal. Core screening normal. Cobble ~3" diameter. Decrease in sand volume. Increase in gravel volume. Decrease in gravel size down to 2".	
30.0			SANDY FAT CLAY WITH GRAVEL (CH) Blueish gray (GLEY 2-6/SB), SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
35.0	10.0		SANDY FAT CLAY WITH GRAVEL (CH) Blueish gray (GLEY 2-6/SB), dense, wet CLAY, with loose, fine- to medium-grained Sand, and Gravel up to 3".	Wet. Increase in sand volume. Increase in gravel size up to 3".	
40.0					

Boring terminated at 40 ft bgs.

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH08

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/14/2020

END : 7/14/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
5.0	10.0		SANDY LEAN CLAY WITH GRAVEL (CL) olive brown (2.5Y 4/3), loose, dry, low-plasticity CLAY, with fine-grained Sand, and Gravel up to 1".	Grass and roots. Hand cleared to 5 ft bgs. Breathing zone normal. Core screening normal.	Bentonite backfill.
10.0			LEAN CLAY WITH SAND (CL) olive brown (2.5Y 4/3), stiff, dry, low-plasticity CLAY, with poorly-graded, fine-grained, angular Sand.	Iron oxidation staining. Sparse medium-grained sand. Very stiff.	
15.0	10.0		LEAN CLAY WITH SAND (CL) olive brown (2.5Y 4/3), SAME AS ABOVE.	Stiff.	
20.0			LEAN CLAY WITH SAND (CL) olive brown (2.5Y 4/3), SAME AS ABOVE.	Increase in gravel volume.	
25.0	10.0		SANDY LEAN CLAY WITH GRAVEL (CL) olive gray (5Y 4/2), loose, dry CLAY, with fine- to medium-grained, round to angular Sand, and fine-grained Gravel up to 0.75".	Iron oxidation staining.	

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH08

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : pending

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : pending

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/14/2020

END : 7/14/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
10.0				Breathing zone normal. Core screening normal.	
30.0				Cobble ~4" diameter.	
35.0	10.0		SANDY LEAN CLAY WITH GRAVEL (CL) Blueish gray (GLEY 2-6/5B), soft, dry CLAY, with fine- to medium-grained Sand, and fine-grained, sub-angular to well-rounded Gravel up to 3".	Intermittent iron oxide staining.	
40.0				Sample WI-AF-BH08-SB-34 collected at 1715.	
45.0	10.0		SANDY LEAN CLAY WITH GRAVEL (CL) Blueish gray (GLEY 2-6/5B), SAME AS ABOVE.	Pulverized rock: shale, mineralized fractures (quartz), mica.	
50.0				Breathing zone normal. Core screening normal.	

Boring terminated at 50 ft bgs.

NEW SOIL BORING LOG: PTMCMINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/10/20

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES: N/A

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 7/21/2020

END : 7/21/2020

LOGGER : A. Seay

[illegible]

Boring terminated at 10 ft bgs.

NEW SOIL BORING LOG; PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 10/22/20



CRYJEFT NUMBER:

951905FH

BYRING NUMBER:

BH00

SHEET O Y2 P

Borehole Log

PRHQ/z E T" ACm I AGn Fø ft PBpxr 3: J5ron3

Hz AEIH" THpk SpadgaDm A

J JVAEIH" T N/A

wRI l" 9 z H" ERAz EHR A" w wRI RI9 T4r ffq(Qpskr rDEaGsk l gGon

z HHRwl" AEJCT N/A

wRI l" 9 MJESHw A" w JQUIPMJ" E TRgrtxgøø

mAEJR JVJ T ---

CEARE T7)33)3232

J" w T7)33)3232

H9 9 J R TA. Or py

wJ PES bJ_Hm 9 RHU" w CUFaz J YN	RJz HVJR4 YN	9 RAPSiz_H9	CHI wJCz RIPEIH" CHI " AMJ DUCz C9 RHUP C4 MbH D z H_HRDMHICEURJ z H" EJ" EDRJ AEIVJ wJ" CIE4 HR z H" CICEJ" z 4 DCHI CERUZ EURJ DMI" J RA_H9 4	z HMMJ" EC wJ PES HF z ACI" 9 D wRI l" 9 wJ EAI CD l" CERUMJ" EAEIH"	mJ wJ EAI C
e.2	e.2		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) gf6r dag(o Y3.e4 ,)uNDggxr D ayDø - rø sgpaxr-i øpørt D xGt-agGot rø agGot CA" wD øB fg(-Vfpxnsøy CdrDpot /ø - rø sgpaxr-i øpørt 9 ø5r f G/Vrø 3.eL		br orgøør dpsk/df.
02.2			CYYRL6 GRADED SAND (SC) gf6r dag(o Y3.e4 ,)uNDggxr D ayDg(-VfpxnsøyDø -i øpørt D CA" w.	Spot sfr part rø e/ndi x. Hø pøø l pñr øpf gdxr ørt . b ø prBøi hgor øga pf. z g ø xs ø r øøi øga pf.	
0e.2	02.2		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) gf6r dag(o Y3.e4 ,)uNDggxr D gøxrdø - rø sgpaxr-i øpørt D xGt-agGot rø agGot CA" wD øB fg(-Vfpxnsøy CdrDpot /ø - rø sgpaxr-i øpørt 9 ø5r f G/Vrø uL	mr n Cpl Vfr m l-AF-bS02-Cb-1.e sgffr smt pn0322. Cpl Vfr m l-AF-bS02-9 m-00 sgffr smt pn03, e. b ø prBøi hgor øga pf. z g ø xs ø r øøi øga pf. way. way.	
32.2			CYYRL6 GRADED SAND (SC) gf6r i øpy Y64 ,)NDggxr D gøxrdg(-VfpxnsøyDø -i øpørt D xGt-agGot rø agGot CA" w.	Cl pff xVgrx g/ ø t øgo gvd pñgo.	

" Jm CHI_bHRI" 9_H9: PEMz l" E4RJ.9_b: " ACml: AF: PSACJ3: 3201.9 PQ z S3M 9 JHEJz S: 03.9 wE: 02)33)32



CRYJEFT NUMBER:

951905FH

BYRING NUMBER:

BH00

SHEET P Y2 P

Borehole Log

PRHQZ E T" ACm I AGnFø ft PBpxr 3: J5ron3

Hz AEIH" THpk SpadgaDm A

J JVAEIH" T pending

wRI l" 9 z H" ERAz EHR A" w wRI RI9 T4r ffq(Qpskr tDEaGsk l gGon

z HHRwl" AEJCT pending

wRI l" 9 MJESHw A" w JQUIPMJ" E TRgrtxgoas

mAEJR JVJ T 02.2 /ndi x

CEARE T7)33)3232

J" w T7)33)3232

H9 9 JR TA. Or py

wJ PES bJ_Hm 9 RHU" w CURFaz J YN	RJz HVJR4 YN	9 RAPSiz_H9	CHI wJCz RIPEIH" CHI " AMJDUCz C9 RHUP C4 MbH D z H_HRDMHICEURJ z H" EJ" EDRJ AEIVJ wJ" CIE4 HR z H" CICEJ" z 4DCHI CERUZ EURJDMI" JRA H9 4	z HMMJ" EC wJ PES HF z ACI" 9 D wRI l" 9 wJ EAI CD l" CERUMJ" EAEIH"	mJ wJ EAI C
3e.2	02.2		WELL GRADED SAND WITH GRAVEL (SW-SM) gf5r i apy Y64 ,)3NDggxr D goxrDg(-VlpxnsayD/or - rg sgpxr-i apørt DkGd-agGot rg agGot CA" wD(øB/or - rg sgpxr-i apørt 9 ap5r f G/Vrg 3.eL	, Lsgddfr . b apBøi hgor oga pf. z ga xsar oøi oga pf.	
ue.2			WELL GRADED SAND WITH GRAVEL (SW-SM) gf5r i apy Y64 ,)3NDAMJ AC AbHVJ.	wr sar pxrt i ap5r f 5gfG r . losar pxrt i ap5r f 5gfG r .	
ue.2	02.2		CYYRL6 GRADED SAND (SC) gf5r i apy Y64 ,)3ND/or-i apørt D rff-agGot rt CA" w.	" g i ap5r f.	

bgæi na øprt pn, 2 /ndi x.

Borehole Log

PROJECT : NASWI Ault Field Phase 2 Event 2

LOCATION : Oak Harbor, WA

ELEVATION : 12.604 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 501230.4, E 1193964.12

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 12.8 ft bgs

START : 7/22/2020

END : 7/22/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS	
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION		
			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) olive brown (2.5Y 4/3), loose, dry, fine- to coarse-grained, sub-round to round SAND, with low-plasticity Silt, and fine- to coarse-grained Gravel up to 5".			8 in steel flush mount well completion.
				Hand cleared to 5 ft bgs.		Bentonite seal/fill.
			POORLY GRADED SAND (SP) olive brown (2.5Y 4/3), loose, moist, fine-grained SAND.	Layer of black organic material.		
5	5.0			Breathing zone normal. Core screening normal.		
						Filter pack.
10				Wet at 9 ft. Sample WI-AF-BH11-SB-9 collected at 0830.		5 ft screen.
	5.0			Increase in sand grain size to medium.		
15				Sands heaved creating a borehole TD of 13 ft bgs.		

Boring terminated at 15 ft bgs.

NEW SOIL BORING LOG; PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH12

SHEET 1 OF 2

Borehole Log

RJ T : Wnl FOW31 kwEt (gIt, Ri aCd 4 Wdb. 4

HT mwl kT O FT a52acr l dMl w

WHW wI kT O F N/A

VJ HHO- mT OI J wml T J wOV VJ H H J k FGdtl N : ao5d.M dEo5 s l Eb.

mT T J V iOwI W8 F N/A

VJ HHO- L W 2 T V wOV VQUIRL WOI FJ l . l O bpg

1 wI WJ HW WHF ww

3I wJ l F7p4up4S4S

WOV F7p4up4S4S

HT - - WJ FwB3dan

VWRI 2 hWHT 1 - J TUOV 3UJ (wml "B"	J WmT : WJ G "B"	- J wR2 km HT -	3 T H V W 8 m J R I k T O 3 T H O w L W M U 3 m 3 - J T U R 3 G L h T H M m T H T J M L T 8 I U J W m T O I W O I M W H m k W V W O 3 H G T J m T O 3 I 8 I W O m G M 8 T H 3 I J U m l U J W M L K O W J w H T - G	m T L L W O I 3 V W R I 2 T (m w 3 I O - M V J H H O - V W w H B M K O 3 I J U L W O I w l k T O	1 W H V W w H B
) B u B Y B 4 S B	u B / B		POORLY GRADED SAND WITH GRAVEL (SP) I t g d r d N b 3 B G y p u " M l I G l M m l p d v . l o l a c d v f c a g d , M C e r v d E b , 3 w O V M n g i o l a c d v f c a g d , - c a A d t E O . l u B	Handcl er tao5 l f abg s a.dagatB h a d a . i g d f z l b d b l c s a t B m l a l C o a d b g d f b l c s a t B	h d b . l b g d r a o 5 g t B
			POORLY GRADED SAND (SP) I t g d r d N b 3 B G y p u " M l I G l M l g l M p d v . l o l a c d v f c a g d , M C e r v d E b , 3 w O V B		
			POORLY GRADED SAND (SP) I t g d f c a n D G y p u " M l I G l M N d . M p d v . l o l a c d v f c a g d , M C e r v d E b , . l d E b , 3 w O V B	3 a s O t d 1 k w (v h 2 Y 4 v 3 h v B o l t t d o . d , a . Y Y) B	
			WELL GRADED SAND WITH GRAVEL (SW) I t g d f c a n D G y p u " M l I G l M N d . M p d v . l s d , g e s v f c a g d , M C e r v d E b , . l d E b , 3 w O V B	3 a s O t d 1 k w (v h 2 Y 4 v 1 v Y Y o l t t d o . d , a . Y Y) B	

OWM 3 T H H T J K O H T - 9 R I L m O I G J W B H 9 O w 3 1 k w l _ R 2 w 3 W 4 _ 4 S Y B R : 9 m 2 4 L - W T I W n 2 _ Y 4 B V 1 9 Y S 4 4 p 4 S



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH12

SHEET 2 OF 2

Borehole Log

RJ T : Wnl FOW31 kwEt (gIt, Ri aCd 4 Wdb. 4

HT mwl kT O FT a52acI dMl w

WHW wI kT O F pending

VJ HHO- mT OI J wml T J wOV VJ H H J k FGdtI N : ao5d.M dEo5 s I Eb.

mT T J VIOwl VB F pending

VJ HHO- L W 2TV wOV VQUIRL WOI FJ I .I Q bqp

1 wI WJ HW WHF ww

3I wJ I F7p4up4S4S

WOV F7p4up4S4S

HT - - WJ FwB3dan

VWRI 2 hWHT 1 - J TUOV 3UJ (wml "B"	J WmT ; WJ G B"	- J WRI 2 km HT -	3T H V W 8 m J R I k T O 3T H O w L W M U 3 m 3 - J T U R 3 G L h T H M m T H T J M L T I 8 I U J W m T O I W O I M W H m k W V W O 3 H G T J m T O 3 I 8 I W O m G M 8 T H 3 I J U m l U J W M L K O W J w H T - G	m T L L W O I 3 V W R I 2 T (m w 3 I O - M V J H H O - V W w H B M I O 3 I J U L W O I w I k T O	1 W H V W w H B
4) B	/ B		WELL GRADED SAND WITH GRAVEL (SW) I t g d f c a n D G y p t " M 8 w L W w 3 w H T ; V B	h o d a . i g f z l b d b l c s a t B m l a d G o a d b g f b l c s a t B	
u S B			WELL GRADED SAND WITH GRAVEL (SW) I t g d f c a n D G y p t " M 8 w L W w 3 w H T ; V B		
u) B	/ B		POORLY GRADED SAND (SP) I t g d f c a n D G y p t " M I G I M N d . M p d v c a g d , 3 w O V B	3 a s O t d 1 k w (h 2 Y 4 v - 1 w / a C N d t t a C L 3 p 3 V G a s O t d C a t t o l t t d o . d , a . Y y y S B	
y S B					

OWM 3T H H T J K O - H T - 9 R I L m O I G J W B H 9 O w 3 1 k w (_ R 2 w 3 W 4 _ 4 S Y / B R : 9 m 2 4 L - W T I W n 2 _ Y 4 B V I 9 Y S 4 4 p 4 S

hI g f . d s g a . d , a . y S e r f C B



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH13

SHEET 1 OF 2

Borehole Log

EF: J C6 MDw3v TwGt / ield Ehase - QJ Nent -

L: Cw6T O M ak HarborRv w

JLJ Vw6T O MN/A

SFTLLD, C: O6FwC6: F wOS SFTLL FT Maellop acketR6rGck moGht

C: : FSTw6J3 M N/A

SFTLLD, YJ6H: S wOS JU7 EYJO6 M Fotosonic

v w6JF LJ VJL M ---

36wF6 MPQ V0 4-4

JOS MPQ V0 4-4

L: , , JF Mw. 3eay

SJE6H BJL: v F: 7OS 37F/wCJ If8	FJC: VJFA If8	FWEHCL:	3: L SJ3CFE6T O 3: L OwYJR7 3C3, F: 7E 3AYB: LR C: L: FRY: B67FJ C: O6JO6FJLw6TJ SJ036A: F C: O3B6JOCAR3: L 36F7C67FJRYDJFWL: , A	C: YYJO63 SJE6H: / Cw3D, R SFTLLD, SJ6wL3R D36F7YJO6w6T O	v JLL SJ6wL3
5.4	" .5		WELL GRADED SAND WITH GRAVEL (SW) yellop l- .5A P0 8RooseRdryRop DilasticityRfineDto coarseDgrainedRsGbDdGnd to roGnd 3wOSRpith fineDto coarseDgrained , raNel Gu to - 9.	Hand cleared to 5 ft bgs. Layer of black organic material. Breathing zone normal. Core screening normal.	Bentonite backfill.
			POORLY GRADED SAND WITH GRAVEL (SP) ray l, LJA (D O8RooseRmoistRop DilasticityRfineDgrainedR sGbDdGnd to roGnd 3wOSRpith fineDto coarseDgrained , raNel Gu to - 9.	Cobble V0	
(4.4)			POORLY GRADED SAND (SP) oline 15A V0 8RooseRmoist to petRfineDgrainedRroGnd 3wOS.	Sark redish bropn l- .5 AF 1018 organics and roots.	
			WELL GRADED SAND WITH GRAVEL (SW) oline bropn l- .5A V0 8RooseRp etRfineDto coarseDgrainedRroGnd 3wOSRpith fineDgrained roGnd , raNel Gu to 4.59.	3 amule v Dv BH(1D B12.5 as pell as Y 30S samules collected at 4) 55. 3 amule v Dv BH(1D v D(collected at 4) 54 Na hydrouGch.	
(5.4)	(4.4)		POORLY GRADED SAND (SP) oline gray 15A V0 8RooseRp etRfineDgrainedRroGnd 3wOS.	Sark redish bropn l- .5 AF 1018 organics and roots.	
			WELL GRADED SAND WITH GRAVEL (SW) oline gray 15A V0 8RooseRp etRfineDto coarseDgrainedRroGnd 3wOSRpith fineDgrained roGnd , raNel Gu to (.59.		

QJv 3: I B: FTD, L: : E6YCTD6AFJ-, LB: Ow3v TDw GEHw3J-Q 4(2: E: CH-Y, J: 6JCHQ-., S6: ((B04



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH13

SHEET 2 OF 2

Borehole Log

EF: J C6 MDw3v TwGt / ield Ehase - QJ Nent -

L: Cw6T O M ak HarborRv w

JLJ Vw6T O M pending

SFTLLD, C: O6FwC6: F wOS SFTLL FT Maellop acketR6rGck moGht

C: : FSTw6J3 M pending

SFTLLD, YJ6H: S wOS JU7 EYJO6 M Fotosonic

v w6JF LJ VJL M 2.4 ft bgs

36wF6 MPQ V0 4-4

JOS MPQ V0 4-4

L: , , JF Mw. 3eay

SJE6H BJL: v F: 7OS 37F/wCJ lft8	FJC: VJFA lft8	FWEHCL: ,	3: L SJ3CFE6T O 3: L OwYJR73C3, F: 7E3AYB: LR C: L: FRY: B67FJ C: O6JO6FJLw6TVJ SJ036A: F C: O3B6JOCAR3: L 36F7C67FJRYDJFWL: , A	C: YYJO63 SJE6H: / Cw3D, R SFTLLD, SJ6wL3R D36F7YJO6w6T O	v JLL SJ6wL3
			WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM) oline gray 15A V0 RRooserpetRfineDto coarseDgrainedRoGnd , FwVJLRpith fineDto coarseDgrained 3andRand lop Dilasticity 3ilt.		
			POORLY GRADED SAND (SP) oline gray 15A V0 RRooserpetRop DilasticityRfineDgrainedRoGnd 3wOS.		
-5.4	) .4			Breathing zone normal. Core screening normal.	
14.4			POORLY GRADED SAND (SP) oline gray 15A V0 R3wYJ w3 wB: VJ.		
15.4	) .4				
			POORLY GRADED SAND (SP) oline gray 15A V0 RRooserpetRfineDgrainedRoGnd 3wOS.	3amule v DV/ BH(1D v DV collected at (4) 5 Na hydrouGch.	
16.4					

Boring terminated at 16 ft bgs.



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH14

SHEET 1 OF 2

Borehole Log

PFRQICE T, u37 vu) It Dield Phase -: J6ent -

RCuEvR, TRap Harbor/ 7 u

J JVuEvR, T N/A

SFv v N CR, EFuCERF u, S SFv F-W TAelloWQacpet/ Er) cp mo) nt

CRRFSv uEJ3 T N/A

SFv v N L JEHRs u, S JMQPL J, E TFotosonic

7 uEJF JVJ T ---

3EuFE TU9 w9 (- (

J, S TU9 w9 (- (

RNNJF Tu. 3ea4

SJPEHBJ R7 NFRQ, S 3QFDu CJ lft1	FJCRVJFA lft1	NFuPHC_RN	<u>3Rv SJ3CFvPEvR,</u> <u>3Rv , uL J/ Q3C3 NFRQP 3AL BR /</u> <u>CR RF/ L R8EQFJ CR, EJ, E/ FJ uEWJ</u> <u>SJ, 3vEArF CR, 3v8EJ, CA/ 3Rv</u> <u>3EFQCEQFJ/ L v JFu RNA</u>	<u>CRL L J, E3</u> <u>SJPEH RDCu3v N/</u> <u>SFv v N SJEv3/</u> <u>v 3EFQL J, EuEvR,</u>	<u>7 J SJEv3</u>
5.(	2.(		POORLY GRADED SAND (SP) light broWhish gra4 l- .5A 29 1' loose/ dr4/ fineygrained/ ro) nd 3u, S.	Hand cleared to 5 ft bgs. Breathing zone normal. Core screening normal.	Bentonite bacpfill.
k(.			POORLY GRADED SAND (SP) oli6e gra4 l5A w9 1' loose/ moist/ fineygrained/ ro) nd 3u, S/ With sGarse Nra6el) Gto (.5".	Sarp redish broWh l- .5 AF 0901 organics and roots obser6ed.	
k5.(	Y.5		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) oli6e gra4 l5A w9 1' loose/ V6t/ fineyto coarseygrained/ ro) nd 3u, S/ With loWYGasticit4 3ilt/ and finygrained Nra6el) Gto 0".	3 amGe 7 vuDyBHkw3Bykk collected at k0k(.	

J7 3Rv BRfv N RN: PEL Cv EAFJ N B: u37 v uD: PHu3J-: (KYNPQ CH-L NJREJCH: k- NSE: kk959 (



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH14

SHEET 2 OF 2

Borehole Log

PFRQICE T, u37 vu) It Dield Phase -: J6ent -

RCuEvR, TRap Harbor/ 7 u

J JVuEvR, T pending

SFv v N CR, EFuCERF u, S SFv F-W TAelloWQacpet/ Er) cp mo) nt

CRRFSv uEJ3 T pending

SFv v N LJEHRS u, S JMQPL J, E TFotosonic

7 uEJF JVJ T Y(ft bgs

3EuFE TU9 w9 (-

J, S TU9 w9 (-

RNNJF Tu. 3ea4

SJPEHBJ R7 NFRQ, S 3QFDu CJ lft1	FJORVJFA lft1	NF uPHC_RN	3Rv SJ3CFPEvR, 3Rv , uL J/ Q3C3 NFRQP 3AL BR / CR RF/ L R8EQFJ CR, EJ, E/ FJ uEWJ SJ, 3vEARF CR, 3v8EJ, CA/ 3Rv 3EFQCEQFJ/ L v JFu RNA	CRL L J, E3 SJPEH RDCu3v N/ SFv v N SJEv3/ v 3EFQL J, EuEvR,	7 J SJEv3
			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) oli6e gra4 I5A w9 1' 3uL J u3 uBRVJ.	3amGe 7 vuDyBHkwN7 y- k collected at k0w5 6ia h4droG) nch.	
			POORLY GRADED SAND (SP) oli6e gra4 I5A w9 1' loose/ V6t/ loVvGasticit4/ fineygrained/ ro) nd 3u, S.	Breathing zone normal. Core screening normal.	
			POORLY GRADED SAND (SP) oli6e gra4 I5A w9 1' loose/ V6t/ fineygrained/ ro) nd 3u, S.		

Boring terminated at w(ft bgs.



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH15/MW-627

SHEET 1 OF 3

Borehole Log

JERTPC: NWLSI FL8 il d Jhtsl (DP/Inr)

-RCL: RWNRtk. t d aq l L

P-POL: RWN57d60 etmsd: RC

9EF-FA CRW ELC: RE LW9 9EF- FA N2I cau Tt Hkl r): dHk ma8nr

CRRE9FWL: PS NWY64MQ d6) P 11614M d5

9EF-FA " P: . R9 LW9 PUVR" PW NEarasaniH

I L: PE -POP- N 57d fbs

S: LE: NM/MW(0

PW9 NM/MW(0

-RAAPE NLgSlt,

9PJ: BP-RI AERVW9 SVE_LCP v3	EPCROPE2 v3	AELJ: R- RA	SRF 9PSCEB: RW SRF WL" P)VSCSAERVJ S2" BR-) CR-RE)" RfS: VEP CRW PW)EP-L: fOP 9PWSF 2 RE CRWSIS: PWC2) SRF S: EVC: VEP)" fWPEL-RA2	CR" " PW S 9PJ: . R CLSFA) 9EF-FA 9P: LFS) fWS: EV" PW L: RW	I P-- 9P: LFS
5	7g		SANDY LEAN CLAY WITH GRAVEL (CL) ad/ l f aurn v (52 Y43 sae) aasl) dq) au yd sriHr, C- L2) uirh enl yra ml di8mybd inl d) s8f yt nb8d oSt nd) enl ybd inl d Ad / l c 8p ra (Gt nd Caff f t s 8p ra 5G	Spars aeican axidt riang . t nd Ht d d ra 5 f bsg Bd t rhinb zanl naomt g Cad shd l ninb naomt g	7 in srl l ca8sh ma8nr ul clampd riang Bl nranir sl t oag
10			SANDY LEAN CLAY WITH GRAVEL (CL) ad/ l f aurn v (52 Y43 srie) dq) au yd sriHr, C- L2) uirh enl y ra ml di8mybd inl d) s8f yt nb8d oSt nd) enl ybd inl d Ad / l c8p ra (G		
15	10g		SANDY LEAN CLAY WITH GRAVEL (CL) ad/ l f aurn v (52 Y43 SL" P LSLBROPg		

WPI SRF BREWA -RA: J: " CRW 2EPg- B: WL SI FL_DJ. LSP(D 016gAJT: C: (" APR: PC. DI(g9: 11640



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH15/MW-627

SHEET 2 OF 3

Borehole Log

JERTPC: NLSI FL8 il d Jht sl (DP/Inr (

-RCL: RWNrt k. t d aq l L

P-POL: RWN57460 et msq: RC

9EF-FA CRW ELC: RE LW9 9EF- FA N2I au Tt Hkl r): dHk ma8nr

CRRE9WL: PS NWY64MQ d6) P 11614M d5

9EF-FA " P: . R9 LW9 PUVB" PW NEarasaniH

I L: PE -POP- N 57 d f bs

S: LE: NMW0(0

PW9 NMW0(0

-RAAPE NLgSI t ,

9PJ: BP-RI AERVW9 SVE_LCP v83	EPCROPE2 v83	AELJ: R - RA	SRF 9PSCEB: RW SRF WL" P)VSCSAERVJ S2" BR-) CR-RE)" RfS: VEP CRW PW)EP-L: fOP 9PWSF 2 RE CRWSfS: PWC2) SRF S: EVC: VEP)" fWPEL-RA2	CR" " PW S 9PJ: . R CLSFA) 9EF-FA 9P: LFS) fWS: EV" PW L: RW	I P-- 9P: LFS
(5)	10g		SANDY LEAN CLAY WITH GRAVEL (CL) ad/ l bd , v52 YW3 ml di8mysræ sðbhræ maisr C- L2) uirh ul æbd dl d) ænl yra Hat æl ybd inl d) s8f yæ8nd ra æ8nd St ndg	9I Ht t sinb bd / l c/ a8ml g Bd t rhinb zanl naømt æ Cad stH l ninb naømt æ fHt t sl in siæ ra ænl ybd inl d st ndg fHt t sl in maisr8d g	
40			SILTY SAND WITH GRAVEL (SM) ad/ l bd , v52 YW3 dl nsl) maisr) ænl yra Hat æl ybd inl d) æ8nd SLW9) uirh æu ybd sriHr, Siæ) t nd ænl ybd inl d Ad/ l c8p ra (æ		
45	10g				
50					

WPI SRF BREWA -RA: J: " CRW 2EPg- B: WL SI fL DJ LSP(D 016AJT: C: (" APR: PC: D(fa9: 116W0



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH15/MW-627

SHEET 3 OF 3

Borehole Log

JERTPC: NLSI FL8r il d Jhtsl (DP/Inr (

-RCL: IRWNRtk. t d aq l L

P-POL: IRWN57d60 etmsd: RC

9EF-FA CRW ELC: RE LW9 9EF- FA N2I au Tt Hkl r): dHk ma8nr

CRRE9FWL: PS NWY64MQ d6) P 11614M d5

9EF-FA " P: . R9 LW9 PUVR" PW NEarasaniH

I L: PE -POP- N 57d fbs

S: LE: NM/MW(0

PW9 NM/MW(0

-RAAPE NLgSit ,

9PJ: BP-RI AERVW9 SVE_LCP v83	EPORPE2 v83	AELJ: R-RA	SRF 9PSCEB: IRW SRF WL" P)VSCSAERVJ S2" BR-) CR-RE)" RfS: VEP CRW PW)EP-L: fOP 9PWSF 2 RE CRWSfS: PWC2) SRF S: EVC: VEP)" fWPEL-RA2	CR" " PW S 9PJ: . R CLSfWA) 9EF-FA 9P: LFS) fWS: EV" PW L: IRW	I P-- 9P: LFS
Y5	10g		SILTY SAND WITH GRAVEL (SM) ad/ l bd , v52 YW3 SL" P LSLBROPg		
			POORLY GRADED SAND (SP) ad/ l bd , v52 YW3 easl)ul r SLW9g	St mpd I fL_yB. 15ySBYm Hd Hl d tr 11Y0g	_id opt Hkg
50			WELL GRADED GRAVEL WITH SILT (GW-GM) ad/ l bd , v52 YW3 easl)ul r) enl yra Hat sl ybd inl d) ul a8ndl d AELCP-) uirh saml ml di8myra Hat sl ybd inl d) ul a8ndl d St ndg	Bd t rhinb zanl naomt g Cad shd l ninb naomt g	10 a shd l ng
55	7g		POORLY GRADED SAND (SP) ad/ l bd , v52 YW3 easl)ul r) enl ybd inl d) ul a8ndl d SLW9g		
			WELL GRADED SAND WITH GRAVEL (SW) ad/ l bd , v52 YW3 easl)ul r) enl yra Hat sl ybd inl d) a8nd SLW9) uirh enl ybd inl d) a8nd Ad / l c8p ra 4g		_id opt Hkg

WPI SRF BREWA -RA: J: " CRW 2EPg-B: WL-SI fL_DJ_LSP(D 016AJT: C: (" APR: PC: DI(g9: 116W0

Badnb rl omint rld tr Q fbsg



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH16/MW-626

SHEET 1 OF 3

Borehole Log

JCREPv T : NASWI A4u Ftdu J5osd h P3dnr h

LRv ATIRN : RoV8oif ai, WA

PLPOATIRN : z2H (7 e oc su TRv

DCILLING v RNTCAv TRC AND DCILL CIG : mduab Eol Vdr, Ti4l Vc a4nr

vRRCDINATPS : N)97Y) Y1z9, P ((9(767H7

DCILLING " PT8RD AND PMQIJ " PNT : Carasanti

WATPC LPOPL : zYH e f xs

STACT : U0hz0h2h2

PND : U0hz0h2h2

LRGGPC : AHSdoy

DPJT8 wPLRW GCROND SQCFav P B1	CPV ROPCm B1	GCAJ8lv LRG	SRIL DPSv CIJTIRN SRIL NA" P, QSV S GCRQJ Srt' wRL, v RLRC, " RISTQCP v RNTPNPNT, CPLATIOP DPNSITmRC v RNSISTPNv m SRIL STCQv TQCP, " INPCALRGm	v R" " PNTS DPJ T8 RF v ASING, DCILLING DPTAILS, INSTCQ" PNTATIRN	WPLL DPTAILS
			SANDY LEAN CLAY WITH GRAVEL (CL) au3d f iabn B1z1m) 0'1, sae, uasd, . iy, uab-puesrtl try v LAm b tr5 end- ra c d. t4c -xiotnd, s4f -onx4ui Son, . on. end-xiotnd. Gio3duH	 Spars aeai onxd tian agt. ortanH Sac d aixontl s id. . ts5 f iabn B1z1 mC 70'1H 8 on. l uoid. ra z e f xsH widor5tnx / and naic ouH v aid sl iddntrnx naic ouH	 Y tn srddue4s5 c a4nr b duil ac puirtanH wdnrantrd sdou4uH
			SANDY LEAN CLAY WITH GRAVEL (CL) au3d f iabn B1z1m) 0'1, SA" P AS AwROPH		

NPW SRIL wRCING LRGk J T" vINTmCPH6LwNASWI_AF_J8ASPh_h2(9H6JEx v8h" GPRTPv8_h16DTk ((0202



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH16/MW-626

SHEET 2 OF 3

Borehole Log

JCREPv T : NASWI A4u Ftdu J5osd h P3dnr h

LRv ATIRN : RoV8oif ai, WA

PLPOATIRN : z2H(7 8 oc su TRv

DCILLING v RNTCAv TRC AND DCILL CIG : mduab Eol Vdr, Ti4l Vc a4nr

v RRCDINATPS : N)97Y) Y19, P ((9(767H7

DCILLING " PT8RD AND PMQJ " PNT : Carasanti

WATPC LPOPL : zYH 8 f xs

STACT : U0hz0h2h2

PND : U0hz0h2h2

LRGGPC : AH5doy

DPJT8 wPLRW GCRND SQCFav P B1	CPV ROPCm B1	GCAJ8lv LRG	SRIL DPSv CIJTIRN SRIL NA" P, QSV S GCRQJ Srt' wRL, v RLRC, " RISTQCP v RNTPN, CPLATIO DPNSITmRC v RNSISTPNv m SRIL STCQv TQCP, " INPCALRGm	v R" " PNTS DPJT8 RF v ASING, DCILLING DPTAILS, INSTCQ" PNTATIRN	WPLL DPTAILS
hz	(2H2		SANDY LEAN CLAY WITH GRAVEL (CL) au3d xioy Bzm) 0h1, c d. t4c -srte. iy ra sub5ny c atsr v LAm b tr5 bduxio. d. , dnd- ra l aoid-xiotnd. , s4f -ia4n. ra ia4n. Son. , on. dnd-xiotnd. , ia4n. Gio3du4p ra h;H	Inl idosd tn str af sdi3d. tn wsrz 8 ae tnrdi 3ouH widor5tnx / and naic ouH v aid sl iddntnx naic ouH	
72			SANDY LEAN CLAY WITH GRAVEL (CL) au3d xioy Bzm) 0h1, SA" P AS AwROPH	v af f uds 4p ra 7H2;H	
7z	(2H2				

NPW SRIL wRCING LRGk J T" v INTmCPH6LwKNASWI_AF_J8ASPh_h2(9H6JEx v 8h" GPRTPv 8 _ (ht6DTk ((0202



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH16/MW-626

SHEET 3 OF 3

Borehole Log

JCREPvT : NASWI A4u Ftdu J5osd h P3dnr h

LRv ATIRN : RoV8oif ai, WA

PLPOATIRN : z2H (7 8 oc su TRv

DCILLING v RNTCAv TRC AND DCILL CIG : mduab Eol Vdr, Ti4l Vc a4nr

vRRCDINATPS : N)97Y) Y19, P ((9(767)67

DCILLING " PT8RD AND PMQIJ " PNT : Carasanti

WATPC LPOPL : zYH 8 f xs

STACT : U0hz0h2h2

PND : U0hz0h2h2

LRGGPC : AH5doy

DPJT8 wPLRW GCRND SQCFav P B1	CPV ROPCm B1	GCAJ8lv LRG	SRIL DPSv CIJTIRN SRIL NA" P, QSV S GCRQJ Srt' wRL, v RLRC, " RISTQCP v RNTPNt, CPLATIOp DPNSITmRC v RNSISTPNv m SRIL STCQv TQCP, " INPCALRGm	vR" " PNTS DPJT8 RF v ASING, DCILLING DPTAILS, INSTCQ" PNTATIRN	WPLL DPTAILS
			SILTY SAND WITH GRAVEL (SM) au3d xioy Bzm) 0h1, . dmsd, c atsr dnd-xiotnd, ia4n. SAND, btr5 uab-pusrtf try Stur, on. dnd-xiotnd. Gio3du4p ra 7;H		
			SILTY SAND WITH GRAVEL (SM) au3d xioy Bzm) 0h1, SA" P AS AwROPH	widor5tnx / and naic ouH v aid sl iddntrnx naic ouH	
			POORLY GRADED SAND (SP) au3d xioy Bzm) 0h1, uasd, bdr, dnd-xiotnd, ia4n. SANDH	Soc pud WI-AF-w8 (6-Sw-z7 I audl rd. or (zh2H	
				Son. s 5do3d. I idortnx o f aid5aud TD aez9 8 f xsH	

waitnx rdi c nord. or 62 8 f xsH



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH1/ -MW275

SHEET 1 OF 3

Borehole Log

ETO: R1 N W ASF Awlr Dtdl. ECosd Y9R(dnr Y

LO1 ANOI V0of boicaiyF A

RLRJANOI WB3HBM6 6 o0 slyNO1

h T LL I G I OI NTA1NOT AI h h T LL T G W dlla/ : o5f dryNiw5f 0 awnr

1 OOT h I ANRS W 3u) 8Y) H6ByR MmB8YQH8

h T LL I G PRNb Oh AI h RUV EPRI N W arasant5

F ANRT LRJRL W BuH0 6 cxs

SNATN V6WBYkYk

RI h V6WBYkYk

LOGGRT WAHSdoz

hRENb nRLOF GTOVI h SVTDA1R 2a.	TRI OJRT4 2a.	GTAeb_1 LOG	<u>SOL hRS1 T ENOI</u> SOL I APRyVS1S GTOVE S4PmOLy 1 OLOTyPO SNVTR1OI NRI N yTRLANJR hRI SN4 OT 1OI S SNRI 14ySOL SNTV1 NVTRyP I RTALOG4	<u>1 OPPRI NS</u> hRENb OD1AS I Gy h T LL I G h RNALSy I SNTVPR I NANOI	<u>F RLL h RNALS</u>
B	8HB		SANDY LEAN CLAY WITH GRAVEL (CL) alt(d cia/ n 2YHB4 3y) ,ysaæylaasdy. izyla/ -plosrt5trz 1 LA4y/ trC / dll-xio. d. yend- ra 0 d. tw0 -xiotnd. yswc-onxwloi Son. yon. and- ra 5aoisd-xiotnd. Gio(dl wp ra) "H	Spars aeai onxd ti an agt. ortanH Spoisd clo5f aixont5s tn sparsH bon. 5ldoi d. ra B 6 cxsH h dnstrz tn5i dosds ra srtaH midorQnx 7and nai 0 olH 1 aid s5iddntnx nai 0 olH	8 tn srddl 6wsC0 awnr / dll 5a0 pldrtanH mdnrantrd sdol d l l H
			LEAN CLAY (CL) alt(d cia/ n 2YHB4 3y) ,ysrtæy. izyla/ -plosrt5trz 1 LA4H		
			SANDY LEAN CLAY WITH GRAVEL (CL) alt(d cia/ n 2YHB4 3y) ,ysrtæy. izyla/ -plosrt5trz 1 LA4y/ trC / dll-xio. d. yend- ra 5aoisd-xiotnd. yswc-onxwloi ra swc-iawn. Son. yon. Gio(dl H		
Mk			SANDY LEAN CLAY WITH GRAVEL (CL) alt(d cia/ n 2YHB4 3y) ,ySAPRAS AmQJRH		
MB	uHB				
Yk					

I RF SOLmOT I G LOG: ENP1 I N4TR6Lm I ASF 9AD9EbASRY9YKMu6E: : 1bYP GRONR1b9WM6H N MMBYk



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH1/ -MW275

SHEET 7 OF 3

Borehole Log

ETO: R1 N W ASF Awr Dtdl. ECosd Y9R(dnr Y

LO1 ANOI VOf boicaiyF A

RLRJANOI WB3HMB eo0 slyNO1

hT LL I G 1OI NTA1NOT AI h hT LL T G Wdlla/ :o5f dryNiw5f 0 awnr

1OOT h I ANRS W 3u)8Y)H6ByR MmBYQH8

hT LL I G PRNbOh AI h RUV EPRI N W arasant5

F ANRT LRJRL W BulQ cxs

SNATN V6WBYkYk

RI h V6WBYkYk

LOGGRT WAHSdoz

hRENb nRLOF GTOVI h SVTDA1R 2r	TRI OJRT4 2r	GTAEB_1 LOG	<u>SOL hRS1 T ENOI</u> SOL I APRyVS1S GTOVE S4PmOLy 1 OLOTyPO SNVTR 1OI NRI N yTRLANJR hRI SN4 OT 1OI S SNRI 14ySOL SNTV1 NVTRyP I RTALOG4	<u>1 OPPRI NS</u> hRENb OD1AS I Gy hT LL I G hRNALSy I SNTVPR I NANOI	<u>F RLL hRNALS</u>
YB	MkH		SANDY LEAN CLAY WITH GRAVEL (CL) alt(d xioz 2B4 3W,y0 d. tw0 -sræy. iz ra sltxQtz 0 atrs 1 LA4y/ trC / dll-xio. d. ydnd- ra 5aoisd-xiotnd. yswc-iawn. ra iawn. Son. y on. dnd-xiotnd. yiawn. Gio(dl wp ra MB"H	midorQnx 7and nai0 olH 1 aid s5iddntnx nai0 olH	
)k			SANDY LEAN CLAY WITH GRAVEL (CL) alt(d xioz 2B4 3W,ySAPR AS AmOJRH		
)B	MkH				
3k					

I RF SOLmOT I G LOG: ENP1 I N4TR46Lm I ASF 9AD9EbASRY9YKMu6E:: 1bYP GRONR1b9WM6hN MMBYk



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH1/ -MW275

SHEET 3 OF 3

Borehole Log

ETO: R1 N W ASF Awlr Dtdl. ECosd Y9R(dnr Y

LO1 ANOI V0of boicaiyF A

RLRJANOI WB3HBM6 eo0 slyNO1

hT LL I G 1OI NTA1NOT AI h hT LL T G W dlla/ : o5f dryNiw5f 0 awnr

1 OOT h I ANRS W 3u) 8Y) H6ByR MMIMBYQH8

hT LL I G PRNb Oh AI h RUV EPRI N W arasant5

F ANRT LRJRL W BulQ e cxs

SNATN V6WBYkYk

RI h V6WBYkYk

LOGGRT WAHSdoz

hRENb mRLOF GTOVI h SVTDA1R 2x	TRI OJRT 4 2x	GTAeb 1 LOG	<u>SOL hRS1 T ENOI</u> SOL I AP RyVS1S GTOVE S4PmOLy 1 OLOTyPO SNVTR 1OI NRI N yTRLANJR hRI SN4 OT 1OI S SNRI 14ySOL SNTV1 NVTRyP I RTALOG4	<u>1 OPPRI NS</u> hRENb OD1AS I Gy hT LL I G hRNA LSy I SNTVPR I NANOI	<u>F RLL hRNA LS</u>
3B	MkH		SANDY LEAN CLAY WITH GRAVEL (CL) alt(d xioz 2B4 3W,ySAP R AS AmOJRH		
			SILTY SAND WITH GRAVEL (SM) alt(d xioz 2B4 3W,y. dnsdy. izyend-xiotnd. yiawn. SAI hy/ trC Gio(dl wp ra) "H	I a xio(dIH	
Bk			SILTY SAND WITH GRAVEL (SM) alt(d xioz 2B4 3W,ySAP R AS AmOJRH	midorQnx 7and nai0 oIH 1 aid s5iddntnx nai0 oIH	Dlrdi po5f H
BB	MkH		POORLY GRADED SAND (SP) alt(d xioz 2B4 3W,ylaasdy/ dryend-xiotnd. yiawn. SAI h H	So0 pld F -AD-mb M6-Sm-B) 5alld5rd. or MkYBH h wpl5ord so0 pld F -AD-mb M6-SmE-B) 5alld5rd. or Mk) kH	Mk e s5iddnH
Qk					

maitrnx rdi0 thord. or Qk e cxsH

I RF SOLmOT I G LOG: ENP1 I N4TR46Lm I ASF 9AD9EBASRY9YKMu6E: 1bYP GRONR1b9WM6hN MMBYk



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH18/MW-631

SHEET 1 OF 2

Borehole Log

JET : NCWI GA7F SA. 5. 05 Jgdno 3DNRox3

6T CAVS GIT dYcdpF A

N6NkAVS G I O H99 bxdm5 WTC

" E\$6\$P CTGWEACWT E AG" " E\$6 E\$P I) o\$av : dl Yox Vb I Yma. rx

CTTE" \$AWN7 I G , 9u/ f 3H1- N 0093w33Hf

" E\$6\$P MNWt T" AG" NQU\$MNGWI Eaxanar d

F AWNE 6NkN6 I 19W/ bxBt n

7WAEWI V2923w3w

NG" I V2923w3w

6T P P NE I AH7od0

" NJWt hN6TF PETUG" 7UE_ACN 4y	ENCTkNE) 4y	PEAJc\$6TP	<u>7T\$ " N7CESW\$G</u> 7T\$ GAMN-U7C7 PETUJ 7) MhT6- CT6TE-MT\$WJEN CTGWNGW EN6AVN " NG7\$V TE CTG7\$VNGC) - 7T\$ <u>7WEUCWJEN- M\$NEA6TP)</u>	<u>CTMMNGW</u> " NJWt T CA7\$P- " E\$6\$P " NWA\$7- \$7WEUMNGVAW\$G	<u>F N66 " NWA\$7</u>
f	uhw		SILTY SAND WITH GRAVEL (SM) i dpy't pd0ng Bpav r 43Hf) , 23y- 5aano-i p0- b\$ olt pde oi - pa. ri 7AG" - v eg \$av L(\$lnx e0 7 d\$ dr i PpdRb5. (xa CBH	<p>\$ar ase ondx et xgpa. tga. x. r eH c dr i l \$dpoi xa f bxBt nH</p> <p>hpd\$ge t zar o rapmd\$H Capo nl poor et r apmd\$H</p> <p>7 amo e xopm\$oi \$odr l \$l0H</p>	<p>/ e n\$oo5t\$ ng ma. rx v o\$li am(5xar H</p> <p>hor xar eo nod\$5H</p>
Qw			SILTY SAND (SM) i dpy't pd0ng Bpav r 43Hf) , 23y-i or no- maen\$ b\$ olt pde oi - pa. ri 7AG" - v eg \$av L(\$lnx e0 7 d\$		
Q	uhw		SILTY SAND WITH GRAVEL (SM) i dpy't pd0ng Bpav r 43Hf) , 23y-i or no- maen\$ 7AG" - v eg \$av L(\$lnx e0 7 d\$ dr i PpdRb5. (xa 38H	<p>CaBB\$ 1H\$H</p> <p>7 amo e xopm\$oi \$odr l \$l0H</p>	
3w			POORLY GRADED SAND (SP)		

GNF 7T\$ hTES\$P 6TP: JWMCS\$W ENH\$6h; GA7F \$A DJcA7N3D3wCBH J:: Cc 3M PNT VNCc DO\$H\$ " W 00\$ 23w



PROJECT NUMBER:

695619CH

BORING NUMBER:

BH18/MW-631

SHEET 2 OF 2

Borehole Log

JET: NCWI GA7F SA. 5. 05 Jgdno 3DNFor x3

6T CAVS GIT dYc dP Bap F A

N6NkAWG I O H99 bxdmn5 WT C

" E\$6\$P CTGWEACWT E AG" " E\$6 E\$ I) o\$av : dl Yox Vb I Yma. rx

CTTE" \$AWN7 I G, 9u/ f 3H1- N 0093w33Hf

" E\$6\$P MNW6 T" AG" NQUSMNGWI Eaxnar d

F AWNE 6NkN6 I 19W bxBt n

7WAEWI V292w3w

NG" I V292w3w

6T P PNE I AH7 od0

" NJW6 hN6TF PETUG" 7UE_ACN 4y	ENCT kNE) 4y	PEAJ c\$ 6TP	7T\$ " N7CESW\$ G 7T\$ GAMN-U7C7 PETUJ 7) MhT6- CT6TE-MT\$WJEN CTGWNGW EN6AV\$ N " NG7\$V TE CTG7\$VNGC) - 7T\$ 7WEUCWJEN- M\$NEA6TP)	CTMMNGW " NJW6 T CA7\$P- " E\$6\$P " NVA\$7- \$7VEUMNGVAV\$ G	F N66 " NVA\$7
3f	Owhw		i dpy't pd0eng Bpav r 43Hf) , 2y- \$ano- maenx b\$ olt pde oi 7AG" H SILTY SAND WITH GRAVEL (SM) i dpy't pd0eng Bpav r 43Hf) , 2y- maenxH	h p d g e t z a r o r a p m d \$ H C a p o n l p o o r e t r a p m d \$ H	
			POORLY GRADED SAND (SP) i dpy't pd0eng Bpav r 43Hf) , 2y- \$ano- maenx b\$ olt pde oi 7AG" H		
1w			SILTY SAND WITH GRAVEL (SM) i dpy't pd0eng Bpav r 43Hf) , 2y- i o r n o- maenx 7AG" - v e g p a. r i P p d R o 5. (x a w f l \$ H		_ \$ o p (d l Y H
			POORLY GRADED SAND (SP) i dpy't pd0eng Bpav r 43Hf) , 2y- \$ano- maenx b\$ olt pde oi - p a. r i 7AG" H		O w b x n l p o o r H
1f	Owhw		SILTY SAND WITH GRAVEL (SM) i dpy't pd0eng Bpav r 43Hf) , 2y- i o r n o- maenx 7AG" - v e g p a. r i P p d R o 5. (x a w f l \$ H	7 d m (\$ F \$ A l h c O l 7 h L 1, l a \$ o l x o i d x C Q w H	
			POORLY GRADED SAND (SP) i dpy't pd0eng Bpav r 43Hf) , 2y- \$ano- maenx b\$ olt pde oi - p a. r i 7AG" H		
			SILTY SAND WITH GRAVEL (SM) i dpy't pd0eng Bpav r 43Hf) , 2y- i o r n o- maenx 7AG" H		

GNF 7T\$ hTES\$P 6TP: JWMCS\$W ENP6H; GA7F \$A DJcA7N3D3wC\$H\$ J:: Cc 3M PNT VNCc DO\$H\$ W 00\$ 23w

h a p e t x o p m e d o i d x, w b x B t n H



JWCUT) L AMV BTW
695619) S

BCWON AMV BTW
BS19

PSTTL 1 CF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : N/A

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N/A

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 7/28/2020

END : 7/28/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			POLY PGAD E QS NWGI TRHPV olive brown (2.5Y 4/3), loose, dry to slightly moist SAND.		
5.0	9.0		RTGA) RGY H R olive brown (2.5Y 4/3), stiff, moist CLAY.	Iron oxidation staining. Hand cleared to 5 ft bgs.	
10.0			RTGA) RGY H R Olive gray, SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
15.0	8.0				
20.0			RTGA) RGY H R Olive gray, SAME AS ABOVE.	Well-graded, fine- to coarse-grained, sub-round sand.	
25.0	10.0				

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20

Bentonite backfill.



JWCUT) L AMV BTW
695619) S

BCWAN AMV BTW
BS19

PSTTL 2 CF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2_Event 2

LOCATION : Oak Harbor, WA

ELEVATION : pending

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : pending

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 37.0 ft bgs

START : 7/28/2020

END : 7/28/2020

LOGGER : A. Seay

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
10.0				Increase in sand volume. Breathing zone normal. Core screening normal.	
30.0			POLY PGAD E QS NWG TRHPV (Olive gray, dense, moist, sub-round to round SAND, with fine-grained Gravel up to 1".		
35.0	10.0		JCCWRY NWGDTD PGAD HPJ (olive brown (2.5Y 4/3), loose, wet, round SAND.	Sample WI-AF-BH19-SB-37 collected at 1310.	
40.0			JCCWRY NWGDTD PGAD HPJ (Olive gray, dense, moist, round SAND.		
45.0	10.0		JCCWRY NWGDTD PGAD HPJ (Olive gray, loose, wet, fine-grained SAND.	Sample WI-AF-BH19-GW-49 collected at 1500.	
50.0					

Boring terminated at 50 ft bgs.

NEW SOIL BORING LOG: PTMCINTYRE.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 11/5/20



JHFUR6DEM(BRH:
9519C66I

BFHÆT EM(BRH:
BI P0

SI RRD O F2 P

Borehole Log

EVPRJuB TSyH: I yD6 Fil 51 EV6sl w J1l nt w

NPu yBIPS TPab hareor3: y

JNJ; yBIPS T N/A

AVINNSO uPSBVyuBPV ySA AVINNVIO T(I 50k Raf bl t3BrDf b , oDnt

uPPVAISyBJHT N/A

AVINNSO GJBhPA ySA JQUIEGJSB TVotosonif

: yBJV NJ; JNT ---

HByVB T7Y8Y0w0

JSA T7Y8Y0w0

NPOOJV Ty. Hl a)

AJEBh CJNP: OVPUA HUVFyuJ vtr	VJuP; JV(vtr	OVyEhlu NPO	HPINAJHuVIEBIPS HPINSyGJ3UHuHOVPUE H(GCPN3 uPNPV3GPIHBUVJ uPSBJSB3VJNyBi; J AJSHIB(PV uPSHIHBJSu(3HPIN HBVUuBUVJ3GISJVyNPO(	uPGGJSBH AJEBh PFu yHISO3 AVINNSO AJByINH3 ISHBVUGJSByBIPS	: JNNAJByINH
			SANDY SLEC WAD T HLGRN V6 N) o51l erok n wz(2Y/36osl 3dr) to s5gV15 , oist3HySA.	Iron oxidation staining. Hcarsl e5af b organif s. Braf l roots. h and f5 arl d to z rhegs.	Cl ntonitl eaf bri5
			NRLE 6 NLY V6 N) o51l erok n wz(2Y/3stirn8 , oist uNy(.	CrI atVhng -onl nor, a5 uorl sf r l ning nor, a5	
			SLECY NRLE 6 NLY WAD T HLGRN V6 N) o51l gra) vz(2Y/3, I diD, lstim8 , oist uNy(3kitVkl 51gradl d3 riml Lto f oarsl lgrainl d3sDeIroDnd to roDnd Hand3and riml lgrainl d3roDnd Ora1l 5Dc to wM		

SJ: HPINCPVISO NPO*EBGuSB(VJ.ONC*SyH: I yF_EhyHJw_w0p9.OER uhwG OJPBJuh _pwOAB' pp2W0



JHFUR6DEM(BRH:
95190561

BFHÆT EM(BRH:
BI P0

SI RRD P F2 P

Borehole Log

EVPRJuB TSyH: I yD3 Fil 51 EV4sl w J1l nt w

NPu yBIPS TPab hareor3: y

JNJ; yBIPS T pending

AVINNSO uPSBVyuBPV ySA AVINNVIO T(I 50k Raf bl t3BrDf b, oDnt

uPPVAISyBJHT pending

AVINNSO GJBhPA ySA JQUIEGJSB TVotosonif

: yBJV NJ; JNT 40.0 rths

HByVB T7Y8Y0w0

JSA T7Y8Y0w0

NPOOJV Ty. Hl a)

AJEBh CJNP: OVPUA HUVFyuJ vtr	VJuP; JV(vtr	OVYehlu NPO	<u>HPINAJHuVIEBIPS</u> HPINSyGJ3UHhHOVPUE H(GCPN3 uPNPV3GPIHBUVJ uPSBJSB3VJNyBi; J AJSHIB(PV uPSHIHBJSu(3HPIN HBVUuBUVJ3GISJVyNPO(<u>SLECYNRLE 6NLYWAD THLGRN 6N</u> o51l gra) vz(2Y3HyGJ yHyCP; J.	<u>uPGGJSBH</u> AJEBh PFu yHISO3 AVINNSO AJByINH3 ISHBVUGJSByBIPS	: JNNAJByINH
vz	p0.0			CrI atWng -onl nor, a5 uorl sfrl l ning nor, a5	
40					
4z	p0.0		<u>JFFHNYTHLCRC SLEC 6SJ</u> o51l gra) vz(2Y3Yosl 3kl t3riml lgrainl d3roDnd HySA.	Ha, c5 : llyFLChw0LHCL40 fo5 ftl d at p0w0.	
20				Ha, c5 : llyFLChw0LO: l2p fo5 ftl d at pp0z.	

SJ: HPINCPVISO NPO*EBGuSB(VJ.ONC*SyH: I yF_EhyHJw_w0p9.OER' uhwG QJPBJuh _pwOAB' pp2Y0

Coring tl r, inatl d at 20 rths.



PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-616

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : *pending*

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : *pending*

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 6.0 ft bgs

START : 11/10/2019

END : 11/10/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SILT WITH SAND (ML) very dark brown / dusky yellowish brown (10YR 2/2), Dry, low-plasticity SILT, with fine-grained Sand and trace Gravel < 10mm. (Silt: 80%, Sand: 15%, Gravel: 5%)	Note: Monitoring well not installed at this location. Hand cleared a 2 ft diameter hole to 5 ft.	Bentonite backfill.
	0.0		SILT WITH GRAVEL (ML) olive gray (5Y 4/2), Dry, medium-plasticity SILT, with Gravel < 5mm. (Silt: 95%, Gravel: 5%)		
			SILT (ML) black (10YR 2/1), Dry, low-plasticity SILT, with few fine-grained Sand.	Slight organic odor.	
5	0.0		SILT (ML) very dark greenish gray (GLE Y 3/5 GY) Dry, low-plasticity SILT, with trace fine-grained Sand.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	
			LEAN CLAY (CL) dark gray / olive gray (5Y 4/1), Soft, wet, medium-plasticity, non-dilatant, medium-toughness, LEAN CLAY, with few interbedded Silt layers containing trace shell fragments.	Samples WI-AF-MW-616-SB-07, WI-AF-MW-616-SB-07-M WI-AF-MW-616-SB-07-S collected at 1620.	
			LEAN CLAY (CL) dark gray / olive gray (5Y 4/1), Soft, wet, medium-plasticity, non-dilatant, medium-toughness, LEAN CLAY.	Breathing zone normal. Core screening normal.	
10	12.0				
15					
20.0					
20					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-616

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : *pending*

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : *pending*



DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 6.0 ft bgs

START : 11/10/2019

END : 11/10/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25	20.0		LEAN CLAY (CL) dark gray / olive gray (5Y 4/1), SAME AS ABOVE.	Breathing zone normal. Core screening normal.	
30			LEAN CLAY (CL) dark gray / olive gray (5Y 4/1), Soft, wet, medium-plasticity, non-dilatant, medium-toughness, LEAN CLAY, with little percentage (15%) Gravels < 55mm. Boring terminated at 30 ft bgs.	Consistency slightly stiffens.	
35					
40					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-618

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 19.368 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 496967.91, E 1194695.95

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 7.2 ft bgs

START : 11/17/2019

END : 11/17/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SANDY SILT WITH GRAVEL (ML) very dark brown / dusky yellowish brown (10YR 2/2), Moist, non-plastic, rapid-dilatancy, low-toughness SILT, with fine-grained Sand to fine-grained Gravel.		8 in steel flush mount well completion.
			FAT CLAY (CH) yellowish brown (10YR 5/6), Hard, dry, high-plasticity, non-dilatant, high-toughness FAT CLAY, with trace fine-grained Sand.		Bentonite seal.
0.0			SANDY LEAN CLAY (CL) light brownish gray / pale yellowish brown (10YR 6/2), Soft, dry, low-plasticity, non-dilatant, low-toughness LEAN CLAY, with fine-grained Sand and trace fine-grained Gravel and Cobbles.	Hand cleared a 2 ft diameter hole to 5 ft.	
5			LEAN CLAY (CL) gray (7.5YR 5/1), Soft, dry, medium-plasticity, non-dilatant, low-toughness LEAN CLAY.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	
			LEAN CLAY (CL) gray (7.5YR 5/1), Soft, dry, medium-plasticity, non-dilatant, low-toughness LEAN CLAY, with trace fine-grained Gravel.		Filter pack.
10	12.0		SANDY LEAN CLAY (CL) gray (7.5YR 5/1), Stiff, moist, medium-plasticity, non-dilatant, low-toughness LEAN CLAY, with fine-grained Sand.		5 ft screen.
			POORLY GRADED SAND WITH CLAY (SP-SC) dark gray (7.5YR 4/1), Wet, fine-grained, sub-round to rounded SAND to fine-grained Gravel (majority fine-grained Sand), with non-plastic Clay.	Sample WI-AF-MW-618-SB-11 collected at 0950.	
			SANDY LEAN CLAY (CL) gray (7.5YR 5/1), Stiff, wet, medium-plasticity, non-dilatant, low-toughness LEAN CLAY, with fine-grained Sand.		
			SANDY LEAN CLAY (CL) dark gray (7.5YR 4/1), Wet, low-plasticity, non-dilatant, low-toughness LEAN CLAY, with fine-grained Sand to fine-grained Gravel (majority coarse-grained sand to fine-grained Gravel).	Breathing zone normal. Core screening normal.	
15					

NEW SOIL BORING LOG; USE ME, BD, GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-618

SHEET 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 19.368 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 496967.91, E 1194695.95

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 7.2 ft bgs

START : 11/17/2019

END : 11/17/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION	COMMENTS	WELL DETAILS	
			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION		
12.0						Filter pack.
			LEAN CLAY (CL) dark gray (7.5YR 4/1), Stiff, moist, medium-plasticity, non-dilatant, medium toughness LEAN CLAY, with interbedded wet, poorly-graded, fine-grained Sand.			Bentonite backfill.
20						
11.0						
25			POORLY GRADED SAND (SP) very dark gray (10YR 3/1), Wet, fine-grained, sub-angular to sub-rounded SAND.			
			Boring terminated at 26 ft bgs.			
30						

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



SI NU 9 GPMA B) I :
51C5F19Y

BNI PPH PMAB) I :
AO6F1

WY)) G F N2 J

Borehole Log

OHU: N7 GMFoI i moRin58 fS O9ect 6

TU7oGtF MJeBzeV aI i o

NTNL oGtF MgWkdDuner dI GU7

v HnTTrfj 7 UFGHo7 GUH oFv v HnTTrfj Met ffa(: esBt rI GfRsBr aRQn

7 UUhv rfoGNI MF VbD66AdVbI NggbkGAgbD

v HnTTrfj . NGz Uv oFv NQJ rD. NFGMHaracaC8

i oGNH TNL NT M Dp n/ yc

I GoHGMgg-gA-64gb

NFv Mgg-gb-64gb

TUj j NH M dwRit 1

VNOZ wNTUj j HUJFv i JH5o7N j	HN7 ULNHE jn	j Ho Oz rT TUj	I Urn vNI 7 HnGtF I Urn Fo. NIJI 7I j HUJOI E. wUTI 7UTUHI . UrhGJ HN 7UFGNFG HNTOGbN vNFI rGEUH 7UFI rhGNF7EI I Urn I GHJ 7GJ HNI . rNHoTUJ E	7U . . NFG vNOGZ U5 7oI rfi j I v HnTTrfj . vNGonI I rFI GHJ . NFGoGtF	i NTT vNGonI
k	4dI		WELGALD t SS89 / fesB)g4H 6dk-g, I Lt 10 caul r a8rI fa(h2fecr880I 1e28fSereCs0I fa(hRy9Q cc I nI G(89 nIest u8I hyIe8Q SI eCSd	Haard	Y8Crt t f dRc9 r aRQn(t ff sar 2ft r8Cd
			SNNI LT HI V() (WWP(RNSD / 1a(C)AdEH WMI . a8rI u8I hyIe8Q SI cR/ heCyRfe1ra cR/ hlaRCSI oFv d	Haard	wt OraC8t ct efd
			SNNI LT HI V() (WWP(O8Y WELGRNS8AD Se1B/ 1a(C)AdEH p-p, I i t rI u8I hyIe8Q SI cR/ heCyRfe1ra cR/ hlaRCS I oFv I (89 I 8rI		
			L) VP 9LVT R8LD Se1ByIe0)g4EH Wg, I I r8u Ser 2I fa(h2fecr880I CaChSereQI r t S8r hRy9Q cc TNoF 7 ToEd	I er 2ft i rto5h i hDgbh wh46 saftt srt SengpV4I gg-gA-gbd Fart M ert 1f8t f0 2t 1s9t Sd zeCS sft e1t Se 6 un S8r t rI 19aft ra k unaC gg-gA-gbd	
			SNNI LT HI V() (WWP(O8Y WELGRNS8AD Se1ByIe0)g4EH Wg, I ver 2I u8I hyIe8Q SI cR/ hlaRCS na 1aRCSI oFv I (89 CaQ2fecr88I 8rI nIest u8I hyIe8Q S j 1eP fI eCS car t c9t ff uleyr t Qrd		
k	gdI		WWP(T L) VP 9LVT R8LD yIe0)g4EH k-g, I ver 2I r t S8r h2fecr880I CaChSereQI fa(hRy9Q cc TNoF 7 ToEI (89 u8I hyIe8Q SI eCS eCS car t c9t ff uleyr t Qrd		
			O) LL HI V() (WWP(RNSD Se1ByIe089 / 1a(C- Se1B Ot ffa(89 / 1a(C)g4EH W6, I . a8rI u8I hyIe8Q S na sae1ct hyIe8Q SI cR/ heCyRfe1ra cR/ hlaRCSI SI oFv I (89 c9t ff uleyr t Qrd	v 188Qy / t yeCenk un (89 e W8Csaft / e1t f eCS D8Csec8Qy aC gg-gb-gbd	
g4	g6dI		L) VP 9LVT O8Y WWP(R8LD yIe0)g4EH k-g, I Lt 10 caul r a8rI fa(h2fecr880I CaChSereQI fa(hRy9Q cc TNoF 7 ToEI (89 u8I hyIe8Q SI eCS eCS nIest c9t ff uleyr t Qrd		
					58t 12esBd

FNI I Urn wUHfj TUj vJ I N. N3w q TwWFoI i r8o53Oz oI N6364gbd Q-V7z6. j NU87 z3g6d vGVWD64



SI NU 9 GPMB) I :

51C5F19Y

BNI PH PMAB) I :

AO 6F1

W)) G - N2 J

Borehole Log

OHU: N7 GMFol i mofin58 fS Orect 6

TU7oGtF MJeBzeV a1 i o

NTNL oGtF MgWkDuner cil GU7

v HntTrfj 7 UFGHo7 GUH oFv v HntTrfj Met ffa(: esBt rl GfRsBr aRQn

7 UUHV rfoGNI MF V6D66Ad/6l N ggkkgAgqD

v HntTrfj . NGz Uv oFv NQJ r6. NFGMharacaC8

i oGNH TNL NT M Dp un/ yc

I GoHGMgg-gA-64gb

NFv Mgg-gb-64gb

TUj j NH M dwRit 1

VNOZ wNTUJ j HUJFv i JH5o7N j	HN7 ULNHE jn	j Ho Oz m TUj	I Urn vNI 7 HnGtF I Urn Fo. NIJI 7I j HUJOI E. wUTI 7UTUHI . UrhGJ HN 7UFGNFG HNTOGbn vNF1 r6E UH 7UF1 rhGNF7EI I Urn I GHJ 7GJ HNI . rhNHoTuj E	7U . . NFG vNOZ U5 7ol rhj I v HntTrfj vNGonl I rhI GHJ . NFGoGtF	i NTT vNGonl
			9LVT) T WWP(OBY HI V3) L R0 D Se1By1e0)g4EH Wg,li trl uQ hy1e8Q Sra sae1ct hy1e8Q S)r e a180 sae1ct hy1e8Q S,I cR' heCyRe1ra cR' hlaRCSi SI oFv I (89 fa(h2fecr880 7 fe0l uQ hy1e8Q Sy1ePt fl nlest 7 a/ / ft cl eCS nlest c9t ff uleyr t Qrd	l er 2ft i rto5h i hDgbh wrgg safft srt Seng4kkl gg-gb-gbd	k uncs1t t Qd
	g6dt		L) VP 9LVT R0 LD y1e0)g4EH k-g, l Lt 10 caul (trlr t SPr h2fecr880l CaQs8ereQl fa(harY9Q cc TNoF 7 ToEI (89 nlest uQ hy1e8Q Sj 1ePt fd	w1er88Q ; aQ Ca'r efd 7 a1t cs1t t QDy Ca'r efd	
gk			WWP(T L) VP 9LVT R0 LD Se1By1e0)AdEH Wg, l Lt 10 caul (trlr t SPr h2fecr880l CaQs8ereQl fa(harY9Q cc TNoF 7 ToEI (89 uQ hy1e8Q SI eCS eCS nlest sae1ct hy1e8Q Sj 1ePt fd		
			L) VP 9LVT R0 LD y1e0)g4EH k-g, l Lt 10 caul (trlr t SPr h2fecr880l CaQs8ereQl fa(harY9Q cc TNoF 7 ToEI (89 nlest uQ hy1e8Q Sj 1ePt fd		581t 12esBd
	g6dt				wt OraC8t / esB8fd





PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-620

SHEET 1 OF 2

Borehole Log

3NPU0, L <EI 26 pl 0w- h w 3. nel a

) P, I LpPE <Pnk Mns5osR6 I

9) 9VI LpPE <Ba:DBa d nc eRLP,

mNp) pET, PELNI, LPNI Em mNp) NpT <(I wS Uhgkl tRLsQgk c oQ t

, PPNmEI L92 <E D%Hz:0BR9 BB%Ua0:J0

mNp) pET A9LMPmI Em9QO0A9EL <Notoeoi Ig

6 I L9N) 9V9) < Dz d 5f e

2LI NL <BB/BB/aFB%

9Em <BB/BB/aFB%

) PTT9N <L: , . nwl se

m93LM19)P6 TNPOEm2ON-I, 9 uY	N9, PV9N(uY	TNI 3Mp)PT	2Pp m92, NpLpPE 2Pp EI A9RO2, 2 TNPO3 2(A1P)R , P)PNRAP2LON9, PEL9ELRN9)I Lp/9 m9E2p(PN, PE2pL9E, (R2Pp 2LNO, LON9RApE9NI)PT(	, PAA9EL2 m93LMP- , I 2pETR mNp) pET m9LI p2R pE2LNOA9ELI LpPE	6 9)) m9LI p2
			SILT WITH SAND (ML) vl sy rnsk 5soSi / r Ceky yl wSte. 5soSi uBF(N a/aYmsyRoSWWwettgity 2p) LRSht. di I Wshl l r 2nir ni r Tsnvl wGaFc c: u2hw<zF8 R2nir <BHB R Tsnvl wHB Y	Noote:	z h etl l wdCe. c oQ t SI w goc 4wthoi : 1l i toi hl el nw
	F:F		SILT (ML) rnsk f snyte. 5soSi / rnsk yl wSte. 5soSi uBF(N D/aYmsyR c l r tC Wwettgity 2p) LRSht. tsngl Tsnvl wGHFc c: u2hw<zF8 RTsnvl wHB Y	Mhi r gwnsd r n a d r mcl t l s. ow to Hd:	- htl s4ngk: Hd egsl i i :
H			SILT WITH SAND (ML) vl sy rnsk fsl i l te. f sny uT) 9(B0/HT(YmsyRoSWWwettgity 2p) LRSht. di I Wshl l r 2nir : u2hw<zF8 R2nir <BHB Y	2. I wdnf c l i te: mshw f 5l f ni nt Hd Sh. n Dh gosl 5nsd w ni r b h gnehf: 2nc 4w 6 pW- W6 W6FV21Wb gowwgtl r nt B0FF:	
			SILTY SAND (SM) vl sy rnsk fsl i l te. f sny uT) 9(0/BF(Y a o l e t R 4 o o s y W o s t l r R d i l W s h l l r 2l EmRSht. c l r tC Wwettgity 2h r u2nir <zF8 R2h r <aF8 Y	1s nt. hif 7oi l i osc nw , osl egsl i i hif i osc nw	
			LEAN CLAY (CL) rnsk f sny / owl f sny uT) D/BYR2odRSI tRc l r tC WwettgityRi oi W/hwtni tR c l r tC W6Cf. i l ee) 9l E ,) l (RSht. tsngl Tsnvl wGHFc c:		
BF		BB:F			- htl s4ngk: 1l i toi hl 5ngkdw
BH				2nc 4w 6 pW- W6 W6FV21Wb gowwgtl r:	
	aF:F			1s nt. hif 7oi l i osc nw , osl egsl i i hif i osc nw	
aF					

E96 2Pp 1PNJET)PT: O29 A9_1mtT)1; EI 26 pl - 3M 29a aFB%T3U, MaA T9PL9, M Ba: TmL; D/baF



PROJECT NUMBER:

695619CH

BORING NUMBER:

MW-620

SHEET 2 OF 2

Borehole Log

3NPU, L <EI 26 pl Ow- h w 3. nel a

) P, I LpPE <Pnk Mns5osR6 I

9) 9VI LpPE <Ba:DBa d nc eWLP,

mNp) pET, PELNI, LPNI Em mNp) Np< (I wS Uhgkl tRLsQgk c oQ t

, PPNmEI L92 <E D%Hz:0BR9 BB%Ua0:J0

mNp) pET A9LMPmI Em9QO3A9EL <Notoeoi lg

6 I L9N) 9V9) < Dz d 5f e

2LI NL <BB/BB/aFB%

9Em <BB/BB/aFB%

) PTT9N <L: , . nwl se

m93LM19)P6 TNPOEm2ON-I, 9 uY	N9, PV9N(uY	TNI 3Mp)PT	2Pp m92, NpLpPE 2Pp EI A9RO2, 2 TNPO3 2(A1P)R , P)PNRAP2LON9, PEL9ELRN9)I Lp/9 m9E2d(PN, PE22L9E, (R2Pp 2LNO, LON9RApE9NI)PT(	, PAA9EL2 m93LMP- , I 2pETR mNp) pET m9LI p2R pE2LNOA9ELI LpPE	6 9)) m9LI p2
aH	aF:F			2nc 4w 6 pW- W6 W6aFW1Wf gowwgtl r nt BDaF: 1s nt. hif 7oi l i osc nw , os egsl i hif i osc nw	
OF			1osi f tl sc h ntl r nt OF d 5f e:		
OH					
DF					

E96 2Pp 1PNJET)PT: Q29 A9_1mtT)1; EI 26 pl - 3M 29a aFB%T3U, MaA T9PL9, M Ba:TmL; D/baF



PCF J6RT NUMB6C:

9519C5RH

BFCINE NUMB6C:

MW-920

SH66T O FG 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 12.585 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 494574.28, E 1196246.58

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 4.5 ft bgs

START : 11/10/2019

END : 11/10/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SILT WITH SAND (ML) brown (7.5YR 5/2), Damp, fine-grained SAND, with low-plasticity, non-dilatant, low-toughness Silt and trace roots.		
			SILT WITH SAND (ML) black (10YR 2/1), Dry, non-plastic, slow-dilatancy, low-toughness, medium-dry strength SILT, with fine-grained Sand, trace medium to coarse-grained Sand, and trace roots.		
	0.0		GAT RLAV WITH ECAY6L (RH) grayish brown (10YR 5/2), Soft, dry, medium-plasticity, non-dilatant, medium-toughness CLAY, with fine-grained Gravel, and trace fine-grained Sand.	Hand cleared a 6 in diameter hole to 5 ft.	8 in steel flush mount well completion. Bentonite seal.
			L6AN RLAV (RL) gray (10YR 6/1), Firm, dry, medium-plasticity, non-dilatant, medium-toughness CLAY, with trace fine-grained Sand.		Filter pack.
5			W6LL ECAD6D SAND WITH ECAY6L (SW) dark gray (10YR 4/1), Moist to wet, fine-grained, sub-round to rounded SAND to fine-grained, sub-round to rounded Gravel, with trace shell fragments.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing. Sample WI-AF-MW-621-SB-05 collected at 1125 w/ corresponding duplicate.	5 ft screen.
			L6AN RLAV (RL) gray (GLE1 5/N) Very soft, wet, medium-plasticity, non-dilatant, low-toughness CLAY.		
10	12.0			Breathing zone normal. Core screening normal.	Filter pack.
15					Bentonite backfill.
20.0					
20					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PCF J6RT NUMB6C:

9519C6RH

BFCINE NUMB6C:

MW-920

SH66T 2 FG 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 12.585 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 494574.28, E 1196246.58

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 4.5 ft bgs

START : 11/10/2019

END : 11/10/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25	20.0			Breathing zone normal. Core screening normal.	
30			Boring terminated at 30 ft bgs.		
35					
40					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



6M9 JDCT RUHBDM:

5105F1CV

B9 MR(RUHBDM:

HN -5PP

SVDDT F 92 P

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 11.756 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 493662.97, E 1196181.8

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 2.1 ft bgs

START : 11/9/2019

END : 11/9/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SILT WLA very dark gray (7.5YR 3/1), Damp, low-plasticity, non-dilatant, low-toughness SILT, with trace fine-grained Sand.		
	0.0		N DLL (M) GDG S) RG N ITV (M) EDL WNA very dark grayish brown (10YR 3/2), Moist, fine-grained, sub-round to rounded SAND to coarse-grained, sub-round to rounded Gravel.	Sample WI-AF-MW-622-SB-02 collected at 1105.	8 in steel flush mount well completion. Bentonite seal.
			N DLL (M) GDG (M) EDL N ITV S) RG WNA brown (7.5YR 4/2), Wet, fine-grained, rounded Sand to coarse-grained, rounded GRAVEL.	Hand cleared a 6 in diameter hole to 5 ft.	
5			N DLL (M) GDG S) RG N ITV (M) EDL WNA dark gray (7.5YR 4/1), Wet, fine-grained, sub-round to rounded SAND to coarse-grained, sub-round to rounded Gravel, with little Cobble.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	Filter pack.
					5 ft screen.
8.0					
10					
			CL) YDY S) RG WCA dark gray (10YR 4/1), Wet, low-plasticity CLAY, with interbedded fine-grained Sand and trace fine-grained Gravel.	Breathing zone normal. Core screening normal. Clay beds < 1 in thick. Gap graded.	Filter pack.
15	2.0		N DLL (M) GDG S) RG N ITV (M) EDL WNA very dark gray (10YR 3/1), Wet, fine-grained, sub-round to rounded SAND to fine-grained, sub-round to rounded Gravel (majority medium to coarse-grained SAND).		Bentonite backfill.
			699 MLY (M) GDG S) RG W6A gray (7.5YR 5/1), Wet, fine to medium-grained, sub-angular SAND.	Majority fine-grained sand, some beds with more medium-grained sand.	
12.0					
20					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



6M9 JDCT RUHBDM:

5105F1CV

B9 MR(RUHBDM:

HN -5PP

SVDDT P 92 P

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 11.756 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 493662.97, E 1196181.8

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 2.1 ft bgs

START : 11/9/2019

END : 11/9/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25	12.0				
30			Boring terminated at 30 ft bgs.		
35					
40					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



2(CJDST LUMBD(:
695619SH

BC(ILV LUMBD(:
MN 36F-

WHDDT 1 CY F

Borehole Log

Yyz 9Ok J 7(bf H Dbr owa A Yhaud S

vz kbJ D (7za) Mad edGH b

OvOPbJ D (7 Rb11Q2ha. uGJz k

By Dv D E kz (Jybk Jzy b(B By Dv y D 7Nd 0 9a-) drGJ a-) . eri n

kzz y B D bJ Of 7 (/ Qps/ 15 GO RRGs Fp15P

By Dv D E 4 QJ Mz B b(B Q : D4 Q J 7y ereuei 6

H bJ Oy vOP Ov 7 15S 2t mu

f Jby J 7RRRQSI RQ

Q B 7RRSpLSI RQ

vz EE Oy 7B5W mdc

BOYJMWOVz H Eyz : (Bf : ywbk O 2t	y Okz POy N 2t	Ey bYMD vz E	f z D BOF ky D J D (f z D (b4 OG f kf Eyz : Yf N4 Vb vG kz vz y G4 z D J : y Okz (JQ J Gy Ov bJ D O BQ f D Nzy kz (f D J Q k NG z D f Jy : kJ : y OG4 D Oybvz EN	kz 4 4 Q Jf BOYJMz wkb f D EG By Dv D E BOJb Df G Df Jy : 4 Q JbJ D (	H Ov v BOJb Df
1	15		WELGR ADEL SAERN ITH V(E) DA R SAO Aac) mraC ,Ri Ny / LRIG e2GAa. I G dA6 . g aur6 0CG ei gAarai rG . dA6 . ger nhi duu k vb NC0 0h 26 dgrta6 dAf ai A ai A 26 dgrta6 dA E caVd5	H andcl er 06 m6 re t eadhead5	 F 6 urddo2r uh . eri n0 d0 -e. l adrei 5 Wdi rei 0d uda6
			N DAA V(EGDG V(E) DAN ITH WELG R VNO mraC uih t 0e0i ,Ri Ny 1LSTGPdC0 drG 26 dgrta6 dA Gurt ger i A re cer i AdA f ai A re - eacudgrta6 dA Gurt ger i A re cer i AdA Ey bPOV G 0h k et t 05		
	R		YET SAER R SAO 0hnt 0e0i 0h mraCLI ad Q 0e0 0h t 0e0i ,Ri Ny sLSTG r02GAa. I G h0hng aur6 0CG ei gAarai rG 0hnger nhi duu k vb N5	B 006 mt drai an1 2h 0 0h a / 6 - eed t aaddo ai A s 6 - au6 n5 z cai md ai AntaC . em6 n5 Vdarh6 m8ei d i ec ad k ead u-addi 6 mi ec ad	 w0dcl a-) 5 1 2hu-addi 5
			ADEL SAER R SAO mraC ,Ri Ny sLRIG4 dA6 . gue2GAa. I re . e0rCh0hng aur6 0CG ei gAarai rG . dA6 . ger nhi duu k vb N5		
	Rp5		ADEL SAER R SAO mraC ,U5i Ny 1LRIG e2G e0nrre 0 drG dA6 . g aur6 0CG ei gAarai rG 00 ger nhi duu k vb N5	(erd7Yeuu6 Ca rai u06 ei aori 05 z cai md ai AntaC . em6 n5	 Wdi rei 0d t a-) 206

(OH f z D Vb y D E vz E : f O4 O3Vb E vW(bf H D b w3Ym b f OSSSI RDEY9 . k M54 E Qz JOK M3RSEBJ . / LsLSI





FY5 2OHN EJT UOYB

- M6- 9MH(

U5 YÆL EJT UOYB

T P :- C4

D(OON 9 51 C

Borehole Log

3/ PUEz %G bN5 Sbkte4mws 3HMwW

8Pzb%P) GP Ma 0Mdr:R5 b

E8E9b%P) GFI nApJ æM2 i fR/Pz

, / \$8\$ L zP) % bz %P/ b), , / \$8 / \$ Gywitr. UMhæR%kha2 r kne

z PP/ , \$ b%EN G) I JV00ApFRE FFJQ pFrAW

, / \$8\$ L 6 E%0P, b), EVO\$6 E) %G ræirnd

5 b%E/ 8E9E8 G Wp ædci

N%b/ %GFF(WWAFJ

E), GFF(WWAFJ

8PLL E/ G/mz HM2 wi

L/ PO/ NO/ 4bzE 'E3%0 - E8P5 væ	/ Ez P9E/ y væ	L/ b30 & 8P L	NP\$, ENz/ \$%P) NP\$) b6 ERONzNL/ PO3 Ny6 - P8R zP8P/ R6 P\$N%O/ EzP) %E) %R/ E8b%\$E , E) N\$y P/ zP) N\$N/E) zyRNP\$ N% Oz %O/ ER6 \$ E/ b8PLy	zP66 E) %N , E3%0 P4 zbN\$ LR , / \$8\$ L , E%b\$NR \$ N% O6 E) %b%P)	5 E88 , E%b\$N
1	ArA		P ORR LYGAOA DGEA P \$N(LYG) OR WPI gwI sMa c:M oHd:r. n vAy/ u(VWR M2 fR7nwæ hr Mi wD: MmwsR i kdDmckttM æ :r knsws Nb), R æHi kdDmckttM æ i kdDr knsws L: MjwT T p1 2 2 vNMhsGpA< RL: MjwT G A< Yn	NdeæMhi æ ni æ MgwI sMa dtMha r: cMhdi de . æHi æ dM tæH tr ch f: rf wæni m NM2 f tw 5 \$b4\$ 5 DpW DN- DAW hr ttwæhs MæF I 1m - : wMæHæ Br nwnr : 2 Mm 0 Mhs htWmws MWæ sdæ2 wæv H twæ 1 æm - : ætæc dæcMh Mæ1 æ . æHMI æn hr: wdM: wt Mhs p æ hM æcm - : wMæHæ Br nwnr : 2 Mm z r: wi h: wææc nr: 2 Mm NM2 f tw 5 \$b4\$ 5 DpW DN- DAW hr ttwæhs MæF I 1m	 Con iæwt 7ki H 2 r kne. wt hr 2 f twæ nm - wæ nævi wMm
			DSRN WRI dtMha vAy/ WFR M2 f RæHæ dM ææ R2 wsd2 æ kcHwi i N\$%R æH eMhw ænwD: Mmws NMhs m		
			P ORR LYGAOA LYG) OR P \$N(DGEA WPI sMa c:M vAy/ I (FR5 wæR kdDmckttM æ i kdDr knsws L/ b9E8 T u1 2 2 R æH7nwæ hr Mi wD: MmwsR kdDmckttM æ i kdDr knsws NMhs vL: MjwT G pA< RNmhsG A< Yn		
			ROGE HRGV P \$N(DGEA WRI gwI sMa c:M oHd:r. n vAy/ u(VR5 wæR2 wsd2 æ tM ææ Rnr nDæMæR 2 wsd2 æ kcHwi i z 8byR æH7nwD: Mmws NMhs vF1< Yn		
FA	FFrA		DSRN P \$N(DGEA WRI c: wææ Hc: M vL 8EyF I() Y9wI i r æR wæR2 wsd2 æ tM ææ Rnr nDæMæR tr. æ kcHwi i N\$%R æH7nwD: Mmws NMhs W1< Yn	- : wMæHæ Br nwnr : 2 Mm z r: wi h: wææc nr: 2 Mm NM2 f tw 5 \$b4\$ 5 DpW DN- DAW hr ttwæhs MæF I 1m	 4æv f Mham 1 æi h: wænm 4æv f Mham - wæ nævi dMha æm
			HRGVOV DGEA WHI c: wææ HædtMha vL 8EyF Vm(FAyY5 wæR2 wsd2 æ: Mmws i kdDmckttM æ i kdDr knsws Nb), R æH7nwi WA< YR7nwD: Mmws L: MjwT v1< YRmhs eMhw i Hwt 7Mæ2 wææ vT 1< Yn		
			ROGE HRGV WRI sMa c:M vL 8EyF I() Y9wI i r æR wæR2 wsd2 æ tM ææ Rnr nDæMæR tr. æ kcHwi i z 8bym		
			HRGVOV DGEA WHI dtMha vL 8EyF Vm() Y5 wæR2 wsd2 æ: MmwsR kdDmckttM æ i kdDr knsws Nb), R æH7nwi vF1< Ymhs æv. L: MjwT T W12 2 vFA< Yn		
			ROGE HRGV WRI sMa c:M vL 8EyF I() Y9wI i r æR wæR2 wsd2 æ tM ææ Rnr nDæMæR tr. æ kcHwi i z 8bym		

) E5 NP\$ - P/ \$ L 8PL: ONE 6 E - , æ 8- :) DN5 \$b4_30bNEWVWFræ3U z0W6 LEPæZ0 FVæ , % I (pWA



FY5 2OHN EJT UOYB

- M6- 9MH(

U5 Y5EL EJT UOYB

T P :- C4

D(OON C 51 C

Borehole Log

3/ PUEz %G bN5 Sbkte4ms 3HMwW

8Pzb%P) GPMa 0Mdr:R5 b

E8E9b%P) GFIRApJ 7eM2 i tR/Pz

, / \$8\$ L zP) % bz %P/ b), , / \$8 / \$ Gywtr. UHawR%kha2 rkne

z PP/ , \$ b%(EN G) I JVOCApFRE FFJQ pFrAW

, / \$8\$ L 6 E%0P, b), EVO\$6 E) %G r eirnd

5 b %E/ 8E9E8 G Wp 7edci

N%b/ %GFF(WWAFJ

E), GFF(WWAFJ

8PLLE/ G%nz HM2 wi

L/ PO) NO/ 4bzE 'E3%0 - E8P5 vay	/ EzP9E/ y vay	L/ b30 & 8PL	NP\$, ENz/ \$%P) NP\$) b6 ERONzNL/ PO3 Ny6 - P8R zP8P/ R6 P\$N%O/ EzP) %E) %R/ E8b%SE , E) NS%y P/ zP) NS%N/E) zyRNP\$ N% Oz %O/ ER6 \$ E/ b8PLy	zP66 E) %N , E3%0 P4 zbNSLR , / \$8\$ L , E%b\$NR \$ N% O6 E) %b%P)	5 E88 , E%b\$N
VA	FFrA			- :wMhnc Brwnnr:2 Mm zr:wi:hwnnc nr:2 Mm	
W	FVA			z tM i e7wni i t eHd nwM dr e2 r 7hr:wMhs eMhwc:Mwti Mw r di w.gwsm	
UA			- r:nc ev.2 mMs MeVp 7edci m		

) E5 NP\$ - P/ \$ L 8PL: ONE 6 E - , th 8-:) bN5 Sb4_30bNEWVAFJth3U z0W6 LEP%z0_FVh , % I (pVA



2H1 P 5 S L J M U (H B
CY6C9Y5I

U1 H A T L J M U (H B
N S:09

W ((S 9 10 F

Borehole Log

THNPLpGOJ RY7 URFn1.i t2 Tgedi k

ENpRGUN) QNe8I en4any7 R

L ELVRGUN) OkAg - k 5neDdtyGNp

bHUEU , pN) GHRpGNH R) b bHUE HU Qzi tta6 Pef8i ryGrff8 DaFr n

pNNHbU RGLY O) sJA: kAs: yL hhJAhCJdco

bHUEU , / LG Nb R) b LQj UT/ L) GCHaradar.f

7 RGLH ELVLEO hkd 5h4wd

YGRHG ChhSuk-hJ

L) b ChhSuk-hJ

EN, , LH QbcWFrii m

bLTG WEN7 , HNj) b Yj H1RpL gav	HLpNVLHz gav	HRTI q BN,	YNUE bLYpHUTGUN) YNUE) R/ Lyj YpY , HNj T Yz/ WNEY pNENHy/ NYG HL pN) GL) GyHLERGVL bL) YLGz NH pN) YU'GL) pzyYNUe YGHj pG HLy/ U LHREN, z	pN/ / L) GY bLTG N1 pRYU , y bHUEU , bLGRUEYy U YGHj / L) GRGUN)	7 LEE bLGRUEY
- G	O		WELGR WDS N ASI THEV(D-MD) B r0 2er8 wr0.dg 4ra6r 9h-zH Qkvy/ a.dryta6 (Mednf .r0yraM2 2.terer rf 0y ta6 (raFwgr i ddy5ri (wr0.ri 2 YR) b ra 5ri (wr0.ri 2 , raB tc	Haardc	A.r dri i t3Fdg DaFr n6i tt faDMi nar c
			N (DD THEG(G WELG N ASI THEV(D-WN) 2er8 0i tta6 .dg 4ra6r 9h-zH QdwybeDM5ri (wr0.ri 2ydF4(raFr 2 ra raFr 2i 2 YR) b ra faendi (wr0.ri 2ydF4(raFr 2 ra raFr 2i 2 , raB ty6 .rg raf i Y.tner 2 pa44ti dc		W r rar .ri di etc
			N (DD THEG(G WELG N ASI THEV(D-WN) 2er8 wr0.dg 4ra6r u2er8 0i tta6 .dg 4ra6r 9h-zH sukwyb r0y5ri (wr0.ri 2y dF4(raFr 2 ra raFr 2i 2 YR) b ra faendi (wr0.ri 2ydF4(raFr 2 ra raFr 2i 2 , raB tc	I er 2 fti erh2 e hoo 5n 2.eDi ri ngati ra o 5c bntt.rw4i wer eno 5n 6.rg e s .r farh 4ermt er 2 S.r fed.rwc	
S0	S0		N (DD THEG(G THEV(DN ASI WELG-TN) 2er8 wr0.dg 4ra6r u2er8 0i tta6 .dg 4ra6r 9h-zH sukwyb r0y5ri (wr0.ri 2y dF4(raFr 2 ra raFr 2i 2 YR) b ra faendi (wr0.ri 2ydF4(raFr 2 ra raFr 2i 2 , raB tc	pa44ti c	1.tri mVef 8c
				Wherg.rwlari r arDetc parh df mi r.r wr arDetc	

) L7 YNUEWNHV , EN, 3j YL / L; W0g EV0) RY7 UR1: TI RYLk; k-hJc TP3pI k/ , LNG.pl; hkq bG3 suk-

Borehole Log

THNPLpGO) RY7 URF_{tn1.i} t2 Tgedi k

ENpRGUN) ONe8l en4an7 R

LELVRGUN) OkAg - k 5neDdtvGNp

bHUEU, pN) GHRpGNH R) b bHUEHU Ozitta6 Pef8i nyGnf8 DaFr n

pNNHbU RGLY O) sJA: kAcS: yL hhJAhCJko

bHUEU, / LG Nb R) b LQj UT/ L) GCHaradar.f

7 RGLH ELVLEO hkd 5n4wd

YGRHG OhhuhSuk- hJ

L) b ChhuhSuk- hJ

EN, , LH Ob cWFrñ m

bLTG WEN7 , HNj) b YJ HIRpL gV	HLpNVLHz gV	, HRTI p EN,	YNUE bLYp HUTGUN) YNUE) R/ Lyj YpY , HNj T Yz/ WNEy pNENHy/ NUYG HL pN) GL) GyHLERGVYL bL) YUGz NH pN) YUYGL) pzyYNUE YGHj pG HLy/ p LHREN, z	pN/ / L) GY bLTG N1 pRYU, y bHUEEY, bLGRUEY pYGHj / L) GRGUW)	7 LEE bLGRUEY		
	So		N (DDTHEG(GWELGN SI THEV(D-WW) 2erB 4ra6r 9h-zH QDyb eDMra Da.dry5ri (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 YR) b ra 5ri (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 , ræB tc	Wneng.rwlari r arðetc pari df mi r .r.wrarð etc		o 5ndf mhi rc	
			N (DDTHEG(GTHEV(DN SI WELG-TN) 2erB wra0 9h-zH suhw7 i ry5ri (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 Yer 2 ra faendi (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 , HRVLE 9De am0 faendi (wra.ri 2 Yer 2 ra 5ri (wra.ri 2 , HRVLEvc				YeDMi 7 UR1(7 G-h(YW(hC f atti f ni 2 enhChoc
			211 HDRTHEG(GWELG-W2) 2erB 4ra6r 9 œzH Qkwy7 i ry5ri (wra.ri 2ydF4(er wFtema dF4(raFr 2i 2 YR) bc				
		 	N (DDTHEG(GTHEV(DN SI WELG-TN) 2erB wra0 9h-zH suhw7 i ry5ri (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 Yer 2 ra faendi (wra.ri 2ydF4(raFr 2 ra raFr 2i 2 , HRVLE 9De am0 faendi (wra.ri 2 Yer 2 ra 5ri (wra.ri 2 , HRVLEvc 211 HDRTHEG(GWELG-W2) 2erB 4ra6r 9 œzH Qkwy7 i ry5ri (wra.ri 2ydF4(er wFtema dF4(raFr 2i 2 YR) bc				
ho						1.tri mMeF 8c	

Wann wir nicht in 2 Stunden 54 Minuten

YH6 P(CS LJ MU(HB 951905C1	U6 H A T LJ MU(HB N S:02	W ((S O 6 F 2
<p align="center"><i>Borehole Log</i></p>		

FHJUpu Vnz1B 0zVhC5 i2 FDe di h / J pzuQl N VJ el l en4 nGB z

U/ UOzuQ N V hj cYk me. dtGuJ p bH0 / 0N7 pJ NuHzpuJ HzNb bH0 / H0 V ita6 CeflinGumWl . aWn

pJ J Hb0NzuU1 VN syYj hYqsGU vvyYvsyY bH0 / 0N7 EUul J b zNb U3: 0FEUNu VHaradar 5

B zuUH / UOU/ V vhd m4wd 1uzHu VvlySlhkvy UNb VvlySlhkvy /J 7 7 UH Vbc- Wti m

bUFul - U/J/B 7HJ: Nb 1: HCz p p Rt	HUp J OUH) Rt	7 HzFl qp / J 7	1J0 bU1pH0FuQ N 1J0 NzEUG 1p1 7HJ: F 1) E- J / G pJ / J HGE J 01u: HU pJ NuUNuGHU/ zu0U bUN1u) J H pJ N101uUNp) G1J0 1uH: pu: HUGE 0NUHJ / J 7)	pJ EEUNu1 bUFul J Cpz10N7G bH0 / 0N7 bUuz0 1G 0N1uH: EUNuzuQ N	B U// bUuz0 1	
g	kk		WELGR WDS N ASI THEV(D-MD) M rñ 2erh wr(5D4ra6r R/k) H, lhTGE a5lnGa6 98tedr5 5(G852 25erer rf (G ta6 9aVWDri ddG5i 9wre5i 2 1zNb ra 5i 9wre5i 2 7 reM tc N (DD THEG(G WELGN ASI THEV(D-WW) 2erh (i tta6 5D4ra6r R/k) H, LSTGbe. 8G5i 9wre5i 2GdV49aVW 2 ra raVW 2i 2 1zNb ra faendi 9wre5i 2GdV49aVW 2 ra raVW 2i 2 7 reM tG5D rnf i 15ner 2 pa44ti c	Haardc		Y5 dri it dVd . aVWn6i tt fa. 8ti r5arc - i r rar5i di etc
			WELGR D(EL CDER-CD) 4ra6r R/kg) H gl, TCC5n G2rñG i 25W 98tedr5 5(G ar 25erer nG . i 25W 9aVWDri dd p/ z) G5 5D 5i 9wre5i 2 1er 2c N (DD THEG(G WELGN ASI THEV(D-WW) 4ra6r R/k) H sL, TGB e. 8G5i 9wre5i 2GdV49aVW 2 ra raVW 2i 2 1zNb ra faendi 9wre5i 2GdV49aVW 2 ra raVW 2i 2 7 reM tR elar5(faendi 9wre5i 2 1zNb er 2 5i 9wre5i 2 7 reM tTc	I er 2 fti erm2 e h on 25e. i ri nDatì ra g 5c br55 w4i wer eng on 65Des 55 fam 4ermt er 2 S5 fed5wc		
	vk		N (DD THEG(G THEV(DN ASI WELG-TN) 4ra6r R/k) H sL, TGE a5lnG5i 9wre5i 2GdV49aVW 2 ra raVW 2i 2 1er 2 ra faendi 9wre5i 2GdV49aVW 2 ra raVW 2i 2 7 Hz OU/ c	pa44ti c pa44ti dVWl 55 fam 4ermtc - merD5 wAari ram etc parh dñi r5 wr am etc		
			N (DD THEG(G WELGN ASI THEV(D-WW) 2erh wr(R/k) H slyTGE a5lnra 6i rG5i 9wre5i 2GdV49er wWema dV49aVW 2i 2 1zNb ra faendi 9wre5i 2GdV49er wWema dV49aVW 2i 2 7 reM tc	FVWern5 2 raf l c 1e. 8ti B 0z C5B ukh9l - 9vv fatti fri 2 enkysgc / 5i t(wtef set r5c		
vg	Ytg		WDSR THEV(D NA WELG-TM) wr(R/k) H glyTGB i rG6i tt9wre2i 2G5i 9wre5i 2GdV49er wWema dV49aVW 2i 2 1er 2 ra faendi 9wre5i 2GdV49er wWema dV49aVW 2i 2 7 Hz OU/ c			
			Y6 6 HDR THEG(G WELG-WW) 2erh 4ra6r R/kg) H, lhTGB i rG5i 9wre5i 2GdV49er wWema dV49aVW 2i 2 1zNb c	- merD5 wAari ram etc parh dñi r5 wr am etc		
hk	vgk					

NUB 1Jǻ - JH0N7 / J7 :: 1UEU - bǻ / - ; Nz1B0zC FI z1Uh hkvyǻFQ pI hE 7U uUpI vhc7bu; sLShk



YH6 P/ CS LJM U(HB
951905CI

U6 HA.T LJM U(HB
N S:02

W ((S 2 6 F 2

Borehole Log

FHJ QUpu VNz 1B 0z VhC5 12 FDedi h

/ J pzuQl NVJ el l en4an6B z

U/ UQzuQl N Vhj dYk one. dtGuJ p

bH0 / 0N7 pJ NuHzpuJ H zNb bH0 / H07 V) i ita6 Qefl i rGurMVI . aWn

pJ J Hb0NzuU1 V N syYj hYqysGU vvyYvscy

bH0 / 0N7 EUul J b zNb U3 : 0FEUNu VHaradar 5

B zuUH / UOU/ V vhdK an4wd

1uzHu VvvlvShkvY

UNb VvvlvShkvY

/ J 77 UH Vbc- Wli m

bUFul - U/J B 7 HJ : Nb 1: HCz p U Raj	HUpJ OUH) Raj	7 HzFI q / J 7	1J 0 bU1pH0FuQl N 1J 0 NzEUG 1p17HJ : F 1) E- J / G pJ / J HGEJ 0lu: HU pJ NuUNuGHU/ zu00U bUN10u) J H pJ N10luUNp) G1J 0 1uH: pu: HUGENUH/ J 7)	pJ EEUNu1 bUFul J Cpz10N7 G bH0 / 0N7 bUuz0 1G 0N1uH: EUNuzuQl N	B U// bUuz0 1
hg	vgdk			- merD5 wAar i ram etc parh df mi r 5 wr am etc	C5i nr8ef l c g andf mi r c
k			- ar5 wri m 5 eni 2 en, k an4wdc		
g					
sk					

NUB 1J 0 - JH0N7 / J 7:: 1UEU - b 0 / -; Nz1B 0 zC_Fl z1Uu hkvy0 FQ p l hE 7 U uUp l_vh0 b u; s1Shk



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-03

SHEET 1 OF 2

Borehole Log

7vj Q.TMUGASWI AzInFeld 75ase J

Yj TAMj GU aCHarb. r/ WA

LYL, AMj GU28fJ48 inao sl/ M T

Dv IYIGR Tj GMv ATM v AGD Dv IYv IR Ukell. w QacQerhMzcCo. znm

Tj j v DIGAMLS UG 4: Q6Q4f1J/ L 2J12008fJQ

Dv IYIGR NLHj D AGD LVPI7NLGMUv. ms. nlt

WAMv YL, LYU OfQinbgs

SMAv MU229J19J12:

LGD U229J19J12:

Yj RRLv Udf Bzrlar

DL7MH BLVj W Rvj PGD SPv FATL ury	vLTj, Lvk ury	RvA7HIT Yj R	Sj IYDLSTvI7Mj G Sj IYGANL/ PSTS Rvj P7 SkNBj Y/ Tj Yj v/ Nj ISMPvL Tj GMLGMvLYAM, L DLGSIMk j v Tj GSISMLGTk/ Sj IY SMvPTMPvL/ NIGLvAYj Rk	Tj>NNLGMS DL7MHj F TASIGR/ Dv IYIGR DLMAYS/ IGSMvPNLGMAMj G	WL YY DLMAYS
	1f1		SILT (ML) darCbr. wn u21kv 89y Dao p/ n. n-plasrte/ rapht-dtkaranro (/ l. w-mzg5ness SIYM wht6 race ilne-grained Sand and Rra) elf SILTY GRAVEL WITH SAND (GM) br. wn u21kv 49y Dao p/ well-graded/ ilne-grained/ szb-angzlar m szb-r. znded Sand m c. arse-grained/ szb-angzlar m sz-r. znded Rv A, LY/ wht6 n. n-plasrte Silm and race T. bblef		0 in srnel ilzs5 o. znnwell c. o plerh nf
	t		SILTY SAND WITH GRAVEL (SM) darC(ell. wts5 br. wn u21kv 49y Dr (/ well graded/ ilne-grained/ szb-angzlar m szb-r. znded SAGD m c. arse-grained/ szb-angzlar m szb-r. znded Rra) el/ wht6 n. n-plasrte Silm aErht c. arse-grained SAGD and ilne-grained Rra) elyf	Hand cleared a 2ft im dlao erer 5. le m t irh Drilling began ant im wht6 a 4 in c. re barrel and 6 in casingf	Benmnh sealf Filter pacCf t inscreenf
	22f1		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM) darC(ell. wts5 br. wn u21kv 49y N. hsrilne-grained/ szb-r. znd m r. znded Sand m szb-r. znd m r. znded T. bble u aErht c. arse-grained Sand and ilne-grained Rv A, LYf		
			SILTY SAND WITH GRAVEL (SM) darC(ell. wts5 br. wn u21kv 49y Werhwell-graded/ ilne-grained/ szb-r. znd m r. znded SAGD m ilne-grained/ szb-r. znd m r. znded Rra) el u aErht c. arse-grained SAGDyf	Sao ple WI-AF-WM18-SB-10 c. illecred an221t w9c. resp. nding dzplltare c. illecred an2221f	
			SILTY SAND WITH GRAVEL (SM) jer(darCgra(u21kv 89y Werhwell-graded/ ilne-grained/ szb-r. znd m r. znded SAGD m ilne-grained/ szb-r. znd m r. znded Rra) el u aErht c. arse-grained SAGDyf		
21			SANDY LEAN CLAY (CL)		

GLW SJ IYBj v IGR Yj R3PSL NL; BDIRYB3GASWI; AF: 7HASLJ; J12: IR7Q3 THJN RLJ MTH; 2JFRDM6 499J1



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-03

SHEET 2 OF 2

Borehole Log

7vj QLT MUGASWI AzlnFeld 75ase J

Yj TAMj GU aCHarb. r/ WA

LYL, AMj GU28fJ48 inao sl/ M T

Dv IYIGR Tj GMv ATM v AGD Dv IYv IR Ukell. w QacQerhMzcCo. znm

Tj j v DIGAMLS UG 4: Q6Q4f1J/ L 2J12008fJQ


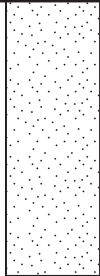



Dv IYIGR NLHj D AGD LVPI7NLGMUv. ms. nte

WAMv YL, LYU OfQinbgs

SMAv MU229J19J12:

LGD U229J19J12:

Yj RRLv Udf Bzrlar

DL7MH BLVj W RVj PGD SPvFATL ury	vLTj, Lvk ury	RvA7HIT Yj R	Sj IYDLSTvI7Mj G Sj IYGANL/ PSTS Rvj P7 SkNBj Y/ Tj Yj v/ Nj ISMPvL Tj GMLGM vLYAM, L DLGSIMk j v Tj GSISMLG Tk/ Sj IY SMv PTMPvL/ NIGLvAYj Rk	Tj>NNLGMS DL7MHj F TASIGR/ Dv IYIGR DLMAIS/ IGSMv PNLGMAMj G	WL YY DLMAIS
			darCgra(u21kv 49y Srtii/ o. tsrhl. w-plasrtch/ sl. w-dharanro(/ l. w-mzg5ness TYAk/ wh5 ime-grained Sand and ime-grained m c. arse-grained Rra) elf FAT CLAY (CH) darCgra(uQft kv 49y Srtii/ o. tsrhl. w-plasrtch/ n. n-dharanrh 5lg5-mzg5ness TYAk f	YfQel(rllf	 Filter pacQ
			SANDY LEAN CLAY (CL) darCgra(u21kv 49y Srtii/ o. tsrhl. w-plasrtch/ sl. w-dharanro(/ l. w-mzg5ness TYAk/ wh5 ime-grained Sand and ime-grained m c. arse-grained Rra) elf	Brear5ing _ ne n. ro alf T. re screening n. ro alf	
	22f1		FAT CLAY (CH) darCgra(uQft kv 49y Srtii/ o. tsrhl. w-plasrtch/ n. n-dharanrh 5lg5-mzg5ness TYAk f		 Benmnlna bacQrlf
2t			B. ring rero lnared an2t imbgsf		
J1					

GLW SJ IYBj v IGR Yj R3PSL NL: BDIRYB3GASWI; AF: 7HASLJ; J12: IR7Q3 THJN RLJ MTH; 2JFRDM6 499J1



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-04

SHEET 1 OF 2

Borehole Log

Q U: E9 MQ7 ASWI AvInFeld C5ase)

zU9AMU7 QJaCHarb. rLWA

EzEGAMU7 Q2) ft 41 imao sILMU9

D(lzzI7T 9U7M(A9MU(A7D D(lzz (IT Q ell. w : acQerhMvcCo . vnm

9UU(DI7AMES Q7 4V66kfBLE 2) 12Bk1f6t

D(lzzI7T j EMHUD A7D E3 JIQ E7MQ . ms. nlt

WAME(zEGEz Q Bf4 inbgs

SMA(MQ22RVR 12V

E7D Q22R 1R 12V

zUTTE(QDf 8vrtier

DEOMH 8EzUW T(UJ7D SJ(FA9E ym	(E9UGE(/ ym	T(AOH9 zUT	SUIz DES9(IOMU7 SUIz 7Aj ELJ S9S T(UJ OS/ j 8UzL 9UzU(Lj UISM(E 9U7ME7M(EzAMGE DE7SIM U(9U7SISME79/ LSUIz SM(J9MU(ELj I7E(AzUT/	9Uj j E7MS DEOMH UF 9ASI7TL D(lzzI7T DEMAlzSL I7SM(Jj E7MAMU7	WEzz DEMAlzS
t	1ft		SILTY GRAVEL WITH SAND (GM) darCbr. wn ykft / (YR, LDao pLwell-gradedLiime-grainedLsvb-r. vnd m r. vnded Sand m c. arse-grainedLsvb-r. vnd m r. vnded T(AGEzLwh6 n. n-plasric Shrf	Hand cleared a 2ft im diao erer 5. le m t irf Drilling began amt im wh6 a 4 in c. re barrel and 6 in casingf	 B in sreel ilvs5 o . vnnwell c. o plerh nf 8enmnha sealf
			SANDY SILT WITH GRAVEL (ML) Neru darCbr. wn ykft / () ft R, LDao pLn. n-plasricLrapit-dtharanrouL l. w-mvg5ness SizMLwh6 ilme-grained Sand m ilme-grained TraNel and mace 9. bblef		
	2ft		WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) br. wn ykft / (4R, LDruLiime-grainedLsvb-angvlar m svb-r. vnded SA7 D m ilme-grainedLsvb-angvlar m svb-r. vnded TraNelLwh6 n. n-plasric Shrf		
			SANDY LEAN CLAY WITH GRAVEL (CL) br. wn ykft / (4R, Lj edlvo -s. irbo . lsrb. w-plasricLwh6 n. n-dtharanrb l. w-mvg5ness 9zA/ Lwh6 ilme-grained Sand and ilme-grained TraNel		
			GRAVELLY LEAN CLAY WITH SAND (CL) grau ykft / (t R, Lj edlvo -s. irbwrb. w-plasricLwh6 n. n-dtharanrb l. w-mvg5ness 9zA/ Lwh6 ilme-grained Sand and ilme m c. arse-grained TraNel		
	21		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM) br. wn ykft / (4R, LWerbiime-grainedLsvb-angvlar m svb-r. vnded Sand m c. arse-grainedLsvb-angvlar m svb-r. vnded T(AGEzLwh6 n. n-plasric Shrf		
	21ft		WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM) Neru darCgrau y21/ (YR, LWemysararared, Liime-grainedLsvb-r. vnd m r. vnded Sand m c. arse-grainedLsvb-r. vnd m r. vnded T(AGEz yo aRrha ilme m c. arse-grained T(AGEz, Lwh6 n. n-plasric Shrf		
2t			GRAVELLY LEAN CLAY (CL) darCgrau ykft / (4R, LSrhiLwerbl. w-plasricLwh6 n. n-dtharanrb. w-mvg5ness 9zA/ Lwh6 ilme-grained SandLiime m c. arse-grained TraNelLand mace 9. bblef	8rear5ing 0. ne n. ro alf 9. re screening n. ro alf zICelu glacial rthf	
			FAT CLAY (CH) grau ykft / (t R, LGeru srhiLDao p m o . lsrb. edlvo -plasricLwh6 n. n-dtharanrb 5tg5-mvg5ness 9zA/ f		
	2kft		POORLY GRADED SAND (SP) darCgrau5 br. wn RdarCuell. wls5 br. wn y21/ (4R, LWerbsvb-angvlar SA7 Df		

7EW SUiz 8U(I7T zUT. JSEI E 8DIT z8; 7ASWI AF_OHASE) 12MTO.; 9HJ TEUME9H 2) ITDM 4R 1



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-04

SHEET 2 OF 2

Borehole Log

Q U: E9 MQ7 ASWI AvInFeld C5ase)

zU9AMU7 QJaCHarb. rLWA

EzEGAMU7 Q2) ft 41 inao sILMU9

D(lzzl7T 9U7M(A9MU(A7D D(lzz (IT Q ell. w : acQertMvCo. vnm

9UU(DI7AMES Q7 4V66kfkBLE 2) 12Bk1f6t

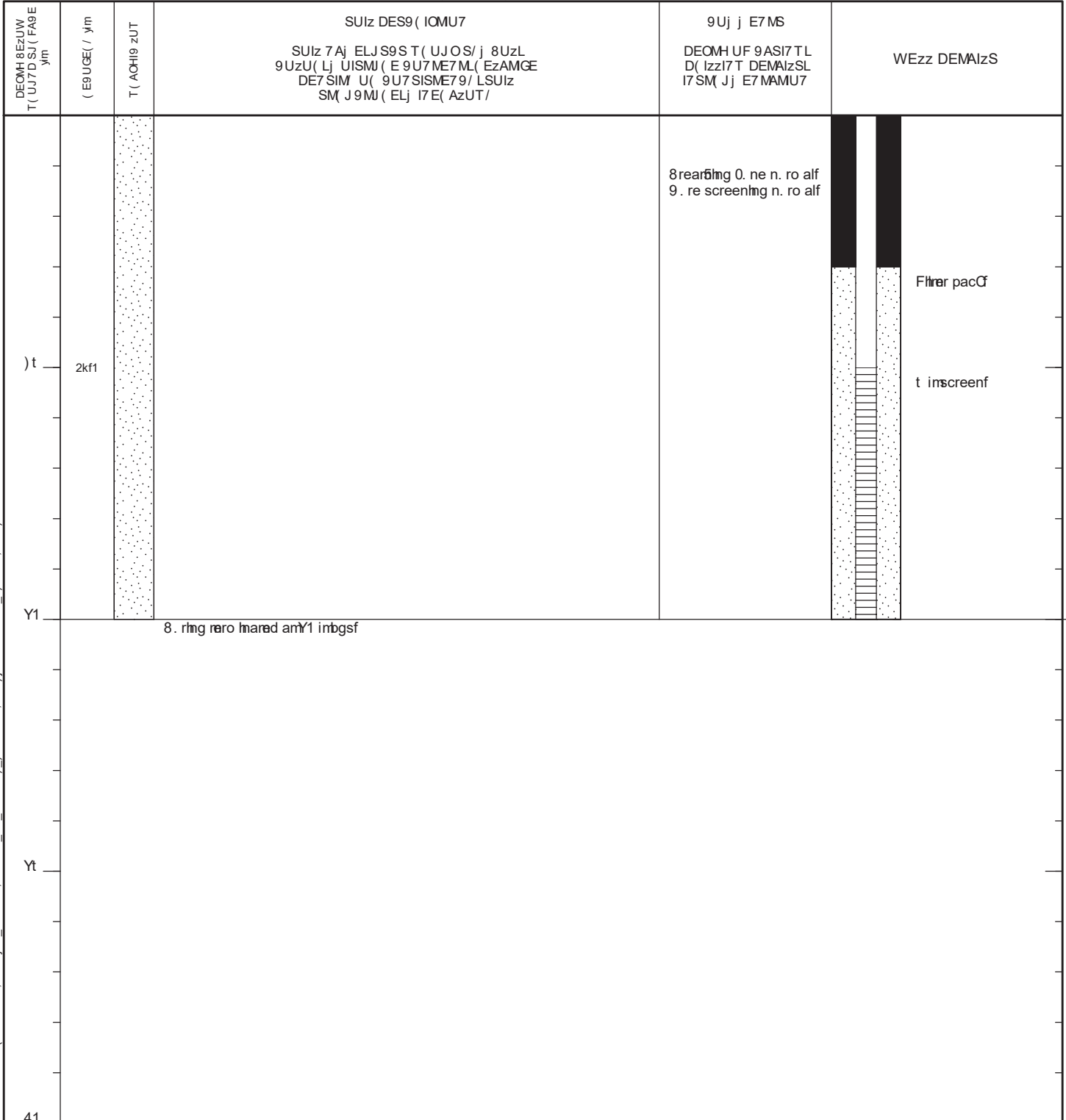
D(lzzl7T j EMHUD A7D E3 JIQ E7MQ . ms. nlt

WAME(zEGEz Q Bf4 inbgs

SMA(MQ22RVR 12V

E7D Q22R 1R 12V

zUTTE(QDf 8vrtier



7EW SUIz 8U(I7T zUT: JSE| E_8DfT z8: 7ASWJ AF_OHASE)_12VTO:; 9H| TEUME9H_2| fTDM 4f6R 1



2R1 PECI VJMUERB
Y69Y56CT

U1 RWG VJMUERB
WI :09

HTEEI 5 10 F

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 12.002 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 494154.15, E 1196696.47

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 6.1 ft bgs

START : 11/13/2019

END : 11/14/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			WELL GRADED GRASEL WNT HAVD (GW- brown (7.5YR 5/2), Damp, fine-grained, rounded Sand to coarse-grained, rounded GRAVEL, with trace Silt (road base material).		8 in steel flush mount well completion.
			WELL GRADED GRASEL WNT HAVD (GW- dark brown (7.5YR 3/4), Dry, fine-grained, sub-round to rounded Sand to sub-round to rounded Cobble, with trace Silt and roots.	Geotextile fabric. Roots.	Bentonite seal.
	0.0		HNL (ML- reddish black (10R 2.5/1), Damp, low-plasticity, slow-dilatancy, low-toughness SILT, with trace fine-grained Sand.		
			HAVD) HNL (ML- brown (7.5YR 5/2), Damp, low-plasticity, non-dilatant, low-toughness SILT, with fine to medium-grained Sand (majority fine-grained Sand) and many shell fragments.		
5			LEAV CL (CL- gray (7.5YR 6/1), Very soft, moist, medium-plasticity, non-dilatant, low-toughness CLAY, with many shell fragments.	Hand cleared a 6 in diameter hole to 5 ft.	Filter pack.
			LEAV CL (CL- gray (7.5YR 6/1), Very soft, moist, medium-plasticity, non-dilatant, low-toughness CLAY, with trace shell fragments.		
	11.0		HAVD) LEAV CL (CL- brown (7.5YR 5/2), Very soft, wet, low-plasticity, non-dilatant, low-toughness CLAY, with fine-grained Sand.	End drilling 11/13/2019 at 1515, Resume drilling 11/14/2019 at 0945.	5 ft screen.
			CL (E) HNL (ML- brown (7.5YR 5/2), Wet, poorly-graded, fine-grained, sub-round to rounded SAND, with low-plasticity CLAY.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	
			WELL GRADED HAVD WNT GRASEL (HW- very dark gray (10YR 3/1), Wet, fine-grained, rounded Sand to coarse-grained, rounded GRAVEL.	Sample WI-AF-WT05-SB-08 collected at 0955.	
10			LEAV CL (CL- gray (10YR 5/1), Very soft, wet, medium-plasticity, non-dilatant, low-toughness CLAY.		

NEW SOIL BORING LOG; USE ME, BD, GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



2R1 PECI VJMUERB
Y69Y56CT

U1 RWG VJMUERB
WI :09

HTEEI F 10 F

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 12.002 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 494154.15, E 1196696.47




DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 6.1 ft bgs

START : 11/13/2019

END : 11/14/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
11.0				Breathing zone normal. Core screening normal.	 Filter pack.  Bentonite backfill.
15					
			Boring terminated at 16 ft bgs.		
20					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



P(OJI - REUNBI (:

695619- A

BO(ET EUNBI (:

S R06

VAI I R 3 OF 2

Borehole Log

ORU: yTDMPu30 9uklt 4ield Chase Y

CUTuD9UP MUaj HarborV0 u

yOyLuD9UP MVW./ p/ ft amslVDUT

ER900PG TUPDRuTDUR uPE ER900CR9G Mello1 : acj etVDrkcj moknt

TUURE9PuDy3 MP / B/ WI .B8Vy W96pwwW

ER900PG AyDHUE uPE yQJ 9DAyPDMrotosonic

0 uDyR OyLyCM ...

3DuRD MWWW-YwWB

yPE MWWW-YwWB

CJGGyR ME. Sktler

EyODH SyQJ0 GRUJPE 3JR4uTy (ft)	RyTULyR7 (ft)	GRuCH9f QJG	3U9CEy3TR9009UP 3U9CPuAyVJ3T3 GRUJO37ASUCV TUQJRVAU8DJ Ry TUPDyPDVRyQuD9Ly EyP39D7 UR TUP39DyPT7V3U9C 3DRJTDJ RyVA9PyRuQJG7	TUAAyPD3 EyODH U4 Tu39PGV ER900PG EyDu9C3V 93DRJ AyPDu9UP	0 yCCyDu9C3
Y5	WB.w				
I w					
I 5	W.5				
			LI ME - LMD S (RA VME) W/LH graN (W7R 5-WV3 oftV1 etVmedikm,2lasticitNnon,dilatantV medikm,tokghness TQu7V1 ith fine,grained 3and and trace fine,grained Grazel.		
			POO(LD T (M I) VME) WPH zerNdarj graN (W7R I -WV0 etVfine,grainedVskb,angklar to skb,roknd 3uPE.		
/ w				Sreathing Fone normal. Tore screening normal.	4ilter 2acj .

Py0 3U9SURPG QJG: J3y Ay SE.GCS: Pu30 9u4_OHu3yY_YwWB.GC: THYA GyUDyTH_WG.GED: / -6-Yw

Borehole Log

ORU: yTDMPu30 9uklt 4ield Ohase Y

OUTuD9UP MJaj HarborV0 u

yCyLuD9UP MWV./ p/ ft amslVDUT

ER909PG TUPDRuTDUR uPE ER90CR9G M7ello1 : acj etVDrkcj moknt

TUURE9PuDy3 MP / B/ W/ I .B8Vy W/B6pww.wY

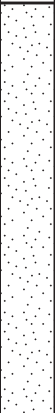
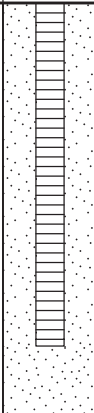
ER900PG AγDHUE uPE γQJ90AγPDM Rotosonic

0 uDyR OyLyCM ,,,

3DuRD MWW-YwB

yPE MWW-YwWB

QUGGyR ME. Sktler

EyODH SyQI0 GRUJPE 3JR4uTy (ft)	RyTULyR7 (ft)	GRuQHjT QJG	3UGCEy3TR9DD9UP 3UGCPuAyVJ3T3 GRUJO37ASUC/ TUQRVAU8DJ Ry TUPDyPDVRy QiD9Ly EyP39D7 UR TUP38DyPT7V3UG 3DRJTDJ Ry VA9PyRuQUG7	TUAAyPD3 EyODH U4 Tu3PGV ER9C9PG EyDu9C3V 93DRJAyPDu9UP	0 yCCeyDu9C3
/ 5	p.w			Eriller notes heazing sands.	 5 ft screen. 4iliter 2acj .
Soring terminated at / 6 ft bgs.					
5w					
55					
6w					



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-07

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 10.808 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 496945.15, E 1199048.86

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 9.6 ft bgs

START : 11/8/2019

END : 11/8/2019

LOGGER : D. Butler

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			POORLY GRADED GRAVEL WITH SAND (GP) gray (7.5YR 5/1), Dry, fine to coarse-grained, angular GRAVEL, with fine to medium-grained Sand.		8 in steel flush mount well completion.
			SILTY SAND WITH GRAVEL (SM) very dark grayish brown (10YR 3/2), Dry, well graded, fine-grained, sub-angular to angular SAND, with fine to coarse-grained, sub-angular to angular Gravel, non-plastic fines, and some Cobble.	Geotextile fabric.	Bentonite seal.
0.0					
5				Hand cleared a 6 in diameter hole to 5 ft.	
1.0				Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	
			SILT WITH SAND (ML) black (10YR 2/1), Dry, non-plastic SILT, with fine-grained Sand (possibly decomposed organics).		
			ORGANIC SOIL (OH) reddish black (10R 2.5/1), Dry, non-plastic, non-dilatant fines, with some wood fibers.		
11.0					
			SILT (ML) dark yellowish brown (10YR 4/4), Dry, non-plastic, non-dilatant SILT, with trace fine to medium-grained Sand, wood fibers, and shell fragments.		Filter pack.
10					

NEW SOIL BORING LOG: USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-08

SHEET 1 OF 2

Borehole Log

WL U: NOK 9PB08 uB, lt Field Whase)

CJOBk uP 9UaT Harbor38 B

NON2Bk uP 9 Yy. (5y ft amsl3k UO

DL uQPG OUPk L BOK UL BPD DL uCL uG 9Eellow : acTet3kr, cT mo, nt

OUUL D uPBk N0 9 P 4/ 6/ 453N YY/ / y5(.5

DL uQPG MNk HUD BPD NQJ uMNPk 9L otosonic

8 Bk NL CN2NC9 ppp

0kBLk 9YY\$ \$yY/

NPD 9YY\$ \$yY/

CJGGNL 9D. 7, tler

DNWkH 7NQJ8 GLUJPD 0JLFBON Atv	L NOU2NLE Atv	GL BWHLO QJG	0U uC DN0 OL uWk uP 0U uC PBMN3J 0O0 GL UJ W0EM7UC3 OU QJL 3MU u k J L N OUPk NPk 3L NCBk u 2N DNP0 u k UL OUP0 u k NPOE30 U uC 0kL J Ok J L N3M uPNL BQJGE	OUMMNPK0 DNWkH UF OB0 uPG3 DL uQPG DNk B u03 uP0k L J MNPK Bk uP	8 NOC DNk B u00
	y.y		POORLY GRADED GRAVEL WITH SAND (GP) gra- A/5EL 5\$ u3Dr- 3fine to coarsegrained3ang, lar GL B2NC3with fine to medi, mpgained 0and Aoad base materialv. SILTY SAND WITH GRAVEL (SM) I er- darT gra- ish brown AyEL R\$ u3Dr- 3well graded3finegrained3 s, b pang, lar to ang, lar 0BPD to fine to coarsegrained3s, b pang, lar to ang, lar Gral el3with some Oobble.	Geotextile fabric.	(in steel fl, sh mo, nt well com1letion. 7 entonite seal.
5	Y.y		SANDY LEAN CLAY WITH GRAVEL (CL) brown AyEL 5\$ u3Dr- 3lowp1lasticit- 3lowp to, ghness OCBE3with finegrained 0and and finegrained Gral el.	Hand cleared a 6 in diameter hole to 5 ft.	
			SILT WITH SAND (ML) blacT AyEL) \$ u3Dr- 3nonp1lasticit3nonpdilatant 0 u k 3with finegrained 0and A oosibl- decom1osed organicsv.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	
			ORGANIC SOIL (OH) reddish blacT AyEL) .5\$ u3Dr- 3nonp1lasticit3nonpdilatant fines3some wood fibers.		
	Yy		SILT (ML) darT - ellowish brown AyEL 4\$ u3Dr- 3nonp1lasticit3nonpdilatant 0 u k 3with trace fine to medi, mpgained 0and 3wood fibers3and shell fragments.		
	YY.y		LEAN CLAY (CL) brown AyEL 4\$ u3Dam13lowp1lasticit- 3nonpdilatant3lowp to, ghness OCBE.		
			SILTY SAND (SM) darT gra- AyEL 4\$ u38 et3moderatel- pgraded3fine to medi, mpgained3 ang, lar 0BPD3with man- shell fragments A oosibl- marine sandv.		
	Y5		SANDY LEAN CLAY (CL) gra- AGONEY 5\$ v8 et3lowp1lasticit- 3nonpdilatant OCBE3with interbedded finegrained 0and.	0am1le 8 uBF p8 kpy(p07 pYR collected at y/ 5y.	
			LEAN CLAY (CL) darT gra- AGONEY 4\$ v8 et3highp1lasticit- 3nonpdilatant3 medi, mpto, ghness OCBE.		
	Y.5		LEAN CLAY (CL) darT gra- AGONEY 4\$ v8 et3highp1lasticit- 3nonpdilatant3 medi, mpto, ghness OCBE3with interbedded fine to medi, mpgained 0and.		
y			LEAN CLAY (CL) darT gra- AGONEY 4\$ v8 et3highp1lasticit- 3nonpdilatant3 medi, mpto, ghness OCBE3with interbedded fine to medi, mpgained 0and.		

PN8 0UUC7UL uPG QJG; J0N MN 7D.GC7; PB08 uBF WHBON) yY/ .GW; OH1M GNKNOH Y1.GDK; 4\$ \$y



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-08

SHEET 2 OF 2

Borehole Log

WL U: NOK 9PB08 uB, lt Field Whase)

CJOBkWP 9UaT Harbor38 B

NON2BkWP 9 Yy. (5y ft amsl3kUO

DL uQPG OUPkLBOKUL BPD DL uCL uG 9Eellow : acTet3kr, cTmo, nt

OUUL DpBkN0 9 P 4/ 6/ 453N YY/ / y5(.5

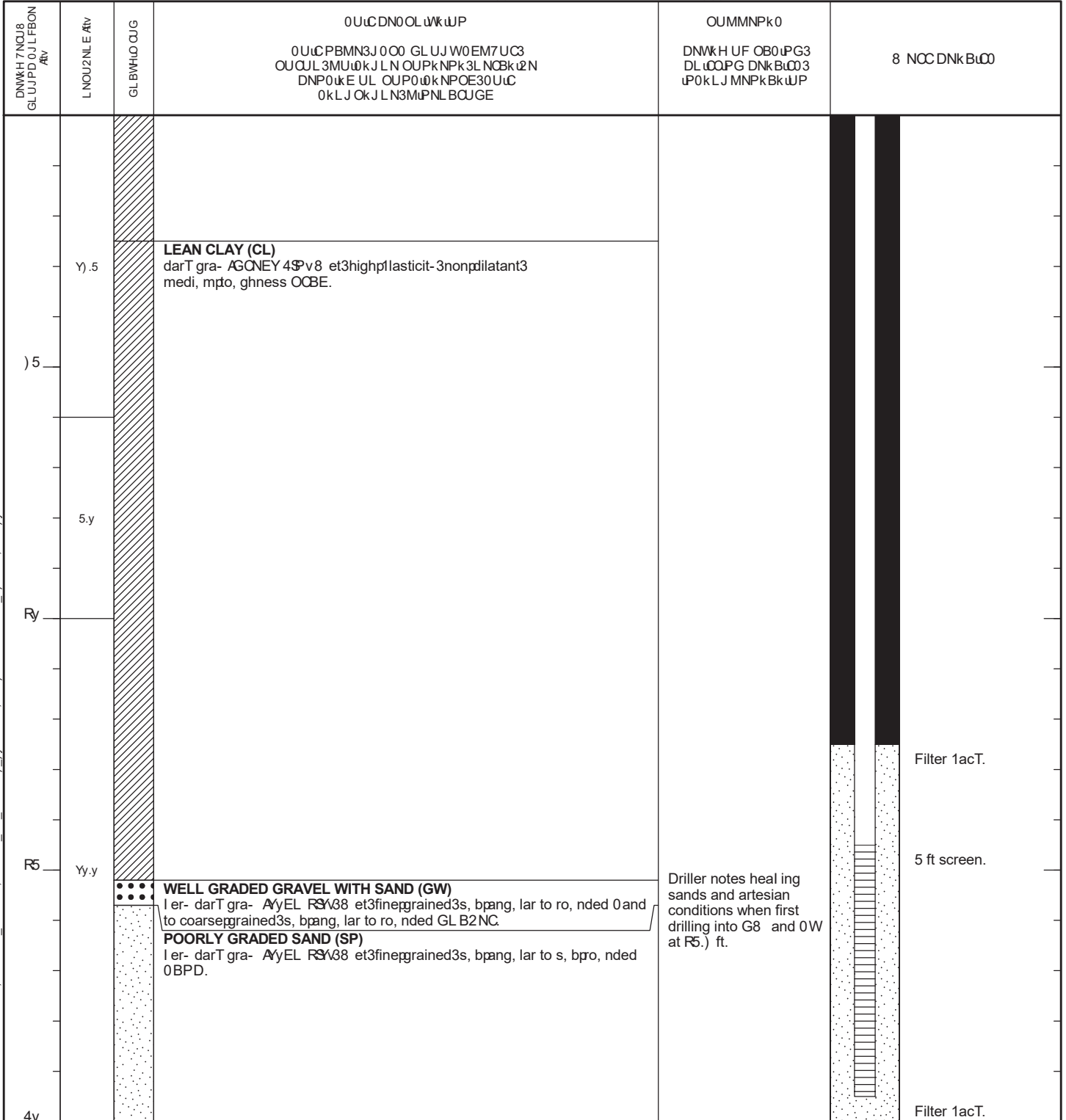
DL uQPG MNkHUD BPD NQJ uMNPk 9Lotosonic

8 BkNL CN2NC9 pp

0kBLk 9YY\$SyY/

NPD 9YY\$SyY/

CJGGNL 9D. 7, tler



7oring terminated at 4y ft bgs.



PROJECT NUMBER:

695619CH

BORING NUMBER:

WT-09

SHEET 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 13.028 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495819.01, E 1195690.23

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : 12.1 ft bgs

START : 11/20/2019

END : 11/21/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) very dark brown / dusky yellowish brown (10YR 2/2), Dry, fine to coarse-grained SAND to Gravel < 50 mm. (Sand: 70%, Gravel: 20%, Silt: 10%)	Geotextile fabric.	8 in steel flush mount well completion.
			WELL GRADED SAND WITH GRAVEL (SW) very dark brown / dusky yellowish brown (10YR 2/2), Dry, fine to coarse-grained SAND to fine to coarse-grained Gravel, with trace Cobble.		Bentonite seal.
0.0			LEAN CLAY (CL) dark yellowish brown (10YR 4/4), Medium-stiff, dry, medium-plasticity, low-toughness CLAY, with trace fine-grained Sand.	Hand cleared a 6 in diameter hole to 5 ft.	
5			WELL GRADED SAND WITH GRAVEL (SW) very dark gray (10YR 3/1), Damp, fine to coarse-grained, sub-angular to sub-rounded SAND, with angular Gravel < 30 mm. (Sand: 60%, Gravel: 40%)	Granitic cobble.	Filter pack.
1.5			LEAN CLAY (CL) dark yellowish brown (10YR 4/4), Medium-stiff, dry, medium-plasticity, low-toughness CLAY, with trace fine-grained Sand.	Drilling began at 5 ft with a 4 in core barrel and 6 in casing.	10 ft screen.
			LEAN CLAY (CL) dark greenish gray (GLE1 4/10 Y) Very soft, wet, medium-plasticity, non-dilatant, low-toughness CLAY.	Sample WI-AF-WT-09-SB-06 collected at 1525. As well as corresponding duplicate WI-AF-WT-09-SBP-06 collected at 1530.	
10.5				At 5.25 ft there is a 20 mm layer of well graded sand with gravel (SW), dark gray (10YR 4/1) Moist, fine to coarse-grained SAND, with Gravel < 15 mm.	
10				Breathing zone normal. Core screening normal.	

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2 2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



P(OJI - A GUNBI (:
695619- V

BO(RST GUNBI (:
S AH0

YVIA 1 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 13.182 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495822.65, E 1195676.41

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 11/20/2019

END : 11/21/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
0.0			<p>S I L L T (M) I) Y M G S R A V Y R L M G T (M E I L W S H Y N D very dark brown / dusky yellowish brown (10YR 2/2), Dry, fine to coarse-grained SAND, with Gravel < 50 mm. (Sand: 70%, Gravel: 20%, Silt: 10%)</p> <p>S I L L T (M) I) Y M G S R A V T (M E I L W S D very dark brown / dusky yellowish brown (10YR 2/2), Dry, fine to coarse-grained SAND to fine to coarse-grained Gravel, with trace Cobble. (Sand: 60%, Gravel: 40%)</p> <p>LI MG - LMC WLD dark yellowish brown (10YR 4/4), Medium-stiff, dry, medium-plasticity, low-toughness CLAY, with trace fine-grained Sand.</p>	<p>Geotextile fabric.</p> <p>Breathing zone normal. Core screening normal.</p> <p>Hand cleared a 6 in diameter hole to 5 ft.</p> <p>Drilling began at 5 ft with a 4 in core barrel and 6 in casing.</p> <p>Sample WI-AF-WT-10-SB-06 collected at 0945.</p> <p>At 5.5 ft there is a 20 mm layer of well graded sand with gravel (SW), dark gray (10YR 4/1) Moist, fine to coarse-grained SAND, with Gravel < 15 mm. Breathing zone normal. Core screening normal.</p> <p>Sluff of top soil, roots, and grass mixed in with the clay.</p> <p>Breathing zone normal. Core screening normal.</p>	<p>8 in steel flush mount well completion. Bentonite seal.</p>
5	1.0				
10	11.0				
15					
16.5					
20					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



P(OJI - A GUNBI (:
695619- V

BO(RGT GUNBI (:
S AH0

YV11A 3 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 13.182 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495822.65, E 1195676.41

DRILLING METHOD AND EQUIPMENT : Rotosonic

WATER LEVEL : ---

START : 11/20/2019

END : 11/21/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25	16.5				
30			UNKNOWN: 3 ft of recovery is a sluff mix of lean clay and medium-grained sand.	Lost core from 30 to 40 ft run. Breathing zone normal. Driller believes he hit a rock at ~33 ft, which pushed through and refused collection of the core.	
35	3.0				
40					Filter pack.

NEW SOIL BORING LOG: USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



P(OJI - A GUNBI (:
695619- V

BO(RST GUNBI (:
S AH0

YV11A 2 OF 2

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 13.182 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495822.65, E 1195676.41

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : ---

START : 11/20/2019

END : 11/21/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SILT (M I) T (M E I L S A V Y M G) W S D black (GLE Y1 2.5/N) Wet, fine to coarse-grained, sub-angular to sub-rounded GRAVEL < 60 mm, with fine to coarse-grained, sub-angular to sub-rounded Sand.		
5.0			FMA - LMC WVD very dark gray (GLE Y1 3/N) Very stiff, moist, high-plasticity, non-dilatant, medium-toughness CLAY.	Breathing zone normal. Core screening normal.	5 ft screen.
45			POO(LCT (M I) YMG) WPD black (GLE Y1 2.5/N) Wet, medium-grained, sub-angular to sub-rounded SAND.	Heaving sands at bottom of the borehole.	Filter pack.
Boring terminated at 46 ft bgs.					
50					
55					
60					

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20



PI OJWW(GUEBW :
695619Y)

BOI 055 GUEBW :
M(-11

N) WW 1 OF 2

Borehole Log

%N93T86 (GbM5 Sb0rt 42 rc %nl ei y

L98b6SG (917 h1 wAw5 b

TLTQb6SG (P:lp1 d1a eru698

- N\$LSR 89 G6Nb869 N bG- - N\$LSR (vi roF 3l . 7i tu6v0. 7 a o0dt

899 N- \$Gb6TM(G 1P1Hy:Q uT ppPHQy)

- N\$LSR UT6h9- bG- TJ E\$UTG6 (Notoeod2

5 b6TN LTQTL () :Bg Ase

M6bN6 (ppQf Ql pP

TG- (ppQf Ql pP

L9 RRTN (6: 8nl ra i ve

- T%6h WTL9 5 RN9 EG- MEN4b8 T kg/		NT89 QTNv kg/	RNb %h \$ L9 R	M9 \$ - TMBN96\$G M9 \$ GbUTuEM8MRN9 E%MvUW0 Lu 89 L9 NuU9 \$6ENT 89 G6TG6uNTLb6\$QT - TGM\$ v 9 N 89 GMB6TG8vuM9 \$ M6NE86ENTuUS\$TNbL9 Rv	89 UUTG6M - T%6h 94 8bM\$SRu - N\$LSR - T6b\$M \$M6NEUTG6b6\$G	5 TLL - T6b\$M	
f	I :I			SI LTWHHA ND(MQ) NLGR VHC , i vz cl w Av0Fd Cc0e7z zi roF2n Av0Fd kpl vN yQ/ukM2(ff Y uRw, i r() I Y uM dc(pf Y /	Noote:		B 2l eti i rg0en a o0dt Fi rr . oa mi t2d:
				NLGRAND(VHC sw i d2n sw z kRLTv p f Ql v/ - vzuroFDnl et2 2zuM\$6: KM2(Hf Y uM dc() I Y uMhi re(f Y /	Mhi rrgvsa i dte:		W dtod2i ei l r.
				MWHH SI LRVR NLGR MQ) SI LTWH WMC , i vz cl w sw i d2n sw z kRLTv p) Ql v/ 42li to . ol vei \$w 2li cu e0AD ds0rl wto e0AD00dci c MbG- uF2n e0AD ds0rl wto e0AD00dci c Rw, i r < yf a a : KM dc(Bf Y uRw, i r(pf Y /	Mhi rrgvsa i dte:		42ti wnt . 7:
				HVLGYHLA WHC cl w wcc2n sw z ky:fvN 1Q/uMogucl a mua i c2Da Dnl et2 2zudod22 tl dtu roFD00sndi ee 8 Lbv:	hl dc . ril wcl H2l c2a iti wnoir to f g:		f g e. wi d:
pp:f				YHLAWA NLGR WYC cl w wcc2n sw z ky:fvN 1Q/u5 i tunowz\$w ci cug2li to a i c2Da \$w 2li cu e0AD ds0rl wto e0AD00dci c MbG- uF2n eogua i c2Da Dnl et2 2zu dod22 tl dturoFD00sndi ee 8rl z l dc tw. i Rw, i r.	M a mi 5 \$b45 6QpDMDf . omi . ti c l t pl pl:		
				HVLGYHLA WHC cl w wcc2n sw z ky:fvN 1Q/uMoguFi tua i c2Da Dnl et2 2zudod22 tl dtu roFD00sndi ee 8 Lbv:	- w2s Aisl dltf g F2nl 1 2l . ow Al wrr l dc H2l . l e2s:		42ti wnt . 7:

GT5 M0 \$ V0 N\$SR L9 RVEMT UT: W :RLWGbM5 \$b4: %hbmFy: yI pP:R%3V8hyU RT9 6T8h: py:R- 6V10Qy



PI OJWW(GUEBW :
695619Y)

BOI 055 GUEBW :
M(-11

N) WW(2 OF 2

Borehole Log

%N93T86 (GbM5 Sb0rt 42 rc %nl ei y

L98b6\$G (917 hI wAow5 b

TLTQb6\$G (P.I pl d l a eru698

- N\$LSR 89 G6Nb869 N bG- - N\$LSR (vi mof 3l . 7i tu6w. 7 a o0dt

899N- \$b6TM(G1P1Hy:Q uT ppPHQy)


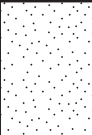

- N\$LSR UT6h9- bG- TJES4UTG6 (Notoeod2

5 b6TN LTQTL () :Bg Ase

M6bN6 (ppPf QI pP

TG- (ppPf QI pP

L9 RRTN (6: 8nl ra i vø

- T%6h WTL9 5 RN9 EG- MEN4b8 T kg/	NT89 QTNv kg/	RNb %h \$ L9 R	M9 \$ - TMBN\$6\$G M9 \$. GbUTuEM8MRN9 E%MvUV0 Lu 89 L9 NuU9 \$6ENT 89 G6TG6uNTLb6\$G - TGM\$ v 9 N 89 GMB6TG8 v uM9 \$ M6NE86ENTuU\$GTNbL9 Rv	89 UUTG6M - T%6h 94 8bM\$SRu - N\$LSR - T6b\$M \$M6NEUTG6b6\$G	5 TLL - T6b\$M	
pf	pp:f			WwI tn2Is _odi dovæ l r: 8ow e. wi d2Is dovæ l r:	 	W dtod2i Al . 7gr:
8oAAri kp)l a a / et0.7 2l tni cvæ n i c l t pf g:						
Vbv2Is ti væ 2Il ti c l t pf g Ase:						

GT5 M0 \$ v0 N\$SR L9 R VEMT UT; W :RLWGbM5 \$b4: %abBMf; yI pP:R%3V8hyU RT9 6T8h; py:R- 6V10QyI



61 9 UW(GBE: W -
1CF120Y)

: 91 125 GBE: W -
M(52J

N) WW(2 9P J

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 9.536 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495466.55, E 1196883.86

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 4.3 ft bgs

START : 11/14/2019

END : 11/14/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
			SI LTWHIA ND(M) NLGR VHC very dark brown / dusky yellowish brown (10YR 2/2), (Silt: 55%, Gravel: 30%, Sand: 15%) NLGR ND(VHC greenish gray (GLEY 1 5/10Y), Dry, low-plasticity SILT, with fine-grained Sand. (Silt: 65%, Sand: 30%, Shells: 5%) HMLG YHLA WHC dark reddish gray (2.5YR 4/1), Soft, damp, medium-plasticity, non-dilatant, low-toughness CLAY.	Roots. Shell fragments. Trace shell fragments.	8 in steel flush mount well completion. Bentonite seal.
5			NLGR HMLG YHLA WHC very dark gray (GLEY 1 3/N), Medium-stiffness, wet, low to medium-plasticity, non-dilatant, low-toughness CLAY, with fine-grained Sand (40%) and trace Gravel < 35 mm.	Sample WI-AF-WT-12-SB-05 collected at 1250 via hand auger. Hand cleared to 6 ft.	
			6991 HA SI LRWR NLGR M) YHLA W65NYC dark gray (GLEY 1 4/N), Wet, medium-grained, sub-angular to sub-rounded SAND, with trace Gravel < 10 mm.	Drilling began at 6 ft with a 4 in core barrel and 6 in casing.	
			HMLG YHLA WHC dark gray (2.5Y 4/1), Soft, wet, medium-plasticity, non-dilatant, low-toughness CLAY.	Breathing zone normal. Core screening normal.	
10	11.0				
15	15.0			Breathing zone normal. Core screening normal.	
20					Filter pack.

NEW SOIL BORING LOG: USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT: 4/6/20



61 9 UW(GBE: W -
1CF120Y)

: 91 16S GBE: W -
M(52J

N) WW(J 9P J

Borehole Log

PROJECT : NASWI Ault Field Phase 2

LOCATION : Oak Harbor, WA

ELEVATION : 9.536 ft amsl, TOC

DRILLING CONTRACTOR AND DRILL RIG : Yellow Jacket, Truck mount

COORDINATES : N 495466.55, E 1196883.86

DRILLING METHOD AND EQUIPMENT : Rotasonic

WATER LEVEL : 4.3 ft bgs

START : 11/14/2019

END : 11/14/2019

LOGGER : T. Chalmers

DEPTH BELOW GROUND SURFACE (ft)	RECOVERY (ft)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING DETAILS, INSTRUMENTATION	WELL DETAILS
25	15.0		<p>NDH (A NLGR M) SI LTWH NE C very dark gray (GLEY 1 3/N), Moist, well-graded, fine to coarse-grained SAND, with Gravel < 50 mm and Silt. (Sand: 60%, Gravel: 20%, Silt: 20%)</p> <p>69 91 HA SI LRWR NLGR W6C very dark gray (GLEY 1 3/N), Wet, fine to medium-grained, sub-angular to sub-round SAND, with few Gravel < 40 mm.</p> <p>NDH VE HC very dark gray (GLEY 1 3/N), Wet SILT, with fine-grained Sand. (Silt: 90%, Sand: 10%)</p> <p>69 91 HA SI LRWR NLGR W6C very dark gray (GLEY 1 3/N), Wet, fine-grained, sub-angular to sub-round SAND.</p> <p>NDH VE HC very dark gray (GLEY 1 3/N), Hard, wet, low-plasticity, rapid-dilatancy, low-toughness SILT.</p>	<p>Likely glacial till.</p> <p>Particle size is on border line of Silt and very fine-grained Sand.</p> <p>Breathing zone normal. Core screening normal.</p>	<p>5 ft screen.</p> <p>Filter pack.</p> <p>Bentonite backfill.</p>
30					
35	5.0				
40					

Boring terminated at 36 ft bgs.

NEW SOIL BORING LOG; USE ME_BD.GLB; NASWI_AF_PHASE2_2019.GPJ; CH2M GEOTECH_12.GDT; 4/6/20

Appendix C

Well Development Logs

ch2m

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/4/19, 12/5/19, 12/6/19
 Weather: 40° Rain

Project Number: 695610CH.04.FI.WI
 Well ID: WI-AF- MW-618
 Sample ID: NA
 Sampling Team: T. Chalmers
 B. Owens

Total Depth: 14.89 FT. (BTOT)
 Depth to water: 13.35 FT. (BTOT)
 Water Column: 1.54 FT.
 Well Volume: 0.163 GAL/FT.
 Total Purge Vol.: 2.51 GAL.

Measuring Device: Solinst: Pine # 12726
 Date and Time: 12/4/19 1305
 12/5/19 1415
 12/6/19 1415

Well Dia. (Inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Disposable Bailer
 Air Monitoring Equipment: MultiRAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, entire 5 ft screen

Surge and bail equipment:

Disposable Bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1305	Begin surge & bail								
1310	2.0	12.46	0.316	13.50	7.75	285	MAX		Murky/No color
1320	Well bailed dry								
1400	1	10.29	0.398	11.60	7.64	303	MAX		Murky/No color
1420	1.75	12.24	0.390	5.75	7.98	211	MAX		"
1440	2.00	12.12	0.410	9.20	7.90	240	MAX		"
1445	End of development for the day.								
1415	Arrive at well take WL, begin bailing								
1430	4.5	12.44	0.509	11.52	8.02	243	MAX		Murky/No color
1500	5.5	12.47	0.514	7.80	8.10	255	445		"
1525	6.0	12.07	0.538	6.31	7.97	270	362		"
1550	6.5	12.16	0.558	8.56	7.82	278	292		"
1610	7.0	12.17	0.563	5.99	8.13	218	189		cloudy/No color
1415	Arrive at well take WL 8.44, begin bailing								
1420	8.0	13.94	0.600	5.21	8.24	305	126		cloudy/No color
1440	9.0	13.32	0.579	3.07	8.28	266	1000		Murky/No color
1500	9.5	12.95	0.571	6.55	8.24	256	609		"
1530	10.0	13.09	0.600	1.47	8.15	288	287		"
Final	10.0	13.09	0.600	1.47	8.15	288	287		Murky/No color

Observations/Notes: Purge Start Time: 12/4/19 1305

Purge Rate:

12/4/19
 After well was initially bailed dry it was left to recharge for 15 minutes. After 15 minute another WL was measured and purge volume calculated. This new purge volume is believed to be more representative to the well. → Low producing well

	BZ	WH
Air Monitoring:		
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s): T. Chalmers

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/8/19
 Weather: 40's overcast

Project Number: 695610CH.04.FI.WI
 Well ID: WI-AF- MW-619
 Sample ID: NA
 Sampling Team: T. Chalmers, A. Vogt

	Before	After	
Total Depth:	15.49		FT.(BTOT)
Depth to water:	(-) 5.64		FT.(BTOT)
Water Column:	9.85		FT.
	(x) 0.63		GAL/FT.
Well Volume:	1.61		GAL.
Total Purge Vol.:	16.1		GAL.

Measuring Device: Horiba Pine # 21290
 Date and Time: Solinst Pine # 12726
 12/8/19

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Pistaltic Pump Pine # 44667
 Air Monitoring Equipment: Multi RAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen? No, along entire 5 ft screen

Surge and bail equipment: Surge block & disposable bailer

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		±0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1040	Begin	Surge							
1100	BEGIN	BAIL							
1113	3.5	11.81	0.962	5.37	7.23	95	71000		BROWN / GREY
1120	Begin Purge								
1140	4.0	10.71	0.990	9.05	9.53	176	473		Murky / No odor
1210	4.125	10.77	0.997	5.40	7.68	206	112		"
1250	5.13	11.23	1.01	3.78	7.73	218	46.5		Cloudy / No odor
1330	5.75	11.70	1.01	5.45	7.75	205	67.9		"
1400	6.35	11.65	1.02	5.16	7.75	226	35.9		"
1430	7.0	11.87	1.05	6.18	7.72	218	30.2		clear / No odor
1515	7.5	11.92	1.03	4.39	7.81	224	19.8		"
Final	7.5	11.92	1.03	4.39	7.89	224	19.8		clear / No odor

Observations/Notes: Purge Start Time: 1120 Purge Rate: 3.02/min

Water in column is most likely drillers water not GW.

Air Monitoring:		BZ	WH
VOC (ppm) =	0.0	0.0	
H2S (ppm) =	0.0	0.0	
LEL (%) =	0	0	
CO (ppm) =	0	0	
O2 (%) =	20.9	20.9	

Signature(s): T. Chalmers



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/4/19
Weather: 40's Rain

Project Number: 695610CH.04.FI.WI
Well ID: WI-AF- MW-620
Sample ID: NA
Sampling Team: T. Chalmers
B. Owens

Horiba: Pine # 21290

	Before	After	
Total Depth:	8.65		FT.(BTOC)
Depth to water:	(-) 4.54		FT.(BTOC)
Water Column:	4.11		FT.
	(x) 0.163		GAL/FT.
Well Volume:	0.67		GAL.
Total Purge Vol.:	6.7		GAL.

Measuring Device: Solinst: Pine # 12726
Date and Time: 12/4/19 0840

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Disposable bailer

Air Monitoring Equipment: MultiRAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, along entire 5 ft screen.

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS								
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU	Color / Odor / Comments
0840	Begin surge							
0850	1.5	11.26	0.961	11.26	7.00	385	MAX	Murky / No color
0920	3.0	11.40	0.999	8.41	7.12	381	103	"
0940	3.5	11.55	0.999	6.29	7.20	339	276	"
1000	4.0	11.56	1.02	7.94	7.46	333	279	"
1025	5.0	11.58	1.02	5.80	7.31	335	159	"
1040	5.5	11.52	1.03	8.70	7.24	335	127	"
1100	6.0	10.85	1.02	6.65	6.35	395	112	cloudy / No color
1120	6.5	11.41	1.03	5.90	7.14	342	28.9	"
1140	7.0	11.41	1.03	5.34	7.26	334	71.5	"
1155	8.0	11.45	1.02	10.50	7.24	338	102	"
1210	8.5	11.45	1.04	6.04	7.30	337	89.4	"
1230	9.0	11.44	1.04	7.69	7.19	333	55.2	"
Final	9.0	11.44	1.04	7.69	7.19	333	55.2	cloudy / No color

Observations/Notes:

Purge Start Time:

0840

Purge Rate:

N/A

Low producing well

		BZ	WH
Air Monitoring:			
VOC (ppm) =	0.0	0.0	
H2S (ppm) =	0.0	0.0	
LEL (%) =	0	0	
CO (ppm) =	0	0	
O2 (%) =	20.9	20.9	

Signature(s):

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 11/24/19
Weather: Clear, 40° wind

Project Number: 695610CH.04.FI.WI
Well ID: WI-AF-MW-021
Sample ID: NA
Sampling Team: D. Butler, B. Owens (YT)

	Before	After	
Total Depth:	9.60	9.60	FT.(BTOC)
Depth to water:	(-) 3.97	5.75	FT.(BTOC) ← not fully recharged
Water Column:	5.63	3.85	FT.
	(X) 0.163	0.163	GAL/FT.
Well Volume:	0.92	0.63	GAL.
Total Purge Vol.:	93	-	GAL.

Measuring Device: Solinst Pine# 12726
Date and Time: 11/24/19 1250

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Horiba Pine# 21290

Purge Device: Disposable bailer & Monsoon pump

Air Monitoring Equipment: MultiRAE Pine# 43639

Was well surged and bailed in 2-3 foot intervals along entire screen? No, surged and bailed whole 5 ft screen

Surge and bail equipment: Disposable bailer - 2ft (used for surging and bailing)

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU	ft b to c	
1250	Begin surging and bailing								
1253	2	12.40	0.627	10.07	7.31	150	7999	-	Dark gray, murky, sed.
1305	Bailed ~ 9 gal.								"
1317	20							4.19	"
1333	23 + 60	12.50	0.599	10.72	7.23	184	369	BTOP	Somewhat clear
1338	28 + 20	12.57	0.615	4.99	7.12	1257	175	BTOP	"
1343	26 + 40	12.53	0.611	5.50	7.20	53	98.4	"	"
1348	38 + 20	12.43	0.619	4.53	7.06	41	34.0	"	Mostly clear
1353	43 + 60	12.34	0.619	4.19	7.11	33	32.2	"	"
1358	48 + 40	12.26	0.609	3.01	7.13	47	23.2	"	"
1403	53 + 60	12.27	0.619	3.07	7.14	39	16.6	"	Clear
1408	58 + 20	12.14	0.623	3.37	7.17	35	16.0	"	"
1415	63	12.22	0.625	3.30	7.08	36	12.7	"	"
1420	68	12.25	0.625	2.83	7.02	40	12.0	"	"
1425	73	12.30	0.626	2.70	7.04	39	12.1	"	"
1430	78	12.31	0.626	2.50	7.08	35	11.9	"	"
1435	83	11.78	0.633	2.02	7.20	20	8.8	"	"
1440	88	12.26	0.630	2.00	6.96	36	8.4	"	"
1445	93	12.26	0.631	2.04	7.05	39	8.6	"	"
Final									

Observations/Notes: Purge Start Time: 1250 Purge Rate: 1A - bailer @ ~1 gpm

Used bailer only due to shallow well and broken surge block.
1319 - pump on, pump delivering pulses of water as well recharged
BTOP = below top of pump

Air Monitoring:	B2	WH
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0	0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.4	20.4

Signature(s): David Butler

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/7/19, 12/8/19
 Weather: 40's Rain

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-623

Sample ID: NA

Sampling Team: T. Chalmers A. Vort
 B. Owens

	Before	After	
Total Depth:	8.19		FT.(BTOC)
Depth to water:	(-) 4.24		FT.(BTOC)
Water Column:	3.95		FT.
Well Volume:	(X) 0.163		GAL/FT.
Total Purge Vol.:	0.64		GAL.
	6.4		GAL.

Measuring Device: Solinst Pine # 12726
 Date and Time: 12/7/19 1250
 12/8/19 0810

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peristaltic pump Pine # 44667

Air Monitoring Equipment: Multi RAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, entire 5 ft screen

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1250	Begin surge & bail								
1300	Peristaltic pump deployed, 150 mL/min flow								
1335	4	12.52	0.992	5.56	7.31	316	267		Murky / No Odor
1350	5	11.23	1.03	3.02	7.13	207	568		"
1415	6	11.12	1.05	1.97	5.84	205	170		"
1440	7	11.01	1.06	3.09	6.05	218	29.5		cloudy / No Odor
1505	8	11.07	1.07	4.52	6.29	220	47.0		"
1530	8.5	11.11	1.06	2.09	6.80	225	40.7		"
1555	9.0	10.96	1.07	1.49	6.53	232	45.3		"
1615	9.5	10.68	1.05	3.51	6.45	225	93.2		"
12/8 0810	Begin bailing								
0840	12.5	Begin purge							
0845	12.9	10.69	1.03	1.62	6.41	370	680		Murky / No Color
0900	14.1	11.02	1.01	1.25	6.71	300	MAX		"
0915	15.3	10.55	0.999	3.11	6.84	276	379		"
0930	16.5	10.52	1.01	1.90	6.88	231	311		"
0945	17.7	10.35	1.01	1.67	6.91	250	MAX		"
1000	18.9	10.89	0.996	2.24	6.96	252	MAX		"
Final	18.9	10.89	0.996	2.24	6.96	252	21000		Murky / No odor

Observations/Notes: Purge Start Time: 12/7 1335, 12/8 0840

Purge Rate: 0.04 gal/min, 12/8 0.05 gal/min

Sample collected 12/7/19 @ 1630 WI-AF-MW-623-GW-1219

		12/7/19		12/8/19	
		BZ	WH	BZ	WH
Air Monitoring:					
VOC (ppm) =	0.0	0.0	0.0	0.0	0.0
H2S (ppm) =	0.0	0.0	0.0	0.0	0.0
LEL (%) =	0	0	0	0	0
CO (ppm) =	0	0	0	0	0
O2 (%) =	20.9	20.9	20.9	20.9	20.9

Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/4/19
 Weather: 40° S Rain

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-624

Sample ID: NA

Sampling Team: T. Chalmers

B. Owens

Horiba Pine #21290

Measuring Device: Solinst Pine #12726

Date and Time: 12/4/19 1513

	Before	After	
Total Depth:	12.41	12.41	FT.(BTQC)
Depth to water:	(-) 2.44	3.77	FT.(BTQC)
Water Column:	9.97	8.64	FT.
	(X) 0.163	0.163	GAL/FT.
Well Volume:	1.62	1.41	GAL.
Total Purge Vol.:	16.2		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Geotech Geosquirt

Air Monitoring Equipment: MultiRAE Pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Entire 5ft screen

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1513	Begin	Surge	± bail						
1520	5	11.92	1.14	10.58	6.98	280	MAX		Murky/No Odor
1536	Begin	purge	at 2 gal/min						
1545	23	11.75	1.20	4.80	6.80	221	906		Murky/No Odor
1600	68	11.97	1.20	8.41	6.90	145	323		"
1605	83	11.96	1.24	5.27	6.83	164	32.9		Clear/No Color
1610	98	12.20	1.26	5.23	6.87	88	31.2		"
1615	108	11.84	1.32	5.55	6.87	148	107		Yellow tint/No color
1620	118	12.00	1.30	4.72	6.86	108	36.6		"
1625	128	12.08	1.26	4.61	6.85	113	18.5		Clear/No Odor
1630	138	12.02	1.31	4.94	6.78	119	5.6		"
1635	148	12.18	1.34	4.61	6.86	118	4.1		"
Final	148	12.18	1.34	4.61	6.86	118	4.1		clear/No odor

Observations/Notes:

Purge Start Time: 1536

Purge Rate: 2 gal/min - 3 gal/min

Good water production.

Air Monitoring:

	BZ	WH
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

[Signature]



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/10/2020
Weather: Sunny

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-625

Sample ID: NA

Sampling Team: G. Gardner

	Before	After	
Total Depth:	58.4	59.00	FT.(BTOC)
Depth to water:	(-) 34.12	33.94	FT.(BTOC) hard bottom
Water Column:	24.28	25.06	FT.
Well Volume:	(X) 0.163	0.163	GAL/FT.
Total Purge Vol.:	3.96	4.08	GAL.
	89.9		GAL.

Measuring Device: Solinst Model 122

Date and Time: 8/10/2020 1500

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon Low Flow

Air Monitoring Equipment: MultiRAE PMG6228

Was well surged and bailed in 2-3 foot intervals along entire screen? Yes

Surge and bail equipment: 6' surge block, 4' bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
16:25	2.5	21.60	0.560	2.71	7.69	-271	71000	35.94	very cloudy
16:35	5.25.5	21.37	0.613	1.69	7.58	-294	71000	35.94	
16:45	7.5	21.29	0.647	8.51	7.50	-294	71000	38.01	
16:55	12.5	18.67	0.682	2.11	7.44	-294	71000	38.03	
17:05	14.5	18.21	0.722	0.93	7.41	-290	310	37.97	
17:15	22.5	17.93	0.735	1.27	7.40	-273	910	37.97	
17:25	32.5	18.08	0.752	1.14	7.38	-270	71000	37.93	
17:35	34.5	18.42	0.760	1.37	7.35	-249	847	36.40	very cloudy
17:45	36.5								
17:45	40.5	18.45	0.756	1.05	7.37	-244	925	36.35	
18:00	66.5	18.14	0.759	1.32	7.34	-237	790	36.31	
18:15	72.5	17.99	0.760	1.11	7.35	-251	827	36.21	
18:30	75.5	19.19	0.765	2.03	7.32	-212	788	34.94	
0735	80.1	15.37	0.820	0.39	6.84	-263	58.2	36.15	clear
0748	85.9	14.90	0.809	0.51	7.16	-261	29.4	36.15	
0758	89.9	14.75	0.803	0.66	7.26	-250	9.5	36.15	
Final	89.9	14.75	0.803	0.66	7.26	-250	9.5	36.15	Clear, no odor

Observations/Notes:

Purge Start Time: 16:15

Purge Rate:

15:15 Begin surging
15:30 Finish surging
15:40 Begin bailing
15:55 Finish bailing
16:15 Begin pumping ~ 0.25 gpm
16:42 increase pumping rate to ~ 0.6 gpm
17:25 reduce pumping rate to 0.4 gpm

Signature(s): [Signature]

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

18:30 Stop pumping; will return and continue on 8/11

Notes continue →

8/11/2020

0722 DTW = 33.75

Restart pumping at ~0.4 gpm

0758 Stop pumping

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/10/2020
Weather: Clouds, Fog, Clear in PM

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-626

Sample ID: NA

Sampling Team: G. Gardner

	Before	After	
Total Depth:	58.3		FT.(BTOC)
Depth to water:	(1) 29.48		FT.(BTOC)
Water Column:	28.82		FT.
	(x) 0.163		GAL/FT.
Well Volume:	4.70		GAL.
Total Purge Vol.:			GAL.

Measuring Device: Solinst model 122

Date and Time: 8/10/2020 0930

Purge Device: Monsoon Low flow

Air Monitoring Equipment: Multi RAE PGM 622P

Was well surged and bailed in 2-3 foot intervals along entire screen? Yes

Surge and bail equipment: 6' 8" Surge block, 4' bailer

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
11:20	11.3	18.55	0.640	20.86	6.06	-114	563	33.79	Very turbid water
11:25	22.6	17.08	0.649	1.45	7.04	-271	247	33.70	
11:30	33.9	15.60	0.694	4.97	7.04	-197	231	33.72	
11:35	45.2	15.42	0.721	4.23	7.09	-126	201	33.73	cloudy
11:40	56.5	15.48	0.728	1.17	7.16	-248	185	33.72	
11:45	67.8	15.25	0.742	1.03	7.17	-230	182	33.72	
11:50	79.1	15.31	0.754	1.44	7.16	-175	191	33.70	
11:55	90.4	15.56	0.762	1.14	7.19	-97	155	33.67	
12:00	101.7	15.30	0.766	1.21	7.20	-100	167	33.67	
12:05	113.0	15.60	0.768	0.72	7.21	-113	146	33.67	
12:10	124.3	15.25	0.777	0.99	7.20	-135	162	33.67	
12:15	135.6	15.24	0.775	0.72	7.22	-125	129	33.65	
12:20	146.9	15.07	0.776	0.69	7.23	-131	101	33.65	
12:25	158.2	15.14	0.778	1.13	7.23	-154	89.6	33.65	
12:30	169.5	15.21	0.779	0.70	7.23	-151	82.6	33.61	Slightly cloudy
12:35	180.8	15.09	0.780	0.66	7.24	-140	65.6	33.60	
12:40	191.1	14.93	0.782	0.74	7.24	-151	49.8	33.61	
12:45	202.4	14.91	0.782	0.64	7.25	-159	38.9	33.60	Clear
12:50	213.7	14.88	0.785	0.79	7.24	-140	29.1	33.60	
12:55 Final	224.0	15.02	0.789	2.15	7.23	-146	23.6	33.60	

Observations/Notes:

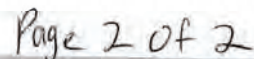
Purge Start Time: 11:15

Purge Rate: ~2.3 gpm

0945 Begin surging
1010 Finish surging, begin bailing
1055 Finish bailing, DTW = 29.83
~8 gal. bailed

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Signature(s):



Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/10/2020
Weather: Clear in PM

Sampling Team: C. Gardner

Date and Time: 8/10/2020 09:30

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Air Monitoring Equipment: Multi DAE PG16225

Was well surged and bailed in 2-3 foot intervals along entire screen? yes

Surge and bail equipment: 6' surge block, 4' bailer

FIELD PARAMETERS

[illegible]

Observations/Notes:

Purge Start Time: 11:15

Purge Rate: 2.3 gpm

1310 Pump off

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/11/2020
 Weather: Foggy in AM

Project Number: 695610CH.04.FI.WI
 Well ID: WI-AF-MW-627
 Sample ID: NA
 Sampling Team: G. Gardner

	Before	After	
Total Depth:	58.70	58.5	FT.(BTOT)
Depth to water:	(-) 37.93	38.08	FT.(BTOT)
Water Column:	20.77	20.42	FT.
Well Volume:	(X) 0.163	0.163	GAL/FT.
Total Purge Vol.:	3.39	3.33	GAL.
	45.75		GAL.

Measuring Device: Solinst Model #122
 Date and Time: 8/11/2020 07:45

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon

Air Monitoring Equipment: MultiRAE PGM 6228

Was well surged and bailed in 2-3 foot intervals along entire screen? yes

Surge and bail equipment: 6' surge block, 4' bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
0855	5.0	16.33	0.319	3.13	7.73	-147	676	38.29	Very murky
0905	7.5	17.18	0.320	1.43	7.67	-188	431	38.25	Cloudy
0915	10.0	17.26	0.342	1.27	7.67	-211	357	38.25	
0928	13.25	17.50	0.354	1.02	7.66	-226	266	38.25	
0938	15.75	17.60	0.368	1.20	7.66	-211	206	38.25	
0948	18.25	17.81	0.375	1.04	7.66	-230	191	38.25	
0958	20.75	17.73	0.382	0.96	7.66	-222	154	38.25	
1008	23.25	17.87	0.387	1.03	7.66	-213	137	38.23	
1018	25.75	17.94	0.395	0.77	7.66	-222	111	38.22	
1028	28.25	17.82	0.395	0.82	7.65	-208	100	38.22	
1038	30.75	17.87	0.406	0.97	7.65	-210	82.0	38.24	
1048	33.25	17.95	0.412	0.81	7.66	-221	65.4	38.25	Slightly cloudy
1058	35.75	18.02	0.418	0.92	7.64	-207	63.3	38.25	
1108	38.25	18.23	0.425	1.01	7.64	-206	57.0	38.23	
1118	40.75	18.72	0.429	0.93	7.63	-211	52.7	38.23	
1128	43.25	19.01	0.432	0.84	7.63	-215	41.5	38.23	
1138	45.75	19.22	0.440	1.08	7.63	-210	42.5	38.23	Clear
4 hrs development time reached									
Final	45.75	19.22	0.440	1.08	7.63	-210	47.5	38.23	Clear, no odor

Observations/Notes:

Purge Start Time: 0847

Purge Rate: 0.25 gpm

0740 Begin Surging
 0800 Finish surging
 0805 Begin bailing
 0830 Finish bailing ~4 gal. bailed
 0847 Begin pumping 0.25 gpm
 081140 Stop pumping

Signature(s):

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.8	20.8



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/11/2020
 Weather: Sunny, 63 °F

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-628

Sample ID: NA

Sampling Team: G. Gardner

	Before	After	
Total Depth:	64.7	64.70	FT.(BTOC)
Depth to water:	(-)53.34	60.87	FT.(BTOC)
Water Column:	11.36	3.83	FT.
Well Volume:	(X)0.163	0.163	GAL/FT.
Total Purge Vol.:	1.85	0.62	GAL.
	7.36 gal		GAL.

Measuring Device: Solinst Model #122

Date and Time: 8/11/2020

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon

Air Monitoring Equipment: PID MultiRAE PMG 6228

Was well surged and bailed in 2-3 foot intervals along entire screen? Yes

Surge and bail equipment: 6' surge block, 4' bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1450	1415	Well is purging dry. Not enough water to fill tubing. Allow to recharge. DTW = 58.75							
1630	1615	Switch to different pump. Sampling pump							
1700	DTW = 62.65	Water is very murky							
1710	200	0.388	2.70	8.42	-247	> 1000			
1718	Well dry	3.84	gallons purged so far. Allow to recharge overnight						
0727	0.48								
0730	0.72						58.78		Very Cloudy
0735	1.12						59.12		
0740	1.52						59.77		
0745	1.92						60.23		
0805	3.52	Well purges dry					60.45		
0817	15.8	0.469	6.33	7.87	-28	71000	62.5		
0825	Well dry								
Well has purged dry multiple times; Development terminated									
Final									

Observations/Notes:

Purge Start Time: 1450

Purge Rate: 0.08 gpm

1400 Begin surging
 1420 Finish surging, start bailing
 1430 Finish bailing, ~2 gal bailed
 1450 Begin pumping ~0.25 gpm
 1500 Well is purging dry
 1630 begin pumping with different pump, @ 0.08 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.6	20.6

Signature(s):

Total Purge from 8/11 and 8/12 = 7.36 gal

additional notes →

8/12/2020

0715 DTW = 57.33

0721 Begin pumping 270 mL/min (0.08 gpm)

0727 DTW = 58.78



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/11/2020
Weather: Sunny

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-0629

Sample ID: NA

Sampling Team: G. Gardner

	Before	After	hard bottom
Total Depth:	66.70	64.69.5	FT.(BTOC)
Depth to water:	119.10	64.35	FT.(BTOC)
Water Column:	47.6	5.15	FT.
Well Volume:	(x) 0.163	0.163	GAL/FT.
Total Purge Vol.:	7.76	0.84	GAL.

Measuring Device: Solinst Model #122
Date and Time:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Manson

Air Monitoring Equipment: PID MULTIRAE PM66228

Was well surged and bailed in 2-3 foot intervals along entire screen? Yes

Surge and bail equipment: 6' surge block, 4' bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
	Well purges dry		after ~15 gallons						
0704	DTW = 61.03		Allow to recharge						
0900	DTW = 61.05								
0906	1.2 (x)								
0910	1.52 (x)							65.8	Very muddy sand in water
0913	Well dry. Let recharge								
0924	DTW = 60.9								
0955	DTW = 60.12								
1000	DTW = 60.09								
Final									

Observations/Notes:

Purge Start Time: 0640

Purge Rate: 0.08 gpm

1500 Begin Surge
1530 Finish Surge begin bail
1600 Finish bailing, ~4 gallons bailed

8/12/2020
0640 Begin pumping ~0.25 gpm
0645 well purges dry

0900 restart pump ~395 mL/min, slow to 300 mL/min
Signature(s): [Signature]

sampling pump

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.6	20.6

Notes Continue →

8/12/2020

- 1000 Attempt to pump dry again; pump won't bring water to surface
1030 pump is stuck in well.
1045 able to remove pump. Pump comes out with silty sand on top; TD=69.5
1100 Decide to add clean water and reattempt surge + Bail
~~1100~~ 1120 Add ~8 gal of clean water DTW= 28.62
1130 Begin Surging
1145 Finish Surging
1150 Begin bailing
1200 ~4 gal bailed. Formation sand in bottom of bucket
1212 Bailer ~~is~~ not filling completely
DTW= 61.03
1217 ~8 gal bailed. DTW= 67.02 ~~TD=~~
only ~2.5' of water in well
water is very murky
1230 DTW= 64.50

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/12/2020, 8/13/2020
Weather: Sunny 60s

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW 630

Well ID: WI-AF-MW 630

Sample ID: NA

Sampling Team: A. V. Jones

G. GARDNER

	Before	After	
Total Depth:	12.61	12.68	FT.(BTOC)
Depth to water:	(1) 6.78	6.52	FT.(BTOC)
Water Column:	5.83	6.16	FT.
	(x) 0.163	0.163	GAL/FT.
Well Volume:	0.95	1.00	GAL.
Total Purge Vol.:	~42 gallons bailed		GAL.

Measuring Device: Solinst #122

Date and Time: 15:00 8/12/2020

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mansco

Air Monitoring Equipment: MultiRAE PG16228

Was well surged and bailed in 2-3 foot intervals along entire screen? *yes*

Surge and bail equipment: Surge: PVC rods with rubber gaskets; Bail: disposable bailer with weights

FIELD PARAMETERS

[illegible]

Observations/Notes:

Purge Start Time:	Not Purged
-------------------	------------

Purge Rate: *NA*

SURGE BLOCK TOO WIDE TO FIT IN
SCREEN SECTION OF WELL. PAUSED UNTIL
NEW SURGE BLOCK CAN BE ACQUIRED

Begin surging 0730 on 8/13/2020

0745 Finish surgery

0845 Finish hailing; ~ 12 gallons bailed

Signature(s):

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	10
O2 (%)	20.9	20.9

0900 cannot get pump past choke point at the top of screen. pause.

Notes continue →

8/18/20

1526 DTW = 0.60

1530 Attempt to surge and bail to reduce turbidity

1700 ~ 18 gallons bailed today

1730 ~ 30 gallons bailed today; 42 total, water is cloudy
* Development terminated (NTU \approx 400)



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/12/2020, 8/13/2020
 Weather: Clear, Sunny, 55°F

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-MW-631

Sample ID: NA

Sampling Team: G. Gardner, A. Vogt

Total Depth: ^{very soft bottom} 39.51 Before 39.56 After FT.(BTOC)
 Depth to water: (-) 8.72 34.36 FT.(BTOC)
 Water Column: 30.79 5.5 FT.
 Well Volume: (X) 0.163 0.163 GAL/FT.
 Total Purge Vol.: 5.02 0.90 GAL.
 ~6 gal

Measuring Device: Solinst #122 Sn: 045651
 Date and Time:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon

Air Monitoring Equipment: PID MultiRAE PGM 6228

Was well surged and bailed in 2-3 foot intervals along entire screen? yes

Surge and bail equipment:

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1255	0.7	14.37	1.19	6.80	7.14	17	#1000	32.05	cloudy
1321	4.00	14.59	1.15	5.36	7.38	4	#1000	Dry	cloudy
1330	restart pump	13.84	1.19	6.52	7.36	7	21000	34.6	
1355	4.5	14.02	1.10	3.74	7.60	-72	21000	39.38	very muddy/turbid
1400	4.7	15.02	1.22	5.43	7.46	13	21000	35.14	cloudy
1407	5	14.73	1.24	5.35	7.52	2	21000	Below pump top	
Final	6	14.73	1.24	5.35	7.52	2	21000		Very cloudy

Observations/Notes:

Purge Start Time: 12:50

Purge Rate: 500-800 mL/min

8/12 1000 Air monitoring reads elevated CO, LEL, & H₂S allow to vent overnight

8/13 1000 Begin surging
 1205 Finish bailing ~15 gallons DTW=36.44

1250 Begin pumping ~500 mL/min

Signature(s): G. Gardner

Air Monitoring	8/12/2020	8/13/2020	WH 8/13
VOC (ppm)	0	0	0.1
H ₂ S (ppm)	0	0	7.7
LEL (%)	0	0	10
CO (ppm)	0	0	314
O ₂ (%)	20.9	20.9	20.9

1321 Well runs dry

1337 Well runs dry again, lower pump ~1 ft

1413 Well runs dry 3rd time; terminate development



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/7/19
Weather: 40's Rain

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-~~100~~ WT-01

Sample ID: NA

Sampling Team:

T. Chalmers A. Vagt
B. Owens

Horiba Pine #21290

Measuring Device: Solinst Pine #12726
Date and Time: 12/7/19 0825

	Before	After	
Total Depth:	14.93	14.93	FT.(BTOC)
Depth to water:	(-) 11.62	11.64	FT.(BTOC)
Water Column:	3.31	3.29	FT.
	(X) 0.163	0.163	GAL/FT.
Well Volume:	0.54	0.54	GAL.
Total Purge Vol.:	5.4		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device:

Monsoon

Air Monitoring Equipment:

Multi RAE pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Entire 5 ft screen

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
0825	Begin surge & bail								
0835	3	11.19	0.175	0.11	6.90	-71	max		murky/No Color
0855	Begin purge								
0910	18	11.23	0.151	0.00	7.46	-64	194		clear/No color
0925	33	12.09	0.146	0.15	7.63	-76	42.3		"
0940	48	12.09	0.140	1.39	7.43	-59	24.6		"
0955	63	11.99	0.147	0.72	7.81	-16	11.7		"
1005	73	12.01	0.145	2.84	7.69	16	12.9		"
1025	93	12.18	0.145	0.09	7.30	22	10.9		"
1035	103	12.17	0.149	0.56	7.26	36	6.4		"
1040	108	12.18	0.151	0.59	7.27	35	6.5		"
1045	113	12.15	0.150	0.66	7.27	34	4.9		"
Final									

Observations/Notes:

Purge Start Time: 0850 0855

Purge Rate: 1 gal/min

Collected GW sample at 1100 WI-AF-WT01-GW-1219

Collected duplicate sample at 0900 WI-AF-WT01-GW-1219

Air Monitoring:

VOC (ppm) = 0.0 0.0

H2S (ppm) = 0.0 0.0

CO (ppm) = 0 0

O2 (%) = 20.9 20.9

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/2/19
Weather: 40's overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT03

Sample ID: NA

Sampling Team: T. Chalmers
B. Owens

Horiba: Pine # 21290

	12/2 Before	12/3 After		After
Total Depth:	9.90	9.90	FT.(BTOT)	9.90
Depth to water:	(-) 8.27	8.36	FT.(BTOT)	8.62
Water Column:	1.63	1.54	FT.	1.28
	(X) 0.163	0.163	GAL/FT.	
Well Volume:	0.27	0.25	GAL.	
Total Purge Vol.:	2.7	2.5	GAL.	

Measuring Device: Solinst: Pine # 12726
Date and Time: 12/2/19 1445

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Bailor / Mega Monsoon

Air Monitoring Equipment: MultiRAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, surge entire 5 ft screen.

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1449		11.20	0.268	16.88	6.86	75	MAX		swampy color
1620	Input Mega Monsoon, begin purge								
1623	29/min 12/2	10.29	0.279	15.21	6.61	165	861		Brown / No odor
1625	Pump well is not able to keep up w/ pump. pump begins to surge								
1645	~14	9.86	0.282	7.98	5.51	301	131		Marky / less of an odor
12/3 0858		10.26	0.399	10.11	5.06	382	321		"
0915	25	10.59	0.275	7.52	5.47	357	38.9		clear / No odor
0930	35	9.68	0.195	8.30	5.59	443	22.6		"
0945	42	10.87	0.278	6.39	5.58	379	22.2		"
1000	50	10.96	0.277	6.70	5.54	350	16.9		"
1010	55	11.10	0.276	6.53	5.55	346	22.3		"
1020	60	11.30	0.275	6.48	5.53	348	22.7		"
1030	65	11.12	0.277	6.89	5.49	355	10.2		"
1040	70	11.14	0.277	6.02	5.45	361	7.0		"
1050	75	11.27	0.271	5.89	5.47	344	7.9		"
1100	80	11.26	0.274	6.23	5.44	372	5.5		"
Final	80	11.26	0.274	6.23	5.44	372	5.5		clear / No odor.

Observations/Notes:

Purge Start Time:

1445 0858

Purge Rate:

12/3 ~ 0.66 gal/min ~ 0.33

Not enough water column to take
WL's while pump is deployed.

Air Monitoring:

VOC (ppm) =

H2S (ppm) =

LEL (%) =

CO (ppm) =

O2 (%) =

Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/2/19
 Weather: 40's overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-04

Sample ID: NA

Sampling Team:

T. Chalmers

B. Owens

Horiba : Pine # 21290

Measuring Device: Solinst: Pine # 12726

Date and Time: 12/2/19 1400

	Before	After	
Total Depth:	29.25	29.25	FT.(BTOC)
Depth to water:	(-) 7.98	8.79	FT.(BTOC)
Water Column:	21.27	20.46	FT.
	(x) 0.163	0.163	GAL/FT.
Well Volume:	3.47	3.33	GAL.
Total Purge Vol.: x10	34.7	190	GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mega Monsoon

Air Monitoring Equipment: MultiRAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Surged entire 5 ft screen.

Surge and bail equipment:

Stainless Steel bailer

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1405	Begin	Surge	w/	Bailer.					
1413	3	11.82	0.413	28.78	6.34	118	MAX	-	Murky/No color
1438	13	11.21	0.423	0.00	6.68	43	181	9.30	
1456	58	10.70	0.404	1.51	6.38	51	25.7	-	Clear/No odor
1505	75	10.61	0.413	14.32	6.88	2	15.6	-	"
1515	100	10.20	0.410	12.73	7.05	-14	12.1	-	"
1525	125	10.13	0.406	11.71	7.12	-14	8.4	-	"
1531	140	10.18	0.398	11.70	7.16	-49	7.7	-	"
1540	165	9.92	0.408	11.72	7.33	-63	8.6	-	"
1550	180	9.93	0.407	11.69	7.29	-60	5.9	-	"
1600	190	9.91	0.405	11.70	7.35	-57	6.2	8.79	"
Final	190	9.91	0.405	11.70	7.35	-57	6.2	8.79	Clear/No color

Observations/Notes:

Purge Start Time:

1434

Purge Rate:

2.5 g/min

Began purge w/ Mega Monsoon at 1415

Air Monitoring:

VOC (ppm) =

0

0

H2S (ppm) =

0.0

0.0

LEL (%) =

0

0

CO (ppm) =

0

0

O2 (%) =

20.9

20.9

Signature(s):

T. Chalmers



Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/3/19
Weather: 40's Overcast

WELL DEVELOPMENT DATA SHEET

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-05

Sample ID: NA

Sampling Team: T. Chalmers
B. Owens

Horiba: Pine # 21290

Measuring Device: Solinst: Pine # 12726
Date and Time: 12/3/19 1213

	Before	After	
Total Depth:	10.02		FT.(BTOT)
Depth to water:	(-) 5.92		FT.(BTOT)
Water Column:	4.1		FT.
Well Volume:	(X) 0.163		GAL/FT.
Total Purge Vol.:	0.67		GAL.
	6.7		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Geotech Squirt

Air Monitoring Equipment: MultiRAE Pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, surged along entire 5ft screen

Surge and bail equipment: Disposable bailer

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1227	Begin surge w/ bailer								
1240	6	12.15	0.769	8.19	6.82	101	MAX		MURKY/No Color
1253	Drop Pump								
1300	Begin Purge								
1310	Set Purge Rate to 2gal/min								
1315	16	12.23	0.781	5.96	6.98	41	MAX		Murky/No color
1337	60	12.25	0.809	7.50	6.87	195	124		
1343	72								
1350	Resume purge at 1gal/min								
1520	92	12.40	0.798	8.34	7.07	66	256		Murky/No color
1540	112	12.20	0.788	6.12	7.06	70	27.3		clear/No odor
1550	122	12.12	0.761	6.11	7.12	25	16.9		"
1605	137	12.11	0.783	5.50	7.07	28	13.5		"
1615	147	11.95	0.790	6.48	7.35	27	8.5		"
1630	162								
Final	162	11.95	0.790	6.48	7.35	27	8.5		clear/No odor
Observations/Notes: Purge Start Time: 1300 Purge Rate: 4 gal/min - 2 gal/min									
Air Monitoring:									
VOC (ppm) = 00 0.0									
H2S (ppm) = 0.0 0.0									
LEL (%) = 0 0									
CO (ppm) = 0 0									
O2 (%) = 20.9 20.9									
Signature(s):									



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/3/19
 Weather: 40% overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-WT-06

Sample ID: NA

Sampling Team: T. Chalmers
B. Owens

Horiba: Pinch: 21290

Measuring Device: Solinst: Pire #12726

Date and Time: 12/3/19 1215

Total Depth: 45 FT.(BTOC)
 Depth to water: (-0.04/2psi) FT.(BTOC)
 Water Column: 45 FT.
 Well Volume: (X) 0.163 GAL/FT.
 Total Purge Vol.: 7.34 GAL.
 73.4 GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Mega Monsoon

Air Monitoring Equipment: Multi RAE Pire #143639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Artesian

Surge and bail equipment:

N/A Artesian

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1218	Removed Artesian well cap and dropped pump								
1222	Began Purge								
1235	52	11.25	0.393	14.14	6.46	-84	580		Murky/No color
1250	112	11.25	0.395	7.15	7.17	-119	268		
1305	172	11.13	0.383	6.85	7.19	-111	176		
1313	Adjusted purge Rate to 2 gal/min.								
1320	218	11.29	0.396	6.43	7.23	-130	165		cloudy/No Odor
1343	264	stop purge to transfer IDW							
1455	Resume purge at 3 gal/min.								
1515	320	11.41	0.403	7.27	7.27	-115	3.5		clear/No odor
1525	350	11.43	0.394	7.77	7.29	-106	3.2		"
1535	380	11.13	0.397	6.58	7.34	-111	9.7		"
1545	410	11.23	0.393	6.51	7.39	-105	9.5		"
1555	440	11.16	0.401	6.42	7.42	-97	20.3		cloudyish/No odor
1608	479	11.22	0.395	6.34	7.38	-90	25.2		"
1613	494	Pulled pump for day.							
Final	494	11.22	0.395	6.34	7.38	-90	25.2		cloudyish/No Odor

Observations/Notes:

Purge Start Time:

1222

Purge Rate:

4 gal/min

PSI on well cap before removal
 2 psi.

Air Monitoring:	BZ	WH
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/5/19
Weather: 40°s Overcast/Rain

Project Number: 695610CH.04.FI.WI
Well ID: WI-AF- WT-07
Sample ID: NA
Sampling Team: T. Chasler's
B. Owens

Hariba Pine #21290

	Before	After	
Total Depth:	15.05		FT.(BTOC)
Depth to water:	(-) 9.30		FT.(BTOC)
Water Column:	5.75		FT.
	(x) 0.163		GAL/FT.
Well Volume:	0.94		GAL.
Total Purge Vol.:	9.4		GAL.

Measuring Device: Solinst Pine #12726
Date and Time: 12/5/19 0918

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Geotech Geosquirt

Air Monitoring Equipment: MultiRAE Pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Entire 5 ft screen

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	<±10% or ≤10 NTU		
0918	Surge								
0935	4.5	11.82	1.51	8.61	6.69	1	MAX		Murky/No odor
1015	11	11.82	1.49	6.93	6.80	50	MAX		"
1045	Insert geotech geosquirt pump.								
1115	12.5	10.99	1.47	10.12	7.09	142	693		Murky/No Odor
1130	14	11.37	1.48	7.57	7.02	111	29.0		Clear/No Odor
1145	15.5	11.81	1.48	7.42	7.07	56	19.4		"
1200	17	11.75	1.44	7.14	7.05	95	10.7		"
1210	18	10.44	1.50	7.11	7.02	124	8.8		"
1220	19	10.27	1.49	7.18	6.98	122	9.5		"
Final									

Observations/Notes:

Purge Start Time: 1045

Purge Rate: 0.1 gal/min

Air Monitoring:

	BZ	WH
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/5/19
Weather: 40°s overcast / Rain

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-CP

Sample ID: NA

Sampling Team: T. Chalmers
B. Owens

	Artesian		
	Before	After	
Total Depth:	40		FT.(BTOT)
Depth to water:	(-)		FT.(BTOT)
Water Column:	40		FT.
	(X) 663		GAL/FT.
Well Volume:	6.52		GAL.
Total Purge Vol.:	65.2		GAL.

Measuring Device: Solinst Pine # 12726
Date and Time: 12/5/19 0850

Purge Device: Self Purge - Artesian

Air Monitoring Equipment: MultiRAE Pin # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

Surge and bail equipment:

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

[illegible]

Observations/Notes:

Purge Start Time: 0850

Purge Rate: $\approx 2 \text{ gal/min}$

Well is producing roughly 3.5 ft of head pressure.
After development artesian well head is attached
to well, pressure gauge reads ~2 psi.

Air Monitoring:

VOC (ppm) =

H₂S (ppm) =

LEL (%) =

CO (ppm) =

$$O_2 (\%) =$$

BZ	VH
0.0	0.0
0.0	0.0
0	0
0	0
20.9	20.9

Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/10/19
Weather: 40°s overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-09

Sample ID: NA

Sampling Team: T. Chalmers A. Vogt

Floribea Pine # 19912

Measuring Device: Solinst Pine #12726
Date and Time: 12/10/19 0910

	Before	After	
Total Depth:	15.33		FT.(BTOTC)
Depth to water:	(-) 7.82		FT.(BTOTC)
Water Column:	7.51		FT.
	(x) 0.163		GAL/FT.
Well Volume:	1.22		GAL.
Total Purge Vol.:	12.2		GAL.

Purge Device:

Air Monitoring Equipment:

Was well surged and bailed in 2-3 foot intervals along entire screen?

Surge and bail equipment:

Well Dia. (Inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Multi RAE Pine #43639

2 x 5 ft intervals, along 10 ft screen

Disposable bailer

[illegible]

Observations/Notes:

Purge Start Time: 0925

Purge Rate: *N/A*

Well has very slow recharge.

	BZ	WH
Air Monitoring:		
VOC (ppm) =	0.0	0.0
H2S (ppm) =	0.0	0.0
LEL (%) =	0	0
CO (ppm) =	0	0
O2 (%) =	20.9	20.9

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/10/19
Weather: 40's overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-10

Sample ID: NA

Sampling Team: T. Chalmers, A. Vogt

Total Depth: 45 FT.(BTOC)
Depth to water: (-) 0 FT.(BTOC)
Water Column: 45 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.33 GAL.
Total Purge Vol.: 73.3 GAL.

Artesian
Before After

Measuring Device: Solinst Pine # 12726
Date and Time: 12/10/19 0850

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon Pine # 16522

Air Monitoring Equipment: MultiRAE Pine # 43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

N/A artesian

Surge and bail equipment:

N/A

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
0850	Begin Purge								
0900	18	11.06	0.516	2.50	7.36	-28	276		Murky / No Color
0950	90	11.09	0.470	1.27	8.20	-125	268		"
1020	139	10.99	0.474	1.70	8.23	-136	21.2		Clear / No Color
1038	160	11.36	0.472	0.60	8.27	-145	12.5		"
1043	167.5	11.06	0.475	0.44	8.25	-143	5.7		"
1048	175	11.26	0.475	0.35	8.22	-139	5.0		"
Final	175	11.26	0.475	0.35	8.22	-139	5.0		Clear / No Color

Observations/Notes:

Purge Start Time:

0850

Purge Rate:

1.5 gal/min

Pressure gauge reading 0.6 PSI

Air Monitoring:

VOC (ppm) = 0.0 0.0

H2S (ppm) = 0.0 0.0

LEL (%) = 0 0

CO (ppm) = 0 0

O2 (%) = 20.9 20.9

Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Well development
 Date: 12/9/19
 Weather: 40's Overcast

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF- WT-12

Sample ID: NA

Sampling Team: T. Chalmers A. Vogt

Total Depth: 26
 Depth to water: (1) 0
 Water Column: 26
 Well Volume: (X) 0.163
 Total Purge Vol.: 42.4

Purge Device: Maxson Pine #16522

Air Monitoring Equipment: MultiRAE Pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

Surge and bail equipment: N/A Artesian

Measuring Device: Solinst Pine #12726
 Date and Time: 12/9/19 1045

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTW	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
1045	Begin	Surge							
1050	24.0	10.54	1.08	3.83	7.09	23	71000	6.45	Marky / Sulfur smell
1107	9.4	12.07	0.961	1.71	7.91	-129	359	6.65	"
1123	16.47	12.84	0.934	1.52	8.61	-127	325	6.98	"
1139	19.54	11.96	0.897	1.51	7.87	-100	305	6.98	CLEAR
1152	23.66	11.88	0.936	1.55	8.03	-123	392	6.98	"
1212	30.0	11.71	0.941	0.89	8.02	-124	423	7.75	"
1249	41.73	11.57	0.946	0.94	8.03	-120	83.9	-	"
1407	104.13	11.34	0.932	1.30	7.98	-60	30.7	-	"
1430	130	11.02	0.927	1.10	7.91	-78	13.0	-	"
1448	160	11.05	0.930	1.24	7.93	-113	39.1	-	"
Final	160	11.05	0.930	1.24	7.93	-113	39.1		Clear / Slight sulfur odor

Observations/Notes:

Purge Start Time: 1045

Purge Rate: 0.8 gal/min

Pressure on well head 0.5 PSI after development

Air Monitoring:	
VOC (ppm) =	0.0
H2S (ppm) =	0.0
LEL (%) =	0
CO (ppm) =	0
O2 (%) =	20.9

Signature(s):

Appendix D

Groundwater Sampling Data Sheets



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/08/19
Weather: cloudy, 40's, breeze

Project Number: 695610CH.04.FIFS

Page: 1 of 1

Well ID: 16-26B

Sample ID: WJ-A16-16-26B-1219

Sampling Team: D. Butler, G. Gardner

Total Depth: 70.3 FT.(BTOC)
Depth to water: 0.1 psi FT.(BTOC)
Water Column: 70.3 FT.
(x) 0.163 GAL/FT.
Well Volume: 11.46 GAL.
Total Purge Vol.: GAL.

Measuring Device: WLI: Solinst Pine#20435
Horiba: Pine#21414

Multi: RAE: Pine#44900

Purge Device: Artesian

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Pres DTW psi #BTOC	Color / Odor / Comments
0847	0	10.40	0.469	2.06	5.43	-22	23.8	0.9	clear, no odor
0850	600	10.25	0.466	1.84	6.44	-98	21.6	0.9	"
0853	1200	10.18	0.465	1.69	6.75	-126	18.6	0.9	"
0856	1800	10.15	0.464	1.71	6.90	-134	16.6	0.9	"
0859	2400	10.10	0.464	1.68	7.03	-141	15.6	0.9	"
0902	3000	10.06	0.464	1.77	7.12	-144	15.6	0.9	"
0905	3600	10.01	0.464	1.66	7.20	-148	14.6	0.9	"
0908	4200	10.02	0.463	2.14	7.24	-150	14.9	0.9	"
0911	4800	9.96	0.464	2.30	7.28	-152	13.0	0.9	"
0914	5400	9.94	0.464	2.25	7.30	-153	13.8	0.9	"
0917	6000	9.95	0.464	2.12	7.34	-155	13.1	0.9	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 60°C	250 mL HDPE	2

Observations/Notes: Parameters stabilized

Pump Start Time: 0845

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 0845 ≈ 200 mL/min

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

WH

0

0

0

0

20.9

0

0

0

0

20.9

Pump Depth: NA - artesian well

Sample /Time: 0920

MS/MSD NA

Duplicate ID: WJ-A16-16-26BP-1219

Signature(s): David Butler

@ 0930



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/08/19
Weather: Cloudy, 40's, breeze

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: 46-B3

Sample ID: WI-A16-H6-B3-1219

Sampling Team: D. Butler, G. Gardner

Total Depth: 17.06 FT.(BTOC)
Depth to water: (-) 2.81 FT.(BTOC)
Water Column: 14.25 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.32 GAL.
Total Purge Vol.: 3750 mL GAL. ~~0.6~~

Measuring Device: WLF Solinst Pine #20435

Horiba: Pine #21414

MultiRAE # 44900

Purge Device: Peri pump: Pine #16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals) 0.6	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1051	0	12.54	0.738	2.36	7.47	-108	151	2.81	cloudy, slight sulfur color
1054	750	13.30	0.735	0.27	7.72	-161	188	2.81	"
1057	1500	13.43	0.735	0.08	7.79	-170	234	2.81	"
1100	2250	13.50	0.735	0.00	7.84	-175	250	2.81	"
1103	3000	13.56	0.736	0.00	7.87	-179	269	2.81	"
1106	3750	13.60	0.735	0.00	7.89	-182	269	2.81	"
All params stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes: Positive pressure when opening well plug

Pump Start Time: 1048

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: 250 mL/min @ 1048

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

0

0

0

0

20.9

WH

0

0

20

0

20.9

Pump Depth: 15 ft bTOC

Sample /Time: 1110

MS/MSD NA

Duplicate ID: NA

Signature(s): D. Butler



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/14/2020
 Weather: Clear sky, sunny, 63°F

Project Number: 695610CH.04.FI.FS Page: 1 of 1
 Well ID: 14-MW-2
 Sample ID: vi-A14-MW-2-0820
 Sampling Team: A. VOGES / G. GARDNER

Total Depth: 44.80 FT.(BTOC)
 Depth to water: (h) 14.70 FT.(BTOC)
 Water Column: 30.10 FT.
 (x) 0.653 GAL/FT.
 Well Volume: 20.00 GAL.
 Total Purge Vol.: GAL.

Measuring Device: SOLINIX-045651
 HORIBA-402485
 PID = C102924

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: MONROE PUMP
 CONTROLLER C102802

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1215	0.15	20.38	0.659	2.97	7.95	60	0.0	15.3	Clear, no odor
1220	0.30	19.96	0.672	1.88	8.01	55	1.5	15.46	"
1225	0.45	19.83	0.684	1.53	8.10	50	10.3	15.74	"
1230	0.60	20.49	0.679	1.31	8.12	49	7.2	15.80	"
1235	0.75	20.57	0.684	1.71	8.22	48	2.8	16.04	"
1240	0.90	20.66	0.642	1.63	8.20	48	4.5	16.45	"
1245	1.15	17.90	0.619	2.40	8.46	53	0.0	16.74	"
1250	1.30	18.56	0.613	2.11	8.48	53	0.0	16.79	"
1255	1.45	19.03	0.622	2.32	8.55	52	2.9	16.99	"
1300	STABILITY	ALB. RED							

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 60L	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1210

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Final Fill Time:

Final Discharge Time:

Submersible Initial Control Setting(Hz): 6.5

Final Control Setting(Hz): 7.5

Purge Rate: 0.03

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0.0	0.0
CO (ppm)	0.0	0.0
O2 (%)	20.9	20.9

Pump Depth:

Sample Time: 1300

MSD NA

Signature(s): [Signature]

Duplicate ID: NA

FLUCTUATIONS IN PUMP CONTROL BOX CAUSING
 INCONSISTENT FLOW, DESPITE KEEPING SAME HE
 UNABLE TO GET FLOW WITHOUT DRAW DOWN.



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/19
Weather: cloudy, 40th, breeze

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW4-B3

Sample ID: V5-AF-MW4-B3-1219

Sampling Team: D. Butler, G. Gardner

Total Depth: 17.63 FT.(BTOC)
Depth to water: (-) 5.34 FT.(BTOC)
Water Column: 12.29 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.00 GAL.
Total Purge Vol.: 5450 mL GAL. 63

Measuring Device: WLI: Solinst Pine# 42265
Horiba: Pine# 21414

MultiRAE: Pine# 4490C

Purge Device: Peripump: Pine# 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0935	0	11.74	0.570	4.01	6.69	187	0.0	5.93	Clear, no odor
0938	450	12.64	0.567	3.32	6.89	186	0.0	6.57	"
0942	850	12.68	0.562	3.09	7.06	182	0.0	6.68	"
0946	1250	12.73	0.561	3.00	7.15	181	0.0	7.16	"
0950	1650	12.86	0.563	2.99	7.22	179	0.0	7.49	"
0951	Excessive drawdown, will purge dry								
0955	Note that WL stable at ~8.00 ft b to c at 400 mL/min, reduce flow and restart params								
0958	4250	14.43	0.554	3.06	7.31	179	0.0	8.00	Clear, no odor
1001	4850	14.45	0.551	3.10	7.33	179	0.0	8.00	"
1004	5450	14.43	0.549	3.17	7.34	180	0.0	8.00	"
	All params stable, proceed to sample								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 0930

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

NA

Final Fill Time:

Final Discharge Time:

NA

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Purge Rate: @0930 ≈ 150 mL/min

@0938 ≈ 100 mL/min

@0950 ≈ 400 mL/min

@0955 ≈ 200 mL/min

Pump Depth: 15 ft b to c

Sample /Time: 1005

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/10/19
Weather: Cloudy, 40's, light rain

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW10-B8

Sample ID: WI-AF-MW10-B8-1219

Sampling Team: D. Butler, G. Gardner

Total Depth: 14.83 FT.(BTOC)
Depth to water: (-) 4.96 FT.(BTOC)
Water Column: 9.87 FT.
(x) 0.653 GAL/FT.
Well Volume: 6.45 GAL.
Total Purge Vol.: 3550 mL GAL. (x)

Measuring Device: WTI Solinst Pine# 042265
Horiba: Pine# 21414

MultiRAE: Pine# 44900

Purge Device: Perist pump: Pine# 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals) (x)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1422	0	13.99	0.276	2.84	7.72	110	16.6	5.07	Clear, no odor, some
1425	600	15.88	0.266	1.26	6.92	145	19.5	5.16	partially
1428	1050	16.43	0.262	1.07	6.95	140	17.6	5.22	"
1431	1500	16.64	0.259	0.91	6.87	140	15.1	5.27	"
1434	1950	16.76	0.258	0.83	6.85	139	11.4	5.34	"
1438	2350	16.73	0.257	0.78	6.91	133	7.4	5.38	"
1442	2750	16.56	0.257	0.74	6.81	136	4.2	5.44	"
1446	3150	16.49	0.257	0.72	6.85	132	3.9	5.49	"
1450	3550	16.59	0.256	0.72	6.81	131	3.5	5.54	"
All parameters stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250mL HDPE	2

Observations/Notes: Biofilm on bottom of J-plug

Pump Start Time: 1420

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 1420 ≈ 200mL/min

@ 1425 ≈ 150mL/min

@ 1434 ≈ 100mL/min

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Pump Depth: 12 ft btoe

Sample Time: 1455

MS/MSD NA

Duplicate ID: NA

Signature(s): D. Butler



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/14/2020
 Weather: Sunny, Clear, 53°F

Project Number: 695610CH.04.FI.FS
 Well ID: MW-14
 Sample ID: ~~W1-AF-MW-14-0820~~ W1-A52-MW-14-0820
 Sampling Team: G. Gardner, A. Vogt

Total Depth: 17.63 FT.(BTOC)
 Depth to water: (-) 11.78 FT.(BTOC)
 Water Column: 5.85 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 0.95 GAL.
 Total Purge Vol.: 2.65 GAL.

Measuring Device: Solinst #122
 SN: 045651

Purge Device: Monsoon
 C-102609

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0827	0.64	16.00	0.638	0.06	6.11	-80	156	11.83	Slightly cloudy, hydrocarbon odor
0831	0.85	15.95	0.641	0.05	6.16	-88	116	11.83	
0835	1.06	15.84	0.642	0.05	6.18	-92	116	11.83	
0840	1.33	16.18	0.640	0.05	6.19	-93	96.2	11.84	
0845	1.59	16.25	0.626	0.03	6.19	-92	83.4	11.84	
0850	1.86	16.08	0.648	0.02	6.21	-98	120	11.85	
0853	2.01	16.15	0.659	0.01	6.23	-99	118	11.85	
0856	2.17	16.36	0.664	0.00	6.24	-101	71.8	11.85	Clear, yellow, hydrocarbon odor
0859	2.33	16.47	0.671	0.00	6.25	-104	48.0	11.84	
0902	2.49	16.58	0.678	0.00	6.26	-106	47.7	11.84	
0905	2.65	16.61	0.685	0.00	6.27	-107	50.4	11.84	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 60°C	2x 250 mL HDPE	2

Observations/Notes: Pump and W1 came out with some smelling of hydrocarbon

Pump Start Time: 0815

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): NA

Final Fill Time: NA

Final Discharge Time: NA

Submersible Initial Control Setting(Hz): 6.2

Final Control Setting(Hz): 8.4

Purge Rate: 0.05 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0.0	max 2.5
H2S (ppm)	0.0	0
LEL (%)	0.0	0
CO (ppm)	0.0	0
O2 (%)	20.9	20.9

Pump Depth: 15 ft

Sample Time: 0910

MS/MSD: W1-AF-MW-14-0820-MS

W1-AF-MW-14-0820-MS

Duplicate ID: NA

Signature(s): Gerald Gardner

MS/MSD: W1-A52-MW-14-0820-MS
 W1-A52-MW-14-0820-MSD



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/19
Weather: cloudy, 40's, breeze

Project Number: 695610CH.04.FI.FS
Well ID: MW15-B23
Sample ID: WI-AF-MW15-B23-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 18.51 FT.(BTOC)
Depth to water: 17.83 FT.(BTOC)
Water Column: 10.68 FT.
(x)0.653 GAL/FT.
Well Volume: 6.97 GAL.
Total Purge Vol.: mL GAL. 08

Measuring Device: WLF: Solinst Pine #042265
Horiba: Pine # 21414
MultiRAE: Pine #44900

Purge Device: Peripump: Pine # 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0836	0	11.22	0.432	2.59	5.75	247	185	7.97	cloudy, no odor, particles
0839	600	12.02	0.421	1.15	5.97	236	131	8.02	"
0842	1200	12.36	0.418	0.95	6.07	228	63.2	8.07	"
0845	1800	12.59	0.416	0.84	6.15	220	30.8	8.15	Clear, no odor, particles
0848	2175	12.49	0.415	0.79	6.19	213	24.4	8.19	"
0851	2550	12.48	0.414	0.73	6.25	208	10.0	8.24	"
0854	2925	12.54	0.413	0.70	6.27	206	6.0	8.29	"
0857	3300	12.48	0.413	0.66	6.31	203	6.3	8.33	"
0900	3675	12.45	0.412	0.65	6.34	202	4.0	8.36	"
All params stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA's	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 0833

Bladder Initial Fill Time(FT; sec): NA
Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time: NA
Final Discharge Time:

Final Control Setting(Hz):

Purge Rate @ 0833 ≈ 200 mL/min
@ 0845 ≈ 125 mL/min

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	20.9	20.9
O2 (%)		

Pump Depth: 16 ft b to c

Sample /Time: 09:00

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/14/2020
 Weather: Partly Cloudy 66°F

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-20

Sample ID: ~~W1-AF-MW-20-0820~~ W1-ASZ-MW20-0820

Sampling Team: G. Gardner, A. Vogt

Total Depth: ^{hard}bottom 15.19 FT.(BTOTC)
 Depth to water: (H) 10.55 FT.(BTOTC)
 Water Column: 4.64 FT.
 (X) 0.163 GAL/FT.
 Well Volume: 0.76 GAL.
 Total Purge Vol.: 4.40 GAL.

Measuring Device: Solinst #122

Purge Device: Monsoon

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOTC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOTC	Color / Odor / Comments
1020	0.75	14.29							
1023	1.18	14.23	0.589	1.08	6.49	-104	23.8	10.6	CLEAR
1026	1.58	14.07	0.592	0.66	6.49	-107	17.2	10.6	"
1029	1.98	13.95	0.596	0.31	6.48	-111	4.7	10.6	"
1032	2.38	12.88	0.599	0.22	6.48	-113	2.1	10.6	"
1035	2.78	13.85	0.601	0.13	6.47	-114	0.0	10.6	"
1038	3.18	13.94	0.605	0.06	6.47	-115	0.0	10.6	"
1041	3.58	13.96	0.606	0.00	6.47	-116	0.0	10.6	"
1044	3.98	13.97	0.606	0.00	6.47	-117	0.0	10.6	"
1047	4.38	13.97	0.616	0.00	6.47	-117	0.0	10.6	"
STABILITY ACHIEVED									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	2 x 250 mL HDPE	2
(DUPLICATE) PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1014

Bladder Initial Fill Time(FT; sec): -

Bladder Initial Discharge Time(DT; sec): -

Final Fill Time: -

Final Discharge Time: -

Submersible Initial Control Setting(Hz): 6.6

Final Control Setting(Hz): 6.6

Purge Rate: 500 mL/min

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: 12.5

Sample Time: 1050

S/MSD

Signature(s):

Duplicate ID: ~~W1-AF-MW-20~~

W1-ASZ-MW-20P-0820



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/13/2020
 Weather: Sunny, 58°F

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-21

Sample ID: W1-A52-MW-21-0820

Sampling Team: G. Gardner, A. Vogt

Total Depth: 13.85 FT.(BTOC)
 Depth to water: 11.98 FT.(BTOC)
 Water Column: 5.87 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 0.96 GAL.
 Total Purge Vol.: 3.48 GAL.

Measuring Device: Salinity #122
 #59: 045651

Purge Device: Monsoon
 C-102609

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1600	0.64	16.76	0.627	1.02	6.43	-82	0.0	8.03	Clear, No odor
1605	1.05	16.01	0.624	0.53	6.39	-86	38.5	8.03	
1610	1.46	15.11	0.627	0.28	6.35	-85	42.1	8.03	
1615	1.86	15.05	0.629	0.09	6.31	-96	33.4	8.04	
1620	2.27	15.02	0.630	0.08	6.31	-90	39.1	8.04	
1625	2.67	15.01	0.627	0.04	6.29	-92	48.6	8.04	
1630	3.08	14.97	0.628	0.03	6.29	-92	50.1	8.04	
1635	3.48	14.97	0.628	0.04	6.29	-92	48.3	8.04	
	Parameters stable								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:

Pump Start Time: 15:52 rate: 310 mL/min

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): NA

Submersible Initial Control Setting(Hz): 5.4

Final DTW = 8.00

Final Fill Time: NA

Final Discharge Time: NA

Final Control Setting(Hz): 6.3

Purge Rate: 0.08 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: 10.0

Sample Time: 1640

MSD NA

Signature(s): 1640 G. Gardner

Duplicate ID: NA



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 2 SI
 Date: 12/12/19
 Weather: 40's Overcast/Rain

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-618

Sample ID: V1-45-MW-618-GW-1219

Sampling Team: T. Chalmers, A. Vogt

Total Depth: 14.92 FT.(BTOC)
 Depth to water: (-) 8.87 FT.(BTOC)
 Water Column: 6.05 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 0.99 GAL.
 Total Purge Vol.: x3 2.97 GAL.

Measuring Device: Solinst Pine #12726

wQ Meter: Horiba Pine #19912

Purge Device: Peristaltic Pump Pine #44667

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1240	Begin Purge								
1300	0.60	12.29	0.588	7.05	8.32	106	111	9.70	Clear/No Odor
1305	0.75	12.05	0.586	6.75	8.29	109	70.7	10.0-10.0	"
1315	1.05	12.01	0.586	8.84	8.29	111	51.6	10.11	"
1325	1.35	11.93	0.588	8.45	8.28	112	43.1	10.13	"
1335	1.65	11.87	0.589	5.70	8.27	111	31.4	10.23	"
1345	1.95	11.80	0.594	5.69	8.28	106	22.3	10.41	"
1355	2.25	11.80	0.593	5.38	8.28	100	15.0	10.57	"
1405	2.55	11.79	0.589	4.88	8.28	87	7.8	10.69	"
1415	2.85	11.73	0.584	4.85	8.27	82	5.8	10.77	"
1425	3.15	11.72	0.585	4.81	8.28	79	5.0	10.81	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS QSM vs. 1 Tab B-15	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1240

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: 100 mL/min
0.03 gal/min

Air Monitoring

BZ

WH

VOC (ppm)

0.0

0.0

H2S (ppm)

0.0

0.0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Pump Depth: N/A 12 ft btoC

Sample /Time: 1430

MS/MSD

Duplicate ID: N/A

Signature(s):

Signature(s): _____



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/07/19
Weather: Cloudy, 40°, rain

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-MW-620
Sample ID: WI-AF-MW-620-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 8.68 FT.(BTOC)
Depth to water: (-) 4.56 FT.(BTOC)
Water Column: 4.12 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.67 GAL.
Total Purge Vol.: 3 ~~ml~~ GAL: 0.6 Gal

Measuring Device: WLI: Solinst Pine # 20435
Horiba: Pine # 21414

MultirAE: Pine # 44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peri pump; Pine # 16866

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1314	150 600	10.71	1.07	8.01	7.17	116	4.2	4.82	Clear, no odor
1319	150 1350	10.72	1.07	7.62	6.91	131	5.0	5.03	
1324	1850	10.72	1.07	7.48	6.93	132	6.3	5.18	
1329	2350	10.75	1.07	7.24	6.98	131	7.4	5.38	
1334	2850	10.72	1.07	7.23	7.02	125	5.6	5.49	
1340	Begin Purging dry								
1347	1350 Finish purging								
1513	Recovered to 4.97' btoC								
1515	NA	11.01	1.07	7.44	7.54	103	9.1	4.97	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes: WL continues to drop when purging at 100 mL/min. Will pump dry and allow to recover

Pump Start Time: 1310

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: initial @ 1310 150 mL/min

1319: 100 mL/min

1340: 450 mL/min (to purge dry)

1347: 850 mL/min

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Pump Depth: 7 ft btoC

Sample /Time: 1520

MS/MSD WI-AF-MW-620-1219-MS/MSD

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/07/19
Weather: Cloudy, 40th, rain

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-MW-621
Sample ID: WI-AF-MW-621-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 9.62 FT.(BTOC)
Depth to water: (-) 4.49 FT.(BTOC)
Water Column: 5.13 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.84 GAL.
Total Purge Vol.: 3600 mL GAL. (x)

Measuring Device: WLI: Solinst Pine #20435
Horiba: Pine #21414
MultiRAE: Pine #44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peri pump: Pine #16866

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1033	0	10.68	0.641	1.05	6.95	-17	33.1	4.58	Clear, no odor
1036	450	10.80	0.639	0.29	6.68	-35	27.3	4.57	"
1039	900	10.81	0.636	0.05	6.67	-39	19.8	4.57	"
1042	1350	10.86	0.633	0.00	6.67	-40	18.2	4.57	"
1045	1800	10.87	0.631	0.00	6.67	-42	14.8	4.57	"
1048	2250	10.88	0.629	0.00	6.68	-43	11.1	4.57	"
1051	2700	10.89	0.626	0.00	6.69	-44	9.1	4.60	"
1054	3150	10.91	0.626	0.00	6.70	-45	8.0	4.60	"
1057	3600	10.91	0.626	0.00	6.72	-46	9.2	4.60	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1030

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @1033 ≈ 150 mL/min

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

0

0

0

0

20.9

WH

0

0

0

0

20.9

Pump Depth: 7 ft BTOC

Sample /Time: 1100

MS/MSD: NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/07/19
Weather: Cloudy, 40°F, rain

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-MW-622
Sample ID: WI-AF-MW-622-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 11.85 FT.(BTOC)
Depth to water: (-) 1.60 FT.(BTOC)
Water Column: 10.25 FT.
(x) 0.163 GAL/FT.
Well Volume: 1.67 GAL.
Total Purge Vol.: 4050 GAL. @ mL

Measuring Device: WLI: Solinst Pine# 20435
Horiba: Pine# 21414

MultiRAE: Pine# 44900

Purge Device: Peri pump: Pine# 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0902	0	11.27	0.480	1.10	6.26	135	105	2.33	Slightly cloudy, no odor
0905	600	11.00	0.479	0.35	6.39	32	110	3.15	"
0908	1200	10.89	0.480	0.20	6.43	9	143	3.30	"
0911	1800	10.90	0.482	0.16	6.50	-3	122	3.40	"
0918	2250	10.82	0.488	0.22	6.60	-14	142	3.22	"
0921	2700	10.74	0.492	0.12	6.56	-15	136	3.23	"
0924	3150	10.69	0.495	0.08	6.56	-19	140	3.23	"
0927	3600	10.68	0.499	0.04	6.57	-24	139	3.21	"
0930	4050	10.65	0.501	0.04	6.57	-27	138	3.20	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes: Positive pressure in well on arrival. 0915 pause purge to change to lower RPM head, 0917 resume purge.

Pump Start Time: 0900

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 0900 ≈ 200 mL/min

(peri pump won't go slower, change to lower RPM head @ 0915)
@ 0918 ≈ 150 mL/min

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: 10 ft btoC

Sample /Time: 0935

MS/MSD: NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/12/14
Weather: ~~6:00~~ Cloudy, 40[°], breeze

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-MW-623
Sample ID: WI-AF-MW-623-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 6.18 FT.(BTOC) - obstruction
Depth to water: (-) 4.52 FT.(BTOC)
Water Column: 1.66 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.27 GAL.
Total Purge Vol.: 2900 mL GAL. ~~0.27~~

Measuring Device: WI: Soling + Pine# 042265
Horiba: Pine# 21414

MultiRAE: Pine# 44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peripump: Pine # 16866

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1051	0	10.28	0.489	3.32	6.81	9	273	4.60	Slightly cloudy, no odor
1055	500	10.29	0.489	1.28	6.62	-19	126	4.65	"
1059	900	10.26	0.481	0.86	6.62	-19	72.9	4.69	"
1103	1300	10.21	0.474	0.64	6.63	-14	35.4	4.72	"
1107	1700	10.16	0.468	0.28	6.63	-9	30.5	4.73	"
1111	2100	10.14	0.465	0.13	6.63	-7	23.0	4.75	Clear, no odor
1115	2500	10.10	0.464	0.12	6.64	-7	22.6	4.76	"
1119	2900	10.04	0.464	0.08	6.65	-6	21.8	4.76	"
All params stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes: surge block stuck in well, TD = depth to obstruction

Pump Start Time: 1047

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 1047 ≈ 125 mL/min

@ 1055 ≈ 100 mL/min

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: 6 ft bto

Sample /Time: 1125

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/08/2019
Weather: Cloudy, 40s, Breeze

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: W1-AF-MW-624
Sample ID: W1-AF-MW-624-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 12.46 FT.(BTOC)
Depth to water: (-) 2.42 FT.(BTOC)
Water Column: 10.04 FT.
(x) 0.163 GAL/FT.
Well Volume: 12.07 GAL.
Total Purge Vol.: GAL.

Measuring Device: W1: Solinst Pine# 20435-
Horiba: Pine# 21414
MultiRAE: Pine# 44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peristaltic Pump pine# 16866

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1457	0	10.71	1.03	2.18	7.54	-93	33.2	2.57	slightly cloudy, no odor
14501	800	12.02	1.03	0.29	7.32	-97	33.0	2.57	
1504	1200	12.08	1.04	0.11	7.30	-97	25.3	2.57	
1507	1800	12.12	1.06	0.00	7.28	-96	17.9	2.57	
1510	2400	12.11	1.08	0.00	7.26	-94	13.5	2.57	Clear, no odor
1513	3000	12.11	1.10	0.00	7.25	-92	11.2	2.58	
1516	3600	12.12	1.11	0.00	7.24	-91	10.2	2.59	
1519	4200	12.19	1.12	0.00	7.23	-90	8.8	2.59	
1522	4800	12.22	1.12	0.00	7.23	-91	8.5	2.59	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS-18	≤ 6°C	250-mL HDPE	2

Observations/Notes:

Pump Start Time: 14:55

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): NA

Submersible Initial Control Setting(Hz): NA

Final Fill Time: NA

Final Discharge Time: NA

Final Control Setting(Hz): NA

Purge Rate: @ 1458 200 mL/min

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: 11 ft b to c

Sample /Time: 1525

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/15/2020
 Weather: Clear sky, 56 °F

Project Number: 695610CH.04.FI.FS

Page: 1 of 2

Well ID: MW-625

Sample ID: WT-AF-MW-625-0820

Sampling Team: A. Vogt, G. Gardner

Total Depth: 59.20 FT.(BTOC)
 Depth to water: (h) 34.14 FT.(BTOC)
 Water Column: 25.06 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 4.08 GAL.
 Total Purge Vol.: 7.12 GAL.

Measuring Device: Solinst #122 SN 045651

HIDRIBA #C102435

PID #C102924

Purge Device: Monsoon #C102808
 COMBOLLER #C102609

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0820	0.500	14.44	0.713	1.05	6.80	-241	2100	34.50	CLOUDY / MILKY
0825	0.975	14.50	0.706	0.53	7.02	-276	438	34.50	"
0830	1.45	14.80	0.733	0.27	7.16	-292	551	34.75	"
0835	1.93	14.62	0.755	0.22	7.23	-312	340	34.48	"
0840	2.38	14.80	0.763	0.16	7.26	-320	220	34.47	"
0845	2.85	14.69	0.775	0.13	7.27	-322	189	34.54	"
0850	3.33	14.71	0.779	0.09	7.30	-326	152	34.54	Slightly Cloudy
0855	3.80	14.73	0.781	0.07	7.31	-330	137	34.48	"
0900	4.28	14.77	0.782	0.05	7.33	-334	142	34.55	"
0905	4.75	14.76	0.784	0.03	7.33	-336	123	34.48	"
0910	5.23	14.78	0.789	0.01	7.35	-336	87.1	34.55	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250mL HDPE	2

Observations/Notes: Elevated gas readings; allow to vent

Pump Start Time: 0815

Bladder Initial Fill Time(FT; sec): -

Bladder Initial Discharge Time(DT; sec): -

Final Fill Time: -

Final Discharge Time: -

Submersible Initial Control Setting(Hz): 11.2

Final Control Setting(Hz): 10.7

Purge Rate: 360 mL/min
 0.045 gal/min

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.1 → 0.0
H2S (ppm)	0.0	20 → 0.0
LEL (%)	0.0	3 → 0.0
CO (ppm)	0.0	63 → 0.0
O2 (%)	20.9	20.9

Pump Depth: 54 FT BTOC

Sample / Time:

S/MSD

NA

Signature(s): Gert A. Gardner

Duplicate ID: NA



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/14/2020
 Weather: Clear sky, 66 °F

Project Number: 695610CH.04.FI.FS

Page: 1 of 2

Well ID: MW-626

Sample ID: WL-AF-MW-626-0820

Sampling Team: G. Gardner, A. Vogt

Total Depth: ^{hard} 29.71 FT.(BTOC)
^{bottom} 59.11 FT.(BTOC)
 Depth to water: (x) 29.71 FT.(BTOC)
 Water Column: 29.4 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 4.79 GAL.
 Total Purge Vol.: 9.00 GAL.

Measuring Device: Solinst #122

HORIBA # C102485

PID# C102924

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon ~~Controller # C102808~~ (A)
 #102609
 CONTROLLER # C102808

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1535	0.96	25.12	0.651	0.89	7.02	-159	21000	29.84	Very Cloudy
1540	1.36	24.61	0.661	0.54	7.10	-165	21000	29.82	"
1545	1.76	23.79	0.660	0.72	7.78	-204	698	29.89	"
1555	2.56	23.63	0.664	0.21	7.79	-206	671	29.88	"
1600	2.96	23.29	0.663	0.13	7.79	-216	476	29.89	"
1605	3.36	22.84	0.665	0.13	7.77	-227	339	29.89	"
1610	3.76	22.88	0.663	0.10	7.74	-220	237	29.88	"
1615	4.16	22.71	0.665	0.12	7.72	-236	161	29.88	"
1620	4.56	22.63	0.665	0.12	7.70	-238	170	29.89	"
1625	4.96	22.54	0.667	0.12	7.69	-227	125	29.83	"
1630	5.36	22.57	0.677	0.10	7.64	-210	79.7	29.94	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 60°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1523

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): NA

Final Fill Time: NA

Final Discharge Time: NA

Submersible Initial Control Setting(Hz): 9.7

Final Control Setting(Hz):

Purge Rate: 0.08 gpm

Air Monitoring BZ WH

VOC (ppm) 0.0 0.0

H2S (ppm) 0.0 0.0

LEL (%) 0.0 0.0

CO (ppm) 0.0 4.0

O2 (%) 20.9 20.9

Pump Depth: 54 FT BTOC

Sample Time: 1720

S/MSDA

Signature(s):

Duplicate ID: NA



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/14/2020
Weather: CLEAR SKY 66°F

Project Number: 695610CH.04.FI.FS Page: 2 of 2

Well ID: MW-626

Sample ID: W1-AF-MW-626-0520

Sampling Team: G. GARDNER, A. VOGT

Total Depth: 59.11 FT.(BTOC)
Depth to water: (-) 29.71 FT.(BTOC)
Water Column: 29.4 FT.
(X) 0.165 GAL/FT.
Well Volume: 4.79 GAL.
Total Purge Vol.: 9.00 GAL.

Measuring Device: SOLINKS #122

HORIBA # C102485

PID # C102424

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: MONSOON # C102609
CONTROLLER # C102808

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1635	2.46	22.22	0.673	0.07	7.63	-231	66.7	29.93	"
1640	6.16	22.02	0.672	0.04	7.63	-236	62.2	29.93	"
1645	6.56	21.85	0.670	0.06	7.58	-241	58.4	29.85	"
1650	6.96	21.82	0.675	0.05	7.61	-240	54.8	29.93	"
1655	7.36	21.70	0.672	0.02	7.66	-240	40.6	29.93	"
1700	7.76	21.65	0.673	0.03	7.63	-240	32.0	29.85	"
1705	8.16	21.51	0.672	0.00	7.59	-244	32.4	29.94	"
1710	8.56	21.41	0.673	0.00	7.61	-246	33.00	29.86	"
1715	8.96	21.33	0.677	0.00	7.60	-244	32.6	29.87	"
		STABILITY	ACHIEVED						

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1527

Bladder Initial Fill Time(FT; sec): -

Bladder Initial Discharge Time(DT; sec): -

Final Fill Time: -

Final Discharge Time: -

Submersible Initial Control Setting(Hz): 9.7

Final Control Setting(Hz): 10.7

Purge Rate:

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0.0	0.0
CO (ppm)	0.0	0.0
O2 (%)	20.9	20.9

Pump Depth: 54 FT BTOC

Sample Time: 1720

S/MSD: NA

Duplicate ID: NA

Signature(s):



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 8/15/2020
 Weather: SUNNY, 70s

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-627

Sample ID: W1-AF-MW-627-0820

Sampling Team: A. Vogt, G. Gardner

Total Depth: 58.59 FT.(BTOT) Hard bottom
 Depth to water: (-) 38.24 FT.(BTOT)
 Water Column: 20.35 FT.
 Well Volume: (X) 0.163 GAL/FT.
 Total Purge Vol.: 3.32 GAL.
 Purge Device: Monsoon # C-102808
 Controller # C-102609

Measuring Device: Solinst #122 SN: 045651

Horiba # C-102985

PID # C-102924

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOT	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOT	Color / Odor / Comments
1035	1.1	19.24	0.371	0.82	7.53	-261	570	38.28	cloudy
1040	1.65	19.17	0.381	0.42	7.55	-287	411	38.28	"
1045	2.2	19.13	0.388	0.22	7.57	-300	257	38.30	"
1050	2.75	19.03	0.387	0.14	7.59	-301	113	38.30	"
1055	3.3	19.13	0.391	0.12	7.59	-200	79.7	38.30	"
1100	3.85	19.22	0.394	0.09	7.60	-298	72.0	38.30	"
1105	4.4	19.03	0.422	0.05	7.59	-300	28.9	38.30	"
1110	4.95	19.01	0.420	0.04	7.57	-298	26.4	38.30	"
1115	5.5	19.20	0.418	0.04	7.60	-203	10.0	38.30	"
1120	6.05	19.48	0.414	0.07	7.60	-295	9.1	38.31	"
1125	6.6	20.24	0.415	0.07	7.59	-294	5.1	38.30	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1024

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz): 11.8

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz): 11.8 14.2

Purge Rate: 420 mL/min

0.11 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0.0	0.0
CO (ppm)	0.0	0.0
O2 (%)	20.9	20.9

Pump Depth: 54

Sample Time: 1130

S/MSD NA

Signature(s):

Duplicate ID: W1-AF-MW-627P-0820



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/17/2020 - 8/18/2020
Weather: 70's, SUNNY - SOME CLOUDS

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-628

Sample ID: W1-AF-MW-628-0820

Sampling Team: A. VOGT / G. GARDNER

Total Depth: 65.90 ^{hard bottom} FT.(BTOC)
Depth to water: 65.02 FT.(BTOC)
Water Column: 12.88 FT.
(X) 0.163 GAL/FT.
Well Volume: 2.10 GAL.
Total Purge Vol.: 4 GAL.

Measuring Device: SOLINST #045651

PID # C102924

HORIZA #102485

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: MONSOON # C102609

CONTROLLER # C102808

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1346	0.16	18.97	0.674	1.25	7.49	-62	296	55.2	cloudy
1350	0.31	16.85	0.674	1.14	7.56	-66	190	55.53	"
1355	0.46	16.55	0.673	1.07	7.61	-70	147	56.06	"
1400	0.61	16.96	0.667	1.11	7.64	-72	149	56.45	"
1405	0.76	17.65	0.672	1.19	7.67	-73	140	56.84	"
1410	0.91	17.77	0.675	1.22	7.69	-74	134	57.08	"
1415	1.06	18.14	0.674	1.17	7.71	-75	117	57.25	"
1420	1.21	18.29	0.681	1.30	7.72	-77	96.7	57.62	"
1425	1.31	TURBID	CAME	OFF	OFF	PUMP			
1445	SWITCHING TO	PURGE	DRY	METHOD					
0945		16.93	0.827	3.55	6.6	46	810		Very cloudy

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes: COULD NOT PURGE WITHOUT DRAWDOWN. SWITCHING TO PURGE DRY METHOD. 1445-1500

Pump Start Time: 0940 1340

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Final Fill Time: —

Final Discharge Time: —

Submersible Initial Control Setting(Hz): 15

Final Control Setting(Hz): 13

Purge Rate: 0.03 gpm

1420 = 80 mL/min

0.021 gpm

Air Monitoring

BZ

WH

VOC (ppm)

0.0

0.1

H2S (ppm)

0.0

1.0

LEL (%)

0.0

0.0

CO (ppm)

0.0

36 → 23

O2 (%)

20.9

20.9

Pump Depth: 60

Sample Time: 0950

MSD NA

Signature(s): Gordon Gardner

Duplicate ID: NA.

Well recovered to 77% of initial WLA-Proceed to after 18 hrs. Proceed to sample



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/17/2020
Weather: Clear Sky, 64°F

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: MW-029

Sample ID: WL-AF-MW-029-0820

Sampling Team: G. Gardner, A. Vogt

Total Depth: 64.4 ^{hard bottom} FT.(BTOC)
Depth to water: (-) 44.71 FT.(BTOC)
Water Column: 24.69 FT.
(X) 0.163 GAL/FT.
Well Volume: 4.02 GAL.
Total Purge Vol.: 3 GAL.

Measuring Device: SOLINST # 045651

PID # C102924

HORIBA # C102485

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: MONITOR # C102609
CONTROLLER # C102808

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1615		21.60							
1622	0.2	23.76	0.702	0.64	7.79	-88	726	49.9	CLOUDY
1629		15.37	0.716	0.96	7.84	-126	364	51.3	
1636		15.34	0.647	0.77	7.85	-141	361	54.12	
1643	LARGE FLOW - CELL LEAK. SWITCHING TO PURGE DRY METHOD.								
1000	water level at 50% of initial. proceed to sample								
1028		17.44	0.819	1.66	7.47	5	384		cloudy

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6 °C	250 mL HDPE	2

Observations/Notes: Well purged dry on 8/17. 8/18 - well recovered to 50% of initial WL after 17 hrs

Pump Start Time: 1605

Bladder Initial Fill Time(FT; sec): —

Bladder Initial Discharge Time(DT; sec): —

Submersible Initial Control Setting(Hz): 12

Final Fill Time: —

Final Discharge Time: —

Final Control Setting(Hz): 13

Purge Rate: 100 mL/min

1620 = 95 mL/min 0.07 gpm

Pump Depth: 65

Air Monitoring

BZ

WH

VOC (ppm)

0.0

0.0

H2S (ppm)

0.0

0.0

LEL (%)

0.0

0.0

CO (ppm)

0.0

10 → 0.0

O2 (%)

20.9

20.9

Sample Time: 1030

S/MSD 1/4

Duplicate ID: 1/4

Signature(s): G. Gardner



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/19/2020
Weather: CLOUDY 71°F

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: W1-AF-MW-630
Sample ID: W1-AF-MW-630-0820
Sampling Team: A. VOGT / G. GARDNER

Total Depth: 12.68 FT.(BTOC)
Depth to water: (-) 6.52 FT.(BTOC)
Water Column: 6.16 FT.
(x) 0.163 GAL/FT.
Well Volume: 1.004 GAL.
Total Purge Vol.: GAL.

Measuring Device: SOLINST #045651
PID# C102924
HORIBA# C102485

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: PETRI. PUMP #043928

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1702	0.395	20.00	0.256	0.92	5.94	-68	16.8	6.52	CLEAR
1705	0.632	18.43	0.715	0.49	6.11	-108	4.3	6.52	"
1708	0.869	17.04	0.716	0.29	6.17	-117	0.0	6.52	"
1711	1.142	16.59	0.716	0.24	6.20	-119	0.0	6.52	"
1714	1.415	16.23	0.719	0.16	6.23	-121	0.0	6.52	"
1717	1.688	16.17	0.718	0.13	6.24	-123	0.0	6.52	"
1720	1.961	16.14	0.716	0.12	6.24	-123	0.0	6.52	"
1723	2.234	15.98	0.714	0.09	6.25	-123	0.0	6.52	"
1726	2.507	15.83	0.713	0.07	6.26	-123	0.0	6.52	"
STABILITY			ACHIEVED						

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA's	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1657

Bladder Initial Fill Time(FT; sec): -

Bladder Initial Discharge Time(DT; sec): -

Submersible Initial Control Setting(Hz): -

Final Fill Time: -

Final Discharge Time: -

Final Control Setting(Hz): -

Purge Rate: 300 mL/min
0.079 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0.0	0.0
CO (ppm)	0.0	0.0
O2 (%)	20.9	20.9

Pump Depth: 11.5 FT BTOC

Sample Time: 1730

S/MSD NA

Signature(s):

Duplicate ID: NA



GROUNDWATER WELL SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 8/18/2020
Weather: Cloudy, 68°F

Project Number: 695610CH.04.FI.FS

Page: 1 of 2

Well ID: MW-631

Sample ID: W1-AF-MW-631-0820

Sampling Team: A. Vogt, G. Gardner

Total Depth: 39.60 ^{hard bottom} FT.(BTOC)
Depth to water: (-) 10.31 FT.(BTOC)
Water Column: 29.25 FT.
(x) 0.163 GAL/FT.
Well Volume: 4.77 GAL.
Total Purge Vol.: GAL.

Measuring Device: Solinst #122 SR: 045051
PID C-102924
Horiba # C-102485

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon # C-102609
Controller # C-102808

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1220	0.30	18.69	1.24	2.33	7.36	-20	730	10.95	cloudy
1225	0.4	18.43	1.27	1.60	7.35	-20	697	11.08	"
1230	0.5	18.63	1.29	1.45	7.34	-21	768	11.23	"
1235	0.6	19.01	1.30	1.38	7.34	-23	824	11.35	"
1240	0.7	19.27	1.29	1.46	7.34	-24	840	11.62	"
1245	0.83	19.24	1.29	1.41	7.34	-24	805	11.70	"
1250	0.93	19.42	1.30	1.32	7.34	-24	765	11.69	"
1255	1.03	19.50	1.31	1.33	7.34	-24	757	11.75	"
1300	1.13	19.88	1.30	1.48	7.34	-26	722	11.90	"
1305	1.25	20.07	1.29	1.42	7.35	-25	677	11.91	"
1310	1.35	20.27	1.30	1.39	7.35	-26	575	11.91	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 12:06 ^(A) 12:08

Bladder Initial Fill Time(FT; sec): —

Bladder Initial Discharge Time(DT; sec): —

Submersible Initial Control Setting(Hz): 6.6

Final Fill Time: —

Final Discharge Time: —

Final Control Setting(Hz): 6.3

Purge Rate: 80 mL/min
± 0.02 gpm

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.1
H2S (ppm)	0.0	7.8
LEL (%)	0.0	6
CO (ppm)	0.0	499
O2 (%)	20.7	20.3

Pump Depth: 35

Sample Time: 1340

S/MSD W1-AF-MW-631-0820-MS W1-AF-MW-631-0820-MSD Duplicate ID: N4

Signature(s):



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Well development
Date: 12/7/19
Weather: 40's Rain

Project Number: 695610CH.04.FI.WI

Well ID: WI-AF-~~WT-01~~ WT-01

Sample ID: NA

Sampling Team: T. Chalmers A. Vaght
B. Owens

Horiba Pine #21290

Measuring Device: Solinst Pine #12726
Date and Time: 12/7/19 0825

	Before	After	
Total Depth:	14.93	14.93	FT.(BTOC)
Depth to water:	(-) 11.62	11.64	FT.(BTOC)
Water Column:	3.31	3.29	FT.
Well Volume:	(X) 0.163	0.163	GAL/FT.
Total Purge Vol.:	0.54	0.54	GAL.
	5.4		GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Monsoon

Air Monitoring Equipment: Multi RAE pine #43639

Was well surged and bailed in 2-3 foot intervals along entire screen?

No, Entire 5 ft screen

Surge and bail equipment:

Disposable bailer

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Stabilization Criteria		± 0.1	± 0.01 (if <1) ± 0.02 (if >1)	± 0.05 (if <1) ± 0.2 (if >1)	± 0.1	± 10	< ± 10% or ≤ 10 NTU		
0825	Begin surge & bail								
0835	3	11.19	0.175	0.11	6.90	-71	Max		Murky/No Color
0855	Begin Purge								
0910	18	11.23	0.151	0.00	7.46	-64	194		Clear/No color
0925	33	12.09	0.146	0.15	7.63	-76	42.3		"
0940	48	12.09	0.140	1.39	7.43	-59	24.6		"
0955	63	11.99	0.147	0.72	7.81	-16	17.7		"
1005	73	12.01	0.145	2.84	7.69	16	12.9		"
1025	93	12.18	0.145	0.09	7.30	22	10.9		"
1035	103	12.17	0.149	0.56	7.26	36	6.4		"
1040	108	12.18	0.151	0.59	7.27	35	6.5		"
1045	113	12.15	0.150	0.66	7.27	34	4.9		"
Final									

Observations/Notes:

Purge Start Time: 0850 0855

Purge Rate: 1 gal/min

Collected GW sample at 1100 WI-AF-WT01-GW-1219

Collected duplicate sample at 0900 WI-AF-WT01-GW-1219

Air Monitoring:

VOC (ppm) = 0.0 0.0

H2S (ppm) = 0.0 0.0

CO (ppm) = 0 0

O2 (%) = 20.9 20.9

Signature(s):



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 2 SI
 Date: 12/11/19
 Weather: Cloudy, 40°, wind

Project Number: 695610CH.04.FI.FS

Page: 1 of 2

Well ID: WI-AF-WT03

Sample ID: WI-AF-WT03-GW-1219

Sampling Team: DiButler, G. Gardner

Total Depth: 9.81 ~~9.88~~ FT.(BTOC)
 Depth to water: (-) 8.44 FT.(BTOC)
 Water Column: 1.37 FT.
 (x) 0.163 GAL/FT.
 Well Volume: 0.22 GAL.
 Total Purge Vol.: 4400 mL GAL. ~~0.50~~

Measuring Device: WLI: Solinst Pine # 042265
 Horiba: Pine # 21414

MultiRAE: Pine # 44900

Purge Device: Per. pump: Pine # 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1443	0	10.20	0.288	1.70	5.06	144	0.0	8.49	Clear, no odor
1447	400	10.23	0.288	1.15	5.41	192	0.0	8.49	"
1451	800	10.22	0.288	0.85	5.31	212	0.0	8.49	"
1455	1200	10.17	0.288	0.72	5.27	226	0.0	8.49	"
1459	1600	10.19	0.288	0.67	5.21	238	0.0	8.49	"
1503	2000	10.23	0.288	0.64	5.19	247	0.0	8.49	"
1507	2400	10.24	0.288	0.55	5.17	252	0.0	8.50	"
1511	2800	10.27	0.289	0.49	5.16	257	0.0	8.50	"
1515	3200	10.31	0.290	0.43	5.14	259	0.0	8.51	"
1519	3600	10.30	0.290	0.32	5.12	260	0.0	8.51	"
1523	4000	10.28	0.291	0.34	5.14	261	0.0	8.52	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 60°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1439

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

NA

Final Fill Time:

Final Discharge Time:

NA

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Purge Rate: @1439 ≈ 100 mL/min

Pump Depth: 9.5ft btoe

Sample /Time: 1530

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/19
Weather: Cloudy, 40°, wind

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-WT04
Sample ID: WI-AF-WT04-GW-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 29.33 FT.(BTOC)
Depth to water: (-) 7.91 FT.(BTOC)
Water Column: 21.42 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.49 GAL.
Total Purge Vol.: 4800 mL - GAL. ~~0.163~~

Measuring Device: WLI: Solinst Pinet 042265
Horiba: Pinet 21414

MultiRAE: Pinet 44900

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Peri pump: Pinet 16866

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1349	0	10.48	0.435	1.12	7.45	-124	62.3	7.94	Slightly cloudy,
1352	600	10.49	0.445	0.24	7.44	-160	50.4	7.95	slight sulfur odor
1355	1200	10.48	0.446	0.00	7.45	-166	42.5	7.95	"
1358	1800	10.47	0.447	0.00	7.46	-169	37.3	7.95	"
1401	2400	10.47	0.448	0.00	7.47	-170	32.6	7.95	"
1404	3000	10.47	0.447	0.00	7.48	-172	35.7	7.95	"
1407	3600	10.45	0.448	0.00	7.49	-173	47.9	7.95	"
1410	4200	10.45	0.447	0.00	7.49	-174	52.8	7.95	"
1413	4800	10.45	0.448	0.00	7.50	-174	51.6	7.95	"
All params stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 60°C	250mL HDPE	2

Observations/Notes:

Pump Start Time: 1347

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 1347 ≈ 200 mL/min

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

WH

0

0

0

0

20.9

0

0

0

0

20.9

Pump Depth: 27 ft b to c

Sample /Time: 14:15

MS/MSD: NA

Duplicate ID: NA

Signature(s): D. Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/08/19
Weather: Cloudy, 40's, breeze

Project Number: 695610CH.04.FI.FS Page: 1 of 2
Well ID: WI-AF-WT05
Sample ID: WI-AF-WT05-GW-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 9.81 FT.(BTOC)
Depth to water: (-) 5.84 FT.(BTOC)
Water Column: 3.97 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.65 GAL.
Total Purge Vol.: GAL.

Measuring Device: WLI Solinst Pine#20435
Horiba! Pine#21414

MultiRAE! Pine#14900

Purge Device: Peri pump! Pine#16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1318	0	11.36	0.774	2.09	7.32	74	187	5.90	slightly cloudy, no odor
1321	600	11.61	0.774	1.49	7.20	71	171	5.94	"
1324	1050	11.68	0.774	1.35	7.17	72	132	5.95	"
1327	1500	11.71	0.774	1.17	7.16	74	106	5.95	"
1330	1950	11.74	0.775	1.12	7.16	77	75.0	5.96	"
1333	2400	11.76	0.778	1.07	7.16	79.6 ± 5.0	61.5	5.97	"
1336	2850	11.75	0.777	1.09	7.16	81	48.8	5.97	"
1339	3300	11.78	0.775	0.83	7.17	82	43.4	5.97	"
1342	3750	11.80	0.776	0.84	7.17	83	39.1	5.97	clear, no odor
1345	4200	11.84	0.776	0.72	7.18	84	34.3	5.98	"
1348	4650	11.84	0.778	0.86	7.18	85	26.9	5.98	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1316

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @1316 ≈ 200 mL/min

@1321 ≈ 150 mL/min

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

6

CO (ppm)

0

0

O2 (%)

20.4

20.9

Pump Depth: 8 ft btoe

Sample Time: 1400

MS/MSD: NA

Duplicate ID: NA

Signature(s): David Butler

Signature(s):



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/08/19
Weather: Cloudy, 40's, breeze

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-WT06-GW-1219
Sample ID: WI-AF-WT06
Sampling Team: D. Butler, G. Gardner

Total Depth: 45 FT.(BTOC)
Depth to water: 10.8 psi FT.(BTOC)
Water Column: 45 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.33 GAL.
Total Purge Vol.: 4800 mL - GAL

Measuring Device: WI Solinst Pine# 20435
Horiba: Pine# 21414

MultiRAE: Pine# 44900

Purge Device: NA - artesian

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Pres DTW psi BTOC	Color / Odor / Comments
1219	0	7.67	0.358	3.05	7.68	-16	44.0	0.8	Clear, no odor
1222	600	10.63	0.362	0.22	7.89	-70	44.1	0.8	"
1225	1200	10.64	0.363	0.01	7.98	-91	45.7	0.8	"
1228	1800	10.72	0.364	0.00	8.03	-105	48.8	0.8	"
1231	2400	10.79	0.365	0.00	8.07	-115	49.7	0.8	"
1234	3000	10.84	0.365	0.00	8.09	-122	50.3	0.8	"
1237	3600	10.92	0.367	0.00	8.11	-127	52.5	0.8	"
1240	4200	10.99	0.369	0.00	8.11	-132	52.9	0.8	"
1243	4800	11.02	0.372	0.00	8.11	-138	52.9	0.8	"
All params stable, proceed to sample									

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1216

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @ 1216 ~ 200 mL/min

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

0

0

0

0

20.9

WH

0

0

0

0

20.9

Pump Depth: NA - artesian

Sample /Time: 1245

MS/MSD NA

Duplicate ID:

NA

Signature(s):



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/90 12/12/19
Weather: Cloudy, 40° rain

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-WT07
Sample ID: WI-AF-WT07-GW-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 15.07 FT.(BTOC)
Depth to water: 11.40 FT.(BTOC)
Water Column: 5.67 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.92 GAL.
Total Purge Vol.: GAL.

Measuring Device: WLI Solinst Pine #042265
Horiba: Pine #21414
MultiRAE: Pine #44906

Purge Device: Peri pump: Pine #16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0855	1000	9.77	1.59	2.94	6.46	-40	18.5	9.70	Clear, no odor
0858	1600	10.08	1.58	0.63	6.58	-59	15.8	9.81	
0902	2000	10.20	1.58	0.34	6.65	-68	10.4	9.84	
0905	2300	10.27	1.57	0.23	6.71	-74	7.3	9.85	
0909	2700	10.31	1.56	0.17	6.75	-78	4.9	9.90	
0912	3000	10.32	1.56	0.12	6.78	-81	4.4	9.92	
0915	3300	10.34	1.55	0.09	6.80	-83	4.1	9.94	
0918	3600	10.34	1.55	0.03	6.82	-84	3.4	9.95	
0921	3900	10.34	1.54	0.00	6.84	-85	3.1	9.99	
0924	4200	10.37	1.54	0.00	6.85	-87	2.9	10.02	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤ 6°C	2x 250-mL HDPE	2

Observations/Notes:

Pump Start Time: 0850

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: @0850 200 mL/min

@0958 100 mL/min

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

20.9

20.9

O2 (%)

20.9

20.9

Pump Depth: 14 ft b to c

Sample Time: 0930

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/12/19
Weather: cloudy, 40's, rain

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: WI-AF-WT08

Sample ID: WI-AF-WT08-GW-1219

Sampling Team: D. Butler, G. Gardner

Total Depth: 40 FT.(BTOC)
Depth to water: Pres 1.95 FT.(BTOC) psi
Water Column: 40 FT.
(x) 0.163 GAL/FT.

Well Volume: 6.52 GAL.
Total Purge Vol.: 7500 mL GAL.

Purge Device: NA-artesian

Measuring Device: WI-I Soling + Pinch

Horiba: Pine# 25314

MultiRAE# 44800

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Pres DTW psi ft BTOC	Color / Odor / Comments
0859	0	9.55	0.348	0.00	6.94	7	4.3	1.95	Clear, no odor
0902	750	9.88	0.344	0.00	7.15	-39	4.9	1.95	"
0905	1500	10.04	0.342	0.00	7.31	-28	4.7	1.95	"
0908	2250	10.29	0.341	0.00	7.37	-96	4.8	1.95	"
0911	3000	10.46	0.340	0.00	7.42	-112	4.7	1.95	"
0914	3750	10.56	0.339	0.00	7.44	-124	4.6	1.95	"
0917	4500	10.67	0.339	0.00	7.46	-132	4.1	1.95	"
0920	5250	10.78	0.339	0.00	7.48	-140	4.0	1.95	"
0923	6000	10.88	0.339	0.00	7.49	-145	3.5	1.95	"
0926	6750	10.90	0.339	0.00	7.50	-149	3.1	1.95	"
0929	7500	10.98	0.339	0.00	7.51	-155	2.7	1.95	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA	≤ 6°C	250 mL HDPE	2

Observations/Notes: All param's stabilized

Pump Start Time: 0850-0856

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: 200 mL/min

@ 0856 ~ 250 mL/min

Air Monitoring

BZ

WH

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

20.9

20.9

Pump Depth: NA-artesian

Sample /Time: 0935

MS/MSD: NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/12/19
Weather: 40°S Rain

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WT-09
Sample ID: WI-AF-WT-09-GW-1219
Sampling Team: T. Chalmers, A. Vogt

Total Depth: 15.49 FT.(BTOC)
Depth to water: (1) 12.47 FT.(BTOC)
Water Column: 3.02 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.49 GAL.
Total Purge Vol.: x3 1.48 GAL.

Measuring Device: Solinst Pine #12726
Water Quality Meter: Horiba Pine #19912

Purge Device:

Peristaltic Pump pine # 44667

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0950	Begin Purge								
1007	0.5	11.74	0.835	7.06	7.96	166	56.1	13.20	clear / No odor
1014	0.71	11.52	0.842	6.92	7.48	168	55.0	13.91	"
1020	0.89	11.36	0.826	6.70	7.99	169	61.5	14.36	"
1026	1.07	11.26	0.792	5.13	7.98	170	240	14.65	Murky / No odor
1030	Well Purged								
0835	on 12/13/19 DTW = 13.21 ft b to c (90% recharge = 12.77 ft b to c, currently ~75%)								
	Per discussion w/ H. Perry will sample now and fill bottles first.								
0857	NA	9.16	0.496	8.30	5.91	286	78.6	13.95	Mostly clear, no odor

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250mL HDPE	2

Observations/Notes:

Pump Start Time: 0950

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

N/A

Final Fill Time:

Final Discharge Time:

N/A

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

Purge Rate: 110 mL/min

0.03 gal/min

Air Monitoring

BZ

WH

VOC (ppm)

0.0

0.0

H2S (ppm)

0.0

0.0

LEL (%)

0

0

CO (ppm)

0

0

O2 (%)

20.9

20.9

Pump Depth: N/A 14 ft b to c

Sample Time: 0850 on 12/13/19

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butte



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 40°S Rain
Weather: 12/12/19

Project Number: 695610CH.04.FI.FS

Page: 1 of 1

Well ID: WT-10

Sample ID: W1-AF-WT-10-GW-1219

Sampling Team: T. Chalmers, A. Vogt

Total Depth: 45.0 FT.(BTOC)
Depth to water: Pres (-) 0.65 FT.(BTOC) (DB) psi
Water Column: 45.0 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.34 GAL.
Total Purge Vol.: x3 22.02 GAL.

Measuring Device: Solinst Pire #12726

WQ meter: Horiba Pire #19912

Purge Device: Peristaltic Pump Pire #44667 DB
Artesian

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1055	Begin Purge								
1100	0.25	10.62	0.450	0.0	8.28	-153	10.7	-	clear / No odor
1105	0.50	10.61	0.452	0.0	8.28	-160	10.8	-	"
1110	0.75	10.61	0.453	0.0	8.29	-167	11.3	-	"
1115	1.0	10.61	0.454	0.0	8.29	-173	11.3	-	"
1120	1.25	10.61	0.455	0.0	8.29	-179	11.7	-	"
1125	1.50	10.60	0.455	0.0	8.29	-183	11.7	-	"

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	≤6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1055

Bladder Initial Fill Time(FT; sec): N/A

Bladder Initial Discharge Time(DT; sec): N/A

Submersible Initial Control Setting(Hz): N/A

Final Fill Time: N/A

Final Discharge Time: N/A

Final Control Setting(Hz): N/A

Purge Rate: 200 mL/min
0.05 gal/min

Air Monitoring

	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)	0.0	0.0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Pump Depth: N/A

Sample /Time: 1130

MS/MSD: N/A

Duplicate ID: N/A

Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/19
Weather: cloudy, 40's, breeze

Project Number: 695610CH.04.FI.FS

Page: 1 of 2

Well ID: WI-AF-WT11

Sample ID: WI-AF-WT11-GW-1219

Sampling Team: P. Butler, G. Gardner

Total Depth: 9.15 FT.(BTOC)
Depth to water: (-) 3.71 FT.(BTOC)
Water Column: 5.44 FT.
(x) 0.163 GAL/FT.
Well Volume: 0.89 GAL.
Total Purge Vol.: 4.5 GAL.

Measuring Device: WLI: Solinst Pine# 042265

Horiba: Pine# 21414

Multi RAE: Pine# 44900

Purge Device: Peripump: Pine# 16866

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. mL (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1121	0	10.44	0.922	7.49	7.26	193	18.0	3.77	Clear, no odor
1125	400	10.77	0.926	7.30	7.39	183	15.1	3.85	"
1128	800	10.70	0.929	6.84	7.44	179	12.5	3.91	"
1132	1200	10.64	0.931	6.66	7.47	174	12.2	3.98	"
1136	1600	10.57	0.933	6.56	7.48	170	10.9	4.06	"
1140	2000	10.53	0.934	6.37	7.47	163	9.5	4.14	"
1144	2400	10.52	0.932	6.26	7.46	146	9.1	4.22	"
1148	2800	10.50	0.930	6.14	7.45	127	7.8	4.32	"
1152	3200	10.45	0.924	5.86	7.44	91	7.2	4.58	"
1156	3600	10.41	0.923	5.65	7.43	70	3.9	4.72	"
1157	Excessive drawdown and can't pump any slower, will purge dry								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1117

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): I

Submersible Initial Control Setting(Hz):

Final Fill Time: NA

Final Discharge Time: I

Final Control Setting(Hz):

Purge Rate: @1117 ≈ 100 mL/min

@1156 ≈ 500 mL/min

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

0

0

0

0

20.9

WH

0

0

0

0

20.9

Pump Depth: 8 ft btoC

Sample Time: 0920 on 12/12/19

MS/MSD NA

Duplicate ID: NA

Signature(s): David Butler



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 2 SI
Date: 12/11/19
Weather: Cloudy, 40° breeze

Project Number: 695610CH.04.FI.FS Page: 1 of 1
Well ID: WI-AF-WT12
Sample ID: WI-AF-WT12-GW-1219
Sampling Team: D. Butler, G. Gardner

Total Depth: 26 FT.(BTOC)
Depth to water: ~~0~~ 0.9 FT.(BTOC) PSI
Water Column: 26 FT.
(x) 0.163 GAL/FT.
Well Volume: 4.24 GAL.
Total Purge Vol.: ~1 GAL.

Measuring Device: Horiba: Pine #25314
MultiRAE: Pine #44900

Purge Device: NA-artesian

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	-DTW Pressure #BTOC PSI
Criteria	±0.1	±0.01 (if <1) ±0.02 (if >1)	±0.05 (if <1) ±0.2 (if >1)	±0.1	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)

FIELD PARAMETERS

Time	Purge Vol. mL (gals) OP	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	-DTW Pressure #BTOC PSI	Color / Odor / Comments
1135	300	9.43	1.12	0.00	6.51	137	0.0	0.6	Clear, no odor
1138	750	9.44	1.09	0.00	7.22	7	0.0	0.6	
1141	1100 1200	9.51	1.09	0.00	7.34	-42	0.0	0.6	
1144	1550 1650	9.59	1.08	0.00	7.44	-69	0.0	0.6	
1147	1900 2100	9.69	1.08	0.00	7.52	-91	0.0	0.6	
1150	2550	9.83	1.08	0.00	7.56	-106	0.0	0.6	
1153	3000	9.90	1.08	0.00	7.57	-112	0.0	0.6	
1156	3450	9.92	1.08	0.00	7.59	-117	0.0	0.6	
1159	3900	9.96	1.08	0.00	7.60	-122	0.0	0.6	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	≤ 6°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 1133

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: 150 mL/min @ 11:33

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

0

0

0

0

20.9

WH

0

0

0

0

20.9

Pump Depth: NA-artesian

Sample /Time: 12:00

MS/MSD NA

Duplicate ID: WI-AF-WT12-GWP-1219 @ 12:00

Signature(s): David Butler



GROUNDWATER GRAB SAMPLING DATA SHEET

Client: NAVFAC
 Location: Ault Field
 Event: Phase 3 SI
 Date: 07/20/20
 Weather: 75°F, Sunny

Project Number: 695610CH.04.FI.WI
 Well ID: BH01
 Sample ID: WI-AF-BH01-GW-40 15:20
 Sampling Team: S. Fitzsimmons
 A. Seay

Total Depth: 40 (BT06) bgs
 Depth to water: 137.50 (BT06) bgs
 Water Column: 2.5 FT.
 (x) 0.653 GAL/FT.
 Well Volume: 1.6 GAL.
 Total Purge Vol.: 4.89 GAL.

Measuring Device: Horiba 29744
 MultiRae C1028

Purge Device: Bailer (disposable)

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BT0C	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

FIELD PARAMETERS										
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments	
13:55	initial	21.46	0.918	6.02	8.17	-598	>1000	38.	Turbid/Muddy	
14:00	Bailed dry with ~1.5 gal. Waited for recharge									
15:00	Unable to get enough volume for more parameters.									
15:20	B.H. purged dry. All recharge. Sampled volume.									
							</			

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
537 Mod PFAS	4°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: 13:50

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

N/A

Final Fill Time:

Final Discharge Time:

N/A

Submersible Initial Control Setting(Hz):

Final Control Setting(Hz):

N/A

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Hydropunch Screen Interval: N/A

Pump Depth: N/A (Bailed dry)

Purge Rate:

N/A

Sample Time: WI-AF-BH01-GWP-40

WI-AF-BH01-GW-40 15:20

Signature(s):

N/A

Duplicate ID: 14-16 No dup.

Not enough volume for collection.



GROUNDWATER GRAB SAMPLING DATA SHEET

Measuring Device: Horiba Pindt 21269

Purge Device: Geosquirt

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

[illegible]

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFAS	4°C	250 mL HDPE	2

Observations/Notes:

Air Monitoring	BZ	WH
VOC (ppm)	0	0
H2S (ppm)	0	0
LEL (%)	0	0
CO (ppm)	0	0
O2 (%)	20.9	20.9

Purge Rate: $\sim 2 \text{ L/min}$ (variable)

Pump Depth: 35 ft b₄gs open hole

WI-AF-BH02-GW-35

Duplicate ID:

Ø. 95 ft water column; will purge well dry and allow for recharge overnight
Ø958 - Pump did not produce any Gnl; driller believes it is sludge.

GROUNDWATER GRAB SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 7-21-20
Weather: low fcs. clear

Project Number:	695610CH.04.FI.WI	Page:	of
Well ID:	BH09		
Sample ID:	W1-AF-BH09-GWL-10		
Sampling Team:	Shannon Fitzsimmons Annika Seay		

Total Depth:	<u>14.6</u>	FT.(BTOC)
Depth to water:	<u>(-) 12.4</u>	FT.(BTOC)
Water Column:	<u>2.2</u>	FT.
	<u>(x) 0.1163</u>	GAL/FT.
Well Volume:	<u>0.35</u>	GAL.
Total Purge Vol.:	<u>1.17</u>	GAL.

Measuring Device: W/L interface

Purge Device: disposable bailer

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

$$\begin{array}{r} 12.4 \quad 14.6 \\ - 12.4 \\ \hline \end{array}$$

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC
Criteria	±10%	±3%	±0.05 (if <1) +10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)

FIELD PARAMETERS

[illegible]

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Method 537-Mod (PFAS-18)	4°C	As Z X polu	As 42

Observations/Notes:

Pump Start Time:

Bladder Initial Discharge Time(DT; sec): NA

Submersible Initial Control Setting(Hz): NA

Final Fill Time: NA
Final Discharge Time: NA

Final Control Setting(Hz): NA

Purge Rate: NA

Air Monitoring

BZ

WH

VOC (ppm)

 Φ, \emptyset

ф. 7

H₂S (ppm)

LEL (%)

CO (ppm)

02 (%)

Hydropunch Screen Interval: 10-12 + + bgs

Pump Depth: disposable bailer lowered to 11 ft bgs

Sample /Time:

S/MSD

Signature(s):

Duplicate ID: WT-AF-BH09-GWP-10



GROUNDWATER GRAB SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 7/14/20
Weather: clear, 70's, breeze

Project Number: 695610CH.04.FI.WI

Page: 1 of 1

Well ID: BH07

Sample ID: WI-AF-BH07-GW-24

Sampling Team: DiButler, A. Seay, L. Baumann

Total Depth: 24.0 FT. (BTOC)
Depth to water: 13.6 FT. (BTOC) ~2.5 ft stickup
Water Column: 12.9 FT.
(x) 0.653 GAL/FT.
Well Volume: 8.42 GAL. 3 well vol = 25.26 gal
Total Purge Vol.: ~20 GAL.

Measuring Device: Horiba Pine# 04545/
wLI Pine# 024670

Purge Device: Geosquirt
Note: no control box, pump only
has on/off

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)	

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
0909	~0	14.60	0.395	18.97	6.16	56	7999	18.20	opaque, no odor
0917	Pump stopped								WL ~ 20 ft. Pull pump to check for clog.
0920	Pump not working								YJ goes to get other pump.
0931	Restart w/ new (disconnected) pump.								
0935	~16	-	-	-	-	-	-	23.20	
0937	Zone dry, stop pump.								Discuss w/ P. Lawson, will wait for recharge, but will not wait for 80% recovery due to slow recharge.
1025	Recharged to ~22 ft bgs (24.5 ft btoe). Restart pump and collect grab params.								
1026	~20	16.01	0.374	7.85	7.20	53	7994	24.5	opaque, no odor

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PFA5	40C	250 mL HDPE	2

Observations/Notes: Hole was drilled to 24.0 ft bgs on 7/13. Tagged w/ obstruction at 24 ft bgs 7/14. Intermittent flow rate due to silts clogging pump.

Pump Start Time: 0905

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate: ~7 L/min (max)

Hydropunch Screen Interval: NA-open hole

Pump Depth: ~25.5 ft btoe

Sample Time: 1025

S/MSD

Duplicate ID:

Signature(s): David Butler

Air Monitoring

BZ

WH

VOC (ppm)

0

0

H2S (ppm)

0

0

LEL (%)

0

0

CO (ppm)

0


0

O2 (%)

20.9

20.9

7-22-20 : purged ~40 gallons from well
7-23-20 : purged 3 gallons before collecting sample. Boring went dry twice while purging.

Signature(s): 

Duplicate ID: NA

Signature(s):



GROUNDWATER GRAB SAMPLING DATA SHEET

Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 7.24.20
Weather: 1st F, cloudy

Project Number: 695610CH.04.FI.WI

Page: 1 of 1

Well ID: BH13

Sample ID: VI-AF-BH13-GW-41

Sampling Team: Shannon Fitzsimmons
Annika Seay

Total Depth: 40 FT.(BTOC)
Depth to water: (1) 8.95 FT.(BTOC)
Water Column: 31.05 FT.
(x) 0.163 GAL/FT.
Well Volume: 5 GAL.
Total Purge Vol.: 15 GAL.

Measuring Device: KUL meter solonist

#18972

Honika #29744

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

Purge Device: Geo Squirr

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC	Color / Odor / Comments
1010	0	13.22	0.376	6.69	7.09	-9	129	8.95	gray to clear
1015	15	12.89	0.390	1.54	7.05	-80	22	13.32	clear, odorless

Sample @ 1015

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Method 537-Mod (PFAS-18)	4°C	AP2 x 250 mL poly-HPDE	2

Observations/Notes:

Pump Start Time: 1010

Bladder Initial Fill Time(FT; sec): NA

Bladder Initial Discharge Time(DT; sec): ↓

Submersible Initial Control Setting(Hz): NA

Final Fill Time: NA

Final Discharge Time: ↓

Final Control Setting(Hz): ↓

Purge Rate: ↓

Air Monitoring

VOC (ppm)

H2S (ppm)

LEL (%)

CO (ppm)

O2 (%)

BZ

WH

0.0

0.0

↓

↓

↓

↓

↓

↓

Hydropunch Screen Interval: 40-42 ft bgs

Pump Depth: 41 ft bgs

Sample /Time: 1015

SS/MSD

Duplicate ID: NA

Signature(s):

Duplicate ID: NA



Client: NAVFAC
Location: Ault Field
Event: Phase 3 SI
Date: 7-24-20
Weather: 64°F, cloudy, windy

Page: of

Sample ID: WU-AF-BH14-GW-4

Sampling Team: Shannon Fitzsimmons

Measuring Device: Solonist WL meter #18972
Hanna #29744

Total Depth:	<u>40</u>	FT.(BTOC)
Depth to water:	<u>(-) 9</u>	FT.(BTOC)
Water Column:	<u>32</u>	FT.
Well Volume:	<u>(x) 0.163</u>	GAL/FT.
Total Purge Vol.:	<u>5.216</u>	GAL.
	<u>16</u>	GAL.

Purge Device: Geo Squirr

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA							
Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)

[illegible]

Sample information: method, container number, size, and type, preservative used.									
Analysis									

Analysis	Preservative	Container requirements	No. of containers
Method 537. Mod (PFAS-18)	4°C	250oz HDPE HDPE	2

Observations/Notes:

Pump Start Time: 1430

Bladder Initial Fill Time(FT; sec):

Bladder Initial Discharge Time(DT; sec):

Submersible Initial Control Setting(Hz):

Final Fill Time:

Final Discharge Time:

Final Control Setting(Hz):

Purge Rate:

Air Monitoring

VOC (ppm)

H₂S (ppm)

LEL (%)

CO (ppm)

02 (%)

BZ

WH

Hydropunch Screen Interval:

Pump Depth: 41 ft bag ~~41 ft bag~~ 40-42 ft bags

Sample /Time:

Duplicate ID: NA

S/MSD

Signature(s)

GROUNDWATER GRAB SAMPLING DATA SHEET

Client:	NAVFAC
Location:	Ault Field
Event:	Phase 3 SI
Date:	7.28.20
Weather:	63°F, sunny

Project Number: 695610CH.04.FI.WI

Page: 1 of

Well ID: BH20

Sample ID: W1-AF-BH-26-GW-4

Sampling Team: Shannon Fitzsimmons

Measuring Device: Solovist WL meter
AS 151 18972

Horiba C102485

Total Depth:	40'	FT.(BTQC)
Depth to water:	(-) 37	FT.(BTQC)
Water Column:	3	FT.
	(x) 0.163	GAL/FT.
Well Volume:	0.45	GAL.
Total Purge Vol.:	1.5	GAL.

Purge Device: disposable bailer

Pipe Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653

PARAMETER STABILIZATION CRITERIA

Parameter	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	DTW ft BTOC
Criteria	±10%	±3%	±0.05 (if <1) ±10% (if >1)	±0.2	±10	±10 % or ≤ 10 NTU	±0.3 (low flow)

FIELD PARAMETERS

[illegible]

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
Method 537 Mod (PFAS 18)	4°C	250 mL HDPE	2

Observations/Notes:

Pump Start Time: NA
Bladder Initial Fill Time(FT; sec):
Bladder Initial Discharge Time(DT; sec):

Final Fill Time:
 Final Discharge Time:

Air Monitoring	BZ	WH
VOC (ppm)	0.0	0.0
H2S (ppm)		
LEL (%)		
CO (ppm)		
O2 (%)		

Final Control Setting(Hz):

Purge Rate:

Hydropunch Screen Interval: 40-42 ft bgs
Pump Depth: 41 ft bgs (bailer sample depth)

Sample /Time:

Duplicate ID:

S/MSD

Signature(s):

Appendix E

Synoptic Water Level Data Sheets

WATER LEVEL DATA SHEET

Client: NAVFAC NW
Location: Ault Field
Event: Ault Field Phase SI
Date: 12/15/19 12/15/19
Weather: 40's overcast

Page: 1 of 1
Project Number: 695610CH.04.F1.WI
Sampling Team: Tom Chalmers
Measuring Device: Solinst, Pine #13726

FIELD MEASUREMENTS

[illegible]

* Signs of surface water intrusion

*All Clear. VOC = 0.0ppm, CO = 0.0ppm, H₂S = 0.0ppm, LEL = 0%, O₂ = 20.9%

Appendix F

Survey Report



Set Monitoring Wells

Whidbey Island Naval Air Station - Ault Field

Oak Harbor, WA

Survey Date: December 2019

New Wells Point Id	Northing	Easting	Top of Metal	Top of PVC
			Case Elev	Casing Elev
MW-618	496967.91	1194695.95	19.801	19.368
MW-619	496227.49	1195171.36	14.903	14.556
MW-620	495358.31	1195723.73	12.834	12.412
MW-621	494574.28	1196246.58	12.998	12.585
MW-622	493662.97	1196181.80	12.159	11.756
MW-623	493640.40	1196835.13	16.956	16.559
MW-624	492880.61	1197461.02	14.518	14.069
WT-01	498728.67	1198139.25	28.563	28.002
WT-02	498728.94	1198149.80	28.316	27.880
WT-03	497674.02	1201883.27	13.611	13.243
WT-04	497667.78	1201870.65	13.060	12.540
WT-05	494154.15	1196696.47	12.491	12.002
WT-06*	494143.98	1196700.02	12.657	12.474
WT-07	496945.15	1199048.86	11.142	10.808
WT-08*	496945.00	1199058.50	11.072	10.850
WT-09	495819.01	1195690.23	13.277	13.028
WT-10*	495822.65	1195676.41	13.258	13.182
WT-11	495462.73	1196867.23	9.480	9.010
WT-12*	495466.55	1196883.86	9.662	9.536

Note: * Indicates Artisan Well. The PVC elevations for these wells are on the top of the nut/nipple.

Existing Wells Point Id	Northing	Easting	Ground Elev	Top of Metal	Top of PVC
				Case Elev	Casing Elev
MW10-B8	495858.05	1193433.21		22.702	22.297
MW15-B23	495854.44	1193641.21		25.271	24.945
MW16-26B*	495667.29	1195931.89	10.849	12.407	12.319
MW4-B3	495899.86	1193584.84		25.721	25.505
MW-H6B3	493445.63	1195384.97		13.985	13.630

Note: * Indicates Artisan Well. The PVC elevations for these wells are on the top of the nut/nipple.

Notes:

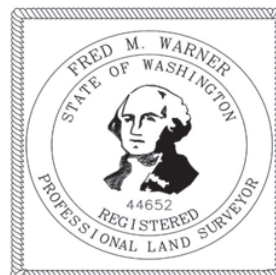
1. HORIZONTAL DATUM: NAD83/11, WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD83/11
US SURVEY FOOT
HORIZONTAL COORDINATES WERE OBTAINED BASED UPON 'PORTER-A' NGS COORDINATES ON DATA SHEET

2. VERTICAL DATUM: NAVD88

BENCHMARKS USED (PER NGS DATA SHEET AND NAVY CONTROL SHEET)

PORTER A NAVD 88 ELEV: 35.204 *STANDARD BRONZE DISK STAMPED "PORTER A, 1974" SET IN CONCRETE BLOCK
NGVD 29 ELEV:
RUN30 NAVD 88 ELEV: 15.990 *MONUMENT NOT FOUND
NGVD 29 ELEV:
*Run30 was used for conversion reference for 'PORTER A' from Navy Control NGVD29 to NAVD88 only
TORPEDO NAVD 88 ELEV: 137.78 *STANDARD BRONZE DISK STAMPED "TORPEDO, 1951" SET IN CONCRETE BLOCK

3. EQUIPMENT USED: LEICA GS15 RECEIVER, LEICA DNA10 DIGITAL LEVEL





Set Monitoring Wells
Whidbey Island Naval Air Station - Ault Field
Oak Harbor, WA

Survey Date: September 2020

New Wells Point Id	Northing	Easting	Top of Metal	Top of PVC
			Case Elev	Casing Elev
MW-625	493823.75	1191426.38	54.849	54.518
MW-626	493848.59	1191363.63	50.339	50.113
MW-627	493762.09	1191378.75	59.098	58.790
MW-628	489175.66	1188474.02	96.092	95.668
MW-629	489238.69	1188272.09	98.407	98.056
MW-630	501230.40	1193964.12	13.012	12.604
MW-631	496852.43	1192022.05	18.715	18.399

Existing Wells Point Id	Northing	Easting	Ground Elev	Top of Metal	Top of PVC	
				Case Elev	Casing Elev	
14-MW-2	492473.10	1193664.33	30.471	33.211	32.841	
AW1	485260.26	1188245.42		142.813	143.136	<i>*Note: Case elevation is on Pump Flange below PVC point</i>
MW14	496845.98	1191685.64		17.965	17.709	
MW20	497027.79	1191707.86		16.661	16.470	
MW21	497059.85	1191925.43		14.223	13.918	
N29-22D	489250.60	1188284.45	98.19	100.145	99.858	

Notes:

1. HORIZONTAL DATUM: NAD83/11, WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD83/11
 US SURVEY FOOT
 HORIZONTAL COORDINATES WERE OBTAINED BASED UPON 'PORTER-A' NGS COORDINATES ON DATA SHEET

2. VERTICAL DATUM: NAVD88

BENCHMARKS USED (PER NGS DATA SHEET AND NAVY CONTROL SHEET)

PORTER A	NAVD 88 ELEV: 35.204	*STANDARD BRONZE DISK STAMPED "PORTER A, 1974" SET IN CONCRETE
	NGVD 29 ELEV:	
RUN30	NAVD 88 ELEV: 15.990	*MONUMENT NOT FOUND
	NGVD 29 ELEV:	
	<i>*Run30 was used for conversion reference for 'PORTER A' from Navy Control NGVD29 to NAVD88 only</i>	
FIRE	NAVD 88 ELEV: 97.87	*STANDARD BRONZE DISK STAMPED "FIRE, 1951" SET IN CONCRETE BLOCK
SLUG	NAVD 88 ELEV: 135.52	*STANDARD BRONZE DISK STAMPED "SLUG, 1994" SET IN CONCRETE

3. EQUIPMENT USED: LEICA GS15 RECEIVER, LEICA DNA10 DIGITAL LEVEL



Appendix G

Field Notes

NASWI AULT FIELD PH. 2 S1
+ NASWI OLF PH. 1 S1
OAK HARBOUR + COQUEVILLE, WA

11/06/19
695610.04.FI.WI
900NVTJ

WEATHER: PARTLY CLOUDY TO SUNNY, LOW 40'S TO MID
50'S °F, NNW TO WNW WINDS @ 2-4 mph.

PURPOSE: DEMOBILIZATION TASKS FOR NASWI OLF
PH. 1 S1 (WELL INSTALL) AND MOBILIZATION
TO AULT FIELD PH. 2 S1 (WELL INSTALL) +
SITE RECON W/ DRILLER SUBCONTRACTORS.

STAFF: JANICE HORTON (TM) / CH2M
MARK ENDO (FIELD COORDINATOR) / CH2M
DAVID BUTLER (SSHO) / CH2M
TOM CHALMERS (FTL) / CH2M
CASEY WALLACE (LEAD DRILLER) / YELLOW J
RANDY JOHNSON (HELPER) / YJ
MARK VAN OOST (AIRFIELD MANAGER) / NASWI
ERIC (AIRFIELD CONTROLLER) / NASWI

07:00 ALL STAFF MEET @ ODO, AIRFIELD MANAGEMENT
BLDG #385. DISCUSS PH. 2 LOGISTICS &
SCHEDULE.

<u>DATE</u>	<u>LOCATION</u>	<u>DATE</u>	<u>LOCATION</u>
11/07	PZ 3-4	11/13	PZ 11-12
11/08	PZ 7-8	11/14	PZ 9-10
11/09	MW-622	11/15	MW-624
11/10	MW-621	11/16	MW-623 (PENDING APS CR)
11/11	DAY OFF	11/17	MW-616 + 620
11/12	PZ 5-6	11/18	DAY OFF

~~m4~~ 11/06/19

NASWI AF PH.2 S1
NASWI OLF PH.1 S1

11/06/19

- MW-618 / MW-619 & PZ 1-2 TO BE COMPLETED THE WEEK OF THE 18TH, PENDING FLIGHT OPS SCHEDULE OF ODO CLOSURE OF ADJACENT TAXIWAYS / RUNWAYS. POSSIBLE COMPLETION OVER WEEKEND.

- WILL PROVIDE WHIDBEY TOWER CONTROLLERS A UPDATED COPY OF - TEMP CONST WAIVER FIGURE #1.

0730 CH2M (DAVID BUTLER) ISSUED WHIDBEY TOWER RADIOS EM-9 & 10. ALSO ISSUED BARRIER GATE KEY #5.

0745 YELLOW JACKET STAFF MOB TO CHEVRON THEN OLF FOR DEMOB ACTIVITIES. J. HORTON MOB TO MEET W/ NTR'S CHARLIE ESCOLA & STEVE SKERHAN. M. ENDO, D. BUTLER, TO CHALMERS MOB TO BLDG #103 & NOSC #2739. - TO DISCUSS VEHICLE ACCESS CAMOS AND ONE EXTRA WHIDBEY ISLAND RADIO FOR WELL DEVELOPMENT CREW.

0845 M. ENDO @ OLF COUPEVILLE. YJ STAFF ON-SITE @ GATE. HSSE TAIL GATE FOR BOTH OLF + AF TASKS (PTSP).

0900 YJ BEGIN DEMOB ACTIVITIES FROM OLF TO AULT FIELD - LOAD EQUIP + SUPPLIES, TRANSFER DECIDING H2O TO ADLER TANK # A3072 IM.

~~(MS)~~ 11/06/19.

NASWI AF PH.2 SI

NASWI OLF PH.1 SI

11/06/19

- D. BUTLER & T. CHALMERS TAKE UN-RESTRICTED AVOC COURSE.

- M. ENDO CHECK-IN W/ L. BAUMANN FOR BEGINNING OF WELL DEVELOPMENT OF NEW PH.1 WELLS @ OLF (SEE OLF FIELD NOTES).

0948 18" OF IDW WATER IN ADLER TANK #A3872IM
= 3,412.6 GAL

- YJ TRANSFER ~ 550 GAL OF DECID H₂O TO ADLER.

1110 YJ COMPLETE LOADING 1ST LOAD. TO M. ENDO, C. WALLACE & R. JOHNSON MOB TO EAST LAYDOWN YARD @ AULT FIELD.

1145 ARRIVE @ EAST LAYDOWN YARD (ELY), UNLOAD EQUIPMENT & SUPPLIES.

1155 D. BUTLER & T. CHALMERS ARRIVE @ ELY.

1230 COLLECTOR SOFTWARE CRASH ERROR ON ALTERRA IPAD # F9F582V1 FLMM. CONTACT R. ORABASE @ ALUTRA. => NO SOLUTION.

1250 ALL STAFF MOB TO AIRFIELD FOR DRILLER SITE WALK OF ALL PROPOSED BOREHOLE LOCATIONS.

1455 COMPLETE SITE WALK. MOB TO ELY.

1505 ARRIVE @ EAST LAYDOWN YARD.

(MCE)

11/06/19

11/06/19

<u>LOCATION</u>	<u>DRILLER REMARKS</u>
MW-624	OK, MOD HITS MAY BE REQUIRED (*MM)
MW-623	OK
MW-622	OK, *MM
PZ 5-6	OK
MW-621	MW-621 REVISED LOCATION, OK
MW-616	MW-616 REVISED ALTERNATE LOCATION PREFERRED.
PZ 11-12	ORIGINAL LOCATION NOT POSSIBLE, PZ 11-12 REVISED LOCATION CHOSEN
MW-620	MW-620 REVISED ALTERNATE LOCATION PREFERRED.
PZ 9-10	OK, *MM
MW-619	MW-619 REVISED, OK
MW-618	MW-618 REVISED LOCATION PREFERRED, OK.
MW-617	MW-617 REVISED LOCATION ONLY, *MM IF POSSIBLE @ ALL, WEATHER PENDING,
PZ 1-2	OK
PZ 3-4	OK, REQUEST MOVE 5 FT SOUTH = OK, WITHIN APS APPROVAL AREA.
PZ 7-8	OK.

1610 YJ COMPLETE OFFLOADING @ ELY. D. BUIER,

T. CHAMBERS MOB TO OLF W/ YJ STAFF.

M. ENDO COMPLETE FIELD NOTES THEN MOB FROM
 SITE.

~~(ME)~~ 11/06/19

NASWI AF Ph, 25F
NASWI OLF Ph, 15F

11/06/19

1615 D. Butler drops T. Chalmers off
at hotel so T. Chalmers can
go purchase supplies

1640 D. Butler and drillers arrive
at OLF. Drillers begin
loading more supplies.

1720 All staff off site.

L. Baumann checks out w/ ODO.

~~Dave Butler~~

~~11/6/19~~

NASW1 Ault Field Ph2 SI
NASW1 OLF Ph1 SI
onk Harbor + Coupeville, WA

11/7/19
695610.04, FI, WI
9000 NVT1

Task: Finish monument at MW205, continue moving supplies to Ault Field

Weather: Partly cloudy, fog (AM), 40's-50's, breeze

Staff: Jacobs: David Butler/SSH0, Tom Chalmers/^{FIL}SSH0

XJ: Casey Wallace/Driller, Randy Johnson/Helper

0700 All staff on site, check in w/ODO.

Flight ops scheduled at OLF from

11:30-13:45 and from 17:50-21:00,

Notify ODO that supplies are still being moved and drilling will not likely begin at Ault Field today.

0715 Conduct PTSP, discussed driving safety and pinch points

0725 Drillers begin loading supplies to move to Ault Field

0735 D. Butler and T. Chalmers begin cleaning out tote w/ residual ~~sediment~~^{sludge} from GW03.

0850 Drillers go to install monument at MW205.

1000 Finish monument install at MW205

1020 Charlie Escobar/NAVFAC on site

1045 Drillers finish loading supplies.

D. Butler and T. Chalmers finish cleaning tote w/ GW03 sludge (only trace sed remains).

11/6/19

- 1050 All staff head to Ault Field,
C. Escola off site, had discussed
progress at OLF and plan for Ault Field,
- 1120 Arrive at East Laydown yard,
begin offloading supplies,
- 1200 Drillers break for lunch
- 1230 Done with lunch, head to OLF
- 1305 Back at OLF, drillers begin
loading supplies
- 1405 C. Wallace heads to dump
then Ault Field
- 1410 D. Butler, T. Chalmers, and R. Johnson
head to Ault Field East laydown
with rest of the equipment
- 1445 Arrive at East laydown,
begin unloading supplies
- 1450 C. Wallace arrives at East laydown
- 1455 D. Butler goes to get barrier key
- 1530 D. Butler back at East laydown. checked
out barrier key 5 and notified Mark
VanDort and Clint Church that
we will set up at PZ 7-8. Mark
VanDort tells D. Butler that the
sweeper is not available on the weekend.
D. Butler notifies J. Horton about
sweeper restriction. — (15)

11/7/19

1530^{cont.} Will plan to use mud mats when accessing locations over the weekend, possibly use the hose on the drill rig to clean tires. J. Horton will call M. VanOort and discuss.

1540 J. Horton spoke w/ M. VanOort, ok to use water to clean tires. Need to avoid any large clumps of mud/grass or other debris.

1555 Head to PZ 7-8

1600 D. Butler checks in w/ Weapons Handling ODO, notifies of work at PZ 7-8

1620 All vehicles at PZ 7-8, begin staging and hand clearing at PZ 8

1720 Finished hand clearing PZ 8 to 5 ft

1725 Drillers off site. CH2M goes to return barrier key.

1745 Key returned, All staff off site.

Dan Butler

11/7/19

NASWZ Ault Field Ph. 2 SI
Oak Harbor, WA

11/8/19
695610.04 Fin

Task: Drill and install at PZ07-8

Weather: Cloudy, 40°-50°, breeze

Staff: Jacobs: David Butler/SSH0, Tom Chalmers/FTL

YJ: Casey Wallace/Driller, Randy Johnson/Helper

0645 D. Butler and T. Chalmers check in at

ODO, notify of work at PZ 7-8 and
check out barrier key 5

0700 All staff meet at East lay down

0705 Conduct PTS P and discuss plan for
the day. Discussed ending time to
avoid working at night.

0715 YJ begin loading well construction
supplies onto pickup trailer, will have
all materials necessary to avoid
multiple trips

0730 Calibrate Multi RAE

0750 Head to PZ07-8

0755 D. Butler checks in w/ Weapons ODO

0800 Arrive at PZ07-8, begin hand clearing
PZ07

0835 Finish hand clearing to 5 ft bgs (PZ 7).
Begin setting up rig at PZ08

0920 Begin drilling at PZ08

1025 Finish drilling to 30 ft. D. Butler calls
Peter Lawson and Heather Perry to discuss
screen interval.

11/8/19

- 1040 Unable to contact P. Lawson. Discussed screen w/ H. Perry. Will likely target 19-22.5 ft unit (interbedded sand & clay), but H. Perry will try to confirm w/ P. Lawson. H. Perry ~~mention~~ @ asks if we need to confirm screens w/ Kendra Leibman. D. Butler calls J. Horton. J. Horton will call and ask.
- 1050 Call from J. Horton. J. Horton had called K. Leibman. K. Leibman would like to be involved w/ screen selection. H. Perry will call and discuss w/ K. Leibman.
- 1125 Receive direction from H. Perry. Will drill 10 ft more to see if we get into sandier material seen in MW605 & MW606 logs.
- 1155 Finished drilling to 40 ft. Sand encountered in bottom 5 ft. Will screen ~~30-40~~ 35-40 ft. Break for lunch.
- 1230 Back from lunch. Begin setting well, screen from 35-40 ft.
- 0950 Collect WI-AF-WT-08-SB-13 for PFA5 analysis. Sample collect at air/water interface in silty sand material w/ shell fragments. (Late entry into log book.)

11/10/14
11/08/14

1345 PVC casing, filter pack, and bentonite seal installed. Driller notes that well is artesian. Does not have the proper top seal/pressure gauge for an artesian well. Casing currently sealed w/ a J-plug. D. Butler notifies H. Perry & J. Horton. C. Wallace looks up requirements for Artesian wells in WA.

1410 Unable to determine if construction requirements differ for artesian wells if well is monitoring ~~of~~ @ or drinking. C. Wallace and D. Butler unable to contact anyone in the office who might know. Will move to PZ07. PZ08 is sealed w/ a J-plug.

1430 C. Wallace spoke w/ Noel Phillips with the WA Dept. of Ecology. Noel Phillips agrees that using a pressure gauge and valve after the gauge is appropriate. C. Wallace will get parts at Home Depot this evening. May need a bigger vault to fit everything. Continue setup at PZ07.

~~11/18/19~~
4/08/19

- 1455 Begin drilling at PZ07 / WT07
- 1525 Finish drilling PZ07 to 16 ft bgs.
Will install well with screen from
10-15 per earlier discussion w/
P. Lawson and H. Perry. YJ begins
well install.
- 1515 Collect WI-AF-WT-07-SB-12 at
air/water interface in PZ07.
- 1600 finished installing casing, filter pack,
and bentonite chips. Begin packing up
and moving equipment off hole to
install monument.
- 1630 Begin installing monuments at
PZ07 and PZ08.
- 1650 D. Butler and C. Wallace take rig
back to East laydown yard
- 1700 D. Butler and C. Wallace back at PZ07-08.
Drillers have placed wooden forms
around wells but will not have
time to place concrete tonight. Marked
wells with delimiters.
- 1705 All staff head to East laydown.
- 1720 CH2M go to return key to ODO,
all staff off site.

David Butler 11/08/19
~~11/18/19~~ EF

NAWII Ault Field Ph2 SE

Oak Harbor, WA

11/09/19

64561004.04.FI.WT

Task: Drill and install MW622, complete install at PZ07 and 08

Weather: Cloud, 40's to 50's, light showers, breeze

Staff: Jacobs: David Butler/SI HO, Tom Chalmers/FTL

YJ: Casey Wallace, Randy Johnson

0645 D. Butler and T. Chalmers check in w/ ODO, notify of work at MW-622 and check out barrier

key 6 to complete work at PZ07-08.

0700 All staff meet at East laydown.

YJ loads extra pipe onto a truck to send back to Portland.

0715 Conduct PTSP, discussed airfield driving and fatigue

0720 Calibrate MultiRAE

0745 Charlie Escola/NAUFAC on site

0805 Drillers finish loading casing and supplies onto truck. D. Butler and R. Johnson off site to take truck of supplies to Acorn Motor Inn, and deliver truck to Brandon Daniels/YJ. T. Chalmers and C. Wallace stay at East laydown. C. Wallace begins deconning casing and rods.

0835 D. Butler and R. Johnson back on site

11/09/19

- 0910 Head to MW-022 (finished loading other supplies and deconning), C. Escala stays at East lay down
- 0940 Begin staging at MW-022. Did FOD check and notified tower.
- ~~0955~~ Utilized mud mats while staging to avoid rutting and FOD.
- 0955 D. Butler and C. Wallace go to East laydown to get support truck. T. Chalmers and A. Johnson continue staging and begin hand clearing.
- 1015 D. Butler and C. Wallace back at MW-022. Continue hand clearing and setup.
- 1035 Collect WI-AF-FB01-110919, field blank for the week
- 1105 Collect WI-AF-MW-022-SB-02 at air/water interface. Collected from side wall of hand clear hole after exposing fresh surface (used a gloved hand).
- 1120 Finish hand clearing to 5 ft bgs. Set up to drill.
- 1145 Begin drilling from 5 ft bgs
- 1215 Complete drilling to 30 ft bgs. Driller advancing casing and clearing out the hole.

1245 Finished advancing casing to 30ft, Driller had to use water pressure due to heaving sands, Break for lunch.

1310 D. Butler discusses well construction w/ Peter Lawson. After confirming minimum well seal requirements w/ C. Wallace (no minimum thickness required in WA for resource protection wells), P. Lawson directs to set the screen from 7-12ft.

1320 Back from lunch. Begin well install.

1330 D. Butler goes to get a 2x4 for the well pad frame from the laydown yard.

1340 D. Butler back at MW-622,

1420 Finish constructing well. Used 3 bags of bentonite chips to backfill, 2.5 bags of sand for the ~~seat~~^{pack}, and 3 bags of chips for the seal. Begin ~~demo~~ moving rigs off the hole to install the monument.

1515 Finished moving rigs off hole, begin monument install

1610 Finished constructing monument, pack up rest of equipment.

11/09/19

- 1615 Move support rig and pickup to laydown
1620 Go to get drill rig
1635 ~~B~~ Drill rig moved to the laydown,
begin deconning rods & casing
1645 D. Butler and C. Wallace head to
PZ08 to see how artesian well
head will fit. T. Chalmers and
~~1710~~ ~~+ R. Johnson~~ ^{continue} ~~begin~~ decon. of
1710 D. Butler and C. Wallace back at
laydown, well head apparatus fits
and will function, will need to
be tightened and will need to
apply PFA5-free thread sealant to
avoid leaks. Will consider using
a fern-co compression fitting so
that the head is removeable.
Will also look into a smaller range
pressure gauge, so reading is accurate.
1720 All staff off site. D. Butler and
T. Chalmers go to return barrier
key to ODO.

Daniel Butler

11/09/19

NASWI Ault Field PH25I

Oak Harbor, WA

11/10/19

695610CH.04.FTW

Task: Drill and install MW-621, install monuments at PZ07-08

Weather: Clear, 50's, breeze

Staff: CH2M: David Butler/SSHO, Tom Chalmers/ETL

YJ: Casey Wallace, Randy Johnson

0645 D. Butler and T. Chalmers check in w/ ODO, notify of work at MW-621, check out barrier key #5

0700 All staff on site, conduct PTSP, discussed fatigue and IDW management

0715 YJ dumps IDW drums from MW-622 into hopper for temp storage

0730 Calibrate MultiRAE

0800 Done dumping drums and loading supplies for the day, move to MW-621

0830 Arrive at MW-622, stage drilling and pick up. D. Butler and C. Wallace go to get support rig. T. Chalmers and R. Johnson continue set up.

0850 D. Butler and C. Wallace back at MW-621, stage support rig.

0855 Begin hand clearing MW-621

0950 Complete hand clearing to 5 ft, begin setting up rig on hole

1020 Begin drilling at MW-621

11/10/14

1040 Pause to replace grip pads on rig jaws

1045 Resume drilling

1105 Finish drilling to 30ft. Drillers advancing casing. DiButler calls Peter Lawson to discuss screen. Decide to set screen from 5-10 ft. No other good areas. Clay from 6.5 to 30.

1120 Drillers finish advancing casing. Begin setting the well.

1125 Collect WI-AF-MW-621-SB-05 at air/water interface. Duplicate at 1130.

1200 Finished backfilling and installing well. Drillers break for lunch.

CH2M move to ODO to discuss schedule.

1225 CH2M back at MW-621. Discussed working on Monday since it is veterans day and will be quiet. Received approval from Mark VanDort (airfield manager). Will move to MW-616 this afternoon and complete on Monday. Possibly move to MW-620 after. Notify Janice Horton of schedule change approval (had previously discussed and received approval from J. Horton).

11/10/19

1230 YJ back from lunch. Begin moving rigs off hole to install the monument.

1300 Begin installing monument.

1355 Finish installing monument at MW-621. Move to MW-616.

1400 Begin set up at ~~MW-616~~ MW-616

1410 Begin hand clearing MW-616

1510 Finish hand clearing, begin setting up to drill

1525 Begin drilling at MW-616

1600 Complete drilling to 30 ft. YJ advancing casing and cleaning out the hole.

1610 D. Butler calls P. Lawson, discuss core and where to sample. Will sample at 7 ft in clay w/ silt interbeds. Will wait to set the well until tomorrow.

1615 YJ finishes advancing the casing and cleaning out the hole. Begin demob.

1620 Collect WI-AF-MW-616-SB-07 at approx. air/water interface. Collected MS/MSD.

1645 YJ done breaking down from hole. Hole secured for the night (casing left in ground).

11/10/19

1646 Mobe drill rig and support rig to the laydown.

1655 D. Butler and C. Wallace head to get XJ pick up.

1705 D. Butler and C. Wallace back at laydown. YJ offloads some supplies and buttons up for the night.

1715 CH2M goes to return barrier key, ~~AB~~ YJ off site.

1725 CH2M off site.

David

Ruth

11/10/19

NASWT Auth Field Ph 255
Oak Harbor, WA

11/11/19
GAS610CH, 04, FSWJ

Task: Drill and install MW-620, install
MW-616, and install PZ07-08

Weather: Cloudy, 40's - 50's, breeze

Staff: CH2M: David Butler/SSH0, Tom Chalmers/FTL

YJ: Casey Wallace, Randy Johnson

0630 CH2M checks in w/ ODO, notifies of
work at MW-620 and MW-616, and checks
out barrier key 6

0645 All staff meet at laydown, conduct
PTSP, discussed decon procedures
and hand tool use

0700 YJ begins emptying drums and decon.
CH2M calibrates MultiRAE.

0730 Pumped water from top of hopper 1
(soil and water from MW-622) into
a dirty water tote YJ had.

0835 Done deconning. Take drill rig
and support rig to MW-620.

0855 Drill rig and support truck at MW-620.
D. Butler, C. Wallace, and R. Johnson go
to laydown to get pickup and
forklift.

0920 D. Butler, C. Wallace, R. Johnson back at
MW-620. Begin hand clearing to 5 ft.

0925 Call from Janice Horton. Discussed plan for wells MW-616 and MW-620. Will drill MW-620 and see if the same conditions are encountered as at MW-616. Also discussed IDW storage. Will need more drums or roll off soon. Filled 5 drums brought from OLF and about 3/4 of one hopper already.

1005 Finish hand clearing to 5 ft bgs at MW-620. Begin setting up rigs.

1040 Begin drilling MW-620 from 5 ft, using 4 in core barrel & 6 in casing.

1110 Finish drilling to 30 ft, drillers advancing casing and cleaning hole. D. Butler calls P. Lawson and H. Perry, no answer. D. Butler calls J. Horton. J. Horton will discuss hole conditions with P. Lawson and decide where to screen due to large amount of clay.

1120 YJ finished advancing casing. Begin prepping for well construction and other clean up activities while waiting for a decision on the screen interval.

11/11/19

- 1200 Break for lunch
- 1230 Back from lunch, still waiting on decision on screen.
- 1240 D. Butler talks w/ J. Horton and P. Lawson. Originally thinking to set screen 3-8 ft, but after discussion w/ C. Wallace will set 4-9 ft to give a thicker bentonite seal. Also discuss collecting additional soil samples at deeper depths to get more data. P. Lawson looking into costs.
- 1300 Collect WJ-AF-MW-620-SB-06, sample collected in clay below air/water interface due to core bag w/ exact interface being saturated w/ drill water. Water was used to force cores out of core barrel.
- 1255 YJ begins constructing MW-620
- 1330 Finished installing well. Back-filled, install PVC casing, sand, and seal. Begin moving off hole to install monument.
- 1340 Begin installing monument
- 1355 D. Butler and T. Chalmers recon path through grass to MW-616.

11/11/19

1400 Path to MW-616 clear. During recon removed hole cover from MW-616 and noted that 6 in drill casing was full of water. D. Butler attempts to call P. Lawson, no answer. D. Butler calls H. Perry, H. Perry defers to P. Lawson, will contact him and let him know.

1415 Collect WI-AF-MW-620-1B-15, sample in clay for vertical profile

1420 Collect WI-AF-MW-620-1B-20, sample in clay for vertical profile

1425 Complete monument install at MW-620. Begin moving to MW-616 to abandon well.

1430 Call from P. Lawson. P. Lawson confirms that we will abandon MW-616 and that water in casing is likely from lower artesian aquifer.

1445 Set up at MW-616, begin abandoning using chip

1525 Finished abandoning MW-616. Filled w/ chips from 30 to 0.5 ft. Used native soil and grass to cover surface.

1530 Move drill rig and support rig to laydown

1540 D. Butler, C. Wallace, and R. Johnson go to get pickup and forklift

11/4/19

- 1600 Back at laydown, get supplies to install monuments at PZ07 and 08.
- 1620 Head to PZ07 and 08
- 1630 Arrive PZ07 and 08, begin install at PZ08 (artesian well) and PZ07
- 1640 D. Butler and R. Johnson go to get stamp kit
- 1650 D. Butler and R. Johnson back at PZ07-08
- 1710 Finish installing WT07 (PZ07) pad
- 1720 Head back to laydown
- 1740 YJ off site, CH2M goes to return barrier key.
- 1750 CH2M off site.

~~David Butler~~

~~11/4/19~~

NASWI Ault Field Ph 2 ST
Oak Harbor, WA

11/13/19

64561000H.04.FI.WI

Task: Drill and install ~~PS~~ PZ05-06

Weather: Cloudy, 40's - 50's, breeze

Staff: CH2M: David Butler/SHO, Tom Chalmers/FTL

YJ: Casey Wallace, Randy Johnson

Clean Harbors: Ted Crosier

0630 D. Butler receives call from Ted Crosier (Clean Harbors delivery driver). He is on site at the lay down and will wait for CH2M before dropping box.

0640 CH2M on site, conduct PTSP w/ T. Crosier. Discussed dropping procedures and staying clear of the "line of fire".

0645 YJ on site. Conduct PTSP, discussed flight line driving w/ more activity. Discussed placement of roll off w/ YJ and Clean Harbors.

0655 Clean Harbors begins dropping box. Needs to lower box, remove totes and secondary, then re-load box and build secondary before placing box.

0700 D. Butler goes to check in w/ ODO.

YJ deconning casing and prepping for day.

0730 D. Butler back at laydown. Calibrate Multi RAE.

0800 Finished staging roll off and totes. T. Crosier working on paperwork.

11/13/19

0805 YJ transfers contents of temporary storage tote (IDW water and decon water from MW-622, MW-621, MW-616, MW-620) into "H1" tote (~200 gal).

0815 T. Crosier finishes paperwork. Dropped off rolloff #25170 (good condition, no residual soil, liner installed) and 5 empty 275 gal totes. YJ dumps hopper from MW-620 (~1/2 full) and hopper from MW-622 (~2/3 full) into rolloff. Also dump "potentially contaminated" trash (plastic, core bags, gloves) into rolloff.

0820 T. Crosier off site.

0840 Head to PZ05-06

0900 Arrive PZ05-06, stage rigs

0905 D. Butler, C. Wallace, and R. Johnson go to get pickup and fork lift

0935 D. Butler, C. Wallace, and R. Johnson back at PZ05-06. Meet Steve Skeehan (NAUFAC) at the laydown, discussed project status and any issues. Steve Skeehan off site after discussion.

0940 Begin hand clearing PZ06.

1030 Finish hand clearing to 5 ft, begin setting up to drill

11/13/19

- 1100 Begin drilling PZ06 from 5 ft
- 1135 Collect WI-AF-WT-06-SB-07 + MS/MSD from air/water interface
- 1140 Finish drilling to 40 ft. D. Butler calls Peter Lawson, sand observed in bottom 2 ft. Per discussion w/ P. Lawson, will drill to 45 ft and set screen in sand.
- 1145 YJ breaks for lunch
- 1220 YJ back from lunch continue drilling from 40 ft
- 1240 Finish drilling to 46 ft, drillers advancing casing and cleaning out hole
- 1255 Finish advancing casing and cleaning out hole, begin setting well, screen from 40 to 45 ft bgs
- 1420 Finished installing WT06 (PZ06). Begin breaking down to move over to WT05 (PZ05). Note! Driller confirms that well WT06 is artesian.
- 1435 Begin hand clearing WT05
- 1515 Complete hand clearing WT05 to 5 ft bgs. Begin installing monument at WT06.
- 1555 Finish installing monument for WT06, will have to add artesian well head later. Continue cleaning up.

11/13/19

- 1600 Move drill rig and support rig
to laydown
- 1625 D. Butler, C. Wallace, and R. Johnson
go to get pickup and fork lift
- 1645 Back at laydown
- 1730 Done dumping IDW (1 full hopper
from WDOG) and transferring water
from ~~OS~~ into H1 tote. Finished
buttoning up site. All staff
off site.

~~Don Butler~~

~~11/13/19~~

NASWI Ault Field Ph2 SI
Oak Harbor, WA

11/14/19

495610CH.04.FIWI

Task: Drill and install WT05, WT11, and WT12

Weather: Cloudy, 40's-50's, breeze

Staff: CH2M: David Butler/SSHO, Tom Chalmers/ETL

YJ: Casey Wallace, Randy Johnson

0635 CH2M checks in w/ ODO and Mark Van Oort, notify of work for day

0645 All staff meet at lay down

0650 Conduct PTSP, discussed ergonomics and musculoskeletal injury

0710 YJ begins decon of casing and prep for the day, Calibrate MultiRAE.

0815 Head to WT05 w/ drill rig & support rig

0840 Drill rig and support rig at WT05, D. Butler, C. Wallace, and R. Johnson go to get pickup and forklift.

0910 D. Butler, C. Wallace, and R. Johnson back at WT05, set up for drilling.

0935 Begin drilling at WT05 from 5ft

0945 Finish drilling to 16ft, YJ advancing casing and cleaning out the hole.

0955 Collect WI-AF-WT05-SB-08 at air/water interface

1005 YJ finishes cleaning out hole, Begin installing well screen @ 11ft,

1030 C. Wallace notifies D. Butler that bottom of screen is closer to 10.5ft, due to slight measurement error.

11/14/19

- 1035 Finished installing well, screen
5.5 to 10.5 ft. Begin breaking down
rigs to move off hole.
- 1045 Begin installing monument at WT05
- 1125 Finish monument at WT05, begin
moving to WT11-12.
- 1150 All vehicles at WT11-12, begin
hand clearing WT12
- 1230 Finish hand clearing a 6 in diam
hole to 5 ft. Advanced to 6 ft
w/ 2 in diam hand auger to look
for first water and lithologic
changes. None observed compared
to 5 ft. YJ breaks for lunch.
- 1245 Collect WI-AF-EB01-111419,
equipment blank from deconned hand
auger
- 1250 Collect WI-AF-WT-12-SB-05 at
air/water interface (~5 ft bgs) using
hand auger
- 1305 YJ back from lunch, continue
setting up at WT12
- 1330 Begin drilling from 6 ft w/ 4 in core
barrel and 6 in casing
- 1410 Finish drilling to 30 ft, YJ advancing
casing and cleaning hole

11/14/19

- 1415 D. Butler calls Peter Lawson, no answer. D. Butler calls Heather Perry, discuss different lithology at this location and if want to drill deeper.
- 1420 Decide to drill 5 ft deeper and see if encounter same artesian aquifer.
- 1435 Drill to 36 ft, encounter same material (fine grained silt/sand). D. Butler calls P. Lawson.
- 1450 Per discussion w/ P. Lawson, will screen 21-26 ft in poorly graded sand below till material and above fine silty material (loess?) in bottom of hole. XJ begins constructing well.
- 1550 Finished installing well. Artesian conditions not noted. Begin breaking down rigs.
- 1620 Move drill rig and support rig to laydown
- 1635 Go to get pickup and fork lift
- 1705 Back at laydown
- 1715 All staff leave laydown, CH2M goes to get OLF key
- 1735 Checked out OLF key #1, CH2M offsite

11/14/19

- 1740 D. Butler drops T. Chalmers off at hotel and goes to OLF, to let YJ in the gate so they can pick up their porta-potty.
- 1810 D. Butler arrives at OLF
- 1815 YJ at OLF
- 1830 Depart OLF. End of day.

~~Done~~

11/14/19

Task: Finish WT12 and drill and install WT11

Weather: Cloudy, 50's, wind

Staff: CH2M: David Butler/SSH0, Tom Chalmers/FTL

0635 YJ: Casey Wallace, Randy Johnson

~~0655~~ CH2M checks in w/ ODO and returns
OLF key #1

0645 All staff meet at laydown

0655 Conduct PTSP, discussed hazards due
to moderate wind and rain

0705 YJ removes water from hopper used
yesterday (from WT05 and WT12) and
places in tote "H1". Then dumps
soil in roll off.

0715 YJ begins decon and loading for day

0820 Head to WT11 w/ drill rig and support rig

0840 Arrive WT11, staging rigs

0845 D. Butler, C. Wallace, R. Johnson go to
get pickup and fork lift

0915 D. Butler, C. Wallace, and R. Johnson back
at WT11, continue set up

0925 Begin hand clearing WT11

1000 Finish hand clearing to 5 ft. Note water
beginning to trickle into hole at 5 ft.
Decon hand auger and collect sample.

1005 Collect WI-AF-EB01-111519, equipment
blank from deconned hand auger

11/15/19

- 1010 Collect WI-AF-WT-11-SB-05 at
air/water interface (~5ft bgs) using hand auger
- 1011 Begin set up to drill
- 1045 Begin drilling WT11 from 5 ft
- 1055 Finish drilling to 15 ft at WT11,
Driller advancing casing and clearing
out the hole,
- 1100 D. Butler calls Peter Lawson and
Heather Perry, no answer.
D. Butler calls Janice Horton, discuss
different lithology at WT11 vs WT12,
no sand at about 5 ft to screen in,
but water observed at ~~5~~ 5 ft.
- 1105 Discussed well construction w/
J. Horton, will screen 4-9 ft, ~~at~~
YJ begins constructing well.
- 1145 Finish installing well, begin breaking
down rigs and moving off hole,
- 1205 Drill rig can't make it up the slope
from the WT11-12 drilling location.
- 1215 Able to pull drill rig up using
forklift. Go to get support rig.
- 1225 Support rig out of WT11-12 location.
Begin de-FOD'ing to go back to
laydown and meet other YJ employee
with more supplies.

11/15/19

- 1255 Done cleaning tires (used hose on drill rig), move to laydown
- 1305 Back at laydown, C. Wallace off site to get truck from Brandon Daniels/YJ
- 1330 C. Wallace back on site w/ truck of supplies (pallet of bentonite and pipe for OLF replacement well)
- 1400 Done loading supplies to take off site, C. Wallace off site to take truck to B. Daniels, R. Johnson dumps hopper from WT11 (~1/3 full) into ~~for~~ rolloff, water transferred to "H1",
- 1420 C. Wallace back on site, head back to WT11-12
- 1430 Back at ~~H1~~ WT11-12, cleaning mud off other vehicle tires
- 1500 Finished cleaning tires go to build WT11 & 12 monuments
- 1600 Finish installing monuments for WT11 & 12. While installing WT12, artesian conditions were noted. Not noted during drilling or install,
- 1610 Take support truck and pickup to laydown
- 1625 At laydown, R. Johnson begins decon of casing, D. Butler and C. Wallace go to get drill rig.

11/15/19

1645 D. Butler and C. Wallace back
at laydown. Continue decon
and buttoning up for the night.
1715 Done with decon. All staff
offsite.

David
Butler

11/15/19

Task: Drill and install WT01-02

Weather: Cloudy, 50's, wind, rain

Staff: CH2M: David Butler KS 40, Tom Chalmers / FTL

YT: Casey Wallare, Randy Johnson

~~0645 All staff meet at la. @B~~

0630 CH2M checks in w/ ODO, confirms
work at WT01-02, check out barrier
key #5

0645 All staff meet at laydown, conduct
PTSP, discussed weather hazards and
working near runway 7-25

0700 Move drill rig and support rig to WT01-02

0715 Rigs at WT01-02. D. Butler, C. Wallare, and
R. Johnson go to get pickup & forklift.
T. Chalmers calibrates MultiRAE.

0740 D. Butler, C. Wallare, R. Johnson back at WT01-02

0745 Begin hand clearing WT02

0855 Finish hand clearing a 2 ft diam hole
to 5 ft. Begin setting up to drill,

0920 Begin drilling from 5 ft bgs

1000 Finish drilling to 30 ft, YT advancing
casing and cleaning out the hole,
D. Butler contacts Peter Lawson,

1015 Per discussion w/ P. Lawson, will target
25-30 ft for screen at WT02 and
likely 8-12 ft for WT01.

11/16/19

- 1016 YJ begins prepping to construct the well.
- 1025 YJ begins constructing WT02
- 1120 Finish installing WT02, begin breaking down rigs to move off hole.
- 1135 Begin hand clearing WT01
- 1200 Finish hand clearing WT01 to 5 ft bgs. Begin setting up on hole,
- 1210 Break for lunch
- 1240 Back from lunch, prep to drill
- 1250 Begin drilling at WT01 ~~at~~ from 5 ft
- 0945 Collect WIAF-WT02-SB-11 at air/water interface (late entry into lg)
- 1305 Finish drilling to 15 ft, YJ advancing casing,
- 1315 Collect WIAF-WT01-SB-13 at air/water interface,
- 1316 Per discussion w/ P. Lawson will screen 10-15 to ensure saturated screen (no confining layer observed),
- 1320 YJ done advancing casing and cleaning out hole, begin constructing well.
- 1400 Finished installing WT01, begin breaking down to move off hole

11/16/19

1410 Begin installing monuments at
WT01 & 02

1500 Finished installing monuments at
WT01 & 02, begin packing up

1505 Take pickup and forklift to laydown

1520 D. Butler, C. Wallace, and R. Johnson go
to get drill rig and box truck

1540 Back at laydown, dump 1.25 hoppers
into roll off, no significant water.

1600 YJ begins deconning

1640 YJ done deconning. Dumps tote
of decon water into empty tote.
Label tote "H2", Decon water
from WT05, WT06, WT11, WT12,
WT01, and WT02.

1650 Done buttoning up for the night,
YJ offsite. CH2M goes to
return key.

1705 CH2M offsite

~~David Butler~~

~~11/16/19~~

NASWI Ault Field Ph 252
Oak Harbor, WA

W/17/19
645610CH.04.FI.WI

Task: Drill and install MW-617 or MW-618,
complete pad at W108

Weather: Cloudy, 50's, wind, rain

Staff: CH2M: David Butler ISSHO, Tom Chalmers/ETL

YJ: Casey Wallace, Randy Johnson

0630 CH2M checks in w/ ODO and checks out
barrier key

0645 All staff meet at lay down,
conduct PTSP discussed cold stress

0700 Move rig and box truck to MW-617

0720 Reconned MW-617, too wet to
access today. Will check later in week.

0730 Rig and box truck at MW-618, access
ok. D. Butler, C. Wallace, and R. Johnson
go to get pick up and forklift.

0735 Load extra hopper onto pickup trailer

0745 Leave laydown w/ pickup and forklift

0805 D. Butler, C. Wallace, and R. Johnson back
at MW-618.

0815 Begin hand clearing MW-618

0855 Finish hand clearing MW-618 to 5 ft.
Begin setting up to drill.

0930 Begin drilling MW-618 from 5 ft

0950 Collect WI-AF-MW-618-90-11 at
air/water interface.

11/17/19

- 1000 Finish drilling to 26 ft. YJ
advancing casing and cleaning out the
hole.
- 1005 Finished advancing casing. D. Butler
calls Peter Lawson to discuss screen.
- 1015 Per discussion w/ P. Lawson, will
screen 10-15 ft to capture best
permeable zone. YJ begins well install.
- 1110 Finished installing well. Begin moving
rigs off hole.
- 1125 Rigs moved off hole. Begin installing
monuments.
- 1215 Finish installing MW-618 monument.
- 1220 YJ breaks for lunch.
- 1250 YJ back from lunch. Continue
packing up.
- 1315 Head to MW-619 to begin
hand clearing to 5 ft.
- 1320 Begin hand clearing MW-619.
- 1340 Collect WI-AF-MW-619-SB-02 at
air/water interface. May be perched
water. Noted water seeping into
hole above clay unit.
- 1420 Finish hand clearing MW-619 to
5 ft. Backfilled w/ native soil.

11/17/19

- 1425 Head to W106 and W112 to attach artesian well heads.
- 1455 Unable to attach well head to W112. Will need different fittings to make assembly shorter. Will also need to add more concrete to bottom of completion. Head back to MW-618 to get YJ equipment and move to laydown.
- 1510 Move pick up and fork lift to laydown.
- 1530 D. Butler, C. Wallace, and ~~Fitt~~
R. Johnson go to get rig and box truck.
- 1555 Back at laydown, get supplies to complete W108 well pad.
- 1600 Head to W108.
- 1610 At W108, ~~co~~ begin monument install.
- 1615 Replaced pressure gauge on W108 well head w/ 0-30 psi gauge. Reading ≈ 2 psi. Will need a lower range gauge for an accurate reading (0-5 psi?).
- 1650 Finish monument for W108, head to laydown.
- 1710 Dumped hopper into rolloff, pumped water into tote "M1".
- 1725 All staff offsite. CH2M returns keys.
- ~~Dave Butler~~ 11/17/19

NASWS Ault Field Ph25T
Oak Harbor, WA

W. Maher

695610Z04, FI. WI

Task: Drill and install MW-619 & MW-623

Weather: Cloudy, 50's, light rain, light wind

Staff: CH2M: David Butler, Tom Chalmers

YJ: Casey Wallace, Randy Johnson,

Brian Owens

0630 CH2M checks in w/ ODO

0645 All staff meet at laydown, conduct
PTSP, discussed active runways
and utilities near MW-623,

Did site H&S brief w/ Brian Owens

0710 R. Johnson begins decon. T. Chalmers
calibrates MultiRAE,

0725 D. Butler, C. Wallace, and B. Owens
go to hand clear MW-623.

T. Chalmers & R. Johnson continue decon

0740 ~~Cont~~ Begin hand clearing MW-623

0800 D. Butler calls J. Horton & L. Kaphan,
~~rec'd~~ receive confirmation to
continue hand clearing and drill 623

0820 Collect WT-AF-MW-623-SB-03 at
air/water interface. Possibly a perched
zone, will check when drilling.

0840 Finish hand clearing MW-623 to 5ft,
head back to laydown.

0845 Meet T. Chalmers and R. Johnson at
gate 104

11/19/19

- 0846 D. Butler, T. Chalmers, and R. Johnson
take box truck to MW-619
- 0900 Box truck at MW-619, head back
to laydown
- 0905 Back at laydown. All staff
take rig, pickup, and forklift to
MW-619.
- 0925 Arrive at MW-619, begin setup
- 0940 Support rig gets stuck while setting
up at MW-619. Attempting to
get unstuck.
- 1000 Mark Van Oort and Jim Coleman
on site. Notify CH2M and YJ that
there are utilities in the area and
would like to avoid digging to
get unstuck. Will bring out
another vehicle and supplies to help
get unstuck. All staff stop work
to wait for Navy.
- 1010 Navy back on site w/ large tractors
- 1015 Rig unstuck, will use forklift to
handle casing at this location.
- 1020 Navy off site. Continue set up.
- 1030 D. Butler notifies J. Horton of
getting stuck and Navy assistance.
Also discussed schedule.

11/9/19

- 1035 Begin drilling at MW-619 from 5ft
1100 Finish drilling to 26ft. D. Butler attempts to call Peter Lawson and Heather Perry, no answer. Make field call to set well 11-16ft. Drillers advancing casing and cleaning out hole.
- 1110 Finish cleaning out hole. Begin constructing well.
- 1120 Jim Coleman w/ NAWI OPS back on site. Instructs CH2M and YJ to drive shoulder of ECHO to Juliet and remove FOD at Juliet. Will then call for sweeper.
- 1055 Collect WFAF-MW-619-SB-LL at air/water interface. Actual water table. (Late entry into log book)
- 1125 Jim Coleman off site.
- 1150 Finish installing MW-619, begin breaking down from hole.
- 1155 Forklift becomes stuck while ~~trying to~~ moving casing back to box truck. Attempting to unstuck.
- 1215 Forklift unstuck. YJ breaks for lunch. CH2M goes to ODO.

11/19/19

- 1240 CH2M back at MW-619. Checked out barrier keys and spoke w/ Mark Van Oort about plan for the week. Will go to PZ03-04 next.
- 1245 YJ back from lunch, continue break down.
- 1300 Begin constructing MW-619 well pad
- 1345 Finished constructing MW-619 monument. Move to Juliet for de-FODing.
- 1430 All vehicles at Juliet. Box truck got stuck coming off grass onto shoulder of Echo. Begin de-FODing all tires.
- 1500 Finished de-FODing tires. Take rig, box truck, and pickup to laydown.
- 1515 D. Butler and R. Johnson go to get fork lift
- 1535 D. Butler and R. Johnson back at laydown. Dump hopper into rolloff (~2/3 full). No water pumped off (less than 1 in in hopper).
- 1545 P. Butler, C. Wallace, and B. Owens go to hand clear PZ03-04.
- 1555 Begin hand clearing PZ04
- 1640 Finish hand clearing PZ04 to 5ft, head back to laydown.

u/h/19

1645 All staff back at laydown.

1700 YJ offsite. CH2M goes
to return barrier key.

1715 Key returned. CH2M offsite.

~~Don't
forget
to
return
key~~

11/19/19

NASW's Ault Field Ph 2 SE

11/20/19

Oak Harbor, WA

Gasblow 04. PFIWI

Task: Drill and install WT03-04

Weather: Clear, 30-40's, light breeze

Staff: CH2M: David Butler, Tom Chalmers

YJ: Casey Wallace, Randy Johnson, Brian Owens

0630 CH2M checks in w/ ODO and checks
out barrier key 5

0645 All staff meet at laydown n.
Conduct PTSP, discussed backing
and limited access at WT03-04

0700 Mobe drill rig, box truck, and pickup
to WT03-04

0715 Vehicles at WT03-04. D. Butler
and R. Johnson go to get forklift.
T. Chalmers calibrates MultiRAE.

C. Wallace and B. Owens begin set up.

0730 D. Butler and R. Johnson back at WT03-04.
Continue set up.

0750 Begin drilling at WT04 from 5 ft

0820 Complete drilling to 30 ft. YJ advancing
casing and cleaning hole.

0840 YJ done advancing casing. Begin
constructing well. Made a field
call to screen 25-30 ft.

0925 Finished installing well. ~~Begin~~ Begin
moving off hole.

- 0945 Begin hand clearing WT03
1025 Finish hand clearing WT03 to 5ft.
Begin setting up to drill.
1045 Begin drilling from 5ft
1055 Finish drilling to 15 ft, YJ advancing casing and cleaning out the hole.
1110 Done advancing casing, Begin well construction, Will screen 5-10ft.
1105 Collect WI-AF-WT03-SB-08 at air/water interface, FD at 1110,
0810 Collect WI-AF-WT04-SB-08 at air/water interface (late entry into notes)
1135 Finish installing well, Begin moving rigs off hole.
1155 Finished moving off hole, begin installing monuments.
1215 YJ breaks for lunch
1245 YJ back from lunch, Continue building well pads.
1310 D. Butler and R. Johnson take forklift to laydown.
1325 D. Butler and R. Johnson back at WT03-04
1340 Move rest of equipment to laydown, well pads for WT03 and 04 complete,
1345 Back at laydown, Begin decon and dump hopper.

11/20/19

1350 D. Butler and C. Wallace go to ~~de~~ recon remaining locations, T. Calmers, R. Johnson, and B. Owens decon, dump hopper, and pump tote of decon water into tote "M1" (~125gal).

1445 D. Butler and C. Wallace back at laydown. MW-623 and MW-624 access ok (hard ground and close to pavement so can lay out mud mats). P209-10 access ok (dredge materials dry and gravels are below). MW-617 still questionable (soft on pavement side near Golf and top of mound where location is, is hummocky with some hard spots and some soft).

1500 ~~1300~~ All staff go to hand clear WT09-10.

~~1515~~ ~~1315~~ Begin hand clearing WT09 and 10.

1600 Finish hand clearing WT10 to 5 ft and WT09 to 5 ft

1610 Backfilled holes w/ native material. Head back to laydown.

1630 All staff back at laydown.

1650 Done buttoning up for night. YJ offsite.

1705 CH2M returned barrier key offsite

~~Dave Butler~~ 11/20/19

Task: Drill and install PZ09-10, repair
cuts at MW-619

Weather: Clear, 30-40's, breeze

staff: CH2M: David Butler, Tom Chalmers

YJ: Casey Wallace, Randy Johnson, Brian Owens

0635 CH2M checks in w/ ODO

0645 All staff meet at laydown, conduct
PTSP, discussed site access and cold stress

0710 Head to PZ09-10

0730 Arrive at PZ09-10 w/ drill rig, box truck,
and pick up. Begin setting up.

0732 Box truck gets stuck while setting up.
YJ didn't bring mud mats even though
CH2M recommended they bring them.

0745 Box truck unstuck, pulled out using drill
rig. Continue set up. D. Butler
and R. Johnson go to get forklift.

0815 D. Butler and R. Johnson back at PZ09-10

0823 Begin drilling at WT10 (PZ10) from 5ft
using 4in core barrel and 6in casing

0830 Bottom of 6-16ft run fell out, trying
to retrieve w/ flapper bit

0840 Successfully retrieved bottom of run.
Bottom two bags mix w/ sluff from
top of hole (topsoil and roots).

11/21/19

- 0850 Drill to 30ft. YJ advancing casing and cleaning hole
- 0855 D. Butler calls H. Perry and P. Lawson, no answer. D. Butler calls J. Horton.
- 0910 Discussed drilling deeper at W10, will go to 40ft. Discussed sampling, will collect in small sand at ~6ft. Discussed W109 (shallow well) screen, will see if different lithology when at W109 and try to contact P. Lawson and H. Perry since no good upper unit observed.
- 0915 Collect WI-AF-WI-10-SB-OG at approx air/water interface, not obvious in core
- 0925 Pull 30-40ft, core had fallen out and possibly been pushed by a rock per driller. Only 3ft of run recovered and portion recovered is mixed up due to multiple drilling attempts. D. Butler calls J. Horton to discuss.
- 0935 Per discussion w/ J. Horton will drill 5 more feet to try and verify material to set screen in.

11/21/19

0936 YJ resumes drilling.

1000 Pull 40-46 ft run. 5/6 ft recovery.
Sands and gravels. Will screen 40-45 ft.
YJ begins ~~well construction~~ ~~to~~
advancing casing and cleaning out hole.

1030 Finish advancing casing and cleaning
out hole. Driller notes artesian
conditions and heaving sands.
Begin constructing well.

1130 Finish installing well. Begin moving
off hole. WT10 is artesian.

1150 Drill rig slipping in mud while trying
to set up on WT09. ~~DO~~ C. Wallace
notifies D. Butler of potential for
running into WT10 while trying to
back up. C. Wallace thinks that
mud mats won't work. D. Butler
calls J. Horton to discuss.

1200 J. Horton recommends attempting
location w/ mud mats. D. Butler notifies
C. Wallace. C. Wallace agrees to try
with mud mats. YJ breaks for lunch.

1230 Kendra Leibman calls D. Butler, is on
the island and would like to come
out to the site at ~13:00.

11/21/19

1235 YJ back from lunch. Prep to go get mud mats.

1300 D. Butler goes to ODO to meet K. Leibman, T. Chalmers and YJ continue de-fodding and then go to get mud mats.

1410 While touring with K. Leibman, attempt to access MW-619, told by Whidbey control tower that there is an emergency in progress and to hold position.

1420 YJ meet ~~with~~ D. Butler and K. Leibman on the ~~site~~ ramp, waiting for all clear from tower.

1430 Cleared to access MW-619, D. Butler and K. Leibman recon site, T. Chalmers and YJ go to WTO9-10,

1440 Done reconning MW-619, rats will need to be fill, D. Butler drops K. Leibman back at ODO, K. Leibman offsite,

1450 D. Butler back at WTO9-10. YJ using mats to stage rig.

1455 Mats successful, rig at WTO9, set up to drill.

11/21/19

- 1505 Begin drilling at WT09
1515 Complete drilling to 16 ft. YJ
advancing casing and cleaning out
hole.
1520 Consulted w/ P. Lawson and H. Perry.
Decide to screen 5-15 ft for best
chance of water. YJ begins install.
1545 Finish installing WT09, begin break down.
1600 Drill rig becomes stuck ~~while~~
while moving off hole. Mud mats
not used whole way while de-mobbing.
1620 YJ unsticks drill rig by pulling
with forklift. Begin de-FOOing.
1710 D. Butler and R. Johnson take forklift
to laydown
1525 Collect WI-AF-WT-09-SB-06 at
approx. air/water interface. FO at 1530.
(Late entry into log book.)
1725 D. Butler and R. Johnson back at WT09-10
1810 All staff head back to laydown.
Called sweeper to follow us out.
1830 All staff off site

Dave Butte

11/21/19

NASWI Ault Field Ph 2st

11/25/19

Oak Harbor, WA

645610th, 04, FT, WI

Task: Repair leaks at wells WT08 and WT12

Weather: Partly cloudy, 40's, wind

Staff: David Butler

0645 D. Butler purchases supplies at Home Depot

0730 Check in w/ ODO and check out barrier key

0810 Arrive WT12, conduct PTSP, set up "semi-lone worker" protocol w/ Mark Endo, will call every 4 hours

1020 Fixed leak at WT12. Well was leaking out of casing joint above bentonite, but within concrete. Remove concrete (not set due to water), removed upper PVC (~4 in section), cleaned threads, and reattached. Left well with well plug in casing. Artesian well head sitting in monument (not attached). Go to measure flow at WT10.

1030 Arrive WT10

1050 Flow at WT10 ≈ 200 mL/min (had correct threaded adaptor and tubing today). Note: also measured flow at WT12 ≈ 200 mL/min

11/25/19

1105 Finished de-FODing, head to W108

1125 Arrive W108

1210 Determined that the artesian well head assembly is leaking. Attempted to tighten to remove leaks, but no success (too many fittings). Additionally, the assembly is not efficient (too many adaptors) and doesn't fit in the box well. Will replace ~~it~~ in the future. Head to laydown to dump trash.

1240 Done dumping trash. Notified Janice Horton, Mark Endo, and Peter Lawson of well status. Go to ODO to return key.

1250 D. Butler offsite.

~~David Butler~~

~~1200~~

~~11/25/19~~

December 2, 2019, Ault Field Well development, ^{T. Chalmers}

Purpose: IDW delivery (totes + vermiculite), continuation of well development.

Crew: Tom Chalmers (Jacobs), Brian Owens (Yellow Jacket), Clean Harbors

Weather: 40's, overcast

0700: Conduct tailgate safety w/ Ted Crosier, ^(Clean Harbors) discuss lifting & ergonomics.

0730: Ted Crosier (Clean Harbors) concludes drop-off of 5 water totes & 12 bags of vermiculite, I sign order receipt.

0740: Clean Harbor off site.

0807: Talk to Janice Horton & discuss strategy & logistics. Decide to utilize YJ & get to the wells in which they can be the most effective. Will further discuss w/ Briane Owens.

1045: Receive message from Brian Owens that he is roughly 1.5 hrs away.

1215: Check in w/ ODO.

1226: YJ arrives on site.

1240: Calibrate PID & Water Quality Meter (WQM).

1315: Gate to airfield would not grant access.

1325: Sent YJ back to laydown as I visit ODO to inquire.

1332: Talked to ODO about access issue they could not look into our access card due to the fact that it is issued by NAVFAC not ODO. ODO tried calling NAVFAC, Loyd (Butler?) on our behalf, NO ANSWER. I got the barrier gate Key so we could work away from the flight line for now.

1355: Arrive at WT-04, begin setup.

1405: Begin surge w/ stainless steel bailer.

1415: Complete surge w/ bailer, begin to set up the Mega Monsoon pump.

1440: Begin setup on WT03, will use a bailer on WT03 while WT04 is pumped w/ the Mega Monsoon.

1600: Parameters stable at WT-04, begin breakdown.

1617: Decon Mega Monsoon in field.

1620: Input Mega Monsoon into WT03

1625: WT03 is not keeping up w/ the pump, pump is surging but producing roughly 0.5 gal/min.

1645: Took last parameters on WT-03

for the day. Developed well for 2 hours. Will pull pump & clear field.

1700: YJ & Jacobs off field area. Return to laydown to unload.

1710: YJ off site.

1735: Scanned & sent documents from the day to Janice Horton. Jacobs off laydown area.

1750: Returned barrier gate to ODO, was instructed by Clint Church to see Lloyd Potter (NAVFAC) in the morning regarding access carot issue. Jacobs off site for the day.

Ch
12/2/19

12/3/2019, Ault Field Well Development, T. Chalmers

Purpose: Monitoring well & Piezometer development.

Weather: 40°s overcast

Crew: Tom Chalmers (Jacobs), Brian Owens (Yellow Jack)

0700: Visit the NAVFAC access card office, was told that our access cards are good & the issue yesterday was due to a gate problem

0725: Check in w/ ODO & check out barrier gate Key #5.

0730: Arrive at laydown yard.

0745: YJ on site, security stopped and checked YJ's truck at gate

0755: Calibrate Horiba & PID.

0800: Conduct tailgate, Topic: flight line driving & awareness.

0815: Pumped IDW from mobile tote to Tote L1.

0835: Arrive at WT-03, begin setup.

0858: Begin to purge WT-03, pump is surging and not able to keep a steady flow.

1100: Complete development at WT-03, begin breakdown

1115: Return to laydown to pump IDW into Tote L1 & decon.

1146: Complete IDW transfer & decon, Head to airfield.

1205: Arrive at PZ-05 & PZ-06, begin setup. Will attempt to develop both wells simultaneously.

1218: Remove well cap from Artesian well PZ-06, were able to drop pump & begin purge with out any spillage. Set the pump to roughly 4 gal/min.

1227: Begin surging & bailing on PZ-05

1253: After surging & bailing, drop pump into PZ-05.

1300: Geotech geo squirt would not turn on using the controller. Hooked it up directly to the battery & are getting ~4 gal/min flow.

1304: PZ-05 pumped dry.

1309: Got controller to work on PZ-05, able to slow flow to ~2 gal/min

1343: Stop both pumps, tote is full & will be taken to the laydown to be pumped. Artesian well head is put back onto PZ-06

1409: Return to laydown to pump IDW into tote H4.

12/4/19, Ault Field Well Development, T. Chalmers

Purpose: Monitoring well & Piezometer development

Weather: 40°s Rain

Crew: T. Chalmers (Jacobs) Brian Owen (Yellow Jacket)

0700: Daily Check in w/ ODO. Discussed closing runway 7-25 w/ Mark VanDort, he says it SHOULD not be a problem but they will get it officialized in the next few days.

0720: Arrive at lay down yard. YJ on site

0800: PTSP signed, meters calibrated, daily strategy discussed. Also discussed amount of totes to order with Janice Horton (8 & another secondary containment).

0830: Arrive at MW-620, begin setup.

0840: Begin surge & bail on MW-620

0908: Well bailed dry, will let it sit for 10 minutes then continues

0918: ~~Remain~~ Resumed bailing.

0950: Well (MW-620) continues to be bailed dry, we are taking the approach of bailing for 5 to 10 minutes, then letting it recharge for 5 to 10 mins.

1240: Complete development on MW-620.

MW-620 did not develop to turbidity
NTUs, well was worked on until $> 10 \times$
Volume was purged & for 4 hours.

1250: Mobilize to MW-618

1300: Arrive at MW-618, begin setup.

1305: Begin surge & bail w/ disposable
bailer.

1320: MW-618 bailed dry, water in column
was likely from drilling not groundwater.
~~When~~^{to} Will let the well re-charge for
15 minutes & take another WL to attempt
to get a more realistic water column &
thus Purge volume.

1340: After 15 minute recharge 1.54 ft of
water in column. We will take the approach
to bailing well dry then letting it recharge
for 10 minutes, then bailing, & so on.

1405: MW-618 producing very slowly, will let it
recharge for 15 minutes between bailing dry.

1445: Decided to stop development on
MW-618 for the day. Well not producing
well and want to use YJ elsew

1455: Mobilize to MW-624

1505: Arrive at MW-624, begin setup.

1513: Begin surge & bail.

1535: Geosquirt Pump inserted into well.

1635: MW-624 development complete,
begin breakdown.

1650: Arrive at laydown to transfer IDW.

1700: IDW transferred to Tote H6.

1705: Yellow Jacket off site.

1715: All documents from the day
scanned and sent. Jacobs off site
for the day.

[Signature]
12/4/19

12/5/19, Ault Field Well Development, T. Chalmers
Purpose: Monitoring well & Piezometer development.

Weather: 40°s overcast / Rain

Crew: Tom Chalmers (Jacobs), Brian Owens (Yellow Jacket)

0700: Daily checkin w/ ODO

0715: Arrive at laydown, YJ on site.

0730: Sign PTSP, calibrate meters.

0750: Mobilize to Weapons Handling for debriefing.

0810: Concluded debriefing from weapons handling, mobilize to PZ 07-08.

0815: Arrive at PZ-07-08, begin setup.

0850: Open PZ-08 & insert Mega Monsoon

0855: At ~5.3 gal/min pump is not able to keep up w/ Artesian flow.

0905: Line is set to the well head manifold but there is not enough head to make it into the tote (~5'9" high)

0915: System is set up where water flows into a bucket on the ground, then the monsoon pumps water from the bucket into the tote.

0918: Surge & bail begins on PZ-07

1005: Development complete on PZ-08

1010: Artesian well head attached to PZ-08 pressure gauge read 2 Psi.

1015: Bailing continues on PZ-07, Recharge is slow but keeping up w/ a slow bail.

1045: Inserted (deconned) geotech geosquirt, into PZ-07, want to see if the well will keep up.

1120: Talked to Kaleb Heezen from Clean Harbors, he is having trouble getting on base to deliver the totes + secondary containment.

1220: Development complete on PZ-07

1240: Arrive at laydown to meet Clean Harbors (Kaleb Heezman) for Tote delivery. Signed APP & PTSP.

1315: IDW drop off complete, received receipt from Clean Harbors, Clean Harbors off site.

1400: Arrive at MW-618, will take WL at MW-619 then continue development at MW-618

1410: WL at MW-619: 5.64' TD: 15.53

1435: MW-618 development resumes.

1435: Well bailed dry, will continue w/

intervals of recharge & bailing dry.

1625: Finished development of MW-168 for the day. Has been slowly but steadily dropping in NTUs, should be able to get it clear at later date.

1640: Return to Laydown to transfer IDW.

1645: VJ off site for night.

1650: All documents from day scanned & sent.

1700: Return gate key to ODO. Jacobs off site for the day.

12/5/19

12/6/19, Ault Field Well Development, T. Chalmers

Purpose: Monitoring well & Piezometer development.

Crew: Tom Chalmers (Jacobs)

Weather: 40's overcast

1230: Yellow Jacket (B. Owens) & Jacobs (T. Chalmers) arrive at laydown yard to stage development trailer for tomorrow's work.

1245: YJ off site for day.

1315: Discussed and received confirmation from ODO that runway Z-25 will be shut down from 0700-1600 tomorrow (12/7/19) for us to work at locations PZ-01-02

1345: Visited Public Works to see if they could help me get the radio working. No one around that can help, been told to try back on Monday morning.

1355: Attempted to access flightline at Hanger 9, access denied.

1400: Arrive at MW-618, Discovered we are having issues w/ both NASWI EM10 & PW08 radios. Will have both looked at Monday morning.

1535: Finished w/ development on MW-618 for the day.

1545: Arrive at the laydown to transfer
IDW.

1550: All documents from the day scanned
& sent. Jacobs off site for day.

12/6/19

12/7/19, Ault Field Well Development, T. Chalmers
Purpose: Monitoring Well & Piezometer Development
Weather: 40's Rain

Crew: Tom Chalmers, Aaron Vogt (Jacobs)
Brian Owens (Yellow Jacket)

0700: Arrive at laydown, YJ on site. Sign PTSP
& organize equipment w/ David Butler &
Gerrit Gardner (Jacobs).

0800: Arrive at PZ-01-02, begin setup

0805: Begin surge & bail on PZ-02.

0825: Begin surge & bail on PZ-01

0850: Deploy Mega Monsoon down PZ-02
& Monsoon down PZ-01.

0850: Begin Purge on PZ-02

0855: Begin Purge on PZ-01

1002: Development complete on PZ-02.

1010: Collect sample + MS/SD from PZ-02

WI-AF-WT02-GW-1219, WI-AF-WT02-GW-1219MS/SD.

1045: Development complete on PZ-01.

1100: Collect sample + duplicate from PZ-01.

WI-AF-WT01-GW-1219, WI-AF-WT01-GW-1219 (0900).

1115: Collect equipment blank from Mega monsoon.

WI-AF-EB02-120719.

1125: Collect equipment blank from monsoon

WI-AF-EB03-120719.

1140: Return to laydown to transfer IDW

1230: Complete paperwork & sample organization. Head to MW-623

1245: Arrive at MW-623

1250: Begin surge & bail on MW-623

1300: Bailed well dry, recharge is very slow. We hooked up the peristaltic pump & are able to get ~ 150 mL/min.

1400: YJ off site.

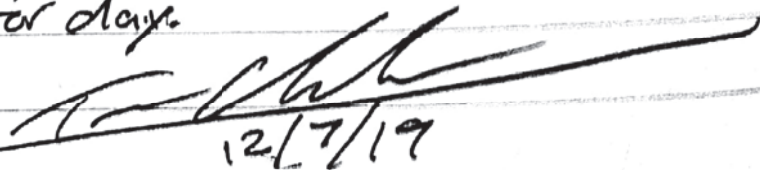
1615: Finish development on MW-623 for day collected sample even though stabilization not reached, will discuss w/ Project manager if this sample will be used. ID: WT-AF-MW-623-GW-1219.

@1630.

1635 Equipment blank taken on 1/2" tubing used for Mega Monsoon: WT-AF-EB04-120719@1640,

Equipment blank taken on 3/8" tubing used for peristaltic pump: WT-AF-EB05-120719@1645

1700: Return to laydown, transfer IDW from MW-623 into tote H6. Jacobs off site for day.


12/7/19

Oak Harbor, WA

695610 CH.04, FI.F5

Task: Groundwater sampling at 621 and 622

Weather: Cloudy, 40's, rain, light wind

Staff: David Butler, Gerrit Gardner

0645 Check in w/ ODO. Notify of development work at WT01-02 and MW-623, Notify of sampling at MW-621 and 622. Check out barrier key #5.

0700 Meet all staff at laydown (development and GW). Conduct group PTSP, discussed flightline and weather hazards.

0720 Transfer equipment to development team (Tom Chalmers, Aaron Vogt, and Brian Owens/XJ).

0740 Calibrate MultiRAE and Horiba

0800 Head to MW-622

0815 Arrive MW-622, begin setup

0900 Begin purging MW-622

0935 Collect WI-AF-MW-622-1219 for PFAS only

1010 Head to MW-621

1015 Arrive MW-622, begin setup

1030 Begin purging MW-622

1100 Collect WI-AF-MW-621-1219 for PFAS only

12/07/19

- 1110 Collect WI-AF-AW-EB01-120719.
Equipment blank from 1/4 in tubing.
- 1120 Done at MW-621, head to ODO.
- 1130 Done at ODO. Head to 16-26B.
- 1145 Arrive 16-26B. Break for lunch.
- 1215 Back from lunch, Begin setting up at 16-26B.
- 1240 While setting up at 16-26B, it was noted that the well is artesian with a high flow rate. Since we do not have a spare artesian well head, the well was re-sealed with the well plug and sampling will be conducted at a later date.
- 1250 Head to MW-620
- 1255 Arrive MW-620, begin setup
- 1310 Begin purging MW-620
- 1340 MW-620 not keeping up, excessive drawdown, purge dry.
- 1350 Well purged dry. Waiting for recharge
- 1430 Go to take more bottles to T. Chalmers and A. Vogt.
- 1500 Back at MW-620
- ~~1520~~ 1515 Fully recharged proceed to sample

12/07/19

1520 Collect WI-AF-MW-620-1219
and MS/MSD for PFAS only

1545 Done packing up, head to laydown

1600 Offloaded ~6 gal of purge
water into tote H6

1615 D. Butler ~~and~~ goes to
return barrier key. G. Gardner
off site.

1625 Barrier key returned. D. Butler
off site

D
ave
Butler

12/07/19

12/8/19, Ault Field Well Development, T. Chalmers
Purpose: Monitoring Well & Piezometer development

Weather: 40's Overcast

Crew: T. Chalmers, A. Vogt

0700: Arrive at laydown yard.

0750: Organize gear and secure tote in the pickup. Head to airfield.

0800: Arrive at MW-623, begin setup, will spend roughly 1 hour on well to see if it will clear up any further.

0810: Begin bailing.

0825: Bailed roughly 3 gal from well, deploy Peri pump

0846: Begin purge w/ Peri pump at ~10 oz/min.

0854: Monsoon pump used on PZ-01 on 12/8/19 was Pine #15622.

1000: Took final reading AT MW-623, NTUs Maked out meter (>1000), Pack up gear & move on.

1030: Arrive at MW-619, begin setup.

1040: Begin surge MW-619

1100: Begin bailing MW-619

1120: Begin Purge w/ peripump at roughly 30 ¹⁰ 3 oz/min

1515: Development complete on MW-623,
Spent 4 hrs, NTUs < 20.

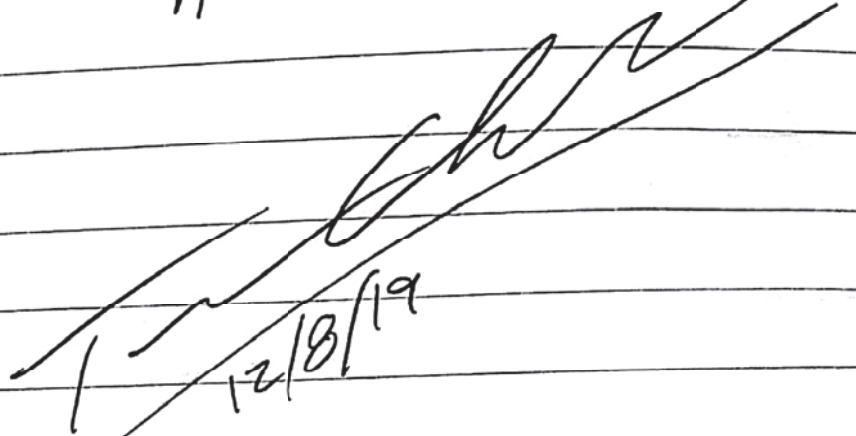
1530: Arrive at MW-623, going to utilize
the last hour of weekend to surge & bail
on well.

1550: Surge block is stuck down well

1600: David Butler & Gerrit Graveler arrive
& help try to get surge block loose w/
no luck.

1645: Arrive at Hone Depot to acquire supplies
necessary to remove surge block from MW-623.

1710: Acquire supplies. Head back for day.


12/8/19

Task: Continue GW sampling

Weather: Cloudy, 40's, breeze

Staff: David Butler, Gerrit Gardner

0640 D. Butler checks in w/ ODO. Notify of planned work locations for well development and GW samp.

0710 All staff meet at laydown.

0720 Conduct group PTSP, discuss fatigue and new tasks.

0730 Calibrate MultiRAE and Horiba

0750 Head to 16-26B

0810 Arrive 16-26B, begin set up and constructing artesian well head

0845 Done attaching artesian well head. Also tagged TD (70.3-ft btoe). Used hand pump to pump water coming out of well into jug (~6gal). Begin purge at 16-26B.

0920 Collect WI-A16-16-26B-1219

0930 Collect WI-A16-16-26BP-1219, dup at well 16-26B

0950 Finished packing up. Will leave artesian well head on 16-26B per discussion w/ J. Horton. Go to dump IDW.

12/08/19

- 1010 Transferred 13 gal from 16-26B into "H6" tote. Head to H6-B3.
- 1025 Arrive H6-B3, well location in field doesn't match what is shown on the map. Call Mark Endo/SEA (Mark did the well recon) to confirm well location is correct. Mark confirms well is located between the two big hangar doors near a fire hydrant.
- 1030 Begin setting up at H6-B3
- 1048 Begin purging H6-B3
- 1110 Collect WI-AIG-H6-B3-1219
- 1125 Done packing up, head to WT05-06
- 1130 Arrive WT05-06. Break for lunch
- 1200 Back from lunch, begin setup at WT06
- 1216 Begin purging WT06, artesian well
- 1245 Collect WI-AF-WT06-GW-1219
- 1250 Pack up from WT06 and move to WT05
- 1316 Begin purging WT05
- 1400 Collect WI-AF-WT05-GW-1219
- 1415 Done packing up. Head to OD for break.

12/08/19

1425 Done at ODO. Head to MW-624.

1430 Arrive MW-624, begin setup.

1455 Begin purging MW-624.

1525 Collect WI-AF-MW-624-1219

1540 Done packing up. Go to meet
up w/ development crew at MW-623.

1620 Assisted development crew w/
trying to get surge block unstack
from MW-623, unsuccessful.

Development crew will go to
Home Depot to get more supplies
tonight and attempt unsticking
tomorrow. D. Butler and G. Gardner
go to laydown.

1640 Transferred 6 gal of purge water
from H6-B3, WT05, WT06, and
MW-623 into "H6" tote.

1645 D. Butler and G. Gardner offsite

~~Dave Butler~~

~~12/08/19~~

12/2/18. Ault Field Well Development, T. Chalmers

Purpose: Monitoring well & Piezometer Development

Weather: 40's Thick Fog

Crew: Tom Chalmers, Aaron Vogt

0725: Arrive at laydown for calibration & tailgate meeting after visiting ODO.

0800: PTSP signed, equipment calibrated, head to airfield.

0810: Arrive at MW-623, will begin to work on freeing the stuck surge block.

0845: Hooked onto the surge block w/ our anchor line, while trying to pull up on the surge block our line snapped.

0900: We doubled up on our anchor line and are again hooked up to the surge block. Our fears now are as follows: The design of the actual surge block relies on a length of anchor line run through PVC w/ a washer on each end. With our anchor line doubled up if we apply upwards tensile pressure the single anchor line running through the surge block is the "weak link" and if snapped the surge block will be much more difficult

to remove:

0905: Contacted Janice Horton for guidance. No answer left message.

1000: Have not heard back from Janice, secured well & associated anchor lines, will move on & return at later time.

1010: Arrive at PZ-11-12, begin setup.

1020: Replace pressure gauge on WT-12 well head w/ 0-3 psi pressure gauge.

1030: Discussed MW-623 surge block situation, she will discuss further & let us know what she decides to do moving forward.

1045: Remove well cap & deploy Monsoon pump down PZ-12, begin development.

1110: Begin surge of PZ-11

1125: Begin bail of PZ-11

1206: Begin Purge of PZ-11.

1445: Development complete on PZ-12.

1500: Artesian well head attached to PZ-12

1600: Development complete on PZ-11, Parameters did not stable, Roughly 6x well volume was purged & 4 hr time limit was met.

1625: Depart from airfield to laydown.

1635: Arrive at laydown to transfer IDW.

1655: IDW successfully transferred
wast tracking accounted for, Jacobs
off site for day.

12/19/19

12/10/19, Ault Field Well Development, T. Chalmers

Purpose: Monitoring Well & Piezometer Development

Weather: 40°s overcast

Crew: Tom Chalmers, Aaron Vogt

0700: Arrive at laydown to organize & calibrate.

0730: Discuss further scheduling w/ field crew & Janice Horton + Rachel Clendenen

0755: Head to flightline.

0815: Arrive at PZ-09-10, begin setup.

0850: Begin Purge of PZ-10.

0910: Begin Surge of PZ-09

0925: Begin bail of PZ-09

0935: PZ-09 is bailed dry

1030: PZ-09 has recharged & been bailed dry

1048: PZ-10 Development complete.

1055: Artesian well head w/ pressure gauge & Ball valve.

1115: Head to laydown to transfer IDW.

1220: IDW transferred waste tracking updated.

1315: Return to WT-09 (PZ-09).

1350: Development on PZ-⁰⁹₁₀ complete.

PZ-~~10~~⁰⁹ WL was 14.51 after roughly
3 hours of recharge, development complete
after 4 hours of work.

1425: Arrive at MW-619 to sample.

1455: Begin purge of MW-619.

1550: Sample MW-619, Sample ID:

WI-AF-MW-619-GW-1219

1615: Arrive at laydown to Transfer IDW
& update waste tracking.

1700: All documents from the day
are scanned & sent. Jacobs AF
Site for day.

12/10/19

NASWE Ault Field Ph2SI

Oak Harbor, WA

12/10/19

695610CH.04.FI.R

Task: Continue GW Sampling

Weather: Cloudy, 40's, light rain

Staff: David Butler, Gerrit Gardner

1330 D. Butler and G. Gardner arrive

at ODO and return OLF key.

Morning was spent sampling at
OLF, see OLF notes.

1345 Recon locations of wells MW4-B3,
MW15-B-23, and MW10-B8

1355 All wells located. Go to setup
at MW10-B8.

1420 Begin purging MW10-B8

1455 Collect WI-AF-MW10-B8-1219

1505 Done cleaning up from MW10-B8.

Go to laydown to dump water.

1530 Transferred ~1 gal into "M1" tote

1540 D. Butler and G. Gardner offsite,

~~David Butler~~

~~12/10/19~~

Oak Harbor, WA

695610C14.04.FI.P5

Task: Continue G-W sampling

Weather: Cloudy, 40's, wind, rain in PM

Staff: David Butler, Gerrit Gardner

0715 D. Butler checks in w/ ODO and
notifies of work at WT03-04 and WT07-08.
check out barrier key #6.

0730 D. Butler arrives at laydown, prep
for the day

0740 Calibrate MultiRAE and Horibas

0745 G. Gardner on site

0800 Conduct PTSP, discussed noise
protection and weapons handling
check in

0810 Go to weapons handling to
check in

0811 Notified by Navy personnel at
gate along weapons handling road
that they are beginning an ~~exercise~~
exercise and we can't access the
wells in the vicinity. Go to
sample remaining wells near ODO.

0820 Arrive at MW15-B23, begin setup

0900 Collect WT-AF-MW15-B23-1219

0915 Done packing up from MW15-B23,
go to MW4-B3 and begin setup

12/11/19

- 0930 Begin purging MW4-B3
- 1005 Collect WI-AF-MW4-B3-1219
- 1020 Done packing up. Go to laydown to dump water and get Field blank bottles.
- 1030 Dumped ~3 gal into "M1" tote
- 1035 Done at laydown. Weapons handling gate still closed. Head to wells in RSL on flightline.
- 1100 Arrive WT11 and WT12, begin setup
- 1117 Begin purging WT11
- 1133 Begin purging WT12
- 1140 Collect WI-AF-FB01-121119, field blank for GW sampling
- 1157 Excessive drawdown at WT11, will purge dry
- 1200 Collect WI-AF-WT12-GW-1219 and FD WI-AF-WT12-GWP-1219, FD at 1300,
- 1230 Done cleaning up from WT12. Break for lunch.
- 1300 Back from lunch. Check WL in WT11.
- 1310 DTW in WT11 = 7.8 ft bto c. Recharge is slow. Will return to well tomorrow. Head to WT03-04.

12/11/19

- 1330 Arrive WT03-04. Begin setting up at WT04.
- 1347 Begin purging WT04
- 1415 Collect WI-AF-WT04-GW-1219
- 1420 Pack up from WT04, move to WT03
- 1430 Only 1.37 ft of water in WT03, D. Butler attempts to contact Janice Horton, Peter Lawson, and Heather Perry to confirm sampling or if need to modify procedure since SOP requires 3 ft (1 ft above intake and 2 ft below). No answer to calls. Will attempt sampling w/ intake slightly above bottom of well.
- 1439 Begin purging WT03
- 1530 Collect WI-AF-WT03-GW-1219, no drawdown at well
- 1545 Done cleaning up, head to laydown
- 1550 Transferred ~3 gal from WT03 & 04 into tote "L1". Transferred ~4.5 gal from WT11 & 12 to tote "H6".
- 1605 G. Gardner offsite. D. Butler goes to return key to ODO.
- 1625 Key returned. D. Butler offsite.

David Butler 12/11/19

NASWI Ault Field Ph 2SI

12/12/19

Oak Harbor, WA

GA5610CH.04, FIFS

Task: Continue GW sampling

Weather: Cloudy, 40's, rain, mod wind

Staff: David Butler, Gerrit Gardner

0715 D. Butler checks in w/ ODO, notifies
of work for the day and checks
out barrier key #6

0730 D. Butler, T. Chalmer, and A. Vogt
arrive at laydown, Prep for day

0745 G. Gardner on site

0750 Calibrate MultiRAE and Horibas

0800 Conduct PTSP. Discussed plan
for the day and weather.

0815 Head to WT07-08

0825 Signed in w/ Weapons Handling,
no operations today.

0830 Arrive WT07-08, begin set up

0850 Begin purging WT07

0856 Begin purging WT08

0930 Collect WI-AF-WT07-GW-1219

0935 Collect WI-AF-WT08-GW-1219

0950 Done packing up. Go to check out
w/ Weapons Handling.

1000 Checked out w/ Weapons. Go to laydown.

1010 Transferred ~4 gal into "L2" tote.
Head to MW-023.

12/12/19

- 1030 Arrive MW-623, begin setup
1047 Begin purging MW-623. Intake
set on top of stuck surge block.
1125 Collect WI-AF-MW-623-1219
1130 Begin trying to unstick surge block
1240 Unable to unstick surge block.
Need a better hook to grab
carabiner on top of block. Unable
to pump well dry w/ peripump.
Pumped ~4 gal and didn't expose
top of block. Done packing up,
Head back to laydown.
1250 Dumped ~3.5 gal into "H6" tote.
1300 Begin organizing supplies in prep
for de mob e.
1335 Done organizing for now. Go to
hotel to get IDW coolers.
D. Butler goes to return key to ODO.
1400 D. Butler and G. Gardner back at
hotel. Inventory IDW bottles
that have arrived and pre-label
for IDW sampling tomorrow.
1615 Done with bottles. End of day.

Dave Butler
12/12/19

12/12/19, Ault Field GW Sampling, T. Chalmers

Purpose: Monitoring Well & Piezometer GW Sampling

Weather: 40's Rain

Crew: Tom Chalmers, Aaron Vogt

0730: Arrive at laydown

0800: Sign PTSP, calibrate meters, organize equipment for day.

0830: Arrive at WT-11, begin setup

0920: Collect sample, WI-AF-WT-11-GW-1219.

0935: Arrive at WT-09, begin setup.

0950: Begin Purge

1030: Well Purged dry, no sample collected.

1040: Begin setup on WT-10

1055: Begin Purge of WT-10.

1130: Collect sample, WI-AF-WT-10-GW-1219.

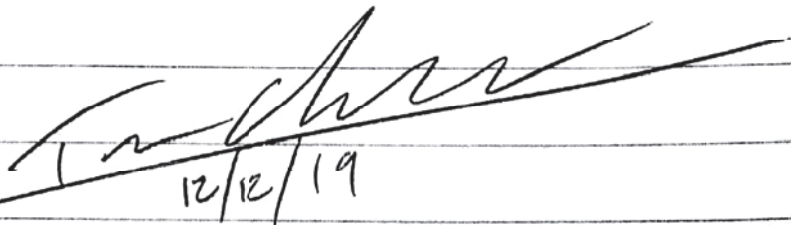
1155: Arrive at MW-618, begin setup

1240: Begin Purge at MW-618.

1430: Collect sample, WI-AF-MW-618-GW-1219

1500: Arrive at laydown

1535: IDW transferred, documents from the day scanned. Jacobs off site for the day.


12/12/19

NASWI Ault Field Ph2SI

12/13/19

Oak Harbor, WA

695610CH

Task: Finish GW sampling, begin
IDW sampling

Weather: Cloudy, 40's, wind

Staff: David Butler, Gerrit Gardner

0715 D. Butler and G. Gardner meet
at hotel, load IDW coolers

0720 Head to laydown

0730 Arrive at laydown, unload
coolers and prep for day.

Calibrate MultiRAE and Horiba.

0745 T. Chalmers arrives at laydown

0800 Conduct PTSP, discussed rushing
and fatigue

0815 D. Butler and G. Gardner head to WT09

0835 Arrive at WT09. DTW = 13.21 ft bblc
which is only ~75% of the static
water column recharged. D. Butler
calls H. Perry.

0840 H. Perry directs to proceed w/
sampling since well will not
be fully recharged (or 90%) within
24 hours. Will collect sample
first and then one set of params
due to limited water column.

0850 Collect WI-AF-WT-09-GW-1219.

12/13/19

0900 Begin packing up. Also reattached well ID plate to WT10 using construction adhesive.

0920 Depart WT09. Begin de-fording.

0945 Back at laydown. Begin IDW sampling.

0950 Transferred 0.1 gal to "H3" tote

1030 Collect IDW Sample WI-AF-IDW-S001-1219 from IDW drums.

1100 Collect WI-AF-IDW-S002-1219, IDW sample from rolloff #25170

1130 Collect WI-AF-IDW-AQ01-1219, IDW sample from "H1" tote

1140 G. Gardner off site to get ice

1155 G. Gardner back on site

1200 Collect WI-AF-IDW-AQ02-1219, IDW sample from "H2" tote

1230 Collect WI-AF-IDW-AQ03-1219, IDW sample from ~~"H4" tote~~ @ "H3" tote

1300 Collect WI-AF-IDW-AQ04-1219, IDW sample from "H4" tote

1315 Collect WI-AF-IDW-AQ05-1219, IDW sample from "H5" tote

1345 Collect WI-AF-IDW-AQ06-1219, IDW sample from "H6" tote

12/13/19

- 1415 Collect WI-AF-IDW-AQ07-1219,
IDW sample from "M1" tote
- 1500 Done packing. Go to Pony
Mailing to drop off.
- 1520 All 10 ~~cold~~ coolers dropped off
(8 to GCAL, 2 to Battelle),
Head back to laydown to
pack up supplies.
- 1535 Back at laydown.
- 1600 Done packing up supplies. All
staff offsite.

~~Paul Batt~~

~~12/13/19~~

12/13/19, Ault Field Surveying, T. Chalmers
Purpose: Survey Monitoring Well & Piezometer locations.
Weather: 40°s Overcast

Crew: Tom Chalmers, Kenny Kong

0730: check in w/ ODO & check out barrier
Key #6.

0745: Arrive at laydown

0815: Kenny Kong arrives on site

0830: Instruments calibrated.

0900: Discuss plan of action w/ Kenny,
head out to begin survey.

0925: Using "Leap Frog" approach, begin
at MW-607 as starting point for exterior
well loop.

1007: Take point on WT-08, will use the
top of the valve on top of well head as
point (Kenny's suggestion).

1018: PZ-07, so there's no confusion: we
took one shot on WT-08 well casing, then
2 shots on well head, then one shot
on WT-07 well casing then 2 shots
on well

1051: Complete 1st loop containing PZ-07-08.
begin second loop from MW-607.

1119: Take Shot of WT-04, casing-well-well, then WT-03, casing-well-well.

1240: Took shots of WT-01 casing-well-well, & WT-02 casing-well-well.

1345: Complete 2nd loop, at MW-607, containing PZ-01-02 & PZ-03-04.

1400: Head to Charles Porter to survey locations near ODO.

1500: After multiple unsuccessful attempts to locate a survey monument at which we can use to survey the 3 well locations outside of the airfield boundaries Kenny decided to call it a day so he can get to his computer & acquire more/better information.

1515: Return barrier key to ODO. Discussed walking the flightline w/ Mark VanCort.

We have the green light to do so.

1530: Daily documents scanned. Jacobs off site for day.

12/13/19

NASWT Ault Field Ph 211
Oak Harbor, WA

12/14/19
E95610CH

Task: IDW sampling

Weather: Cloudy, 40's, breeze

Staff: David Butler

0725 D. Butler arrives at laydown,
prep for day

0735 Tom Chalmers and Kenny Kong
(survey crew) on site

0740 Conduct group PTSP, discussed
flightline access (for survey crew)
and weather conditions

0800 Collect WI-AF-IDW-AQ08-1219,
IDW sample from "L1" tote

0830 Collect WI-AF-IDW-AQ09-1219,
IDW sample from "L2" tote

0900 Collect WI-AF-IDW-AQ10-1219,
IDW sample from "L3" tote

0930 Collect WI-AF-IDW-AQ11-1219,
IDW sample from "H7" tote

0945 Collect WI-AF-IDW-AQ12-1219,
IDW sample from "H8" tote

1000 Done w/ IDW sampling. Begin packing up.

1050 Done cleaning up. Added one bag
of vermiculite to rolloff to
absorb small amount of water. All
IDW containers ok, All secondary
containments ok. Head to OLF.

12/14/19

1140 Arrive at OLF. Had stopped at ODO while at Ault field to check out key and notify of work. Break for lunch.

1200 Back from lunch. Prep for IDW sampling.

1230 Collect WI-CU-IDW-AQ01-1219,
IDW sample from "H1" tote

1330 Collect WI-CU-IDW-AQ02-1219,
IDW sample from "H2" tote.

Only 2 VOAs for TCLP VOCs
(unpreserved 8260C) due to breakage.

1430 Collect WI-CU-IDW-AQ03-1219,
IDW sample from "H3" tote.

Only 2 VOAs for TCLP VOCs
(unpreserved 8260C) due to breakage.

1450 Done w/ IDW sampling. Begin packing up.

1530 Done packing up. Also performed weekly IDW inspection. All containers and secondaries ok. No water on top of roll off tarps. Go to return key to ODO.

1605 Keys returned to ODO. D. Butler offsite.

D. Butler

12/14/19

12/14/19, Ault Field Surveying, T. Chalmers

Purpose: Elevation survey on flightline

Crew: Tom Chalmers, Kenny Kong

Weather: 40's Rain/Overcast

0715: Check in w/ ODO, check out barrier Key # 5.

0730: Arrive at laydown, David Butler on site.

0745: Kenny Kong on site sign & scan PTSP, head to airfield.

0830: Failed to find starting point on SE side of the ramp. Will move to Charles Porter & attempt to find Survey Monument There.

0900: Located survey monument "Charles Porter B", however the cap has been removed & surveyor says it can not be used.

0915: Survey Monument "Charles Porter A" exists! We will be able to use it as a starting point. I will go on a quick recon to see best place to enter the airfield.

0920: There is a turnstyle at building

410 which can use to enter carfield.
0925: Begin survey loop 3 at Survey
Monument Charles Porter A.

1000: Get shots of H6-B3, wall casing-well-adj.

1030: Complete loop 3 containing well H6-B3.

1045: Begin loop 4 through the air field
starting w/ H6-B3 as a reference point.

1103: Shot MW-622, C-W-W.

1123: Shot MW-624, C-W-W.

1136: Shot MW-623, C-W-W.

1146: Shot PZ-06, C-W-WH.

1151: Shot PZ-05, C-W-W.

1203: Shot MW-621, C-W-W.

1228: Shot PZ-12, C, WH-WH.

1240: Shot PZ-11, C-W-W.

1312: Shot MW-620, C-W-W.

1322: Shot 16-26 B, concrete pad-
edge of metal casing-WH-WH.

1330: Shot PZ-09, C-W-W.

1335: Shot PZ-10, C-WH-WH.

1342: Shot MW-619, C-W-W.

1400: Shot MW-618, C-W-W.

1452: Complete loop 4 at location H6-B3.

Loop 4 consists of: MW-622, MW-624, MW-623,
PZ-05-00, MW-621, PZ-11-12, MW-620, MW-626B,
PZ-09-10, MW-619, & MW-618.

1514: Loop 5 begins at location designated
while surveying loop 4. Location is east of
ODO building, on ramp, near where
airfield managers truck parks.

1526: Shot MW10-B8, C-W-W

1534: Shot MW4-B3, C-W-W

1539: Shot MW15-B23, C-W-W

1548: Finish loop 5 (consisting of MW10-B8,
MW4-B3, & MW15-B23) at same designated
location at which it began.

1555: Kenny Kong off Site.

1600: Return Perimeter Key # 5 to ODO.

Jacobs off Site. (C=Casing of well, W=Well, WH=Well Head)

12/14/19

12/15/19, Ault Field Surveying, T. Chalmers;

Purpose: Location survey on Ault Field

Weather: 40°s Overcast

Crew: Tom Chalmers, Kenny Kong

0715: Check in w/ ODO & check out #5 Key.

0730: Arrive at laydown.

0745: Kenny Kong arrives on site. PTSP Signed, meter calibrated.

0825: Got antenna set up over "Charles Porter A". Drop off my truck at laydown so I can ride w/ Kenny & only have 1 vehicle.

0847: GPS locate PZ-01

0848: GPS PZ-02

0901: GPS PZ-03

0903: GPS PZ-04

0913: GPS PZ-07

0915: GPS PZ-08

0932: GPS MW-624

0940: GPS MW-623

0949: GPS H6-B3

0953: GPS MW-622

0959: GPS MW-621

1004: GPS PZ-06

1007: GPS PZ-05

1015: GPS PZ-12

1020: GPS PZ-11

1025: GPS 16-26B

1031: GPS PZ-09

1034: GPS PZ-10

1045: GPS MW-620

1053: GPS MW-619

1058: GPS MW-618

1111: GPS MW10-B8

1113: GPS MW4-B3

1115: GPS MW15-B23

1130: Return barrier Key #5 to ODO &
check out OLF Key #3

1135: Kenny stops at Survey Monument
"Charles Porter B" & takes location measurement
for future reference.

1150: Surveying antenna removed from "Charles
Porter A".

1200: Depart from Ault Field, head to OLF.

1225: Arrive at OLF, begin to setup
Survey antenna at Survey Monument "Carpville".
Sign PTSP & AHA.

1305: Try to access fence surrounding

radar building & GW03/MW22X. OLF
Keys don't fit lock. Called ODO & they
have the key for me to check out.

1315: Leave to get the Key from ODO
while Kenny begins survey.

1415: Return to OLF radar building w/
Key #6. Key does not fit lock.

1425: Meet back up w/ Kenny, he has
location data measure at the 7 of 8
wells (8th being the well, GW03/MW22X, inside
the fenced area.

1430: Kenny disassembles survey antenna.
We will then begin an elevation loop to
location MW#7M.

1440: Begin survey loop 1 at survey
monument "Campville"

1508: Shot 3 measurements at MW-17M,
well casing, well, well.

1521: Complete loop 1 containing MW-17M.

1530: Pack up equipment and leave OLF for
the day.

1605: Return Key #6 Key to ODO, keep
OLF Key for future work. End of Day.

[Signature] 12/15/19

NASWT-Ault /OLF

4/26/20

Recon / White Lining

695610CH/9000VVT1

Task: Recon and mark drilling locations,
white line for utility locate

Weather: Partly cloudy, 60¹⁵, breeze

Staff: CH2M: David Butler

1020 D. Butler arrives at ODO at
Ault Field. Conduct PTSP,
Lone Worker check in w/ J. Horton.

1030 Check in w/ Mark VanDort
and ODO, notify of work
at BH 12-14. Get ok to
walk onto ~~into~~ grass on
other side of airfield
boundary. No radio needed.

1040 Head to BH 12-14.

1145 Finish marking BH 12-14 (notified
ODO when done). Also finished
marking BH 09-11.

1150 Go to mark BH 18, coordinate
w/ Bldg 420 staff.

1210 Adjusted BH 18 location west
into grass due to utilities in
area and ~~for~~ limited access at facility.
Go to mark BH 15-17.

1235 Done marking BH 15-17. Go to
mark BH 19 & 20.

1255 Recycle Center is closed due to COVID-19. Attempted calling to get access, but no answer, so left a message. Break for lunch.

1330 Back from lunch. Inspect IDW at Clover Valley.

1335 All tanks and drums ok. Go to mark BH03-08.

1430 Done marking BH03-08. Slightly adjusted locations of BH05 and BH07 (<25ft) due to thick veg. Note: we have a lock on Area 29 south gate, but it is stuck. Bring a new and cut old. Also may need brush clear past gate. Go to recon culvert under Clover Valley Rd.

1450 Located culvert. Lone worker check in w/ J. Horton. (Had also checked in at 1200). Go to Home Depot to buy more paint.

1535 Arrive at Golf Course. Check in at club house.

1610 Done marking BH01 and 02. Had to adjust both locs north due to trees

6/26/20

- 1610 Head to OLF.
1640 Arrive at OLF.
1650 white lined MW 18M. Already
staked by M. Endo. Access
from road to the south is
difficult due to berm and
ditches. Access from WA 20
likely difficult due to traffic.
Maybe access through field.
Go to inspect frac tank. Notify
ODO.
1715 Frac tank and secondary ct. Attempted
to measure sediment on bottom
of tank, none detected, but
difficult to measure. Check
out w/ ODO.
1720 D. Butler heads back to
Bellevue.

~~Doug Butler~~

~~6/26/20~~

①

Ault Field PFAS Investigation Phase 3 7.13.20

- Project: Ault Field
- Task/Activity for the day
Obtain base passes; begin setting up equipment at staging yard; begin drilling
- Personnel: Jacobs Engineering
Annika Seay (geologist, logbook scribe) (AS)
Janice Horton (assistant) (JH)
- Subcontractors:
Yellow Jacket Drilling (YJD)
- PN: 69561 Ø CH. Ø H. FI. FK
- Weather: 62° F, clear, light wind

Ø7ØØ - Annika Seay (AS) meets Janice Horton (JH), Lindsey Bauman (LB), and Yellow Jacket Drilling (YJD) at the Ault Field badge office. AS and YJD get their base passes; JH and LB move to sites for inspection.

Ø92Ø - AS receives base pass and moves to lay down area.

Ø925 - A. arrives. JH onsite; moves w/ YJD to visit boring locations. (Cont'd)

AS 7.13.20

(2)

Ault Field

PF Investigation

Phase ~~II~~ 3

7.13.20

2p
A/S

1091 (cont'd) AS stays at lay down yard with the YJD crew that is setting up.

1120 - YJD ready to move to first drilling location. AS calls base security for access to Ault Field Rd / Clover Valley gate.

1130 - The officer that arrives informs us that he must open and shut the gate each time it is accessed. YJD discusses with him that many trips in and out are needed. He calls superior who says someone has to be there when the gate is open. AS relays info via text to JH and LB.

Base security contact *:

360. 257. 3127

1200 AS waits at Ault Field Rd gate while YJD begins mobilizing to the site

1300 - Guard at Ault Field gate is called away and has to lock the gate, no warning as to his departure.

A/S 7.13.20

(3)

PFAS Investigation

Phase ~~II~~ 3

7.13.20

Ault Field

1300 (cont'd) - Guard says replacement should arrive in ~20 minutes

AS will call security office if no replacement has arrived by then. JH informs YJD of this

1320 - AS calls security for a guard to open the gate.

1330 - Guard arrives and opens the gate. AS discusses any alternatives to having a guard open/shut the gate. Guard will inquire. Guard is on site now and will stay as long as possible.

1340 - Guard informs AS that a compromise has been reached for the gate. Jacobs will call to be allowed access in the morning, where then the lock will be "dummy locked" during the day. Jacobs will call at the end of the day to have the gate locked.

1430 - Drillers set up for drilling (Area 30) LB hold HSE meeting (see P.TSP).

1445 AS and LB call Peter Lawson to discuss the plan for this site.

A/S 7.13.20

(4)

PFAS Investigation

Phase 3

7.13.20

Ault Field

1530 - AS calibrates MultiRAE
(C102806)

Fresh air cal: Pass

Isobutylene: 99.7 ppm

cal. value = 100 ppm

Cal. values:

Multi Gas:

18.18%

O₂: 18 %

50 ppm

CO: 50 ppm

50%

LEL: 51 %

10 ppm

H₂S: 10.1 ppm

1545 - Drillers begin @ 07R

1553

Begin logging soil @ T

(See boring log for details)

16
1530
AS- Drillers reach 20' bgs and no
water has been produced.

AS and LB consult Peter Lawson (PL)

who instructs to go to 40' bgs to
see what the lithology is and
look for groundwater.16
1545
AS- Between 35-40 ft bgs is wet,
Sandy. AS and LB call PL to
consult. PL says to let it sit overnight
and see if water is in the boring
tomorrow. Call him with the
findings to discuss further.

AS 7.13.20

PFAS Investigation

Phase 3

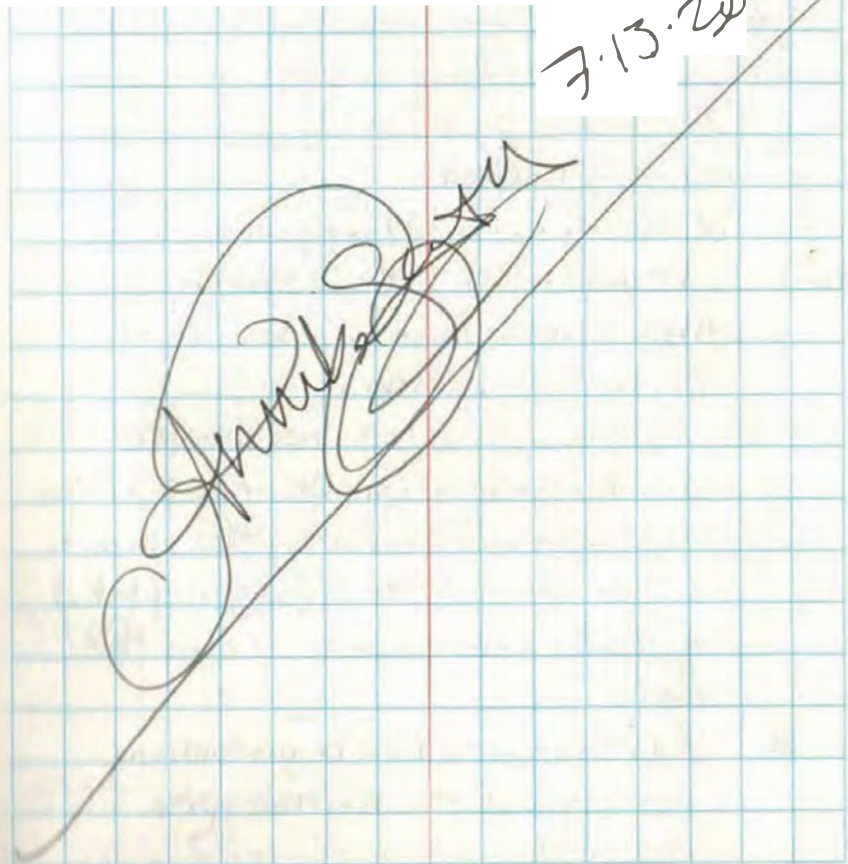
7.13.20

(5)

Ault Field

1700 - Begin cleanup. Soil from 35-40' bgs
is retained for sampling tomorrow
(if necessary)1755 - AS calls to have the Ault Field gate
closed; waits for security to arrive.1825 - Security arrives and locks the gate.
AS offsite. End of Day.

7.13.20



PFAS Investigation

Phase 3

7.14.20

- Project: Aultfield
- Task/Activity for the day: see if OTR is producing GHL, and can be a viable well
- Personnel: Jacobs Engineering
David Butler - SSHO (DB)
Lindsey Baumann - SSHO (LB)
Annika Seay - FTL (AS)
- Subcontractors: Tyler: driller, Alex & Jeremy: helpers
Yellow Jacket Drilling (YJD)
- PN: 69561 ØCH. Ø4. FL FK
- Weather: 55°F, clear
- PPE: Modified Level D | All equipment for day's work is available and on site.
- 0615 - David Butler (DB) and Annika Seay (AS) meet at hotel; move to base to show AS the drilling locations.
- 0645 - Getting on base was not an option due to the long line. DB shows AS the "Golf course" site, then they move to the Clover Valley / Aultfield Rd gate. AS calls security to open the gate.
- 0650 - Gate is open; YJD begin morning activities. DB and AS begin prep for the day.

AS 7.14.20

PHS INVESTIGATION

Ault Field

Phase 3

7.14.2p

- 0700 - Lindsey Baumann (LB) arrives.
Prep for HS meeting. YJD still making and setting up equipment.
- 0745 - Darrel from Jacobs arrives to perform crane inspection
- 0800 - Darrel of site; field crane holds health and safety meeting (see RTSP). Discuss:
- the major trip hazards on the site
- 0815 - Water is present in the boring. Boring #07 (Boring #07)
DB consults Peter Lawson (PL) hole sloughed to 24 feet logs; GWL tagged at 12 feet logs
- 0830 - Set up for purging the well and attempt a sample.
- 0845 - LB offsite to meet w/utility locate. DB calibrates ^{to} Horiba (see cal log for details). YJD sets up to purge the well.
- 0900 - Begin purging. 1x well casing volume = ~8 gallons. 3 well volumes will attempt to be purged.
- 0905 - Water is very brown
TWL = 14.6 ft logs. Well dropped ^{to} 1 ft. ~~water~~ is dry 2 minutes later. At 7:14:27

⑧

PFAS Investigation

Ault Field

Phase 3

7.14.20

0910 - Water is not purging anymore, but the WL indicator detects water. Troubleshoot and pump water again (raised pump)

Take Horiba measurements (see Gwl Grab data sheet):

- Temp: 14.60 °C
- Cond: 0.395 mS/cm
- DO: 18.97 mg/L
- pH: 6.16 (SU)
- ORP: 56 mV

Water begins to slow to a stop.

YJD troubleshoots (raising/lowering the pump). ~1x well volume has been purged. YJD pulls pump to clean out (decon will be performed before lowering it back into the boring)

0920 - YJD determines that the pump and/or wiring is faulty. The pump is switched out with new, deconned pump.

0930 - New pump lowered; ^{ground} water draws immediately. Continue purging to reach 3x well volume
DTW = 21 ft bgs

A/S 7.14.20

PFAS Investigation

⑨

Ault Field

Phase 3

7.14.20

0935 - pump stops producing. Pump is stopped and boring is allowed to recharge. ~1.5x well volumes purged.

0940 - DTW = ~24.5 ft bgs

0945 - DTW = 23 ft bgs

0950 - DTW = 22.5 ft bgs

DB consults PL; full 80% recharge not required, but the well needs to recharge enough to sample.

1000 - Collect soil ^{grab} sample:

WL-AF-BH07-SB-36

for ^{AT} from 36 ft bgs for

analysis of:

- ~~537~~ ^{AT} Method 537-Mod

(PFAS-18)

Well continues recharge.

1020 - WL = ~22 ft bgs. Field crew considers the recharge rate and decides to attempt sampling.

1025 - Collect Gwl grab sample

WL-AF-BH07-GW-24

for analysis of:

- Method 357-Mod (PFAS-18)

1035 - YJD sets up to run casing to 40 feet bgs.

A/S 7.14.20

(10)

PFAS Investigation

Phase 3

7.14.20

Ault Field

1040 - collect field blank sample:
 WI-AF-FB01-~~0720~~ 071420

for analysis of:

- Method 357 - Mod (PFAS-18) A/S

1100 - Continue setting casing at ~~Area 30-07~~
 [BH07]. Begin Soil Drum #2

1125 - AS and DB call project chemist
 Tiffany Hill (TH) to ask questions
 about sample TAT and shipping.
 No answer. Message left.
 YJD continue with casing.

1200^{AS} - Casing set ^{AS} set

1215 - Drillers break for lunch.

1245 - Lunch break over. Begin setup
 at [Area 30-BH08]

Begin hand clearing the boring to
 5 feet bgs.

1330 - continue hand augering boring

1415 - take TD @ boring = 5 ft bgs.

Begin rig setup for drilling.
 68°F, clear, light wind.

1450 - Begin drilling

1540 - Boring is dry to TD of 40' bgs.

DB calls PL to relay; PL instructs
 to drive 10 more feet.

AS 7.14.20

PFAS Investigation

Phase 3

7.14.20

(11)

Ault Field

1630 - YJD has been cleaning out the
 boring before advancing casing.
 Very hard drilling; a pulverized rock
 was seen ^{at the} ~ 37 ft bgs.

Still drilling through the solid rock.

1640 - Label tote GW #1 (GW from
 BH07)

1645 - view and log the soil from 40-50' bgs
 (see boring log for details) ^{shallow at}
 No GW. DB consults PL; at bedrock
 ridge is in this area. The pulverized
 rock that was seen in the boring
 @ 37 ft bgs is the beginning of the
 bedrock. PL ^{advises} instructs that the
 drillers should clean the hole out
 and allow it to sit overnight to see
 if it fills with groundwater.

1715 - Collect sample SB

WI-AF-BH08-~~34~~ 34

from ~ 34' bgs for analysis of.

- Method 537 - Mod (PFAS-18)

Clean up site for the evening.

This boring did not have a GW interface
 zone, as no GW was found. The sample
 was collected from moist sand found, per PL.

AS 7.14.20

⑫

PFAS Investigation

Phase 3

7.14.20

Ault Field

1745 - YJD offsite; Security arrives to close gate. DB and AS offsite ^{AT} offsite. End of Day.

7.14.20

[Handwritten signature/initials]

⑬

PFAS Investigation

Phase 3

7.15.20

Ault Field

- Project: Ault Field
- Task/Activity for the day:
Continue borehole drilling at Area 30
- Personnel: Jacobs Engineering
David Butler (SSH) (DB)
~~Lindsey Baumann~~ ^{AS} Annika Seay (FTL) (AS)
- Subcontractors: Yellow Jacket Drilling (YJD)
Tyler - driller; Tony Fehrenbach -
Alex - assistant; health and safety
Jeremy - assistant
- PN: 695610CH
- Weather: 55°F, fog
- PPE: modified Level D + COVID-19 precautions (face mask)
- All equipment for today's work is on site and available for use.
- 0645 - AS meets DB and YJD at the Rocky Point gate (entrance to Area 30)
DB called Security to open gate.
Crew moves to site and begins set up for the day
- 0700 - Lindsey Baumann (LB) arrives on site.

AS 7.15.20

(14)

PFAS Investigation

Ault Field

Phase 3

7.15.20

0715 - Hold health and safety meeting
(see PTSP). Discuss:

- fog
- colder weather

Continue setting up.

0735 - ~~3~~ 4 AFs DB takes WL & TD
@ BH08.

- DTW: 35.6 feet bgs (ft bgs)
- TD 40.6 feet bgs

~ 5 feet of water. Note from

0714.20: 4JD pumped ~ 50 gal
of water into boring, and purged ^{ALS}
it out - DTW after purging ~~was~~
~~24~~ ~~ft~~ bgs. dry. Prior to purging, DTW = 24' bgs

0745 - plug in pump, water draws
immediately. Appearance:
murky, brown DTW after sample:
collect sample 38 ft bgs

WL-AF-BH08-GW-35

for analysis of:

- Method 537-Mod (PFAS-18)

Note: ^{soil} Drum #3 began on 7.13.20

0750 - Begin move to ~~area 2~~ ~~area 3~~

0815 - Begin hand clearing BH06 ~~ALS~~
to 5 feet bgs ~~ALS~~

ALS 7.15.20

PFAS Investigation

(15)

Ault Field

Phase 3

7.15.20

* 0755 - Stabilization parameters for

0745
(cont'd)
late
entry

BH08 Gwl sample are:

- temp: 18.9 ^{air} 14.8 °C
- Cond: 0.308
- DO: 4.56
- pH: 7.02
- turbidity: > 999 NTU

A duplicate sample was assigned
to this location, but due to lack
of Gwl, the duplicate sample will
be moved to another location.

0815 - Begin hand clearing BH06
to 5 feet bgs

0930 - Hand clearing complete. Set
up to begin ^{drilling} sampling/sampling.

0945 - Begin drilling. Soil is ^{ALS} lagged (see
boring log for details)

1015 - Collect equipment blank

WL-AF-EB01-071520

for analysis of:

- Method 537-Mod (PFAS-18)

This sample covers yesterday's drilling
at BH08 and today @ BH06 ^{40 ft bgs}

1030 - LB offsite. Drilling reaches TD; ^(cont'd)
1045 no water. Consult Peter Lawson (PL) →

ALS 7.15.20

(16)

PFAS Investigation

Phase 3

7.15.20

Ault Field

1030 (cont'd) - ^{pulverized} Bedrock is seen at ~40 feet bgs.

PL adviser setting casing and waiting to see if the boring fills with water.

YJD sets casing to 30 feet bgs.

1050 - collect soil sample

WI-AF-BH06-SB-35

from ~35 feet bgs for analysis of:

- Method 537-Mod (PFAS-18)

1055 - casing set; DTW taken: ~34' bgs

(This could be water from pushing the soil out of the barrels)

1100 - Begin site cleanup and ~~also~~ begin move to Area 29.

1105 - Begin and fill IDW Drums:

- ~~Ats~~ SD * 5: BH06

- SD * 6: BH06

1130 - Continue setup at Area 29.

1145 - Break for lunch.

1220 - Begin hand augering at

Area 29-BH05^{Ats}
1230

1255 - continue set up. YJD decons equipment.

^{Ats} 7.15.20

(17)

PFAS Investigation

Phase 3

7.15.20

Ault Field

1315 - Begin drilling @ ^{Ats} BH05

Soil is logged (see boring log for details)

1345 - Reach TD of 40 ft bgs; no GW.

Clay is still dominant in the lithology.

DB calls PL; drilling will continue to 50 feet bgs in an attempt to hit the shallow bedrock ridge.

1400 - Reach 50' bgs: no GW. DB

Consults w/ PL and Janice Horton.

Casing is set to 30 feet bgs.

1440 - collect sample

WI-AF-BH05-SB-44

from ~44 feet bgs for analysis of:

- Method 537-Mod (PFAS-18)

casing ^{Ats} will be left in - Boring will sit overnight to see if it ^{Ats} recharges fills with GW.

1445 - Begin decon and mobilization to the next Area 29 location.

DB takes DTW at BH05:

- DTW ~44 feet bgs

Water was used to extract soil from the casing, and the detected ^{Ats} ~~GW~~ ^{water} in the boring is suspected to be associated with that.^{Ats} 7.15.20

(18)

PFAS Investigation

Phase 3

7-15-20

Ault Field

1355 - Boring BH03 is cleared to 5 feet bgs.

1413

Continue setting up for drilling

1414

63°F, clear, windy

1410 - YJD does rig maintenance.

1430 - YJD done drilling for the day; did not begin drilling BH03 to day. YJD leaves site for the day.DB and AS move to BH05 to label a partially full drum left at the site. SD #7

1440 - Collect equipment + blank W2. AF. EB02. 071520 from sample tubing (YJD provided) for analysis of:

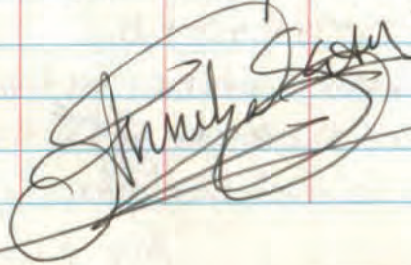
- Method 537 - Mod (PFAS-18)

1455 - Security is called to close the Rocky Point gate.

1700 - Security arrives; closes gate. DB and AS call into a team meeting.

1705 End of Day.

7-15-20



PFAS Investigation

Phase 3

7-16-20 (19)

7-15-20

Ault Field

- Project: Ault Field

- Task/Activity for the day:

See if GWT samples can be collected at BH08 & BH05; begin drilling at BH03

- Personnel: Jacobs Engineering

Annika Seay - FTL (AS)

Lindsey Baumann - SSH0 (LB)

- Subcontractors: Yellow Jacket Drilling (YJD)

Tyler Turpin - driller

Alex Forman - assistant

Jeremy Walker - assistant

Aaron Adams - Supervisor

Tony Fehrenbach - H&S Supervisor

- PN: 695610CH

- Weather: 58°, slightly overcast

- PPE: modified Level D, Covid-19 precautions (face mask)

- All equipment for the day's work is on site and available.

0645 - AS on site to call security to open the Rocky Point gate for site access. YJD arrives.

0700 - LB onsite. Prep for safety meeting.

AF

(20)

PFAS Investigation

Ault Field

Phase 3

7.16.20

- 0705 - Hold health and safety meeting (see PTSP). Discuss:
- not smoking near the rig
 - wearing masks when working within 6 ft of each other.

Tyler alerts Jacobs that he will not be able to drill after we start at BH03 because casing shoes are all in the open borings. ^{LB calibrates Horiba & Multi PCE} (see cal sheets)

0715 - Move to BH06

- 0745 - Take measurements at BH06:
- DTW: 24.2 ft bgs
 - TD: 32.2 ft bgs
- Set up to purge.

0755 - Begin purge.

0800 - Water stops; well dry. Allow for recharge. AS calls Heather Perry (Peter Lawson is in a meeting). Message was left.

0825 - Check WL:

- DTW = 19.8 ft bgs. Continue recharge.

A/S 7.16.20

PFAS Investigation

Phase 3

(21)

Ault Field

7.16.20

0835 - DTW = 24 ft bgs.
Prep to take sample.

0840 - collect sample
WI-AF-BH06-GW-31
from 31 ft bgs for analysis of:

- Method 537-Mod (PFAS-18)

0845 - collect sample duplicate
WI-AF-BH06-GWP-31
from 31 ft bgs for analysis of:

- Method 537-Mod (PFAS-18)

0850 - VJD moves to decon pump.
AS & LB move to BH05
and set up to sample.

0920 - DTW and TD at BH05

- DTW: 44.67
- TD: 45.62

AS consults Heather Perry about this (stand-in for Peter Lawson). She advises to purge dry and allow recharge; check WL at end of day.

0930 - Time is taken to decon kill probe as it is very coated in mud.

A/S

(22)

PFAS Investigation

AHH Field

Phase 3

7.16.20

0950 - Pump started. No pressure; no water. Nothing is produced.

Well will be tagged this afternoon for sampling if water is present

1025 - Begin drilling @ BH03
(5-foot hand clearance was done yesterday)

Soil is logged (see boring log for details)

1050 - Reach 40 feet bgs - No GW; lithology is all clay. Continue drilling.

1100 - Reach 60 feet bgs; no GW, all clay. Consult Peter Lawson^(PL) go to 70 feet bgs, then let him know what we find.

1130 - At 70 ft bgs; no GW. AS communicated this through text to Peter Lawson.

1135 - PL advises to leave the hole open and see where GW infiltrates.

1145 - AS texts PL about casing off; no answer. YJD takes lunch. AS & LB continue at site.

Take DTW: 44.75 ft bgs

A/S 7.16.20

PFAS Investigation

AHH Field

Phase 3

(23)

7.16.20

1210 - collect sample
W1-AF-BH03-SB-47
from 47 ft bgs for analysis of.

- Method 537. Mod (PFAS-18)

DTW is taken: ~44.75 ft bgs

1215 - Drillers return; casing needs to be set to at least 30 feet bgs; This is the last of ^{the} their casing ^{shoes} in order ^{of casing} it is supposed to arrive by 2 P.M. today.

1245 - Casing set; begin move to BH04 ~~entering area~~ This one will be drilled to 40 feet bgs, then PL or Heather Perry (HP) will be contacted with lithology results.

1330 - continue move to BH04
Begin and fill SD#8: BH03
Begin and fill SD#9: BH03

1400 - Begin drilling @ BH04
The boring was hand cleared to 5 feet bgs this morning.
Soil is logged (see boring log)

1430 - Reach TD of 40 feet bgs. No GW.
Consult w/ Heather Perry A/S 7.16.20

(24)

PFAS Investigation

Ault Field

Phase 3

7.16.20

1500 - HP consults PL; continue
 boring to 60 ft bgs.
 check for any GW in the
 lithology. If not, let well
 sit.

1555

Continue advancing BH04~~1600~~
AF

Collect field blank

WI-AF-FB02-071620

for analysis of:

- Method 537-Mod (PFAS-18)

1605 - GW is Observed at ~54 feet bgs.
 PL, HP consulted. PL OK with
 screen from 65-55 feet bgs.
 No sump; 1 centralizer at the
 top of the screen.

1610 - Collect Sample

WI-AF-SI-BH04-SB-54

for analysis of

- Method 357-Mod (PFAS-18)

1620 - Tony Ichrenbach retrieves the
 casing shoes that arrived today.
 Drillers set up to case BH04

1630 - Casing started.

1700 - Continue setting casing. AS 7.16.20

(25)

PFAS Investigation

Ault Field

Phase 3

7.16.20

1745 - Casing set to TD; site is
 cleaned up and secured
 before YJD leaves the site
 for the day.

1800 - AS calls security to close the
 gate. Crew makes plans for
 the next day.

1805 - End of Day

late entry

1745 (cont'd) -

Began and filled Drum #10
(BH04)Began and filled
Drum #11
(BH04)

7.16.20

[Handwritten signature/initials]

(26)

PFAS Investigation

Ault Field

Phase 3

7.17.20

- Project: Ault Field
- Task/Activity for the day:
attempt to collect samples at
BH#3 and BH#5; set a well at BH#4
- Personnel: Jacobs Engineering
Annika Seay - FTL (AS) Field Team Lead
Lindsay Baumann - SSH# (LB) site
safety & health officer
- Subcontractors: Yellow Jacket Drilling (YJD)
Tony Fehrenbach - health & safety Super.
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Walker - assistant (JW)
- DN: 695610CH
- Weather: 57°F, clear, windy
- PPE: Level D, modified, COVID-19
precautions (face masks)
- Equipment for today's work is on site
and available for use.

0645 - AS meets YJD at the site gate;
Call security to open the gate. LB
has communicated that she will
be arriving after 7 A.M.
AS conducts H&S meeting.

AS 7.17.

PFAS Investigation

(27)

Phase 3

7.17.20

- 0700 - Conduct tailgate H&S meeting:
(see PTSP). Discuss:
- mask use
- COVID-19 precautions/procedures
- good ergonomic practices
observed yesterday.
- 0715 - LB on site. Move to BH#3
to take WL and purge.
- 0720 - Very thick mud is ~~filling~~ ^{observed}. YJD sends a bailer
down and retrieves 1x pull,
clear water. Only mud after
that. TT says that he can
set casing to total depth, clean
out the hole, then let it
sit to see if water infiltrates.
AS relays info back to Jacobs
management team.
- 0735 - Move to BH#5. ^{Boring} ~~Intert~~ ^{Intert} has
been sitting since 7.15.20; still
no GWL observed. AS relays
info back to Jacobs management.
- 0745 - Set up to begin setting a well
at BH#4
- 0800 - Begin well installation.
(See well install form)

(28)

PFAS Investigation

Ault Field

Phase 3

7.17.20

0815 - lower screen to depth of

- 55-65 ft bgs.

- Screen: ϕ 2 ϕ -inch machine slotted

0830 - Begin adding sand filterpack:

- 12/2 ϕ Industrial sand- Quantity used: 5 X-5 ϕ lb-bags
52.1 ϕ ft bgs, top of filter pack

0920 - Begin adding bentonite seal:

- 3/8 Bentonite Hole Plug

- Quantity used: 10 X-5 ϕ lb bagsBentonite seal and bentonite chips
group, top @ 5 ft bgs.Discussed the plan forward with
Jacobs management:- BH03: case to TD of 7 ϕ ft bgs,
Clean out boring and try to get
a water level- BH05: abandon.0945 - grouting complete. Begin move to
BH03 VJD decons equipment.1030 - LB offsite to ship samples. AS calls
Battelle contact Jon to confirm
Saturday delivery address, and to
let them know that 1 sample

AS

BH04 Well ID:
WI-AF-MW-L28

PFAS Investigation

(29)

Ault Field

Phase 3

7.17.20

1030 (cont'd) - cooler is shipping.

1100 - driving casing @ BH031145 - Reach 67 ft bgs with casing;
tag WL: indicator sounds at
57 ft bgs, but the probe is
coated in mud when it is reeled in.
AS consults w/Peter Lawson (PL)1230 - WL indicator sounds at ~ 57 ft bgs,
but the probe is covered in mud.
Per PL, let the boring sit overnight.
Begin move to abandon BH051305 - Begin abandoning BH05 casing
is pulled, bentonite chips to
~ 1 ft bgs;1310 - complete BH05 ^{AT} abandon casing
pull, add bentonite1320 - Move to BH08; ^{AT} begin pull1330 - begin pulling casing at BH08
LB on site.1335 - grout up BH08; move to
BH07

1340 - pull casing.

1350 - grout borehole. Move to
BH06

AS 7.17.20

(30)

PFAS Investigation

Phase 3

7.17.20

Ault Field

1410 - Complete grouting. All 3 Area-30 borings have been abandoned.

1420 - Begin moving all equipment / Supplies not needed at ~~A-29~~ Area 29 [BHP3] out of the area and into the laydown area for decon. The rig is set up at [BHP3] for further field activities.

1500 - Continue move.
66°F, clear, wind

1600 - Continue move and decon.
AS and LB discuss future site plans w/ PL.

1645 - AS does IDW management (labels were ~~removed~~ ^{destroyed} during drum transfer by the drum picker)

1730 - YJD done for the day. AS calls security to lock gate.

1810 - AS calls security to confirm ETA. LB off site.

1820 - Security arrives to lock gate; AS off site. End of Day.

7.17.20

PFAS Investigation

Phase 3

7.18.20

(31)

Ault Field

- Project: Ault Field

- Task/Activity for the day: Complete BHP3 as ~~AF~~ ^{AS} MLI-AF-MW-629; decon equipment; move to next site

- Personne: Jacobs Engineering

- Annika Seay - FTL (AS)

- Lindsey Baumann - SSH (LB)

- Subcontractors: Yellow Jacket Drilling

- Tony Fehrenbach, Health & Safety supervisor (TF)

- Tyler Turpin, driller (TT)

- Alex Forman, assistant (AF)

- Jeremy Walker, assistant (JW)

- PN: 695610CH

- Weather: 57°F, clear, light wind

- PPE: Modified Level D, COVID-19 precautions (face masks)

- Equipment for today's work is on site and available for use.

0700 - AS meets LB and YJD at the site gate. AS calls security to open the gate. YJD is prepping for the day's work.

AS

7.18.20

(32)

PFAS Investigation

Ault Field

Phase 3

7.18.20

Ø710 - Security arrives to open the gate.
Hold daily tailgate meeting (see PTSP). Discuss:

- well labeled "pinch points" on the rig
- taking breaks when needed
- Stay hydrated
- good hygiene in the field
- radiological safety: the next site is a plane crash site

Ø730 - Prep for well building at BHØ3 and for the rest of the day

Ø745 - AS takes measurements at WI-AF-MW628:

- DTwl: 46.8 ft BTOC
- TD: 64.8 ft BTOC

When reeling up the measuring tape, the spool detached from the base. Closer inspection revealed that the point of attachment had rusted through, and the spool broke off. LB communicates

Ats 7.18.20

PFAS Investigation

(33)

Ault Field

Phase 3

7.18.20

Ø745 (cont'd) - to Jacobs David Butler (DB), and this one will be returned for a replacement.

Ø800 - Begin clearing out BHØ3
Correction from yesterday: the casing is at the TD of 70 ft bgs; AS misunderstood this as 67 ft bgs when TT said there was ~3-foot of ^{AS} mud in the casing.

Ø815 - Casing is cleared. ~100 gallons of water ^{was} ~~there~~ ^{AS} plugged.
Prep to set well.

Ø830 - Begin setting WI-AF-MW629
(see well construction log for details)

- screen: Ø. Ø20-inch machine slotted; set from 70-60 ft bgs

Ø850 - filter pack:
- 12/20 industrial sand
- quantity used: 4 x 50 lb bags
top of filter pack at 58 ft bgs

Ø935 - Set seal above filter pack, and grout to top

- 3/8" Bentonite hole plug chips
- quantity used: -

Ats 7.18.20

(34)

PFAS Investigation

Ault Field

Phase 3

7.18.20

0935 (cont'd) - note that the bentonite chips were used in lieu of a grout slurry.

1000 - WII-AF-MW1629 is set.

Begin site cleanup.

1045 - AS offsite.

1115 - AS back on site. Crew will be out of the Rocky Point gate for the afternoon, returning this evening. Security is called and they are going to ~~close~~^{lock} it; call back when we need back in. Security also confirms that Jacobs does not need to wait for the gate to be locked.

1145 - Drillers break for lunch.

1215 - Continue decon and mobe.

1245 - TI and JW mobe to do surface completions. Well cards will be placed on each completion:

- Well ID
- installation date
- total depth
- screen depth

Security has not locked the gate; AS calls to cancel.

AS 7.18.20

(35)

PFAS Investigation

Ault Field

Phase 3

7.18.20

1345 - continue surface completions and prep to move to new site

1445 - Continue surface completions and prep to move to new site.

WII-AF-MW1628 will not be completed today due to too much water in the casing. This will be completed Monday, 20 July.

1545 - Equipment/Supplies moved to Plane Crash Site.

1615 - TF offsite for the day. Continue well pad construction.

1715 - Well pad was able to be completed at WII-AF-MW1628; water was not present when re-checked.

1700 - Well pad construction complete at WII-AF-MW1629.
Cleanup site.

1710 - YJD offsite. AS calls security to lock the gate; they instruct AS to remain at the gate until an officer arrives and it is confirmed to be locked.

1755 - Gate locked. Before security arrived, people were observed

AS 7.18.20

(36)

PFA's Investigation

Ault Field

Phase 3

7-18-20

1755 (cont'd) - over at the laydown area. LB investigated: they said

they're just hanging out

1800 - End of Day.

~~Amber Day 7-18-20~~

PFA's Investigation

(37)

Ault Field

Phase 3

7-19-20

1130 - Lindsey Baumann (LB) stops by the laydown yard to check the drillers decon pit. They had said the water was evaporating before they could pump it. LB observed water in the decon pit. The crew will discuss this tomorrow.

1145 - End of Day.

~~Amber Day 7-19-20~~

(30)

PFAS Investigation

Phase 3

7.17.20

Ault Field

1410 - Complete grouting. All 3 Area-30 borings have been abandoned.

1420 - Begin moving all equipment / Supplies not needed at ~~A-29~~ Area 29 [BHP3] out of the area and into the laydown area for decon. The rig is set up at [BHP3] for further field activities.

1500 - Continue move.
66°F, clear, wind

1600 - Continue move and decon.
AS and LB discuss future site plans w/ PL.

1645 - AS does IDW management (labels were ~~removed~~ ^{destroyed} during drum transfer by the drum picker)

1730 - YJD done for the day. AS calls security to lock gate.

1810 - AS calls security to confirm ETA. LB off site.

1820 - Security arrives to lock gate; AS off site. End of Day.

7.17.20

PFAS Investigation

Phase 3

7.18.20

(31)

Ault Field

- Project: Ault Field

- Task/Activity for the day: Complete BHP3 as ~~AF~~ ^{AS} MLI-AF-MW-629; decon equipment; move to next site

- Personne: Jacobs Engineering

- Annika Seay - FTL (AS)

- Lindsey Baumann - SSHP (LB)

- Subcontractors: Yellow Jacket Drilling

- Tony Fehrenbach, Health & Safety supervisor (TF)

- Tyler Turpin, driller (TT)

- Alex Forman, assistant (AF)

- Jeremy Walker, assistant (JW)

- PN: 695610CH

- Weather: 57°F, clear, light wind

- PPE: Modified Level D, COVID-19 precautions (face masks)

- Equipment for today's work is on site and available for use.

0700 - AS meets LB and YJD at the site gate. AS calls security to open the gate. YJD is prepping for the day's work.

AS

7.18.20

(32)

PFAS Investigation

Ault Field

Phase 3

7.18.20

Ø710 - Security arrives to open the gate.
Hold daily tailgate meeting (see PTSP). Discuss:

- well labeled "pinch points" on the rig
- taking breaks when needed
- Stay hydrated
- good hygiene in the field
- radiological safety: the next site is a plane crash site

Ø730 - Prep for well building at BHØ3 and for the rest of the day

Ø745 - AS takes measurements at WI-AF-MW628:

- DTwl: 46.8 ft BTOC
- TD: 64.8 ft BTOC

When reeling up the measuring tape, the spool detached from the base. Closer inspection revealed that the point of attachment had rusted through, and the spool broke off. LB communicates

Ats 7.18.20

PFAS Investigation

(33)

Ault Field

Phase 3

7.18.20

Ø745 (cont'd) - to Jacobs David Butler (DB), and this one will be returned for a replacement.

Ø800 - Begin clearing out BHØ3
Correction from yesterday: the casing is at the TD of 70 ft bgs; AS misunderstood this as 67 ft bgs when TT said there was ~3-foot of ^{AS} mud in the casing.

Ø815 - Casing is cleared. ~100 gallons of water ^{was} ~~there~~ ^{AS} plugged.
Prep to set well.

Ø830 - Begin setting WI-AF-MW629
(see well construction log for details)

- screen: Ø. Ø20-inch machine slotted; set from 70-60 ft bgs

Ø850 - filter pack:
- 12/20 industrial sand
- quantity used: 4 x 50 lb bags
top of filter pack at 58 ft bgs

Ø935 - Set seal above filter pack, and grout to top

- 3/8" Bentonite hole plug chips
- quantity used: -

Ats 7.18.20

(34)

PFAS Investigation

Ault Field

Phase 3

7.18.20

0935 (cont'd) - note that the bentonite chips were used in lieu of a grout slurry.

1000 - WI-AF-MW1629 is set.

Begin site cleanup.

1045 - AS offsite.

1115 - AS back on site. Crew will be out of the Rocky Point gate for the afternoon, returning this evening. Security is called and they are going to ~~close~~^{lock} it; call back when we need back in. Security also confirms that Jacobs does not need to wait for the gate to be locked.

1145 - Drillers break for lunch.

1215 - Continue decon and move.

1245 - TT and JW move to do surface completions. Well cards will be placed on each completion:

- Well ID
- installation date
- total depth
- screen depth

Security has not locked the gate; AS calls to cancel.

AS 7.18.20

(35)

PFAS Investigation

Ault Field

Phase 3

7.18.20

1345 - continue surface completions and prep to move to new site

1445 - Continue surface completions and prep to move to new site. WI-AF-MW1628 will not be

completed today due to too much water in the casing. This will be completed Monday, 20 July.

1545 - Equipment/supplies moved to Plane Crash site.

1615 - TF offsite for the day. Continue well pad construction.

1715 - Well pad was able to be completed at WI-AF-MW1628; water was not present when re-checked.

1700 - Well pad construction complete at WI-AF-MW1629.
Clean up site.

1710 - YJD offsite. AS calls security to lock the gate; they instruct AS to remain at the gate until an officer arrives and it is confirmed to be locked.

1755 - Gate locked. Before security arrived, people were observed

AS 7.18.20

Ault Field

PFAS Investigation

Phase 3

(B7)

7-19-20

1130 - Lindsey Baumann (LB) stops by the laydown yard to check the drillers decon pit. They had said the water was evaporating before they could pump it. LB observed water in the decon pit. The crew will discuss this tomorrow.

1145 - End of Day.

7-19-20

~~Amber Scott~~

38 Aultfield PFAS Investigation
7-20-20 Phase 3 7.20.20

- Project: Ault Field
- Task/Activity for the day:
begin drilling at the plane crash site;
take Gkl and soil samples
- Personnel:
Annika Seay - FTL (AS)
Shannon Fitzsimmons - SSHO (SF)
David Butler - SSHO (DB)
- Subcontractors: Yellow Jacket Drilling
Tony Fehrenbach - HS supervisor (TF)
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Walker - assistant (JW)
- PN: 695610CH
- Weather: 63°F, clear
- PPE: Modified Level D + COVID-19 precautions (face mask)
- Equipment for today's work is on site and available for use.
- 0700 - AS meet DB and YJD at the Plane Crash site. SF is getting badged this morning; DB is filling in until she arrives.
- 0705 - Hold health and safety tailgate meeting (see PTSP) Discuss:

At 5 7.20.20

PFAS Investigation Aultfield Phase 3 7.20.20 39

- 0705 (cont'd) - new site; be observative for hazards
- stay hydrated
- new field, but same slips/trips/falls issue
- 0730 - YJD begins site set up.
DB calibrates multiRAE and YSI (see calibration logs for details)
- 0800 - Continue set up.
- 0820 - DB offsite to meet with SF; DB will drive SF to the on-base proper sites before returning to the site.
YJD begins hand clearing to 5 feet bag at BH02
- 0835 - Hand clearing complete; set up to drill
- 0845 - DB and SF onsite. DB reviews H&S w/ SF
- 0910 - Begin drilling BH02
See boring log for details ^{DB & SF but onsite}
- 0930 Collect Field blank
as ocated to C1 Site
WI - AF - F 1 - 072020
- AF - BH 2 - SB - 13
at 13 ft bgs. 7.20.20

(40)

PFAS Investigation

Ault Field Phase 3 ^{in boring} 7.20.20

- 1000 - Take DTW ^{in boring} 25.7 ft bgs;
 Pump set at ~35-36 ft bgs
 TD of drilling = 40 ft bgs
 Purge ~24 gallons before sampling
- 1015 - Pump on; water draws immediately
 (silty, brown)
- 1020 - DTW: 31 ft bgs; pump stops,
 producing water. Troubleshoot, get
 water to purge again.
- 1025 - Pump stopped drawing water;
 allow for recharge
- 1030 - DTW: 31 ft bgs, continue
 recharge
- 1040 - begin purging again; water draws
 immediately

*late entry A/S

- 1050 - dry, allow for recharge.
- 1100 - collect Gwl sample
WI-AF-BH02-Gwl-35
 from 35 ft bgs
 for analysis of:
 - Method 537-Mod (PFAS-18)
 Begin move to BH01
- 1130 - Drillers break for lunch.
- 1200 - Lunch over. Continue move.

A/S 7.20.20

(41)

PFAS Investigation

Ault Field Phase 3 7.20.20

- 1205 - start and fill soil drum
 #12.
 Begin hand clearing BH01
 to 5 feet bgs.
 DB offsite.
- 1225 - hand clearing complete. Set
 up to drill.
- 1240 - Begin drilling BH01 (see boring log)
- 1250 - Reach 20 ft bgs; did not see
 potential water bearing unit like
 at BH02 ~20 ft bgs. Continue
 to 30 ft bgs.
- 1300 - Water bearing zone not present
 in 20-30 ft bgs, but the bottom
 (~30 ft) is a very loose, moist sand.
 Advance to 40 ft bgs
- 1320 - Reach 40 ft bgs. Lithology not
 very promising, but ~1' of Gwl
 is present in the boring. Allow the
 boring to settle, then a Gwl
 sample will be attempted.
- 1325 - collect soil sample
WI-AF-BH01-SB-29
 from ~29 ft bgs for analysis of:
 - Method 357-Mod (PFAS-18)

A/S 7.20.20

(42)

PFAS Investigation

Ault Field

Phase 3

7.20.20

1325 (cont'd) - decon pump for an
equipment blank.

^{As}
~~132~~ 1330 - collect field blank

W1-AF-EB03-072020

from the driller's sample pump
for analysis of:

- Method 537-Mod (PFAS-18)

1345 - DTW: 37.5 ft bgs

set up to purge and sample

^{As}
DTT uses a bailer instead of the
pump because

1400 - 1 gal purged and the boring
is ~~dry~~ dry. Allow for recharge
Start and fill soil drum #13

1430 - recharging slowly

1440 - TT and SF off site to go to the
next site (Waste Water
Treatment Plant) to survey areas
for the drillers to ~~stage~~ ^{As} stage

Continue purging

1520 - collect sample

W1-AF-BH01-GW1-40

from ~40 feet bgs
for analysis of:

- Method 537-Mod (PFAS 18)

As 7.20.20

PFAS Investigation

(43)

Ault Field

Phase 3

7.20.20

1530 - SF back on site.

YJD continues clean up of site,
mobilizing to WWTP.

** LATE ENTRY ** OFFSITE ^{As} ON BASE CREW

15:10 S. Fitzsimmons on base with TT/
operator for WWTP BH locations
to confirm rig is allowed in area
to be left/operating tomorrow.
Scott Lemke (bldg 420) confirmed
okay. Jim Allen (worker at WWTP)
expressed concern for utility locate.

15:30 S. Fitzsimmons calls D. Butler.

Confirms locate with as-builts!

1545 - Move out of area, back to the
laydown yard. Begin decon.

79° F, clear, light wind

1630 - continue decon and move prep

1700 - move to WWTP to stage
equipment.

1745 - Equipment is staged. Make plans
to meet tomorrow.

1750 - End of Day. 7.20.20

[Signature]

(44)

Ault Field

PFAS Investigation
Phase 3

7.21.20

- Project: Ault Field
- Task/Activity for the day:
advance two borings; collect soil and GKI samples from each. A third location will be installed as a monitoring well.
- Personnel: Jacobs Engineering
Annika Seay - FTL (AS)
Shannon Fitzsimmons - SSO (SF)
- Subcontractors: Yellow Jacket Drilling
Tony Fehrenbach - HS supervisor (TF)
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Walker - assistant (JW)
- PN: 695610 CH
- Weather: 59°F, clear, light wind
- PPE: Modified Level D + COVID-19 precautions (face mask)
- Equipment for today's work is on site and available.
- 0700 - Field crew meets at the Wastewater Treatment Plant (WWTP)

AFS 7.21.20

PFAS Investigation
Phase 3

(45)

Ault Field

7.21.20

- 0710 - Hold daily tailgate meeting (see PTSP). Discuss:
 - Stay hydrated; a restroom is available on site.
 - COVID-19 self checks
- 0730 - Look over utilities in the area; Jim, the WWTP operator is on site and advises crew on water lines in the area. Conflict appears to exist at some locations. SF calls Jacobs management to consult.
- 0745 - NAVFAC Steven ~~Klemm~~^{Skreen} visits site to retrieve well keys left for him by David Butler.
- 0800 - Steven ~~Klemm~~^{Skreen} off site. SF confirms that utilities are not in conflict; boring
- 0810 - Begin hand clearing BHT; this location was moved ~5 ft N due to a possible utility conflict. SF calibrates VSI and MultiRAE (see calibration logs)

AFS 7.21.20

(46)

PFAS Investigation
Phase 3

7.21.20

0850 - very hard soil; still hand clearing
Jim at WWTP says he closes
the gate at 530 P.M.
~1 foot bgs cleared.

0900 - SF offsite to get ice. Peter Lawson
(PL) communicates that
Janice Thornton^(JH) will be onsite
today to assist with the well
placement.

0945 - JH communicates that she
will not be onsite today, but the
well assignment is discussed:
[BH11] will be set as a well.

0950 - TF offsite; the YJD trailer
needs maintenance and TF is
retrieving parts.

1015 - Continue hand clearing (@ 25 ft bgs)

1115 - Continue hand clearing
@ [BH09] Due to the tough
~~nature~~^{AD} of the hand clearing,
it is decided to hand clear
all 3 boring locations today,
prior to starting any drilling.

1140 - [BH09] hand cleared to 5 ft bgs.
Move to [BH11]

A/S 7.21.20

PFAS Investigation
Phase 3

7.21.20

(47)

Ault Field

1150 - Begin hand clearing to
5 feet bgs

1310 - [BH11] cleared to 5 feet bgs.
Move to clear ~~BH09~~^{AD} [BH10]

1320 - Steve Skeehan stops by briefly

1420 - Continue hand clearing [BH10]

15 Prep for drilling.

1320 - Continue clearing [BH10]

~~AD~~ Continue prep to drill. Rig is
Set up on [BH09]

~~AD~~ 1530 - begin drilling @ [BH09]

~~AD~~ 1400 - reach 10 ft bgs. Sand
is seen in lithology, wet at ~7.5' bgs
~~AD~~ casing driven to 10 ft; a

water was observed in boring
~1 ft water column

No water is retrieved when the
bailer is lowered.

1615 - Set casing to 10 ft bgs.
Allow well to sit.

1625 - Water not able to be bailed;
set up for drive ahead sampler.

1645 - collect field blank

W-AF-FB01072120

for analysis of:
- method 537-Mod (PFAS-10)

7.21.20

(48)

PFAS Investigation

Ault Field

Phase 3

7.21.20

late entry

1630 - collect soil sample

WI-AF-BH09-SB-9.5

from 9.5 ft bgs for

analysis of:

- Method 537 Mod (PFAS-18)

1700 - collect groundwater sample

WI-AF-BH09-SB-GW-10

from 10 ft bgs for analysis
of:

- Method 537-Mod (PFAS-18)

1705 - Begin site cleanup; WWTTP
gate closes at 1730.

Begin Drum #14 - BH09

1730 - Crew makes plans to meet
tomorrow offsite.

End of Day.

7.21.20

late entry

1705 - collect

Sample duplicate

WI-AF-BH09-SB

WI-AF-BH09-GW-10

from 10 ft bgs for analysis of:

- Method 537 Mod (PFAS 18)

PFAS Investigation

(49)

Ault Field

Phase 3

7.22.20

- Project - Ault Field

- Task/Activity for the day:

advance BH10, collect Gwl and
soil samples; advance BH11 andcollect a soil sample before
completing as a monitoring well.

- Personnel: Jacobs Engineering

Annika Seay - FTL (AS)

Shannon Fitzsimmons - SSO (SF)

- Subcontractors: Yellow Jacket Drilling

Tony Fehrenbach - HS supervisor

Tyler Turpin - driller

Alex Forman - assistant (AF)

Jeremy Walker - assistant (JW)

- PN: 695610CH

- Weather: 57°F, partly cloudy

- PPE: modified Level D + COVID-19
precautions (face masks)- Equipment for today's work is on site
and available for use.0700 - Field crew meets at the
Waste Water Treatment Plant
(WWTTP)

AS 7.22.20

(50)

PFAS Investigation

Ault Field

Phase 3

7.22.20

0705 - Hold daily tailgate safety meeting (see PTSP). Discuss:

- COVID-19 precautions and self testing
- pinch points
- hydration

0715 - Set up at BH11

SF calibrates MultiRAE and Horiba (see cal logs for details)

0810 - Begin drilling BH11 (see boring log for details)

0820 - GWL is observed at ~9.5 ft bgs. Take WL in borehole - it collapsed. Depth of screen will be 8-13 ft bgs.

0825 - Begin casing to depth to build the well

0830 - Collect SB at 9 ft (grab)

WI - AF - BH11 - SB - 9

for analysis of:

- Method 537-Mod (PFAS-18)

0855 - Sands heaved to 12 ft bgs. When setting the well. Pull screen and casing and clear boring to set the bottom of the screen at 13 ft bgs.

AFS 7.22.20

(51)

PFAS Investigation

Ault Field

Phase 3

7.22.20

0905 - screen is lowered to depth (13 ft bgs). SF takes Jkl to the flightline to begin hand clearing the boring locations. ODO is notified.

0915 - Begin building the filter pack:

~~0915~~ 120 Industrial Sand ~~BAU~~
 AFS 2X 50 lb bags AFS 8-1/2 ft bgs

0925 - 3/8" Bentonite holeplug
 1X 50 lb bag
 filter pack depth AFS

Seal is set above the filter pack to ~3 ft bgs

0930 - Well set, begin cleanup and move to BH10. Jkl goes to hand auger the three borings in the lagoon.

Well ID:

WI - AF - MW - 630
 AFS

1040 - Begin drilling BH10

1045 - Sand is wet at 10 ft bgs; Set up to hydro punch. screen from 10-12 ft bgs

~~1100~~

1130 - WL meter is not sounding to indicate hitting GUL. A replacement has been sent to the office. SF offsite to retrieve. YJD takes lunch.

AFS 7.22.20

(52)

PFAS Investigation

Ault Field

Phase 3

7.22.20

1200 - Only ~6 in. of water is observed
(used tape to see where water hit)
It will drive the hydropunch
down further to see if more
water will infiltrate.

SF back on site.

1210 - Bottom of screen at 12.5 ft bgs

1200 Collect SB at 9.5 ft

WI-AF-BH10-SB-9.5

for analysis of:

- Method 537 Mod (PFAS-18)

1225 - pump lowered. Not pulling
water. Troubleshoot.1230 - pump is not pulling enough
water. Switch to disposable
bailer.

1245 - Collect grab GWL sample

WI-AF-BH10-GWL-11@ 11 feet bgs for analysis
of:

- Method 537 Mod (PFAS-18)

1255 - Continue drilling to a

TD = 40 ft bgs

(See boring log for details)

A/S 7.22.20

(53)

PFAS Investigation

Ault Field

Phase 3

7.22.20

1330 - Reach TD of 40 ft bgs. Set up
to collect a grab groundwater
sample at TD. Drive casing to 40' bgs
Heaving sands required the driller
to use water while drilling.
~30 gallons was used and will
be pumped out prior to sampling.

1450 - heaving sands have the
pump stuck in the formation
at 40 ft bgs; water is
pumping. ~~450 work to~~
~~rem~~

SF off site to meet subs
at laydown yard (related to
fracture removal from the
laydown yard, not related
to this project)

Begin drum #15 - soil cuttings
from BH10

1540 - the pump was able to be
removed. Pause in purging.

1600 - the pump is lowered down,
but is not pumping. After
troubleshooting, the decision is
made to ~~stop~~ go down the ^(cont'd)

A/S 7.22.20

(54)

PFAS Investigation

Phase 3

7.22.20

7.22.20

~~DTW 6.58~~ Als~~TD 14.15~~ Als

1100 (cont'd) - hydropunch (the crew currently only has 1 hydropunch; the second on site was defective and a replacement is en route) and take the grab sample at TD in the morning.

1130 - Clean up site for the evening. Move to laydown yard (Clover Valley) to decon equipment.

Take measurements at

MW-630:

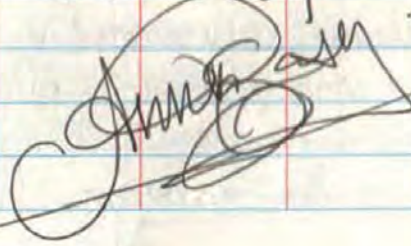
- DTW: 6.58 ft bgs

- TD: 14.15 ft bgs

1700 - At decon area: the decon equipment needs maintenance before it can be used. YJD leave to get materials; crew will reconvene tomorrow.

1710 - End of Day.

7.22.20



Ault Field

PFAS Investigation

Phase 3

7.23.20

(55)
7.23.20

- Project: Ault Field

- Task/Activity for the day:

Collect grab Gwl sample @ BHP, then abandon boring. Move to the former Sludge lagoon and advance 3 borings, grab Gwl & grab soil samples to be taken.

- Personnel: ~~Yellow Jacket Drilling (YJD)~~ Jacobs Engineering Als

Annika Seay - FTL (AS)

Shannon Fitzsimmons - SSO (SF)

- Subcontractors: Yellow Jacket Drilling (YJD)

Tony Fehrenbach - HS super.

Tyler Turpin - driller

Alex Forman - assistant

Jeremy Walker - assistant

- PN: 695610 CH

- Weather: 57°F, overcast, windy

- Equipment for today's work is on site and available for use.

- PPE: Modified Level D + COVID-19 precautions (face masks)

0700 - Crew meets at decon area. Hold tailgate meeting (see PTSP). Discuss:

- COVID-19 ^{self} checks - slips/trips/falls

Als 7.23.20

56 Ault Field PFAS Investigation Phase 3 7.23.20

7:35 Collect EB on Hydropunch associated to BH09 7/21/20 GW sample WI-AF-EB04-072320

7:45 Collect EB on Hydropunch associated to BH10 7/22/20 GW sample WI-AF-EB05-072320

* late entry *

0715 - VJD decons the hydro punches used 7.21.20 and 7.22.20 for collection of equipment blanks.

0800 - Move to WWTP.

0815 - Begin prep for grab GW sample at [BH10], 4 ft bgs.

0845 - Begin pumping; ~2 gallons needed to purge before sampling. The 3 gal ^{added} from yesterday has been purged.

0855 - ^{As} Stopped purged dry. Allow for recharge.

0900 - Water produces, then dries up. Very slow recharge.

0930 - collect GW grab sample WI-AF-BH10-GW-41 from 41 ft bgs for analysis of:

- Method 537 Mod
(see grab GW sheet for details) ^{As} 7.23.20

57 Ault Field PFAS Investigation Phase 3 7.23.20

0940 - Begin site cleanup. Abandon borings w/ bentonite chips.

1000 - Begin move to the former Sludge Lagoons. [BH12]

1125 - Begin drilling [BH12] see boring log for details.

1135 - GW @ ~10 ft bgs. Set up for hydropunch.

1145 - collect soil sample WI-AF-BH12-SB. 9.5 from 9.5 feet bgs for analysis of:

- Method 537-Mod

1155 - collect grab GW sample WI-AF-BH12-GW-11 @ 11 ft bgs for analysis of:

- Method 537-Mod

1315 - Reach TD of 40 ft bgs; drillers take lunch.

1345 - Take measurements at [BH12] (Drillers lunch over)
- DTW: 38.8 ft bgs

1400 - TD - 40 ft bgs

1350 ^{As} - Bail dry. Allow recharge. ^{with 1/2 gal ~ 1/4 gallon purged} ^{As} 7.23.20

(58)

Ault Field

PFAS Investigation
Phase 3

7.23.20

- 1410 - no GW observed in the boring.
Drillers pull the hydropunch up & down
to try to infiltrate water into.
Water is rising. TD is still 4 ft bgs
- 1425 - Begin pumping.
- 1440 - collect sample

W1. AF. BH12. GW. 39

from 39 feet bgs (pump
intake depth) for analysis
of: (See gab GW sheet for details)

- Method 537 - Mod
collect sample ^{AS} MS/MSD

W1. AF. BH12. GW. 39 - MSW1. AF. BH12. GW. 39 - MSD

from 39 ft bgs for analysis
of:

- Method 537 - Mod

- 1450 - pull hydropunch and casing.
Decide not to start another
boring today b/c decon, mobilization
would not leave enough time
to complete a boring and
mobe all equipment off the
area, as is required by ODO for
work near the flightline. ^{AS} 7.23.20

(59)

Ault Field

PFAS Investigation
AFS PFA Phase 3

7.23.20

- 1530 - AS offsite to return the
faulty Honda and WL. SF
stays with drillers as they
mobe.

- ^{AS} 1600 - AS back; waiting at
decon area for drillers to
decon the hydropunch for
EB collection.

- 1630 - Drillers working on well pad
for BH-11 well

W1. AF. MW. 630 AS mobs
there.

- 1730 - Clean up for the day; WWTP
operator arrives to close the
gate. SF offsite to return keys
to ODO (keys were retrieved
prior to work this morning)
and check out for the day.

- 1750 - Make plans to meet at the
WWTP tomorrow.

- 1800 - End of Day 7.23.20

[Signature]

(60)

PFAS Investigation

Ault Field

Phase 3

7.24.20

- Project: Ault Field
- Task/Activity for the day:
Advance ~~BH13~~ and BH13 to depth,
collect soil and GWS samples at
each location.
- Personnel: Jacobs Engineering
Ahnika Seay - FTL (AS)
Shannon Fitzsimmons - SS40 (SF)
- Subcontractors: Yellow Jacket Drilling (YJD)
Tony Fehrenbach - HS supervisor
Tyler Turpin - driller
Alex Forman - assistant
Jeremy Walker - assistant
- PN: 695610CH
- Weather: 55°F, overcast
- PPE: Modified Level D + COVID-19
precautions (face masks)
- Equipment and supplies for today's
work is on site and available.
- 0700 - Field crew meets at the
WWTP.
- 0705 - Hold daily tailgate safety
meeting. Discuss:
 - COVID19 Self checks - Beacon on
vehicles
 - fatigue

AS 7.24.20

PFAS Investigation

(61)

Ault Field

Phase 3

7.24.20

- 0715 - Begin move and setup at
Former Sludge Lagoons
BH13
SF calibrator Horiba, see
cal sheet for details.
- 0820 - Begin drilling @ BH13
See boring log for details
- 0830 - wet @ ~10 ft bgs. Drive
hydra-punch
- 0845 - Collect Field Blank for
Former Sludge Lagoons at
BH13 WI-AF-FB01-072420
- 0850 - Collect GWS grab sample
WI-AF-BH13-GW-11
at 11 feet bgs (hydropunch
screen from 10-12 ft bgs)
for analysis of:
- Method 537 Mod (PFAS-18)
- 0855 - Collect grab soil at 9.5 ft
WI-AF-BH13-SB-9.5
WI-AF-BH13-SB-9.5-MS
WI-AF-BH13-SB-9.5-MSD
- 0920 - Collect equipment blank
for 7/23 off decomred sub
pump WI-AF-EB06-072420

AS 7.24.20

(62)

Ault Field

PFAS Investigation

Phase 3

7.24.20

- 0950 - reach TD of 4 ft bgs.
Set up to collect Gwl grab sample.
- 1010 - Start pump + purge 15 gal
(see Gwl grab sample sheet for details)
- 1015 - Collect GW sample
WI-AF-BH13-GW-41
at 41 ft bgs (hydropunch
screen from 40-42 ft bgs)
for analysis of:
- Method 537-Mod (PFAS-18)
- 1020 - Begin cleanup of area; decon
both hydropunches.
Move to BH14
- 1100 - Move and set up at BH14
- 1140 - Begin drilling @ BH14
- 1150 - Reach 1 ft bgs; cone is
damp @ 9.5-10 ft bgs
Push hydropunch to 12 ft bgs
(screen is 10-12 ft bgs,
pump @ 11 ft bgs)
- 1155 - No water. ~1.5" is detected
by WL meter. TI troubleshoots,
boring will sit during lunch
for recharge.

A/S 7.24.20

(63)

Ault Field

PFAS Investigation

Phase 3

7.24.20

- 1210 - Break for lunch.
- 1240 - Check wlf @ BH14 dry.
Advance to 2 ft bgs
- 1305 - GW @ ~11 ft bgs
Set up to bail 3x well
volumes (see Gwl grab sample
sheet)
- 1310 - Collect soil sample
WI-AF-BH14-SB-11
@ 11 ft bgs for analysis
of:
- Method 537-Mod (PFAS-18)
- 1345 - collect grab Gwl sample
WI-AF-BH14-GW-21
@ 21 ft bgs (hydropunch
screen from 20-22 ft bgs)
- 1400 - Continue drilling to TD of
4 ft bgs ~~#7(F)~~
- 1405 - Collect EB ~~7(F)~~ on the
pump associated with
BH14 Gwl sampler: EB07
WI-AF-EB07-072420
for analysis of:
- Method 537-Mod (PFAS-18)
- 1430 - Collect WI-AF-BH14-GW-40

1415 -
late entry
* reach
of 4 ft bgs

A/S 7.24.20

(64)

Ault Field

PFAS Investigation
Phase 3

7.24.20

1440 - Begin site cleanup; abandon
boring w/ bentonite chips

1515 - SF offsite.

1540 - All equipment has been removed
from the former sludge lagoons.
The gate is locked.

1550 - Move to KWTTP to pack up
the supplies staged there.

SF back onsite.

~~AS offsite. AS~~

1620 - AS moves to lay down yard;
field crew en route.

1630 - Field crew arrives. Unloads, decons.

1720 - AS offsite. SF stays w/ YJD
@ decon.

1725 - End of Day.

7.24.20

[Signature]

Ault Field

Phase 3

7-25-20

- Project: Ault Field
- Task/Activity for the day:
Area 27: Advance three borings (BH15, BH16, & BH17) to groundwater and complete as monitoring wells.
- Personnel: Jacobs Engineering
Annika Seay - FTL (AS)
Shannon Fitzsimmons - SSO (SF)
- Subcontractors: Yellow Jacket Drilling (YJD)
Tony Fehrenbach - HS supervisor (TF)
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Walker - assistant (JW)
- PN: 695610CH
- Weather: 55°F, partly sunny
- PPE: Modified Level D + COVID 19 precautions (face masks)
- Equipment and supplies for today's work is on site and available.
- 0700 - Field crew meets at the Clover Valley laydown yard (CVL)
- 0705 - Hold daily tailgate safety meeting (see PTSP). Discuss:
 - Working in a high profile area
 - COVID-19 self checks

A/S 7-25-20

(66)

PFAS Investigation

Ault Field

Phase 3

7.25.20

- 0715 - Move to Area 27; begin staging equipment and hand clearing boring locations.
- 0745 - SF offsite to return to CVL for oversight involving IDW removal for another project. Drillers setting up on BH17
- 0840 - Collect Area 27 Field Blank: WL-AF-FB01-072520 for analysis of:
- Method 537-Mod (PFAS-18)
- 0845 - TF offsite for the day. Continue setup @ BH17
- 0855 - Begin drilling BH17
- 0950 - Reach 50 ft bgs; no GW. Consult w/ Jacobs Management team. Continue until GW is found @ BH17.
- 1005 - GW is observed in the 50-60 foot run @ ~53' bgs. Prep. to set a well. Boring complete.
- 1025 - Collect grab soil sample WL-AF-BH17-SB-53 @ 53 ft bgs for analysis of:
- Method 537 Mod (PFAS-18)
AF 7.25.20

PFAS Investigation

(67)

Ault Field

Phase 3

7.25.20

- 1030 - Collect grab soil sample duplicate WL-AF-BH17-SB-53 from 53 ft bgs for analysis of:
- Method 537 Mod (PFAS-18)
- 1115 - Driller required water to flush out the boring due to mud. Gallons used: 75 gallons
- 1130 - Begin setting monitoring well WL-AF-MW-631 at 1625 former boring BH17 ^{AS}
(see well install completion diagram for details). Screen: 0.020-inch machine slotted from 50-60 ft bgs
- 1140 - Begin building the filter pack:
- 12/20 industrial sand
- quantity: 4 X 50-16 bags
- depth: 50-48 ft bgs
- 1205 - Begin building the seal above the filter pack, and adding bentonite chips to ~3 ft w/in ground surface
- 3/8" Bentonite chips Holepug
- quantity: ~~4 X 5~~ 12 X 50 15 bags
- depth: 48-50 ft bgs
AF 7.25.20

(68)

PFAS Investigation

Ault Field

Phase 3

7.25.20

1230 - W.I. AF. MW. 625 installation complete. Break for lunch.
Driller informs AS that we do not have enough water to complete another well, if the same conditions at BH17 are at the other two site borings.

1315 - Begin move to next location. BH16. Lunch over.

Drum #21: BH17, full

Drum #22: BH17, full

Tote #2: BH17

1420 - Begin drilling @ BH16

See boring log for details

Drum #23: BH16, full

Drum #24: BH16, full

1515 - Reach TD of 60 ft bgs.

GWL observed ~53 ft bgs.

1520 - Take grab GWL sample

W.I. AF. BH16. SB. 53

@ 53 ft bgs for analysis of:

- Method 537 Mod

1530 - Begin cleanup. Do ~~well~~ ^{AS} surface completion @ W.I. AF. MW. 625

AS 7.25.20

Ault Field

PFAS Investigation

Phase 3

(69) 7.25.20

3 (Conty)
1540 - ~~Drum #25 - BH17 AS~~
Aug

W.I. AF. MW. 625 surface

completions

~~Well~~ ^{AS} completion will not be completed today due to the lack of water left on site. The ~~AS~~ ^{AS} incomplete ~~well~~ ^{surface} completion is secured for the duration until drilling resumes.

1630 - AS offsite for the day.

SF remains onsite until cleanup is complete and all equipment and supplies left ~~to~~ ^{AS} left onsite are secured for the duration until drilling resume.

End of Day

7.25.20

[Signature]

(14) PFAS Investigation
Ault Field Phase 3 7.27.20

- Project: Ault Field

- Task/Activity for the day:

Atto complete BHL as monitoring well with MWD-626; advance BHL to a ~~monitoring~~ ^{new} groundwater and complete as a monitoring well

- Personnel: Jacobs Engineering

Annika Seay - FTL (AS)

Shannon Fitzsimmons - (SF) SJHO

- Subcontractors: Yellow Jacket Drilling

Tyler Turpin - driller (TI)

Alex Forman - assistant (AF)

Jeremy Walker - assistant (JW)

~~Adam~~ ^{Adam} ~~Tony~~ ^{Tony} ~~Chen~~ ^{Chen} ~~bach~~ ^{bach} - HS super. (IF/AA) ^{HS}

- PN: 695610CH

- Weather: 63°F, clear

- PPE: Modified Level D + COVID 19 precautions (face masks)

- Equipment: all equipment for today's work is on site and available.

0700 - Field crew meets at Clover Valley laydown yard (CVL) and preps for the day's work

0715 - Move to Area 27.

AS 7.27.20

PFAS Investigation
Ault Field Phase 3 7.27.20

0730 - hold daily tailgate safety meeting (see PTSP). Discuss:

- traffic awareness/safety while working in a high profile area.

- plans for move to next site.

0800 - Prep to set well

WLL AF MWD-626 at boring BHL

take measurements at

MWD AF MWD-625

- DTW: 35.37 ft BTOC

- TD: 59.85 ft BTOC

Casing is ~1 ft above ground, surface completion as flush mount to be completed today.

0815 - sand is heaving TD to 59 ft bgs. AS okays

Setting screen from 49-51 ft bgs

0820 - Begin setting the well

WLL AF MWD-626

see well completion diagram for details

AS AS

7.27.20

- (72) PFAS Investigation
Ault Field Phase 3 7.27.20
- 0825 - Build filter pack
- 12/20 industrial sand
- quantity used:
4 x 50 lb bags. Sand: 49-47 ft bgs
- 0900 - Building seal and grout to top
- 3/8" Bentonite Holeplug
- quantity used:
- 0935 - well WI-AF-MW-626
installation complete. Move to
BH15. Set up to drill Chand
clearance completed
- 1030 - NAVFAC Steve Sheehan stops by
to check progress. Brief visit.
- 1040 - Sheehan off site. Begin
drilling BH15
(see boring log for details)
- 1120 - Observe GW @ ~47 ft bgs
in lithology.
- 1140 - Collect soil grab sample
WI-AF-BH15-SB-47
from 47 ft bgs for analysis
of:
- Method 537-Med
- 1145 - Discuss findings w/ Jacobs
Management. Continue (→)
A/S 7.27.20

- (75) PFAS Investigation
Ault Field Phase 3 7.27.20
- 1145 (cont'd) - drilling to 60 ft bgs, and
complete the well like
the other two set at
Area 27: screen from
50 - 60 ft bgs
- 1215 - Break for lunch after
reaching TD of 60 ft bgs
Drum #25 - ^{surface completion} ~~maxi-drill~~ _{maxi-drill} ~~also~~
- 1245 Drum #26 - BH15
- 1315 - Lunch over. Set up to
build monitoring well
WI-AF-MW-627
- 1315 - lower screen to depth
(50 - 60 ft bgs)
See well completion diagram
for details
- 1320 - Begin building well filter pack
- 12/20 industrial sand
- quantity used 5 x 50 (47 ft bgs
top of filter pack)
- 1400 - Begin building seal
- 3/8" Bentonite Holeplug
- quantity - 12 x 50 lb bags
- 1415 - complete WI-AF-MW-627
Begin site cleanup. Surface
completion done at WI-AF-MW-625
and began at WI-AF-MW-626 and WI-AF-MW-627
A/S 7.27.20

(76)

PFAS Investigation

Ault Field

Phase 3

7.27.20

1500 - ~~SF offsite to provide oversight~~
~~for FRAC tank removal for~~
~~another project. AT~~

Continue site cleanup.

1630 - Surface completion done at
[W1-AF-MW-626]. Move to
[W1-AF-MW-627] for surface
completion

1700 - Surface completions done.
Load up and move to
CVL.

1715 - Arrive at CVL. Decon and prep
for work tomorrow.

1740 - End of Day

7.27.20

[Signature]

(76)

PFAS Investigation

Ault Field

Phase 3

7.27.20

1500 - ~~SF offsite to provide oversight~~ ~~for FRAC tank removal for A's~~ ~~another project.~~ ATJ

Continue site cleanup.

1630 - Surface completion done at

WI-AF-MW-626. Move to

WI-AF-MW-627 for surface completion

1700 - Surface completions done.
Load up and move to CVL.

1715 - Arrive at CVL. Decon and prep for work tomorrow.

1740 - End of Day

7.27.20

PFAS Investigation

Phase 3

7.28.20

Ault Field

- Project: Ault Field
- Task/activity for the day:
Advance two borings at Area 14;
Collect soil and groundwater grab samples.
- Personnel: Jacobs Engineering
Annika Seay - FTL (AS)
Shannon H. Simmons - SSHO (SF)
- Subcontractors: Yellow Jacket Drilling (YJD)
Aaron Adams - HS supervisor (AA)
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Klaker - assistant (JW)
- PN: 695610CH
- Weather: 55°F, partly sunny
- PPE: Modified Level D + COVID-19 precautions (face masks)
- All equipment and supplies for today's work are on site and available for use.

0700 - Field crew meets at Clover Valley laydown (CVL) yard.

0710 - Hold daily tailgate meeting (see PTSP). Discuss:

- COVID-19 self checks - complacency
- mobilization

ATJ 7.28.20

(78)
Ault Field

PFAS Investigation
Phase 3

7.28.20

0720 - SF and AA move to ~~Site~~ ^{Area 14} to confirm parking and staging areas.

0740 - SF and AA back on site. Continue prep to move to Area 14.

0745 - Label drums:
Dx 28 - ~~driller~~ ^{nubbish} - full
Dx 29 - ~~driller~~ ^{nubbish} - full
Dx 30 - ~~driller~~ ^{nubbish} - full

0815 - Move to Area 14.

0820 - Arrive at Area 14. Begin setting up to begin drilling.

0845 - Take measurements
@ ~~14~~ ^{At} 14-MW-2
- DTW: 14.35 ft bgs
- TD: 46.30 ft bgs

Report info back to Jacobs Management to see if this will effect boring depths.

VJD hand clears borings BH19 and BH20 to 5 ft bgs each.

0915 - Jacobs management communicates no changes: TD of 46 ft bgs
2-grab Gwl, 1-soil grab
A/s 7.28.20

PFAS Investigation
Phase 3

(79)
7.28.20

Ault Field

0945 - begin drilling BH20
1015 - Gwl observed in 30-40 ft bgs set up to use hydropunch
1020 - Collect soil grab sample
W1-AF-BH20-SB-30
from 30 ft bgs for analysis of:

- Method 537-Mod (PFAS-18)

1030 - Hydropunch ^{Screen} @ 40-42 ft bgs
DTW = 37 ft bgs

Begin bailing required purge volume (~2 gallons)

1100
1115 - collect field blank

1105
1120 - W1-AF-BH20-FB-072820

1120 - collect grab Gwl sample
W1-AF-BH20-GWL-41
from 41 ft bgs (hydropunch
Screen 40-42 ft bgs)

1115
1130 - Begin cleanup and move to set up at BH19 AA and SF move to Frmr. Bldg. 420 to scope out areas to park equipment and store supplies when moving over there this afternoon.

Drum # 31/32
Soil from BH20
Drum # 32/32

A/s 7.28.20

(80)

PFAS Investigation

Phase 3

Ault Field

7.28.20

* late entry from 7.27.20: *

- ~75 gallons of water was used by the drillers when ^{AS}advancing setting W.I. AF. MW. 626 and W.I. AF. MW. 627. This will need to be purged during development.

1145 - break for lunch

1215 - lunch over. Set up to drill.

1225 - Begin drilling BH19

(see boring log for details)

1310 - GWL @ ~37 ft bgs per lithology, but not a very large water bearing zone. Punch to 40-42 ft bgs.

1320 - No water in boring.

move hydropunch up to 37-39 ft bgs. Allow to set for GWL infiltration.

1340 - No GWL. contact Jacobs Management; decide to go to 50 ft bgs to find a more productive zone.

Find GWL zone w/ 40-50 ft bgs

Take measurements;

~1 ft water. 48-50 ft bgs hydropunch screen

AS 7.28.20

(81)

PFAS Investigation

Phase 3

Ault Field

7.28.20

1415 - Begin bailing. No water. Driller raises and lowers the hydropunch to attempt to unclog the screen.

1425 - water is observed, and present 48-50, GWL @ 43

Drum #33 - BH19

Begin bailing purge volume required (see grab GWL sample)

15

1500 - Collect grab GWL sample

AS

W.I. AF. BH19-GWL-41

from 49 ft bgs (hydropunch screen at 48-50 ft bgs)

15

1505 - Begin site cleanup.

1545 - move from site to Clover Valley Laydown (CVL)

1555 - Arrive at CVL; begin decon

1610 - collect EB

17

1650

W.I. AF. EB08-072820

associated w/ BH19 & BH20 for analysis of:

- Method 537-Mod (PFAS-18)

1745 - Make plans to meet tomorrow. End of Day.

7.28.20

[Signature]

82

PFA5 Investigation

Phase 3

July 29 2020

Ault Field

- Project: Ault Field
- Task/Activity for the day:
Advance BH18 at Bldg 42φ to groundwater and complete as a monitoring well; collect a soil sample.
- Personnel: Jacobs Engineering
Annika Seay - FTL (AS)
Shannon Fitzsimmons - S&T (SF)
Subcontractors: Yellow Jacket Drilling (YJD)
Aaron Adams - HS Supervisor (AA)
Tyler Turpin - driller (TT)
Alex Forman - assistant (AF)
Jeremy Walker - assistant (JW)
- PN: 69561φ CH
- Weather: 54°F, overcast, fog
- PPE: modified Level D + COVID 19 precautions (face masks)
- All equipment and supplies for today's work is on site and available for use.
- 0700 - Field crew meets at Clover Valley Laydown (CVL).
- 0705 - Hold health and safety meeting (see PTSP). Discuss:
 - COVID 19 self checks
 - visibility (fog)
 - mobilization

AS 7.29.20

PFA5 Investigation

Phase 3

7.29.20

83

Ault Field

- 0715 - Prep to move to Bldg 42φ.
- 0745 - move to Bldg 42φ; begin staging equipment
- 0800 - Begin hand clearing BH18 to 5 feet bgs.
- 0930 - BH18 cleared, set up to drill
- 0945 - Begin drilling BH18
(See boring log for details)
- 1015 - At 2φ ft bgs; some water at 2φ ft bgs; continue to 3φ ft bgs
- 1025 - At 3φ ft bgs: some zones of Cnl are seen, but in between confining units. Continue to 4φ ft bgs.
Drum #34 - BH18 - full
- 1030 - At 4φ ft bgs; zones of water production are seen at 34 ft bgs and 37 ft bgs, but not much Cnl is observed in the boring. Peter Lawson consulted: wait ~1 hr for recharge.
- 1130 - AS communicates with Jacobs management that the boring is slowly recharging. Get OK to set screen from 3φ-4φ ft bgs

AS 7.29.20

(84)

PFAS Investigation

Ault Field

Phase 3

7.29.20

1140 - collect soil grab sample

W.L. AF. ^{BH}SB 18-34

from 34 ft bgs for analysis of:

- Method 537-Mod (PFAS-18)

1150 - collect field blank

W.L. AF. FB 01-072920

for analysis of:

- Method 537-Mod (PFAS-18)

1155 - Begin building

W.L. AF. MW. 631 @ BH 18

(see well completion diagram)

- screen: 0.020-inch machine spotted

- depth: 40-30 ft bgs

1200 - Begin building filter pack

- 1/2 industrial sand

- quantity used: 5 x 50 lb bags

filter pack depth: 30-28 ft bgs

1230 - Begin building seal and grout to

~5 ft bgs (note: 3/8" bentonite chips used from top of filter pack to ~5 ft bgs; no grout slurry)

- 3/8" bentonite holeplug chips

- quantity used: ~~5~~ 9 x 50 lb bags

A 57.29.20

PFAS Investigation

(85)

Ault Field

Phase 3

7.29.20

Drum # 35 - BH 18 - full

1245 - Break for lunch

1315 - ~~Continue with setting~~ surface completion at Atr

W.L. AF. MW. 631

Begin site cleanup.

1400 - Continue surface completion and site cleanup. Pack samples for shipment.

1500 - SF offsite to ship samples.

1520 - surface completion done.

1550 ⁵⁰ ~~AF~~ Mobe to CVL

1600 - Arrive at CVL. Park equipment and make plans to meet tomorrow morning.

1630 - Return to hotel to do paperwork.
End of Day

7.29.20

NASWI Ault Field Phase 3 PFAS S1

695610CH.04.FI.WI

8/10/2020

Task: Well development

Personnel: G. Gardner (Jacobs), J. Davis (Yellow Jacket)

Location: Ault Field, Oak Harbor, WA

Weather: Fog in AM, Clear, Sunny in PM

0810 G. Gardner Meet J. Davis at
Clower Valley Laydown Yard.
Unload Coolers & Sampling Supplies
by IDW totes

0830 Mob to Area 29

0840 Road plate & skid steer will not
arrive until tomorrow; need road plate
to access MW-629 and 628

0855 Mob to Area 27 via Charles Porter
Gate

0915 Arrive at Area 27, locate wells.
J. Davis set up trailer at MW-626

0925 H+S meeting

0945 Begin Surging MW-626

1010 Finish Surging, begin bailing

1055 Finish bailing, ~8 gallons bailed

11:15 Begin pumping ~2.3 gpm; see development log

1310 Finish pumping, remove pump

1345 off-site to empty tank at IDW

1350 Only 2 300-gal totes are empty
J. Davis Call H. Adams to ask about

[Signature]

NASWI Ault Field Phase 3 PFAS S1

695610CH.04.FI.WI

8/10/20

getting more

1500 Mob to MW-625

1515 Begin Surging MW-625

1530 Finish ~~bailing~~ Surging, begin bailing

1555 Finish bailing, set up pump

1615 Begin pumping, see development log
for parameters

1830 Stop pumping; Turbidity is still ~700 NTU
will continue pumping tomorrow morning

1845 Off-site

8/10/2020

Genot
Schreiner

NASWI Ault Field Phase 3 PFAS SI
6956LOCH.04.F1.W1

8/11/2020

Task: Monitoring well development

Personnel: G. Gardner (Jacobs), J. Davis (Yellow Jacket)

Location: Ault Field, Oak Harbor, WA

Weather: Cloudy, Foggy in AM, 56 °F
Sunny, 68 °F in PM

0700 Meet at Area 27, H+S meeting

0722 Resume pumping at MW-625

~~0758 Finish development, stop pumping~~ ~~Mob~~

0740 Begin surging & Bailing at MW-627

0758 Finish pumping at MW-625, 89.9 gal purged

0830 Finish bailing at MW-627, ~4 gal bailed

0847 Begin pumping at MW-627, see development log

1140 Stop pumping, finished developing MW-627, 45.75 gal purged
Pack up to Mob to Area 29

1200 Lunch

1300 Mob to Area 29

1315 Retrieve road plate from Clover Valley Laydown Yard

1320 Place road plate accross ditch

1330 Set up smear rig at MW-628

1400 Begin surging MW-628

NASWI Ault Field Phase 3 SI
6956LOCH.04.F1.W1

8/11/2020

1420 Finish surging, start bailing

1430 Finish bailing, ~2 gallons bailed
Set up pump

1450 Begin pumping ~0.25 gpm

1500 Well purges dry

1520 G. Gardner drive to hotel to get sampling pump & tubing.

1540 G. Gardner return to Area 29

Set up sampling pump

1630 Begin pumping ~0.08 gpm

1718 Well purges dry, slow recharge
will allow to recharge over night

1500 J. Davis Begins surging MW-629

1530 Finish surging MW-629, Begin bailing MW-629

1600 Finish bailing MW-629. will begin pumping tomorrow morning

1800 Off-site

8/11/2020

[Signature]

NASWI Ault Field Phase 3 PFAS 51

695610CH 04.FI.WI

8/12/2020

Task: Monitoring well development

Personnel: Jacobs: C. Gardner, A. Vogt
Yellow Jacket: J. Davis.

0600 meet at Clover Valley laydown yard
H&S Meeting

0620 Mob to Area 29

0640 Begin pumping at MW-629 with developer's pump

0645 Well purges dry; slow recharge.

0709 Will allow MW-629 to recharge while
w/ pump MW-628.

Mob to MW-628

0721 Resume pumping MW-628

0805 well dry

0815 Attempt to pump again

0817 0825 Well dry

Terminate development at MW-628

0835 Mob to MW-629

080900 Restart pumping with sampling
pump. Pump is pulling sand with water

0913 Well is dry; Allow to recharge

1000 Attempt to pump again

~~well~~ pump cannot lift
water to surface

1030 Pump is stuck in well

1045 Able to dislodge & remove pump

NASWI Ault Field Phase 3 PFAS 51

695610CH 04.FI.WI

8/12/2020

pump comes out with sand on top,
appears to be formation sand rather
than filter pack

1100 Call P. Lawson to discuss options.
Decide to add clean water to
well and surge and bail again.

1120 Add ~ 8 gal ~~to MW~~ clean
water to MW-629.

DTW = 28.62

1130 Begin Surging

- A. Vogt off-site to purchase supplies
at Grocery Store & Home Depot.

1145 Finish Surging

1150 Begin bailing

1200 ~ 4 gallons bailed; formation sand coming
out with water.

1217 ~ 8 gallons bailed DTW = 67.02
Stop bailing

1230 DTW = 64.50

Call N. Badon to talk about whether
to try to pump some more; Decide
to terminate development at
MW-629

1245 Clean up site

1330 Remove road plate

NASWI Ault Field Phase 3 PFAS S1

695600CH 04.F1.W1

1345 J. Davis remove casing filling ditch
at Area 29. 8/12/20

1400 Transfer ~140 gallons to 10W tote

1415 Mob to WWTP ~~MW-630~~ MW-630

1430 Assemble surge block

1445 Surge block will not yet past joint
at top of screen. call N. Badon
to discuss options

1515 Clean up

1545 Mob to MW-631

1600 Air monitoring device indicates
high LEL, CO, and H₂S

LEL: 10%

CO: 314 ppm

H₂S: 7.7 ppm

Leave well open to breathe
over night

1610 Mob to Home Depot to get supplies
to fix surge block.

1700 Finish building alternative surge block
End of Field Activities

Note: J. Davis off site
at 1430

8/12/2020

Note: C. Escda

+ S. Sheehan on-site

for site visit at 0930,

off-site at 0935 - 8/12/2020

NAS Whidbey Island Phase 3 PFAS S1

695600CH 04.F1.W1/04.F1.W500 8/13/2020

Task: Monitoring well development, Gw Sampling

Personnel: G. Gardner, A. Vogt

Location: Ault Field, Oak Harbor, WA

Weather: Mostly clear, high of 68°F
low of 52°F, winds from WSW 8mp.

0600 Meet in hotel lobby

0620 Mob to Ault Field via Charles Porter
gate

0630 Arrive at WWTP - MW-630
Calibrate Horiba and PID.

0700 prepare surge and bail equipment

0730 Begin surging + Bailing.

0845 Finish surging and bailing
prepare to pump

0900 unable to get pump past the choke
point at the top of the screen

0915 pack up and mob to MW-631
to surge and bail while we wait to
hear from N. Badon.

0900 Begin surge + Bail

1205 Finish bailing ~15 gallons

Set up pump

1245 A. Vogt mob to ~~ent~~ transfer 15 gal
purge water to totes at Clover Valley

1300 call with N. Badon, P. Lawson
and H. Perry to discuss difficulties

NAS Whidbey Island Ault Field Phase 3 PFAS SI
at 695610CH-04.FI.WI/04.FI ^{FS} ~~W5~~ 8/13/2020
at MW-630.

Pumping at MW-631 begins at
12:50

1413 Well runs dry for 3rd time. End
development.

1449 Mob to Clover Valley, Prep for GW sampling

1536 Mob to Former WWTP MW-21

1540 Drop pump down well

1552 Begin purging see sample data sheet for
details

1640 Collect sample ^{A52} ~~WI-AF~~ MW-21-0820

1650 Clean up

1701 Mob to Clover Valley Laydown yard
(Stop to get ice)

1730 Collect EB from pump

~~WI-AF~~ EB01-081320

1735 Collect EB from tubing

~~WI-AF~~ EB02-081320

1750 Off-site

End of Field Activities

8/13/2020

Herbert Gardner

NAS Whidbey Island Ault Field Phase 3 PFAS SI
695610CH-04.FI.WI ^{FS} ~~W5~~ 8/14/2020

Task: Groundwater Sampling

Staff: G. Gardner, A. Vogt

Location: Ault Field, Oak Harbor, WA

Weather: Clear, sunny, high of 70°F, low of 52°F
winds from SE 5 mph

0600 Meet in hotel lobby; Mob to Ault Field

0620 ~~Search~~ H+S meeting. Discussion
about sun exposure and protection

0630 Search for MW-14 and MW-20

0715 Calibrate Horiba and PID.

~~08~~ 0730 Mob to MW-14

0800 Lower pump into well

0815 Begin purging; see sample data sheet
for details

^{A52} 0910 Collect sample ~~WI-AF~~ MW-14-0820

^{A52} MS. ~~WI-AF~~ MW-14-0820-MS

0930 MSD. ~~WI-AF~~ MW-14-0820-MSD

0950 Collect EB from pump

~~WI-AF~~ EB01-081420

0945 Resume search for MW-20

0950 Locate MW-20

0955 Mob to MW-20

1005 Put pump down well

1014 Begin purging

1050 Collect sample ~~WI-A52~~ MW-20-0820

NAS Whidbey Island Ault Field Phase 3 PFAS S1
695610CH 04.FI.FS
8/14/2020

- 1055 Collect FD WI-A52-MW-20P-0820
- 1100 Clean up and decon
- 1115 Mob to Area 14
- 1130 Locate 14-MW-2
- 1200 Set up for sampling
- 1210 Put pump in well
- Begin purging; see sample data sheet for details
- 1300 Collect sample WI-A14-MW-2-0820
- 1315 Clean up and decon
- 1333 Mob to Gallery Golf Course
- 1345 Talk to Club house attendant about accessing pump house 337 to collect sample from Ault Field well #1
- Manager is not available to give us the keys; leave our contact info and mob to Clover Valley Laydown yard.
- 1415 Lunch
- 1445 Mob to Area 27
- 1500 Set up at MW-626
- 1523 Begin purging; see sample data sheet for details.
- 1530 Call from B-²⁰ Lindgren Golf Course manager. He will leave keys to gate at Club house desk

NAS Whidbey Island Ault Field Phase 3 PFAS S1
695610CH 04.FI.FS
8/14/2020

- 1605 Collect ER from tubing Lot # 2058309
- WI-AF-EB07-0814207
- 1720 collect sample WI-AF-MW-626-0820
- 1725 Clean up and decon
- 1740 Mob to Clover Valley Laydown Yard
- Note: ~25 gallons of purge and decon water were transferred to tote #4
- 1810 Off-site
- End of Field Activities

8/14/2020

Permit Binder

NAS Whidbey Island Ault Field Phase 3 PFA5 S1
64506 CH. 04. FI. FS

8/15/2000

Task: Groundwater Sampling

Staff: G. Gardner (SSH), A. Wight (FTL)

Location: Ault Field, Oak Harbor, WA

Weather: Clear sky, high of 74°F, low of 56°F
winds from NNW 2-4 mph

0630 Meet in hotel lobby

Mob to Clover Valley

0645 H+S meeting, discuss lifting heavy
totes full of water

0700 Mob to Area 27

0715 Calibrate Horiba and PID

0730 Set up at MW-625

0810 Put pump in well

0815 Begin purging, see sample data
sheet for details

0935 Collect Sample [WL-AF-MW-625-0820]

0940 Clean up and decon

0950 Move to MW-627

Set up sampling area

1019 Put pump in well

1024 Begin purging, see sample data sheet
for details

1130 Collect Sample [WL-AF-MW-627-0820]

1150 Collect EB from Pump [WL-AF-EB01-081520]

1200 Collect FD [WL-AF-MW-627P-0820]

(Signature)

NAS Whidbey Island Ault Field Phase 3 PFA5 S1
645610 CH. 04. FI. FS

8/15/2000

1205 Clean up and decon

1210 Mob to Clover Valley

1215 Transfer ~10 gallons of purge/decon
water to tote #4.

1220 Mob to Gallery Golf Course

1230 Obtain Key to building ~~371~~ 337

1245 Call NASWI Security to obtain
access to gate 74

1310 Security officer Arrives at gate 74
officer does not have Key to gate

Access pump house through golf course

1350 Begin flushing spigot closest to well
head. Need to turn knob on pump
control box to "hand" to ~~use~~ get water
from spigot

¹⁴⁰⁰ ~~1355~~ Collect Sample [WL-GC-W1-0820]

~~1400~~ Discharge flushed water from bucket
to ground outside pump house.

1410 Mob to Golf Course Club house, return
Key

1415 Mob to Clover Valley Laydown yard

1420 Update drum labels

1430-1445 Mob to get photos of ground around
wells at Area 29, WWTP, and former WWTP

1507 Cannot Access MW-630, road closed

(Signature)

NAS Whidbey Island Ault Field Phase 3 PFAS S1
6956LOCH-04.F1.F5
8/15/2020

1510 Mob to hotel
End of Field Activities

8/15/2020

Frank Gardner

NAS Whidbey Island Ault Field Phase 3 PFAS S1
6956LOCH-04.F1.F5
8/17/2020

Task: Groundwater Sampling (monitoring well
Sampling).

Staff: G. Gardner (SSH0); A. Vogt (FTL)

Location: Ault Field, Oak Harbor, WA

Weather: Scattered clouds, high of 75°F, low
of 57°F, winds from SW 7 mph

0725 Meet at Clover Valley Laydown yard.

- Don PPE

- load supplies into truck

0745 Calibrate Horiba and MultiRAE

0800 H+S meeting; discuss importance of
changing gloves frequently

0815 Mob to Area 29.

0820 Carry supplies and set up at MW-628

0900 put pump down well

0910 Attempt to start pump; pump is not
working. May ~~be~~ Marine battery may not
have sufficient charge to run pump.

0920 return to hotel to charge marine
battery

1040 Battery is charged. Mob to MW-628

1100 Attempt to run pump. Battery not able to
sustain pump when under load

1120 Connect ~~the~~ control box needing unstable
voltage output

(NG)

NAS Whidbey Island Ault Field Phase 3 PFAS S1
69561CCH.04.F1.FS

8/17/2020

1120 Connect control box to truck battery, voltage is stable. Problem is likely that the marine battery is old and faulty. It will run the pump at lower voltage, but will fail under ≥ -13 volts.

1200 call N. Badon. ~~call~~ discuss options for ~~fun~~ getting a new battery.

1230 Mob to store to buy new marine battery.

1300 Lunch

1340 Begin purging MW-628 with new marine battery

1440 Excessive draw down at minimal flow, change to purge dry method of sampling.

1450 Well is dry. will allow to recover over night and collect sample ~~then~~ after 90% recovery.

1500 Clean up and decon

1515 Mob to MW-629

1555 Lower pump into well

1605 Begin purging MW-629; see sample data sheet for details

1640 Well has excessive drawdown with < 100 mL/min flow rate; ~~purge~~ change

NAS Whidbey Island Ault Field Phase 3 PFAS S1
69561CCH.04.F1.FS

8/17/2020

to purge dry sampling method
1650 Well is dry. Allow to recover overnight; will collect sample when well has recovered to 90%.

1655 Clean up and decon

1715 Mob to Clover Valley Laydown Yard; Transfer ~7 gallons of purge and decon water to tote #4

1730 Off-site

End of Field Activities

8/17/2020

Jerrit Anderson

NAS Whidbey Island Ault Field Phase 3 PFA 51
695610.04. FI. FS/04. FI. WI

8/18/2020

Task: Monitoring well sampling, MW development

Staff: G. Gardner (SSH), A. Vayt (FTU)

Location: Ault Field, Oak Harbor, WA

Weather: Partly cloudy, high of 72°F, low of 56°F, wind from SW, 13 mph

0710 Meet in hotel lobby

Mob to Clover Valley Laydown Yard

0730 Calibrate Horiba and MultiRAE

Have trouble changing MultiRAE
Battery pack.

0815 H&S meeting. Topic use of hand
tools, right tool for the task

0830 Mob to Area 29

0840 Carry supplies to MW-628

0853 Check DTW. DTW = 55.87

Water level has not yet recovered
to 90% of initial level

$$65.9 - 55.87 = 10.03$$

$$10.03 \div 12.88 = 0.77$$

WL is only 77% of initial

0900 Check DTW at MW-629

DTW = 57.17

$$64.4 - 57.17 = 7.23$$

$$7.23 \div 14.69 = 0.5 \%$$

WL is only 5% recovered

[Signature]

NAS Whidbey Island Ault Field Phase 3 PFA 51
695610CH. D4. FI. FS/04. FI. WI

8/18/2020

0925 Receive permission to sample MW-
628 and MW-629 without waiting

to for 90% recovery

0930 Deploy pump in MW-628

0950 Collect sample WT-AF-MW-628-0820

1000 Mob to MW-629

1020 Deploy pump in well

1030 Collect sample WT-AF-MW-629-0820

1035 Clean up and decon

1100 Mob to WWTP

1125 Set up at MW-631

1130 Elevated gas readings, allow well to
vent

1150 Deploy pump in well

1208 Begin purging

1340 Collect sample WT-AF-MW-631-0820

MS: WT-AF-MW-631-0820-MS

MSD: WT-AF-MW-631-0820-MSD

1350 Clean up and decon

1405 Take Field blank

WT-AF-FB01-081820

1415 Take EB off pump

WT-AF-EB01-081820

1420 Message from N. Budon. Will
attempt to use bailers to develop

[Signature]

NAS Whidbey Island Ault Field Phase 3 PFAS S1
695610CH.04.FI.FS/04.FI.W1 8/18/2020

MW-630, then sample tomorrow with
peristaltic pump.

1430 Mob to Clover Valley Laydown Yard

1550-1440 Transfer ~3 gallons of purge
and decon water to tote #4

1455 Mob to WWTP

1520 Begin surging and bailing MW-630

1730 Finish bailing, ~30 gallons bailed,
development complete
Clean up and decon

1755 Mob to Clover Valley Lay down
Yard

1805 Transfer ~30 gallons of purge
and decon water to tote #4

1825 Off-site

End of Field Activities

8/18/2020

Herald Herndon

NAS Whidbey Island Ault Field Phase 3 PFAS S1
695610CH.04.FI.FS/04.FI.10/04.FI.W1 8/19/2020

Tasks: IDW sampling, monitoring well sampling,
monitoring well development

Staff: G. Gardner (SSH), A. Vogt (FTL)

Location: Ault Field, Oak Harbor, WA

Weather: Mostly clear skies, high of 73°F
low of 69°F, winds from SE 4 mph

0630 A. Vogt mob to Pine - Environmental
to pickup peristaltic pump

0700 G. Gardner obtain IDW sampling supplies
from hotel front desk

0730 Mob to Clover Valley Laydown Yard

0745 Begin sample management + QC

1000 Finish sample management
Re-label drums due to faded labels

1100 Begin sampling soil IDW

1115 A. Vogt returns with peristaltic pump

1230 Collect soil IDW sample - Composite from
drums #1 - #10

WIAF-IDW-5001-081920

1330 A. Vogt Mob to MW-630 to check
turbidity.

1330 Collect IDW soil samples composite
from drums #11 - #20

WIAF-IDW-
5002-081920

A. Vogt return to Clover
Valley

NAS Whidbey Island Ault Field Phase 3 PFAS SI
695610CH.04.FI.1D/04.FI.FS 8/19/2020

1430 Collect Soil IDW Sample From
drums #21-#28 & #32-#33

WT-AF-IDW-SO03-081920

1575 Collect Soil IDW Sample from
drums #34-#36

WT-AF-IDW-SO04-081920

1550 Collect IDW water sample from totes #1 and #2

WT-AF-IDW-AQ01-081920

1620 Mob to MW-630

1630 Set up at well

Calibrate Horiba and PLD

1656 Begin purging MW-630; See
sample data sheet for details

1715 Take EB from 1/4" tubing

WT-AF-EB01-081920

1730 Collect sample WT-AF-MW630-081920

1740 Clean up and decon

1745 Mob to Clover Valley

1757 Transfer ~2.5 gallons of Purge
and decon water to tote #4

1800 Collect IDW water sample from
totes #3 and #4

WT-AF-IDW-AQ02-081920

1815 Clean up, decon, pack coolers

1850 Off-site, demob to warehouse

8/19/2020 *Levi Anderson*