



Final

Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater, Outlying Landing Field Coupeville

*Naval Air Station Whidbey Island
Oak Harbor, Washington*

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Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater, Outlying Landing Field Coupeville Naval Air Station Whidbey Island, Coupeville, Washington

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Introduction

This evaluation describes the results of a groundwater investigation for Per and Polyfluoroalkyl substances (PFAS) at Outlying Landing Field (OLF) Coupeville, Naval Air Station (NAS) Whidbey Island, in Coupeville, Washington. The objectives of this investigation were to do the following: a) refine the understanding of groundwater flow at the OLF, and b) confirm the presence of PFAS in groundwater and characterize their nature, if present. CH2M HILL, Inc. (CH2M) prepared this document under the Department of the Navy (Navy), Naval Facilities Engineering Command, Comprehensive Long-term Environmental Action—Navy 9000 Contract N62470-16-D-9000, Contract Task Order 08.

Site Background and Description

OLF Coupeville is a military airfield associated with NAS Whidbey Island. The OLF is located 2 miles southeast of the Town of Coupeville, Washington, in Island County (Figure 1), and is located on a broad plateau of Smith Prairie in central Whidbey Island at an elevation of approximately 195 feet above mean sea level (amsl). The paved runway is approximately 5,400 feet long and is bordered by grass maintained by mowing operations extending to the public roads (Navy, 1994). A runway safety area extends approximately 3,300 feet south of the runway footprint and is bordered by trees and residential parcels (Figure 2). OLF Coupeville was commissioned for use by the Navy in 1943, and provides support for day and night Field Carrier Landing Practice operations by the Navy for aircraft based out of NAS Whidbey Island. Such operations allow aviators and crew to fly in patterns as well as practice touch-and-go, simulating carrier landings and take offs.

PFAS are found in aqueous film-forming foam (AFFF) compounds used in Navy firefighting activities. There is no available documentation that AFFF was used at the OLF Coupeville. However, several PFAS were recently detected in a sample collected from an onbase drinking water supply well in November 2016. This served as confirmation that AFFF was historically used/released at the site and this prompted initiation of off-site drinking water sampling and the on-site investigation. Suspected source areas include the runway and buildings located east and west of the runway.

Geologic Setting

Surficial geology at OLF Coupeville consists of the Partridge Gravel, which is composed of sand, gravel, and sand-gravel mixtures with minor inter-layered silt and silty sand. This unit was deposited by glacial meltwaters as a coarsening-upward, marine, kame-delta-turbidite complex (Polenz et al., 2005). Bedding planes in the formation generally dip toward the west in the vicinity of OLF Coupeville. Undivided Pleistocene deposits lie beneath the Partridge Gravel. These deposits consist of poorly sorted, mildly compact sands.

Field Activities Summary

The following field activities were performed as part of this investigation:

- Monitoring well installation
- Groundwater level survey and transducer study
- Groundwater sample collection

The following sections detail the field activities that were completed between November 2016 and March 2017.

Monitoring Well Installation

Twenty-seven groundwater monitoring wells were installed between November 28, 2016 and February 14, 2017, ranging in depth from 106 feet below ground surface (bgs) to 237 feet bgs. Wells were installed using sonic drilling techniques in accordance with the Standard Operating Procedure (SOP) *Installation of Monitoring Wells by Sonic Drilling*, included in the Sampling and Analysis Plan (SAP) (CH2M, 2017). Locations of groundwater monitoring wells are shown on **Figure 2**. Well construction details are included in **Table 1**. Soil boring logs are included as **Attachment 1**.

Because of the presence of shallow perched zones of groundwater, it was necessary to use isolation casings to limit potential cross-contamination during well construction. To install isolation casing, the deeper well at each location was advanced to the depth of the isolation seal using 8-inch diameter casing. The depth of isolation seal was determined based on geology and consultation with the licensed professional hydrogeologist, selecting to seal off a confining unit or material above the aquifer unit of interest for screening. A seal comprised of hydrated bentonite pellets was installed within the 8-inch diameter casing, after which the remainder of the borehole was drilled from the depth of the isolation casing using 6-inch diameter casing to the target screen depth. 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 conditions. For the shallower, second borehole at each nested well location, the entire depth of the borehole was advanced using 6-inch diameter casing with no isolation casings.

Each monitoring well was constructed of 2-inch inside-diameter polyvinyl chloride (PVC) riser with centralizers at 20-foot intervals connected to a 2-inch inside-diameter factory-slotted, PVC screen with a bottom cap. Schedule 40 PVC casing and screen were used for shallow and intermediate wells (those with screen bottom elevations greater than mean sea level). Schedule 80 PVC casing and screen was used for deep wells (those with screen bottom elevations less than mean sea level). Additionally, 5 feet of solid casing was installed below the screen interval to serve as a sump for deep wells. Ten feet of screen was used for all wells, with the exception of WI-CV-MW12-S, which was installed with 15 feet of screen to facilitate communication with the perched saturated zone identified during borehole advancement. Well construction information is included in **Table 1**.

A silica sand filter pack was placed around the annular space of the well screen from the bottom of the boring and extended to a minimum height of 2 feet above the top of the well screen. A bentonite seal, at least 2 feet thick, was placed above the top of the sand pack. After the bentonite had been hydrated, bentonite grout was placed in the remaining annular space.

All monitoring wells were finished with flush-mount completions that included a metal well vault and concrete pad. A locking watertight cap was placed on the PVC pipe and the wells were labeled on the exterior of the well vault with a metal stamp indicating the well identification.

Groundwater monitoring wells were developed concurrently with installation starting January 25, 2017 and ending on February 20, 2017. Wells were developed using surge and purge methods using a stainless-steel bailer, submersible pump, and a pneumatic lift. Water quality parameter (WQP) measurements (pH, temperature, conductivity, and turbidity) and observations were done periodically to monitor development. Wells were considered developed once water quality parameters stabilized or until 4 hours of development had passed, whichever occurred first. All wells were developed based on the above criteria with the exception of wells that experienced insufficient recharge during development. The wells that were not developed to the criteria specified included WI-CV-MW05-S, WI-CV-MW09-S and WI-CV-MW11-S. While WI-CV-MW12-S was developed in accordance with the criteria, the water level for this well was near the bottom of the screened interval at the start of development and one well volume was calculated to be only 0.42 gallons. This well was purged dry several times during development and while measured parameters were stable, the well ultimately did not recharge for sample collection. This lack of recharge may indicate that water removed during development was added during sonic drilling operations and the well itself is not within a water bearing zone. Development logs are included as **Attachment 2**.

Monitoring wells were surveyed by a professional land survey licensed in Washington. The survey report is included as **Attachment 3**.

Groundwater Sample Collection

Groundwater samples were collected between February 20, 2017 and March 4, 2017. Groundwater samples were collected from monitoring wells under low flow and low stress conditions, with the sample pump intake placed at the middle of the well screen interval. In accordance with the SAP, the pumps used were PFAS-free pneumatic pumps operated by compressed air, which is essentially a bladder-less bladder pump, in which the air does not come into contact with the air and water interface.

Depth to water readings and WQPs (specific conductance, pH, turbidity, temperature, dissolved oxygen, and oxidation-reduction potential) were measured and recorded approximately every 5 minutes before sampling using a water quality meter, calibrated daily (at a minimum). If excessive drawdown was created at the minimum acceptable flow rate for low flow and low stress sampling conditions, the pump intake was raised to within a few feet of the top of the water column and a minimum of three well volumes was purged. If the well went dry before purging three well volumes, a sample was collected after recharge had taken place within 24 hours of purging.

WQPs were considered stabilized for three consecutive readings, as follows:

- Temperature remained constant
- pH was within 0.1 pH units
- Conductivity was within 10 percent
- Turbidity measurements were less than 10 nephelometric turbidity units or agreed within 10 percent

Groundwater sample locations are shown on **Figure 2**. Stabilized WQPs recorded before sample collection are presented in **Table 2**. Depth-to-water, WQPs, and total well depth measurements were recorded on Groundwater Sampling Data Sheets included as **Attachment 4**.

During sample collection, sample containers were filled in such a manner so as to minimize aeration of the samples. Quality control (QC) samples were collected at a rate of one duplicate sample for every 10 samples for field duplicates and one matrix spike/matrix spike duplicates sample for every 20 samples collected. One equipment rinsate blank sample was collected each day of sampling from decontaminated or disposable equipment.

Groundwater samples were shipped in an ice-chilled cooler under chain-of-custody protocols to Vista Laboratories in El Dorado Hills, California, a National Environmental Laboratory Accreditation Program-accredited laboratory. Groundwater samples were analyzed for perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and perfluorobutanesulfonic acid (PFBS) via United States Environmental Protection Agency (USEPA) Method 537 (Modified).

Investigation-derived Waste Management and Disposal

Wastes generated during the field activities were characterized as investigation-derived waste (IDW) and managed in accordance with the SAP and applicable SOPs. Solid IDW generated from soil cuttings was containerized in four 20 cubic yard roll-off boxes with lids, inner plastic liners, and outer secondary containment. Additional soil IDW was containerized in 30 stainless steel drums placed on wooden pallets and within secondary containment. Liquid IDW, which included well development and purge water, decontamination water, and residual drilling mud was stored in two 20,000-gallon steel fractionation tanks within secondary containment. Soil and aqueous IDW was sampled for waste characterization (PFAS; Toxicity Characteristic Leaching Procedure VOCs, semivolatiles organic compounds, pesticides, and polychlorinated biphenyls ; total Resource Conservation and Recovery Act of 1976 metals plus copper, nickel, and zinc; total cyanide; corrosivity; ignitability). Waste has been characterized as nonhazardous and is not considered a dangerous waste (State of Washington Dangerous Waste Regulations WAC 173-3030) and is currently awaiting disposal.

Groundwater Elevation Study

A groundwater elevation study was conducted from March 3 through March 20, 2017, which consisted of collection of groundwater measurements using water level meters as well as pressure transducers at the newly installed groundwater monitoring wells.

Groundwater level measurements were collected twice at all monitoring wells: March 3, 2017 and March 18, 2017. Groundwater-level measurements were collected from all of the monitoring wells within a 4-hour period, with the exception of the initial measurement at monitoring well WI-CV-MW06-M. Because of limited accessibility, the groundwater-level measurement was collected from WI-CV-MW06-M on March 6, 2017. Groundwater levels were measured manually at all wells using a water level indicator to the nearest 0.01 foot from the top of the survey point on the PVC-riser casing. Groundwater elevations collected during the hydrogeological study are presented in **Table 3**. Hydrographs generated from transducer data are included in **Attachment 5**.

The study also collected data using pressure transducers to collect measurements over a 48-hour period in groups of six wells. Transducers used were vented water-level data loggers with a vented design to allow for automatic atmospheric pressure compensation. The data loggers recorded water level, water pressure, and temperature, and were programmed to collect measurements at 1-minute intervals to determine if there was any effect on the water table from surrounding domestic water well pumping, tidal influx, and during periods of onsite water well use (weekdays) and nonuse (weekends). Once deployed in a well, the data loggers remained for a minimum 48-hour period. Six total data loggers were used and were deployed in wells that were in relative close proximity. The following well clusters were evaluated simultaneously:

- WI-CV-MW12-D and WI-CV-MW12-S
- WI-CV-MW10-D, WI-CV-MW10-M, WI-CV-MW06-M, WI-CV-MW06-S, WI-CV-MW05-S, and WI-CV-MW05-M
- WI-CV-MW09-M, WI-CV-MW13-S, WI-CV-MW13-M, WI-CV-MW14-M, WI-CV-MW04-S, and WI-CV-MW04-M
- WI-CV-MW11-M, WI-CV-MW11-S, WI-CV-MW07-S, WI-CV-MW07-M, WI-CV-MW08-S, and WI-CV-MW08-M
- WI-CV-MW01-D, WI-CV-MW01-M, WI-CV-MW02-S, WI-CV-MW02-M, WI-CV-MW03-M, and WI-CV-MW03-D

Hydrographs were created from the water-level measurements collected by the Level TROLLs from each well. The water levels were converted to groundwater elevation (based on the surveyed elevation at each well) and were plotted compared with tide elevation predictions for Admiralty Head, located to the southwest of the site (NOAA, 2017). Groundwater elevations were evaluated for tidal influences and for influences because of possible

pumping of onsite wells or the nearby Town of Coupeville water supply well, located approximately 700 feet to the west of the northern edge of the runway.

Deviations from the Sampling and Analysis Plan

The following list summarizes deviations from the SAP (CH2M, 2017) during the field investigation activities and justification for those deviations:

- Middle and deep zone monitoring wells were installed at elevations relative to the mean sea level and depths of private drinking water wells, while screen intervals identified in the SAP were based on existing documentation and research of existing soil borings and wells. The depths specified in the SAP were not always consistent with a water-bearing zones observed in the field. Additionally, according to the Island County Water Resources Advisory Committee, 95 percent of wells on record within one-mile of the OLF Coupeville boundary have bottom depths in the interval between 25 and -100 feet amsl. During borehole advancement, observations were made based on soil type and saturation to determine the appropriate installation depth and number of wells installed at each location. Where practical based on lithology, middle and deep zone monitoring well screened intervals were selected to bias the interval in which most water supply wells were installed, while also adding a preference for installation in more transmissive units.
- Schedule 80 PVC casing and screens with 20-foot spaced centralizers were used at deep wells to increase the rigidity during installation to maintain well integrity.
- Five feet of solid casing connected below the screen interval as a sump was installed to assist with well development and the removal of sediment from the well casing.
- Ten feet of screen was used for all wells installed with the exception of WI-CV-MW12-S, which was installed with 15 feet of screen to facilitate communication with the perched saturated zone identified during borehole advancement.
- Bentonite grout was used for the annular seal during well construction instead of a cement-bentonite mixture because of the complications from colder temperatures during installation. There are no specific cement requirement for well installation in the State of Washington.
- One hour of well development was proposed; however, because of the turbidity of the groundwater observed during development, well development was increased to 4 hours to allow for adequate development.
- During groundwater sampling, excessive drawdown was observed during purging. Wells that went dry were sampled within 24 hours of purging after recharge had occurred. This additional contingency procedure was not described in the SAP.

Data quality and usability was not affected by these deviations.

Updated Conceptual Site Model

No prior environmental investigations at OLF Coupeville have been conducted; as such, the conceptual site model (CSM) provided in the SAP (CH2M, 2017) was based on existing documentation from Island County (Island County, 2005) and from the United States Geological Survey (Sapik et al., 1988). Based on the lithological findings during the well installation as well as the groundwater elevation study, the CSM was updated with site-specific information and observations. Lithology at OLF Coupeville consists of heterogeneous glacial deposits of gravel, sand, silt, and clay. Lithology observed is consistent with the previous mapping by Polenz et al. (2005) and described in the Geologic Setting section of this document. Cross sections have been developed to evaluate the comprehensive site hydrogeology and are shown on **Figures 3** through **7**. These mixed deposits are distributed in beds of inconsistent thickness across the site, which complicates identification of distinct hydrogeologic units.

The first encountered groundwater in the northern portion of the site is present in perched zones between 90 and 130 feet bgs. At this interval, a discontinuous clay and silt layer is encountered, which pinches out in the southern

portion of the site. The underlying “middle zone” is semi-confined, with confined conditions in portions of the northern portion of the site and unconfined conditions in the southern portion, in the vicinity of WI-CV-MW10-M and WI-CV-MW12-S/D. The “middle zone” ranges in thickness from just a few feet to greater than 50 feet. The potentiometric surface for the “middle zone” is at approximately 60 to 85 feet amsl, or 120 to 130 feet bgs. A heterogeneous clay, claystone, and silt confining layer underlies the “middle zone.” Organic material (for example, plant material and peat) was frequently logged in this interval. Transmissive sandy zones are present within and beneath the organic silt and clay unit. Borings completed at the site were typically terminated in the organic clay zone or sandy zones within or beneath it. For the purpose of this assessment, these sandy zones are considered the “deep zone.”

The average range in groundwater elevation fluctuations in each well over the 48-hour period during the transducer study was 0.6 feet or less, which is not large enough to significantly impact groundwater flow direction at the site. The deep wells (WI-CV-MW01-D, WI-CV-MW03-D, WI-CV-MW10-D, and WI-CV-MW12-D) show a clear semidiurnal tidal influence, with water elevations mimicking the predicted tide elevations. Two of the middle-zone wells (WI-CV-MW06-M and WI-CV-MW08-M) show a weaker semidiurnal tidal influence. A potential response to nearby pumping, likely of the Town of Coupeville Keystone well, is observed with daily periods of drawdown observed in the water levels observed at WI-CV-MW14-M. Pumping records have not been obtained for the Town of Coupeville well. Most of the remaining wells show daily fluctuations that appear to correlate with barometric pressure fluctuations. The hydrographs for each well and for groups of wells evaluated simultaneously demonstrate these patterns (**Attachment 5**).

Groundwater contour maps have been generated for the middle and deep zones, included as **Figures 8** and **9**, respectively. Because the perched, shallow zone is discontinuous across much of the site, no contour map for this unit was generated. The dominant flow direction in the middle zone is to the southwest in the northern portion of the site, shifting to the south-southeast in the southern portion of the site. Groundwater flow in the deep zone is to the south.

In general, the overall groundwater flow direction appears to be consistent regardless of tidal influence.

Sampling Results Summary

Groundwater sample results are presented in **Table 4** and shown on **Figure 10**. Comprehensive laboratory results are presented in **Attachment 6**. The following is a summary of the groundwater sampling results from samples collected in February and March 2017:

- **PFBS** – PFBS was detected in seven samples, ranging from an estimated 3.07 nanograms per liter (ng/L) in the sample collected from WI-CV-MW10-M to 473 ng/L in the sample collected from WI-CV-MW05-M. None of the detections of PFBS exceeded the Regional Screening Level (USEPA, 2017) of 400,000 ng/L (based on a hazard quotient of 1.0).
- **PFOS** – PFOS was detected in five samples ranging from an estimated 0.844 ng/L in the sample collected from WI-CV-MW07-M to 54.7 ng/L in the sample collected from WI-CV-MW02-S. There were no detected concentrations that exceeded the USEPA lifetime health advisory (LHA) of 70 ng/L for PFOS.
- **PFOA** – PFOA was detected in five samples, ranging from 9.87 ng/L in the sample collected from WI-CV-MW05-S to 1,190 ng/L in the sample collected from WI-CV-MW05-M. Three samples collected from wells WI-CV-MW02-S, WI-CV-MW05-M and WI-CV-MW14-M exceeded the LHA of 70 ng/L for PFOA.

The highest combined PFOA and PFOS concentration in the intermittent shallow/perched aquifer was 626 ng/L, in the sample from WI-CV-MW02-S. This was the only detection in shallow/perched zone that exceeded the LHA for the total concentration of PFOA plus PFOS (70 ng/L). This location may represent a source area. The highest detection was of PFOA at a concentration of 1,190 ng/L in the sample collected from WI-CV-MW05-M. PFAS concentrations in WI-CV-MW05-S, the shallow well for this well pair, were significantly lower with no exceedances of the LHA (**Figure 10**), indicating a possible upgradient source and potential transport pathway between the shallow/perched and middle zone (which could not be positively confirmed with the existing well network).

PFAS contamination was most widespread in the middle aquifer zone, compared to the shallow/perched and deeper zones. In addition to the elevated concentration in the sample from WI-CV-MW05-M, the combined PFOA and PFOS concentration in the sample from WI-CV-MW14-M also exceeded the LHA at 167 ng/L. Detections of one or more PFAS were noted in WI-CV-MW09-M, WI-CV-MW10-M, and WI-CV-MW13-M. With the exception of a PFOS detection of 0.914 J ng/L at WI-CV-MW03-D, there were no detections of PFAS in the deep zone aquifer.

Data Validation

Data validation was performed on groundwater samples collected February 20 through March 4, 2017 from OLF Coupeville. The data validation report is included in **Attachment 7**. The data validation included a review for systematic errors or patterns that are found in the distribution of data qualifiers.

Select PFAS were analyzed by USEPA Method 537 (modified) as specified in the SAP (CH2M, 2017). The data packages were then reviewed by an independent data validator on the basis of the criteria outlined by *National Functional Guidelines for Superfund Organic Data Review* (USEPA, 2016). Excluding field QC samples, 84 distinct data points were generated, and six results were qualified with J-qualifiers (because of the low sample concentrations) or U-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.

Conclusions and Recommendations

Geologic borings collected as part of this investigation indicated surficial geology composed of sand, gravel, and sand-gravel mixtures with minor inter-layered silt and silty sand, consistent with the Partridge gravel as described in mapping completed by Polenz et al. (2005). Where practical based on lithology, middle and deep zone monitoring well screened intervals were selected to bias the interval in which most water supply wells were installed, while also adding a preference for installation in more transmissive units. Groundwater flow beneath OLF Coupeville is to the south (**Figure 9**), which is consistent with the offbase drinking water results; detections of PFAS and exceedances of the LHA in offbase drinking water were due south of the OLF.

An evaluation of the historical use of AFFF at OLF Coupeville is recommended, to include a desktop review of historical documents as well as interviews with current and former OLF personnel. Additional site characterization is recommended, to include an assessment of PFAS concentrations south of WI-CV-MW05-M and WI-CV-MW10 clusters to evaluate the likely offsite transport pathways in both the middle and deep depth intervals, as well as slug testing and effective porosity testing (to evaluate groundwater flow velocity). Additional source identification efforts may be warranted in the central portion of the base, upgradient of the WI-CV-MW05 well pair. Identification of a source area may be complicated by the intermittent nature of the shallow/perched zone, which increases the probability of installation of dry wells or wells that may periodically go dry depending on precipitation and recharge rates that are dependent on weather conditions. Soil samples and direct-push technology groundwater samples are recommended to address data gaps in source area identification. Proposed groundwater sampling locations for future investigations in order to fill the data gaps discussed herein are included on **Figure 11**.

References

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Tables

TABLE 1
Monitoring Well Construction Summary
Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
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Monitoring Well	Installation Date	Ground Elevation (ft msl)	Top of PVC Casing Elevation (ft msl)	Total Well Depth (ft bgs)	Measured Total Well Depth (ft btoc)	Length of Screen (ft)	Length of Sump (ft)	Depth of Top of Screen (ft bgs)	Depth of Bottom of Screen (ft bgs)	Elevation of Top of Screen (ft msl)	Elevation of Bottom of Screen (ft msl)	Pump Intake Depth (ft btoc)	Screened Aquifer	Northing (feet NAD83)	Easting (feet NAD83)
Site Investigation															
WI-CV-MW01-D	12/8/2016	194.99	194.58	217.42	217.00	10	5	202.00	212.00	-7.01	-17.01	207.00	D	439604.95	1202430.71
WI-CV-MW01-M	12/13/2016	194.97	194.61	163.36	163.00	10	5	148.00	158.00	46.97	36.97	153.00	M	439611.38	1202426.49
WI-CV-MW02-M	12/20/2016	193.57	193.11	167.96	167.50	10	5	152.50	162.50	41.07	31.07	157.50	M	439065.11	1202358.17
WI-CV-MW02-S	1/4/2017	193.53	193.17	106.86	106.50	10	5	91.50	101.50	102.03	92.03	100.00	S	439062.88	1202352.24
WI-CV-MW03-D	1/9/2017	193.49	193.07	237.43	237.00	10	5	222.00	232.00	-28.51	-38.51	227.00	D	439391.27	1201759.66
WI-CV-MW03-M	1/13/2017	193.50	193.14	160.36	160.00	10	5	145.00	155.00	48.50	38.50	150.00	M	439397.60	1201756.79
WI-CV-MW04-M	1/27/2017	193.54	193.19	159.05	158.70	10	--	148.70	158.70	44.84	34.84	153.00	M	440483.04	1201341.55
WI-CV-MW04-S	1/31/2017	193.53	193.20	126.93	126.60	10	5	111.60	121.60	81.93	71.93	116.60	S	440487.00	1201338.34
WI-CV-MW05-M	2/7//2017	190.99	190.64	175.35	175.00	10	5	160.00	170.00	30.99	20.99	165.00	M	438254.53	1201503.60
WI-CV-MW05-S	2/12/2017	190.93	190.38	124.56	124.00	10	--	114.00	124.00	76.93	66.93	122.00	S	438248.04	1201506.33
WI-CV-MW06-M	2/7/2017	198.38	197.87	189.51	189.00	10	5	174.00	184.00	24.38	14.38	179.00	M	437400.58	1202641.22
WI-CV-MW06-S	2/8//2017	198.40	197.97	140.43	140.00	10	--	130.00	140.00	68.40	58.40	138.00	S	437394.46	1202643.62
WI-CV-MW07-M	1/24/2017	200.32	199.57	193.75	193.00	10	5	183.00	193.00	17.32	7.32	185.00	M	441202.27	1200339.00
WI-CV-MW07-S	1/27/2017	200.54	200.02	145.02	144.50	10	5	129.50	139.50	71.04	61.04	139.00	S	441209.76	1200340.48
WI-CV-MW08-M	2/13/2017	205.42	205.21	165.21	165.00	10	5	150.00	160.00	55.42	45.42	155.00	M	441676.52	1202808.83
WI-CV-MW08-S	2/14/2017	205.53	205.17	131.26	130.90 ¹	10	--	120.90	130.90	84.63	74.63	125.00	S	441676.84	1202815.43
WI-CV-MW09-M	12/15/2016	187.55	187.23	197.33	197.00	10	5	182.00	192.00	5.55	-4.45	187.00	M	436991.02	1200530.74
WI-CV-MW09-S	12/21/2016	187.57	187.15	110.92	110.50	10	5	95.50	105.50	92.07	82.07	NA	S	436988.92	1200524.67
WI-CV-MW10-D	1/19/2017	188.62	188.25	206.67	206.30	10	5	191.30	201.30	-2.68	-12.68	196.00	D	436180.75	1203179.80
WI-CV-MW10-M	1/23/2017	188.58	188.33	159.45	159.20	10	5	144.20	154.20	44.38	34.38	150.00	M	436186.13	1203182.90
WI-CV-MW11-M	2/5/2017	202.57	202.14	170.43	170.00	10	5	155.00	165.00	47.57	37.57	157.80	M	443696.16	1199632.00
WI-CV-MW11-S	2/8/2017	202.44	202.01	140.43	140.00	10	--	130.00	140.00	72.44	62.44	138.00	S	443692.06	1199626.40
WI-CV-MW12-D	1/27/2017	187.28	186.85	198.03	197.60	10	5	182.60	192.60	4.68	-5.32	190.00	D	433269.90	1204130.83
WI-CV-MW12-S	1/31/2017	187.38	186.97	106.92	106.50	15	--	91.50	106.50	95.88	80.88	NA	S	433273.82	1204137.37
WI-CV-MW13-M	1/6/2017	189.37	189.11	187.76	187.50	10	5	172.50	182.50	16.87	6.87	177.50	M	437627.11	1200713.17
WI-CV-MW13-S	1/9/2017	189.56	189.28	114.98	114.70	10	--	104.70	114.70	84.86	74.86	NA ²	S	437634.55	1200712.10
WI-CV-MW14-M	1/23/2017	191.95	191.61	176.34	176.00	10	5	161.00	171.00	30.95	20.95	164.00	M	439885.76	1200752.61

Notes:

¹ - Total depth measurement after well development on 02/17/2017.

² - Groundwater sample collected using a disposable bailer due to insufficient water column.

NAD 83 - Washington State Plane Coordinate System, North Zone NAD83-11

-- = No sump used in well construction

bgs = below ground surface

btoc = below top of casing

D = deep aquifer

ft = feet

M = middle/intermediate aquifer

msl = mean sea level

NA = not applicable

TABLE 2

Water Quality Parameters

*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
Coupeville, Washington*

Station ID	Sample Date	Sample Time	Depth to Water (ft btoc)	pH	Conductivity (mS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxidation- Reduction Potential (mV)	Turbidity (NTU)
WI-CV-MW01-D	2/28/2017	14:00	141.8	7.93	0.375	9.44	2.02	-67	--
WI-CV- MW01-M	2/28/2017	11:00	124.4	7.73	0.558	9.23	2.85	10	0.0
WI-CV-MW02-M	3/1/2017	13:55	123.8	7.69	0.599	9.64	1.75	-20	--
WI-CV-MW02-S	3/1/2017	11:00	92.73	7.38	0.667	8.18	2.80	168	--
WI-CV-MW03-D	2/27/2017	17:05	143.26	7.39	0.534	6.75	2.53	-78	--
WI-CV-MW03-M	2/27/2017	13:15	123.05	7.73	0.380	7.84	3.09	116	--
WI-CV-MW04-M	2/28/2017	10:00	125.60	8.31	0.387	10.96	8.31	-157	26.7
WI-CV-MW04-S	3/1/2017	13:25	115.10	6.55	0.485	10.98	11.06	202	12.1
WI-CV-MW05-M	2/23/2017	15:45	123.60	8.41	0.355	11.40	8.75	179.8	96
WI-CV-MW05-S	2/24/2017	17:30	121.50	8.29	0.379	9.09	13.90	161.3	167
WI-CV-MW06-M	2/21/2017	14:25	145.45	7.08	0.634	11.65	0.81	-95	0.0
WI-CV-MW06-S	2/22/2017	12:05	134.95	7.28	0.596	12.50	2.95	201	0.0
WI-CV-MW07-M	3/4/2017	17:15	145.20	7.91	0.448	11.10	1.69	-162	10.1
WI-CV-MW07-S	3/4/2017	13:25	127.80	7.38	0.625	11.40	2.42	162	13.3
WI-CV-MW08-M	3/4/2017	12:00	123.20	7.90	0.555	9.05	2.69	75	--
WI-CV-MW08-S	3/2/2017	10:50	117.85	7.24	0.514	8.31	6.11	181	--
WI-CV-MW09-M	2/23/2017	16:55	126.91	7.57	0.431	11.85	2.82	-152	17.4
WI-CV-MW10-D	2/20/2017	11:45	140.30	7.14	0.507	10.57	8.48	-40.1	1.63
WI-CV-MW10-M	2/22/2017	10:00	136.20	7.49	0.518	10.15	7.51	215.9	1.52
WI-CV-MW11-M	2/26/2017	14:35	136.15	7.86	0.686	8.02	3.94	57	43.0
WI-CV-MW11-S	2/26/2017	14:30	132.80	7.79	0.435	7.21	13.67	133	3.3
WI-CV-MW12-D	3/1/2017	16:50	160.95	6.90	0.569	10.73	1.48	-128	11.3
WI-CV-MW13-M	2/22/2017	16:25	127.65	7.81	0.462	12.07	6.33	-71	1.7
WI-CV-MW13-S	3/3/2017	17:05	110.82	5.71	0.747	12.40	10.54	127	39.7
WI-CV-MW14-M	3/4/2017	17:00	122.50	7.56	0.599	8.23	1.30	-108	--

Notes:

-- - turbidity measurements not presented due to inaccurate calibration

°C = degrees centigrade

mg/L = milligrams per liter

mS/cm = milliseimens per centimeter

mV = millivolts

NM = not measured

NTU = nephelometric turbidity units

TABLE 3

Groundwater Elevations (March 3 and 18, 2017)

*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
Coupeville, Washington*

Monitoring Well ID	Top of Casing Elevation	Depth to Water (03/03/2017)	Depth to Water (03/18/2017)	Groundwater Elevation (03/03/2017)	Groundwater Elevation (03/18/2017)
	ft msl	btoc	btoc	ft msl	ft msl
WI-CV-MW01-D	194.58	141.83	141.45	52.75	53.13
WI-CV- MW01-M	194.61	123.94	124.31	70.67	70.30
WI-CV-MW02-M	193.11	123.26	123.66	69.85	69.45
WI-CV-MW02-S	193.17	92.19	92.52	100.98	100.65
WI-CV-MW03-D	193.07	143.12	142.94	49.95	50.13
WI-CV-MW03-M	193.14	123.24	123.54	69.90	69.60
WI-CV-MW04-M	193.19	123.13	123.64	70.06	69.55
WI-CV-MW04-S	193.20	106.28	106.73	86.92	86.47
WI-CV-MW05-M	190.64	123.17	123.58	67.47	67.06
WI-CV-MW05-S	190.38	120.49	120.69	69.89	69.69
WI-CV-MW06-M	197.87	NM	146.61	NA	51.26
WI-CV-MW06-S	197.97	138.88	134.97	59.09	63.00
WI-CV-MW07-M	199.57	130.07	129.25	69.50	70.32
WI-CV-MW07-S	200.02	126.53	126.69	73.49	73.33
WI-CV-MW08-M	205.21	121.8	121.98	83.41	83.23
WI-CV-MW08-S	205.17	117.48	117.88	87.69	87.29
WI-CV-MW09-M ²	187.23	161.8	126.21	25.43	61.02
WI-CV-MW09-S ¹	187.15	109.18	109.25	77.97	77.90
WI-CV-MW10-D ²	188.25	149.52	141.35	38.73	46.90
WI-CV-MW10-M	188.33	136.03	136.29	52.30	52.04
WI-CV-MW11-M	202.14	132.79	131.89	69.35	70.25
WI-CV-MW11-S	202.01	131.2	131.30	70.81	70.71
WI-CV-MW12-D	186.85	160.47	160.56	26.38	26.29
WI-CV-MW12-S	186.97	106.4	106.51	80.57	80.46
WI-CV-MW13-M	189.11	127.13	127.54	61.98	61.57
WI-CV-MW13-S	189.28	113.25	110.37	76.03	78.91
WI-CV-MW14-M	191.61	122.35	122.93	69.26	68.68

Notes:

¹ -Water column measured to be less than one foot. Groundwater data not used for site investigation.

² Water levels between gauging events were considerably different. For the purpose of cross-sections and contour maps, the water level most consistent with other data from sampling and surrounding wells was used. Future events should confirm levels in these wells.

Dry - well was observed to be dry

btoc = below top of casing

ft = feet

msl = mean sea level

NA = not applicable

NM = not measured

TABLE 4
 Groundwater Sample Results for PFAS (February and March 2017)
*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
 Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
 Coupeville, Washington*

Sample ID	USEPA LHA (May 2016)	USEPA RSL (May 2017)	WI-CV-MW01-D-0217 2/28/17	WI-CV-MW01-M-0217 2/28/17	WI-CV-MW02-M-0317 3/1/17	WI-CV-MW02-S-0317 3/1/17	WI-CV-MW02-SP-0317 3/1/17	WI-CV-MW03-D-0217 2/27/17	WI-CV-MW03-M-0217 2/27/17
Chemical Name									
Perfluorobutanesulfonic acid (PFBS)	--	400,000	4 U	3.94 U	3.88 U	332	357	3.91 U	3.88 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.9 U	0.886 U	0.872 U	54.7	53	0.914 J	0.872 U
Perfluorooctanoic acid (PFOA)	70	--	2 U	1.97 U	1.94 U	571	564	1.95 U	1.94 U

Notes:

Bolded text indicates detection.

Shading indicates exceedance of USEPA Lifetime Health Advisory.

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

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

-- = no screening criteria available

LHA = lifetime health advisory

ng/L = nanograms per liter

NS = not sampled

OLF = Outlying Landing Field

PFBS = perfluorobutanesulfonic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

RSL = regional screening levels

TABLE 4
 Groundwater Sample Results for PFAS (February and March 2017)
*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
 Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
 Coupeville, Washington*

Sample ID	USEPA LHA (May 2016)	USEPA RSL (May 2017)	WI-CV-MW04-M-0217 2/28/17	WI-CV-MW04-S-0317 3/1/17	WI-CV-MW04-SP-0317 3/1/17	WI-CV-MW05-M-0217 2/23/17	WI-CV-MW05-S-0217 2/24/17	WI-CV-MW06-M-0217 2/21/17	WI-CV-MW06-S-0217 2/22/17	WI-CV-MW06-SP-0217 2/22/17
Chemical Name										
Perfluorobutanesulfonic acid (PFBS)	--	400,000	4.03 U	3.91 U	3.82 U	473	12.9	3.91 U	3.97 U	3.94 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.907 U	0.879 U	0.859 U	3.26 J	0.922 U	0.879 U	0.893 U	0.886 U
Perfluorooctanoic acid (PFOA)	70	--	2.02 U	1.95 U	1.91 U	1,190	9.87	1.95 U	1.98 U	1.97 U

Notes:

Bolded text indicates detection.

Shading indicates exceedance of USEPA Lifetime Health Advisory.

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

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

-- = no screening criteria available

LHA = lifetime health advisory

ng/L = nanograms per liter

NS = not sampled

OLF = Outlying Landing Field

PFBS = perfluorobutanesulfonic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

RSL = regional screening levels

TABLE 4
 Groundwater Sample Results for PFAS (February and March 2017)
*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
 Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
 Coupeville, Washington*

Sample ID	USEPA LHA (May 2016)	USEPA RSL (May 2017)	WI-CV-MW07-M-0317 3/4/17	WI-CV-MW07-S-0317 3/4/17	WI-CV-MW08-M-0317 3/4/17	WI-CV-MW08-S-0317 3/2/17	WI-CV-MW09-M-0217 2/23/17	WI-CV-MW10-D-0217 2/20/17	WI-CV-MW10-M-0217 2/22/17	WI-CV-MW11-M-0217 2/26/17
Chemical Name										
Perfluorobutanesulfonic acid (PFBS)	--	400,000	3.91 U	4.39 U	3.91 U	3.85 U	11.2	3.85 U	3.07 J	7.66 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.844 J	0.987 U	0.879 U	0.865 U	0.915 U	0.865 U	0.938 U	1.72 U
Perfluorooctanoic acid (PFOA)	70	--	1.95 U	2.19 U	1.95 U	1.92 U	2.03 U	1.92 U	2.08 U	3.83 U

Notes:

Bolded text indicates detection.

Shading indicates exceedance of USEPA Lifetime Health Advisory.

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

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

-- = no screening criteria available

LHA = lifetime health advisory

ng/L = nanograms per liter

NS = not sampled

OLF = Outlying Landing Field

PFBS = perfluorobutanesulfonic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

RSL = regional screening levels

TABLE 4
 Groundwater Sample Results for PFAS (February and March 2017)
*Evaluation of Per- and Polyfluoroalkyl Substances in Groundwater
 Outlying Landing Field Coupeville, Naval Air Station Whidbey Island
 Coupeville, Washington*

Sample ID	USEPA LHA (May 2016)	USEPA RSL (May 2017)	WI-CV-MW11-S-0217 2/26/17	WI-CV-MW12-D-0317 3/1/17	WI-CV-MW13-M-0217 2/22/17	WI-CV-MW13-S-0317 3/3/17	WI-CV-MW14-M-0317 3/4/17
Chemical Name							
Perfluorobutanesulfonic acid (PFBS)	--	400,000	3.91 U	3.97 U	139	4.07 U	111
Perfluorooctane Sulfonate (PFOS)	70	--	1 U	0.893 U	0.872 U	0.915 U	0.898 J
Perfluorooctanoic acid (PFOA)	70	--	1.95 U	1.98 U	20.4	2.03 U	166

Notes:

Bolded text indicates detection.

Shading indicates exceedance of USEPA Lifetime Health Advisory.

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

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

-- = no screening criteria available

LHA = lifetime health advisory

ng/L = nanograms per liter

NS = not sampled

OLF = Outlying Landing Field

PFBS = perfluorobutanesulfonic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonate

RSL = regional screening levels

Figures



Basemap Data and Imagery Source: Esri

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

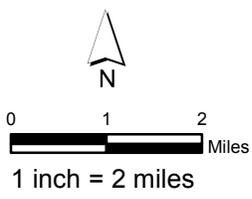


Figure 1
 Base Location Map
 Naval Air Station Whidbey Island
 Whidbey Island, Washington
For Official Use Only



Legend

- Monitoring Well Location
- OLF Coupeville Supply Well
- Elevation Contour (25 ft Interval)
- Base Boundary

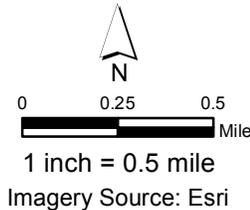
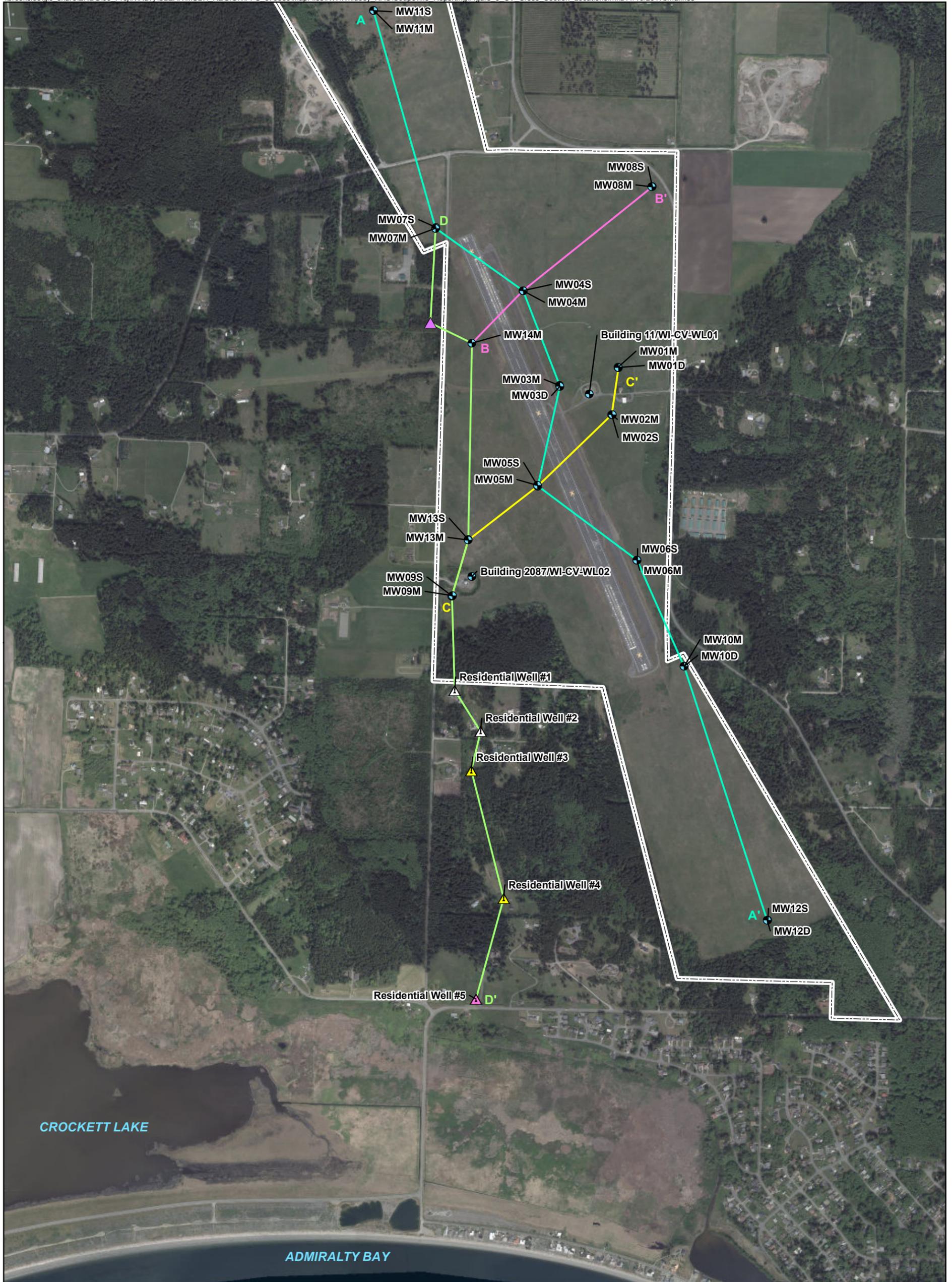


Figure 2
 Site Layout Map
 Outlying Landing Field Coupeville
 Coupeville, Washington
For Official Use Only



Legend

- Well Location
- ▲ Keystone Hill Well Location
- Well Depths**
- ▲ < 60 ft bgs
- △ 151 - 200 ft bgs
- ▲ >201 ft bgs
- Cross Section A-A'
- Cross Section B-B'
- Cross Section C-C'
- Cross Section D-D'
- Base Boundary

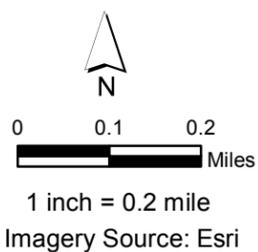


Figure 3
Cross Section Locations
Outlying Landing Field Coupeville
Naval Air Station Whidbey Island
Coupeville, Washington

For Official Use Only

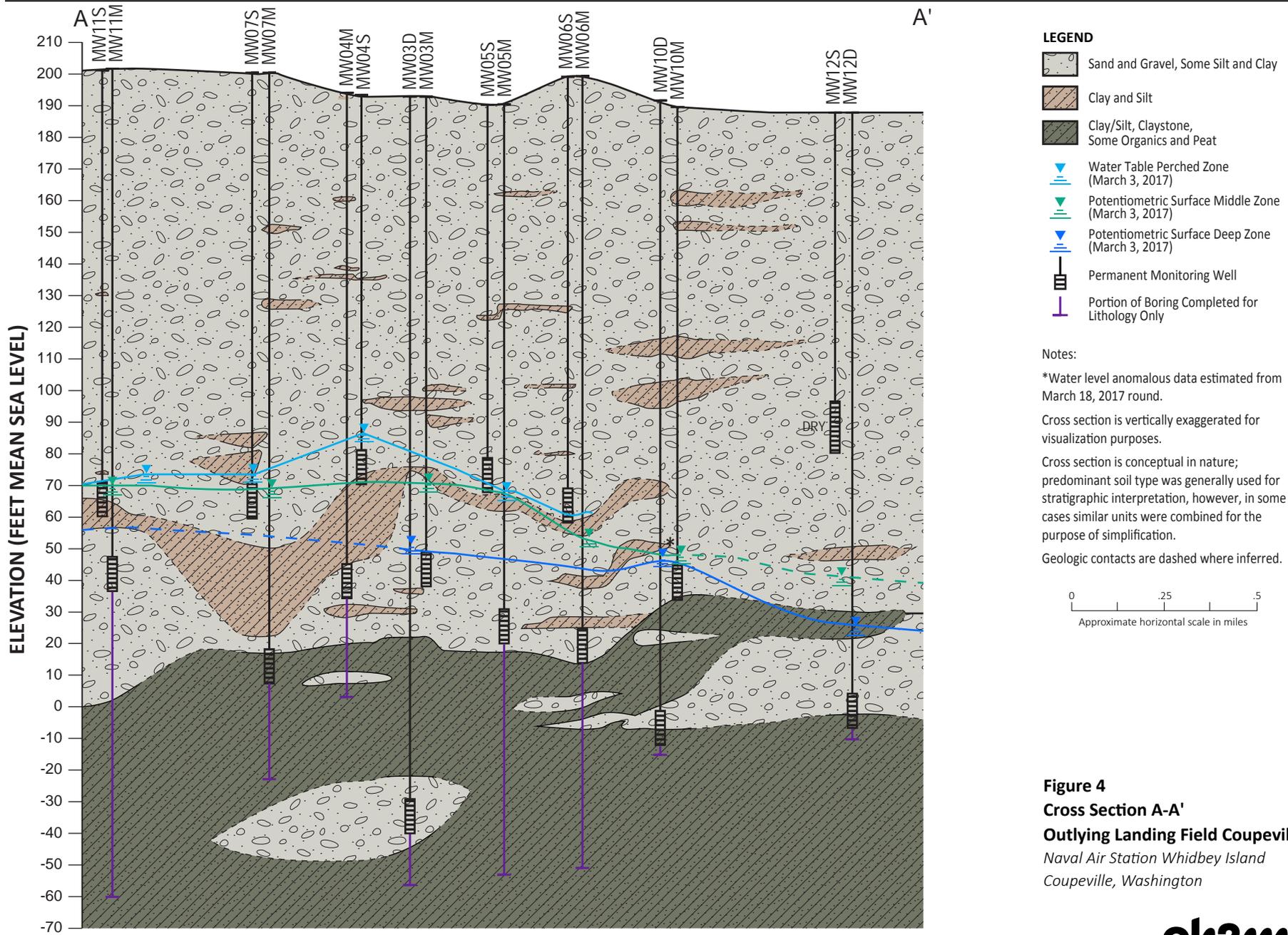
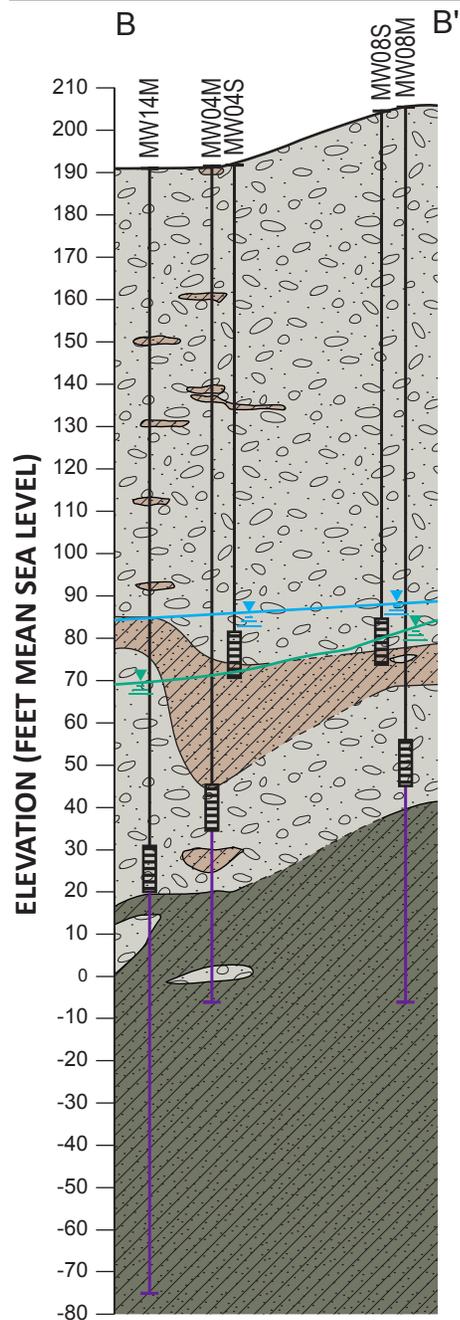


Figure 4
Cross Section A-A'
Outlying Landing Field Coupeville
 Naval Air Station Whidbey Island
 Coupeville, Washington





LEGEND

-  Sand and Gravel, Some Silt and Clay
-  Clay and Silt
-  Clay/Silt, Claystone, Some Organics and Peat
-  Water Table Perched Zone (March 3, 2017)
-  Potentiometric Surface Middle Zone (March 3, 2017)
-  Potentiometric Surface Deep Zone (March 3, 2017)
-  Permanent Monitoring Well
-  Portion of Boring Completed for Lithology Only

Notes:

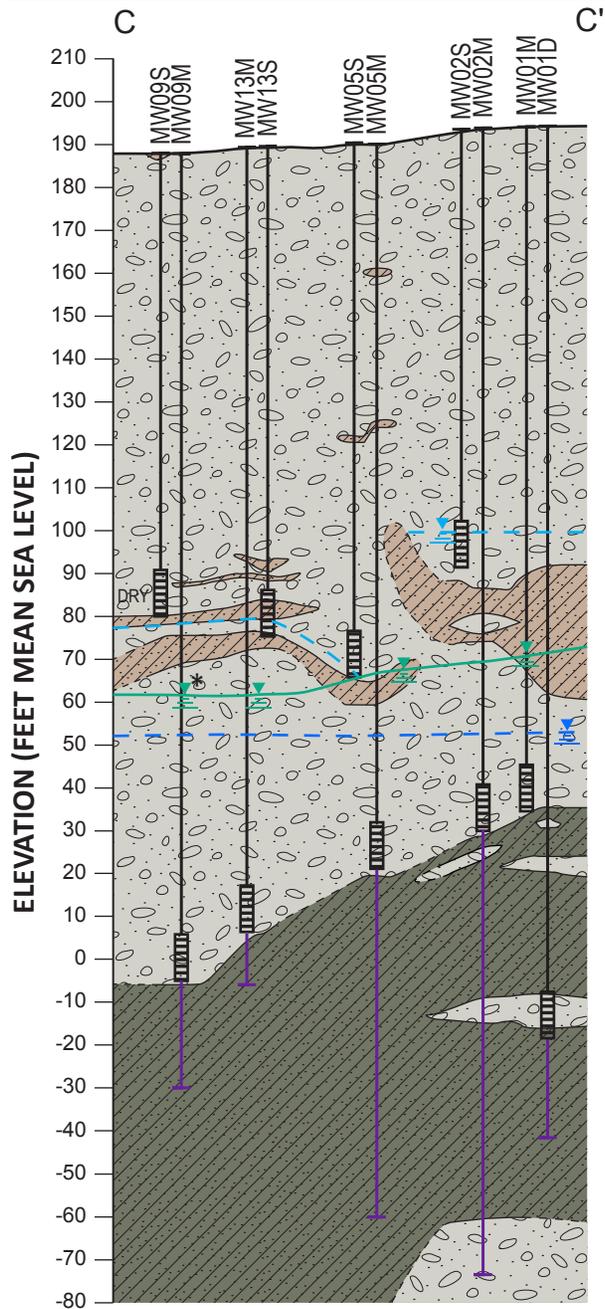
Cross section is vertically exaggerated for visualization purposes.

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

Geologic contacts are dashed where inferred.

Figure 5
Cross Section B-B'
Outlying Landing Field Coupeville
Naval Air Station Whidbey Island
Coupeville, Washington





LEGEND

-  Sand and Gravel, Some Silt and Clay
-  Clay and Silt
-  Clay/Silt, Claystone, Some Organics and Peat
-  Water Table Perched Zone (March 3, 2017)
-  Potentiometric Surface Middle Zone (March 3, 2017)
-  Potentiometric Surface Deep Zone (March 3, 2017)
-  Permanent Monitoring Well
-  Portion of Boring Completed for Lithology Only

Notes:

*Water level anomalous data estimated from March 18, 2017 round.

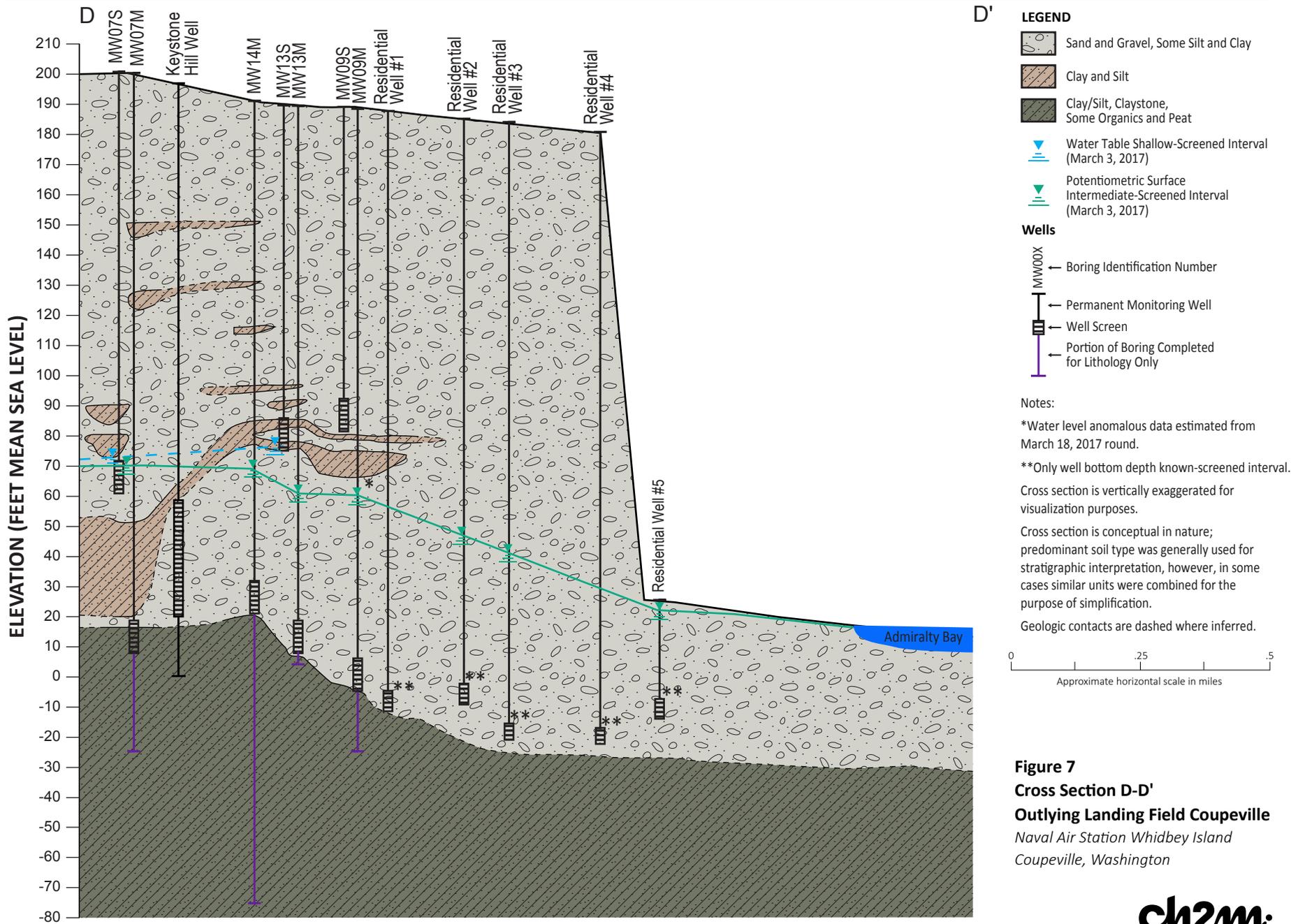
Cross section is vertically exaggerated for visualization purposes.

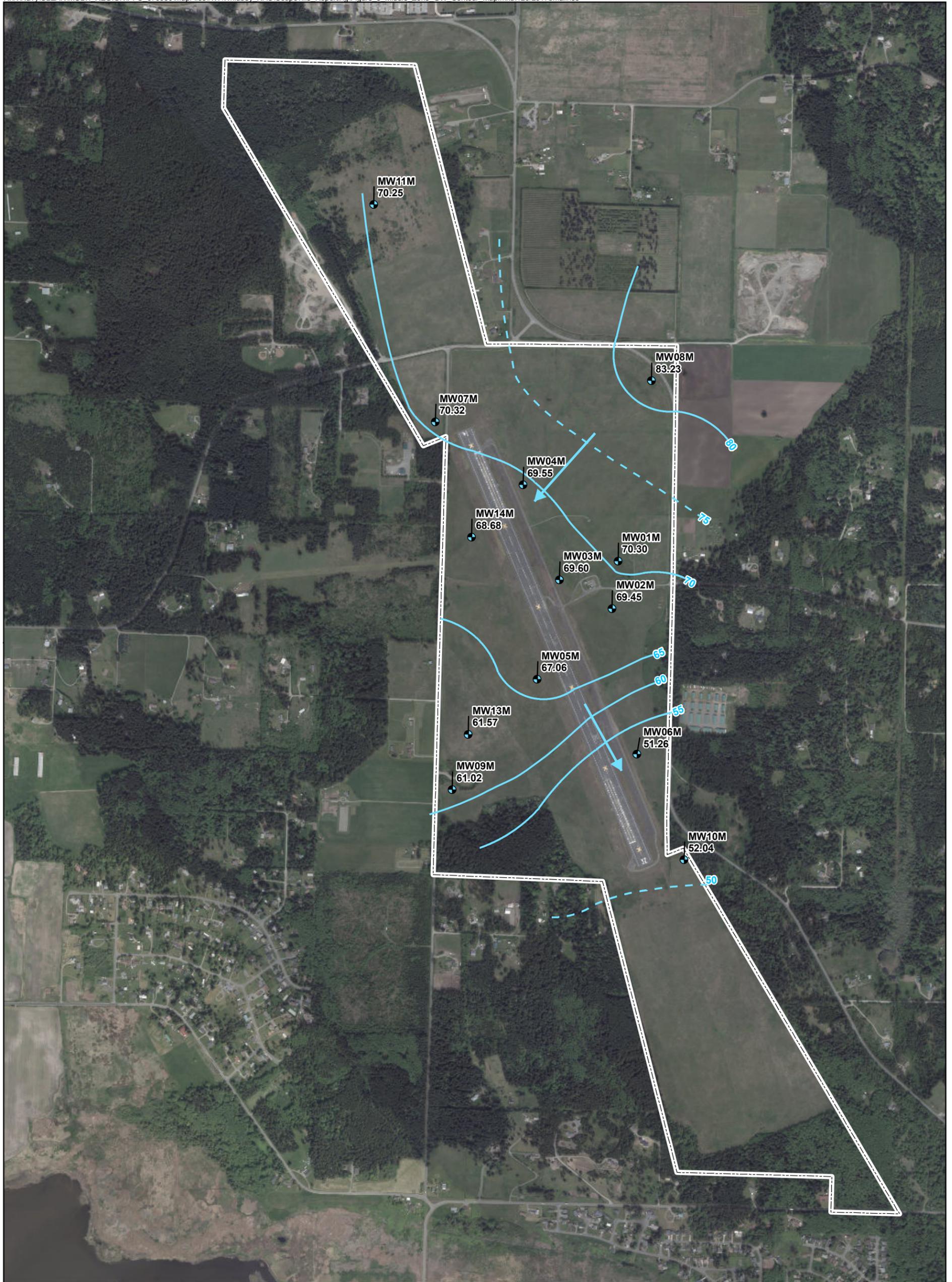
Cross section is conceptual in nature; predominant soil type was generally used for stratigraphic interpretation, however, in some cases similar units were combined for the purpose of simplification.

Geologic contacts are dashed where inferred.

Figure 6
Cross Section C-C'
Outlying Landing Field Coupeville
 Naval Air Station Whidbey Island
 Coupeville, Washington







Legend

- Monitoring Well Location
- 5-foot Contour Interval (dashed where inferred)
- ➔ Direction of Middle Groundwater Flow
- ⎓ Base Boundary

Note:
Groundwater level measurements used to generate this contour map were collected 3/3/2017 and 3/18/2017.

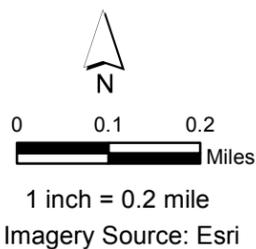
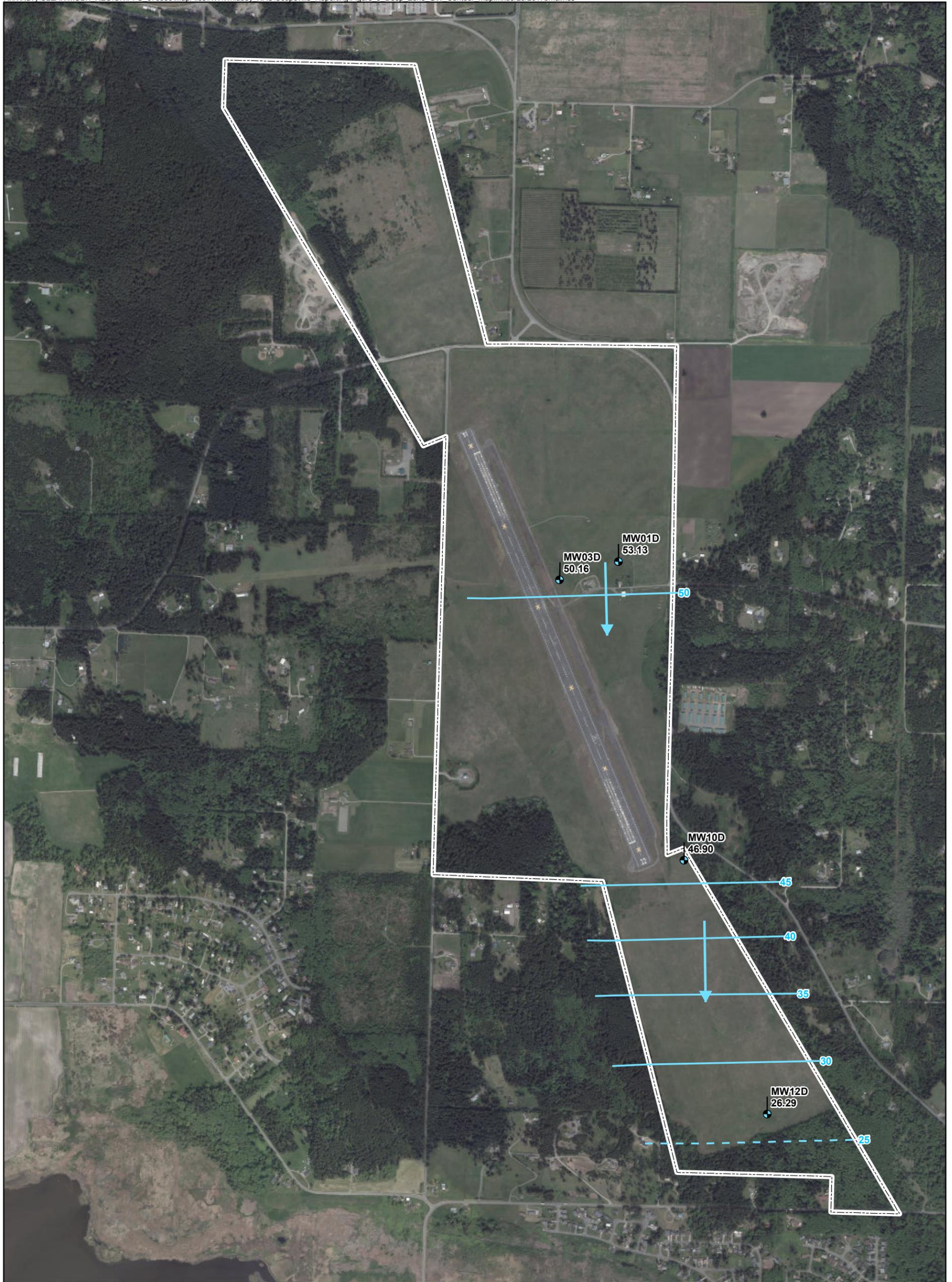


Figure 8
Middle Zone Groundwater Contours
Outlying Landing Field Coupeville
Naval Air Station Whidbey Island
Coupeville, Washington

For Official Use Only



Legend

- Monitoring Well Location
- 5-foot Contour Interval (dashed where inferred)
- ➔ Direction of Deep Zone Groundwater Flow
- - - Base Boundary

Note:
Groundwater level measurements used to generate this contour map were collected 3/3/2017 and 3/18/2017.

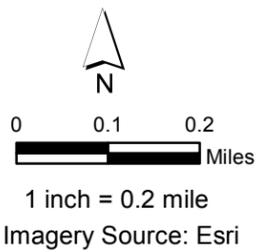
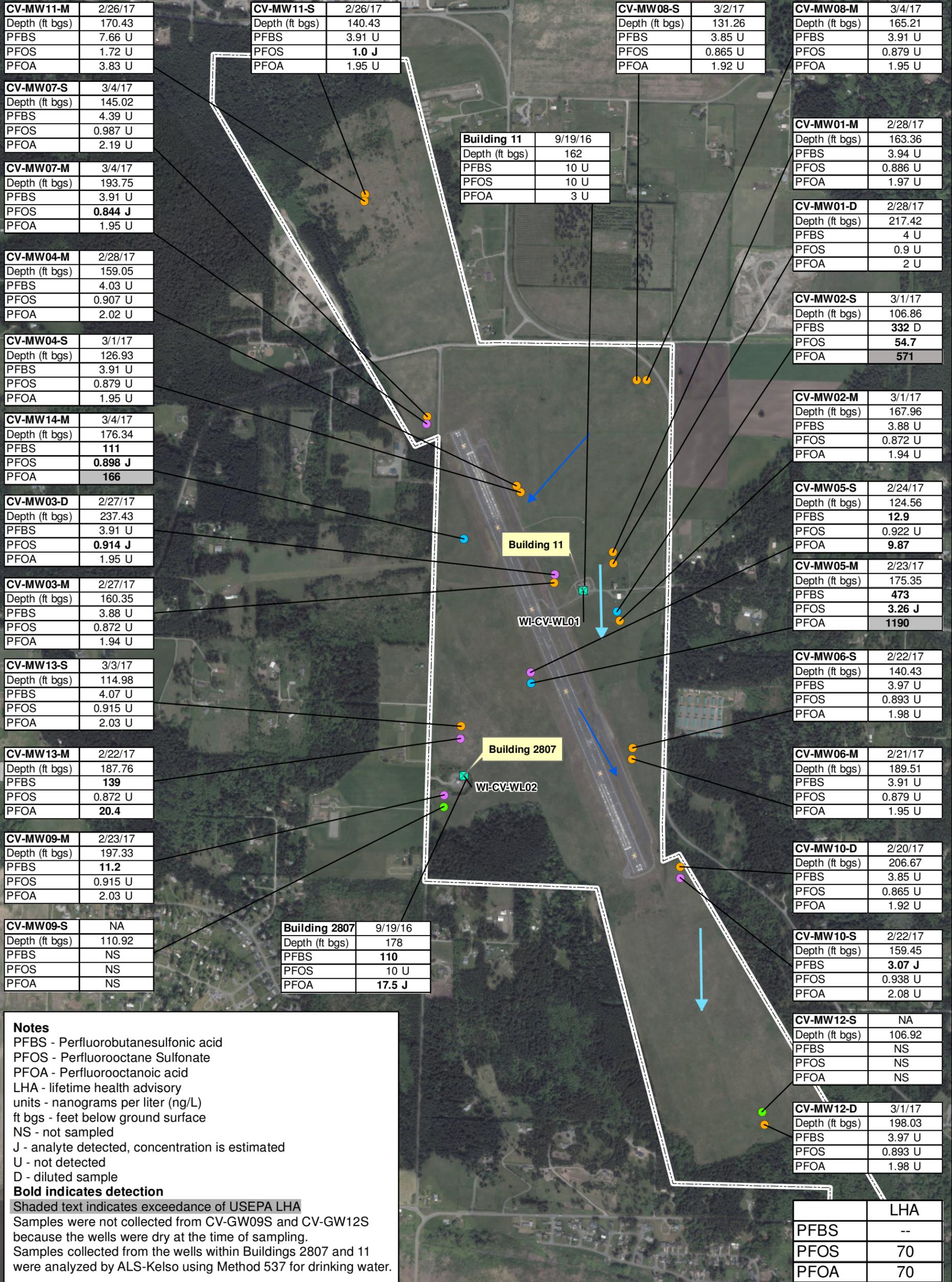


Figure 9
Deep Zone Groundwater Contour Map
Outlying Landing Field Coupeville
Coupeville, Washington

For Official Use Only



Notes
 PFBS - Perfluorobutanesulfonic acid
 PFOS - Perfluorooctane Sulfonate
 PFOA - Perfluorooctanoic acid
 LHA - lifetime health advisory
 units - nanograms per liter (ng/L)
 ft bgs - feet below ground surface
 NS - not sampled
 J - analyte detected, concentration is estimated
 U - not detected
 D - diluted sample
Bold indicates detection
 Shaded text indicates exceedance of USEPA LHA
 Samples were not collected from CV-GW09S and CV-GW12S because the wells were dry at the time of sampling.
 Samples collected from the wells within Buildings 2807 and 11 were analyzed by ALS-Kelso using Method 537 for drinking water.

- Legend**
- Base Supply Well
 - Monitoring well with no exceedance of LHA
 - Monitoring well with LHA exceedance
 - No detections of PFAS
 - Not Sampled
 - Direction of Middle Zone Groundwater Flow
 - Direction of Deep Zone Groundwater Flow
 - Base Boundary

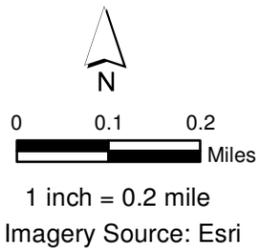
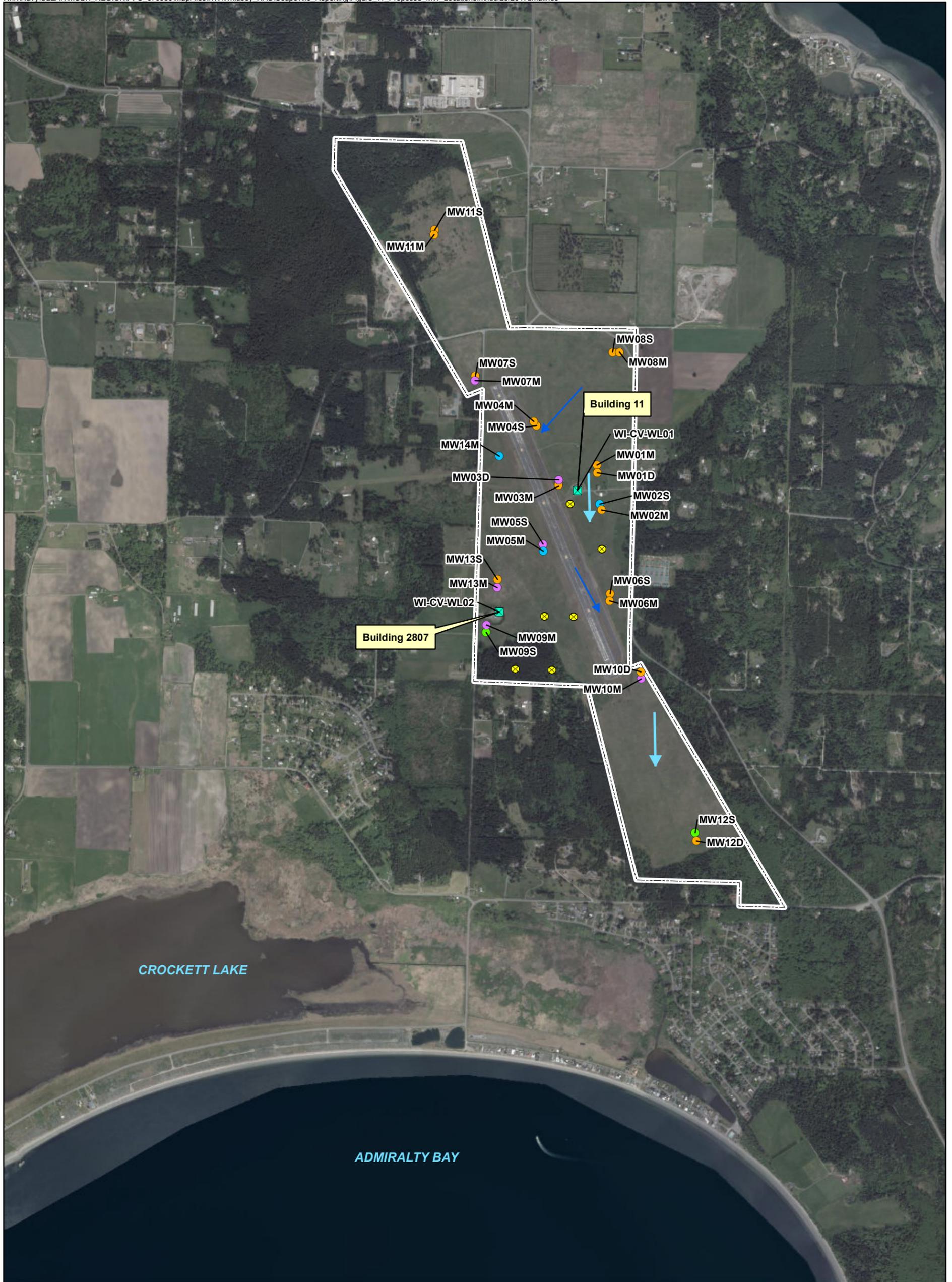


Figure 10
 Detections of PFAS in Groundwater
 Outlying Landing Field Coupeville
 Coupeville, Washington
 For Official Use Only



Legend

- Proposed Monitoring Well Location
- Base Supply Well
- Monitoring well with no exceedance of LHA
- Monitoring well with LHA exceedance
- No detections of PFAS
- Not Sampled
- Base Boundary
- Direction of Middle Zone Groundwater Flow
- Direction of Deep Zone Groundwater Flow

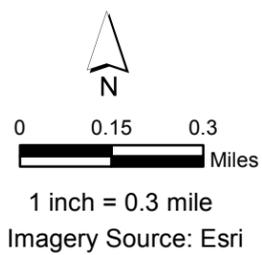


Figure 11
Proposed Monitoring Well Locations
Outlying Landing Field Coupeville
Coupeville, Washington
For Official Use Only

Attachment 1
Soil Boring Logs



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-D	SHEET 3 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439605.0 N, 1202430.7 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling

WATER LEVELS : --- START : 11/30/16 14:40 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
134.6			Silty Sand (SM) 60.4-66.0' - same as above, gray (10YR 5/1)			0.2			
65 129.6	16.5	SN-6	Silty Sand (SM) 66.0-72.6' - dark gray (10YR 4/1) to dark grayish brown (10YR 4/2), moist, moderate dense to dense, fine-grained sand, trace dense silt stringers, dark gray (10YR 4/1)		0.0	0.2	0.0		
70 124.6			No Recovery 72.6-76.0'			0.1			
75 119.6	76.0					NR			
80 114.6			Poorly Graded Sand with Silt (SP-SM) 76.0-80.4' - dark grayish brown (10YR 4/2), moist, loose to medium dense, fine-grained sand			0.1			
85 109.6			Poorly Graded Sand with Silt (SP-SM) 80.4-86.0' - same as above with trace gray (10YR 5/1), silt stringers			0.1			
90	14.6	SN-7	Poorly Graded Sand with Silt (SP-SM) 86.0-90.5' - same as above, wet in 89.0-90.5' silt lens, approximately 0.5' thick, grayish brown (10YR 5/2) to brown (10YR 5/3), moist, stiff, low plasticity, little fine-grained sand, moderate cohesiveness		0.0	0.0			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-D	SHEET 4 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439605.0 N, 1202430.7 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling

WATER LEVELS : --- START : 11/30/16 14:40 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
104.6			No Recovery 90.5-96.0'		0.1				
95 99.6	96.0		Poorly Graded Sand with Silt (SP-SM) 96.0-98.7' - very dark grayish brown (10YR 3/2), moist, moderate density, fine-grained sand, some silt		NR		Driller Note: In 96-116 sample, clayey material squeezed/extruded when retrieving core sample, to longer than 20' length of core	← Bentonite Grout	
100 94.6			Silty Sand (SM) 98.7-102.0' - very dark grayish brown (10YR 3/2), moist, moderate dense to dense, fine-grained sand		0.0				
			Poorly Graded Sand with Silt (SP-SM) 102.0-104.0' -same as 96.0-98.7						
105 89.6		23.6	Clay (CL) 104.0-110.0' - dark gray (10YR 4/1) and very dark gray (GLE Y1 3), stiff to very stiff, medium plasticity, little fine sand, clay is extruded/stretched beyond actual thickness		0.1	0.0			
110 84.6			Silt (ML) 110.0-113.0' - dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2), moist, very stiff		0.0		12/1/16: Approximately 2 ? water (600 gallons) used in drilling; 4 bags quik gel used		
			Silt (ML) 113.0-116.0' - dark gray (10YR 4/1) to dark grayish brown (10YR 4/2), moist, medium stiff/dense, little fine sand		0.1				
115 79.6	116.0		Silt with Sand (ML) 116.0-124.0' - dark gray (10YR 4/1), moist, very stiff/dense, fine-grained sand, no to low plasticity		0.0				
120					0.1				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-D	SHEET 5 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439605.0 N, 1202430.7 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling

WATER LEVELS : --- START : 11/30/16 14:40 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
74.6									
125 69.6	22.2	SN-9	Silt with Sand (ML) 124.0-135.0' - very dark gray (10YR 3/1 to very dark gray (GLE Y1 3), moist, very stiff/dense, fine-grained sand, non-plastic		0.1				
130 64.6					0.0	0.0			
135 59.6	136.0		Silt with Sand (ML) 135.0-136.0' - same as above, grayish brown (2.5Y 5/2) to dark grayish brown (2.5Y 4/2) Silt with Sand (ML) 136.0-137.8' - same as above, wet t saturated (from drilling fluids) Poorly Graded Sand (SP) 137.8-148.6' - dark gray (2.5Y 4/1) to dark grayish brown (10YR 4/2), moist (unsaturated), loose, fine to medium-grained sand, trace fine to loose subround to subangular gravel		0.2		Completed drilling for day on 12/1/16; reached 116' bgs, 96-116; sample pulled Friday (12/2)		
140 54.6							12/2/16: Due to mud inside casing, unable to get accurate water ?? reading cuttings/soil sample, unsaturated to current depth of 136' bgs Drill to 136' bgs on 12/2/16, 150 gallons water used Driller Note: (136-156' Sample), used auger tip to better retain sample (sand), hit something hard at bottom of core, but sample (sand) lost recovery out of bottom of core		
145 49.6	12.6	SN-10			0.0	0.0			
150			No Recovery 148.6-156.0'						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-D SHEET 6 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439605.0 N, 1202430.7 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling

WATER LEVELS : --- START : 11/30/16 14:40 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
44.6									
155 39.6	156.0		Poorly Graded Sand (SP) 156.0-156.9' - same as above, moist to wet (unsaturated)						
			Poorly Graded Sand (SP) 156.9-158.0' - transitioning to silt, very dark gray (GLE Y1 3/N), moist, very stiff, no to low plasticity						
160 34.6	4.9	SN-11	Silt (ML) 158.0-161.3' - same as above						
			No Recovery 161.3-164.0'						
164.0			No Recovery 164.0-167.0'						
165 29.6	0.0	SN-12	Silt (ML) 167.0-169.8' - same as above (156.9-161.3')						
170 24.6	11.0	SN-13	Silty Sand (SM) 169.8-171.8' - very dark brown (GLE Y1 3/N), moist, loose to moderate dense, subround to round fine to large gravel, cobbles to 0.3' length						
			Silty Sand (SM) 171.8-173.6' - very dark gray (10YR 3/1) to very dark gray (GLE Y1 3/N), damp, very stiff to hard, low plasticity						
175 19.6	176.0		Gravelly Silt with Sand (ML/CL) 173.6-174.2' - very dark gray (10YR 3/1), moist, loose to moderate dense/stiff, fine-grained sand, fine to large angular to subround gravel, non-uniform						
			Silt with Sand (ML) 174.2-176.0' - dark gray (10YR 3/1) to very dark gray (GLE Y1 3/N), moist, very stiff to hard, trace fine to subround to subangular gravel						
180			Silt/Lean Clay (ML/CL) 176.0-185.5' - dark gray (GLE Y1 3/N) to very dark gray (10YR 3/1), moist, hard, low plasticity, trace coarse sand, in 182.5-183.0', Sandy Lean Clay, trace coarse sand						

156-176'
Sample: Using auger tip, driller feels 175 potential till, drills to 164', wash out sand above it in hole, use regular bit/tip to confirm presence of till or continuing layer

In 176-196':
Material extruded to > 20'



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-D	SHEET 8 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439605.0 N, 1202430.7 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling

WATER LEVELS : --- START : 11/30/16 14:40 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-15.4			No Recovery 210.1-212.0'		0.4				
212.0			Poorly Graded Silty Sand (SM) 212.0-213.5' dark gray (10YR 4/1), moist to wet, dense, trace fine to subround gravel						
215			Sandy Silt and Poorly Graded Sand (SM) 213.5-216.2' - dark gray (10YR 4/1), moist, very dense, fine-grained sand, trace fine to large subround to round gravel		0.0				
-20.4			TILL Material/Silty Sand (SM) 216.2-222.3' - dark grayish brown (10YR 4/2), moist, very dense, trace to little subround gravel (fine to ?), fine-grained to round sand, few clay stringers, non-plastic		0.0	0.1	0.0		
220	18.3	SN-16	Silt and clay (CL) 222.3-225.3' - dark gray to dark greenish gray (10YR 4/1 to GLEY 4/1), moist, low to medium plasticity, interbedded with 0.2-0.5' sand lenses, very dark gray (10YR 3/1)						
-25.4			- color transition to dark greenish (GLEY1 4/1) in 225.0-226.0'		0.0				
225			Silt and clay (CL) 226.0-226.9' - same as above						
-30.4	226.0		Sandy Silt Interbedded with Clay (ML/CL) 226.9-229.2' - very dark gray (GLEY1 3/N), moist, very stiff						
230			Silt and clay (CL) 229.2-230.5' - same as 225.0-226.0'		0.0				
-35.4		13.8	Poorly Graded Silty Sand (SM) 230.5-233.5' - very dark greenish gray (GLEY1 3/1), moist, very dense, fine-grained sand		0.0		0.0		
235			Silt (ML) 233.5-236.0' dark greenish gray (GLEY1 4/1), to greenish gray (GLEY1 5/2), moist, very stiff to hard, little to some fine sand, no to low plasticity				0.0		
-40.4	236.0		Bottom of Boring at 236.0 ft bgs on						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M SHEET 1 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
194.6								
5	5.0			NA				
189.6								
10	8.2	SN-1		0.0	0.0			
184.6								
15								
179.6	16.0							
20								
174.6								
25								
169.6	10.0	SN-2		0.0	0.0			
30								

Driller Note:
Tough drilling at 20-24' bgs and 30-33' bgs, plus a few large cobbles felt - many account for loss of recovery in 36' sample



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M SHEET 2 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
164.6									
35 159.6	36.0		Poorly Graded Sand (SP) 36.0-42.8' - same as above			NR			
40 154.6			Poorly Graded Sand (SP) 42.8-44.0' - dark gray (2.5Y 4/1) to dark grayish brown (2.5Y 4/2), moist, loose, fine-grained sand, little silt			0.0			
45 149.6			Poorly Graded Sand (SP) 44.0-45.7' - same as above, but dark grayish brown (10YR 4/2)			0.0			
50 144.6	15.6	SN-3	Poorly Graded Sand (SP) 45.7-48.8' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained sand, trace silt			0.0	0.0		
			Sandy Silt (SM) 48.8-49.2' - dark grayish brown (2.5Y 4/2), moist, dense, fine-grained			0.0			
			Poorly Graded Sand (SP) 49.2-51.6' - same as 44.0-45.7'						
			No Recovery 51.6-56.0'						
55 139.6	56.0		Poorly Graded Sandy Silt (SP-SM) 56.0-58.3' - dark grayish brown (10YR 4/2), moist, moderate dense, fine-grained sand, non-plastic						
60			Poorly Graded Sandy Silt (SP-SM) 58.3-66.5' - grayish brown (10YR 5/2), grayish brown, moist, moderate dense to loose, fine-grained sand			0.1'			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M	SHEET 3 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
134.6									
65 129.6	10.5	SN-4	No Recovery 66.5-76.0'		0.0-0.1	0.0-0.1			
70 124.6					NR				
75 119.6	76.0		Poorly Graded Sandy Silt (SM) 76.0-88.5' - same as above, wet, in 76.0-81.0' (most likely from drilling mud), otherwise moist						
80 114.6					0.1'				
85 109.6		SN-5	Sandy Silt (SM) 88.5-90.4' - dark gray (10YR 4/1) and dark grayish brown (10YR 4/2), moist to wet, dense, fine-grained sand, non-plastic		0.0-0.1	0.0-0.1			
90									

← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M SHEET 4 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	SAMPLE #/TYPE										
104.6					Poorly Graded Sand (SP) 90.4-93.2' - dark grayish brown (10YR 4/2), moist, loose to moderate dense, fine-grained sand, trace to few silt						
95					No Recovery 93.2-96.0'			0.1'			
99.6	96.0				Poorly Graded Sand (SP) 96.0-102.3' - same as above						
100					Clay (CL) 102.3-109.8' - dark gray (10YR 4/1) to dark gray (GLE Y1 4/N), moist, stiff to very stiff, medium to high plasticity, trace fine subangular to subround gravel					*Ambient PID readings - 0.1 ppm (drift or due to rainy/wet conditions)	
94.6								0.1'			
105				SN-6							
89.6					Silt (ML) 109.8-113.0' - very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2), moist, medium stiff, low plasticity			0.0-0.1	0.0-0.1		
110					Poorly Graded Silty Sand (ML) 113.0-116.0' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained sand						
84.6								0.1'			
115					Sandy Silt (ML) 116.0-124.8' - very dark gray (2.5Y 3/1) to very dark grayish brown (2.5Y 3/2), moist, stiff, non-plastic						
79.6	116.0										
120								0.2'			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M SHEET 6 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
44.6			Poorly Graded Sand (SP) 150.9-153.7' - same as above, silty sand, sandy silt stringers, increasing moisture in 153.0-153.7'				*Ambient PID readings - 0.0 - 0.2 ppm (likely due to drift or rainy conditions)	<p>2" Schedule 80 - 0.010 Slot Screen</p>	
155 39.6	156.0		No Recovery 153.7-156.0'		0.1'				
160 34.6	10.5	SN-9	Poorly Graded Sand (SP) 156.0-159.2' - very dark gray (GLE Y1 3/N), loose, medium-grained sand, loose, moist to wet, trace silt and coarse sand		0.0				
			Clay (CL) 159.2-162.5' - dark gray (GLE Y1 4/N), moist, stiff, low to medium plasticity		0.0	0.0			
			Clay (CL) 162.5-166.0' - same as above 156.0-159.2', few small (0.2') silt stringers		0.0				
165 29.6	166.0		Sandy Silt (ML) 166.0-168.7' - dark greenish gray (GLE Y1 4/1), moist, very stiff, no to low plasticity						
170 24.6	12.3	SN-10	Gravel (GP) 168.7-171.3' - dark gray (GLE Y1 4/2), saturated, loose, some coarse sand, little silt		0.0	0.0			
			Clay (CL) 171.3-172.3' - very dark gray (GLE Y1 3/N), moist, stiff, moderate plasticity		0.0	0.0	Driller Note: Hit silt/continuing layer at 172' bgs		
			Poorly Graded Sandy Silt (SP-SM) 172.3-172.7' - very dark gray GLE Y1 3/N, moist, moderate dense to loose, fine-grained sand		0.0				
175 19.6	176.0		Coarse Sand and Gravel (GP) 172.7-173.7' - dark gray (10YR 4/1), saturated, loose, coarse-grained sand, little fine to medium sand and silt						
			Sandy Silt (ML) 173.7-175.3' - dark gray (GLE Y1 9/N), moist, very stiff, fine-grained sand, no plastic				*Ambient PID readings - 0.0 - 0.1 ppm		
			Clay (CL) 175.3-176.0' - very dark greenish gray (GLE Y1 3/N), moist, very stiff to hard, moderate plasticity Bottom of Boring at 176.0 ft bgs on 12/12/16 15:30						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW01-M SHEET 7 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439611.4 N, 1202426.5 E)

ELEVATION : 194.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted) 4 x 6

WATER LEVELS : 123.4 ft bgs START : 12/9/10 13:10 END : 12/12/16 15:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)			SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
INTERVAL (FT)	RECOVERY (FT)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
		SAMPLE #/TYPE							
				<div style="display: flex; justify-content: space-between;"> 120 120.5 121 121.5 122 122.5 123 123.5 124 124.5 125 125.5 126 126.5 127 127.5 128 128.5 129 129.5 130 </div>	Water level (12/12): 120' bgs and dropping on 12/13: 123.43' bgs				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M	SHEET 3 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)										
133.1					No Recovery 61.7-66.0'						
65 128.1	66.0				Poorly Graded Sand (SP) 66.0-71.3' - dark grayish brown (2.5Y 4/2), moist, loose, fine sand, trace silt		0.2'			Driller Note: Easier drilling and drilling into a water table in the 66-86' bgs interval	
70 123.1				(Poorly Graded) Silty Sand (SM) 71.3-72.0' - dark gray (2.5Y 41) to dark grayish brown (2.5Y 4/2), moist, dense, fine sand		0.2'					
75 118.1		16.7	SN-5	Poorly Graded Sandy Silt (SP-SM) 72.0-82.7' - dark grayish brown (2.5Y 4/2 to 10YR 4/2), moist, loose to medium dense, fine sand		0.3'			← Bentonite Grout		
80 113.1					No Recovery 82.7-86.0'		0.2'	0.2'			
85 108.1	86.0				Poorly Graded Sandy Silt (SP-SM) 86.0-96.3' - same as above			NR			
90								0.2'			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M	SHEET 4 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
103.1									
95 98.1	18.6	SN-6	Poorly Graded Sandy Silt (SP-SM) 96.3-99.0' - dark gray brown (10YR 4/2), moist, moderate dense to dense, fine sand Poorly Graded Sandy Silt (SP-SM) 99.0-104.4' - dark gray (10YR 4/1) to very dark gray (10YR 3/1), moist, dense, fine sand, non-plastic No Recovery 104.4-106.0'		0.0-0.2"	0.0-0.2"			
100 93.1						0.2"	*Ambient PID readings of 0.2 ppm - likely drift due to equipment		
105 88.1	106.0					0.2"			
110 83.1			Silty Sand (SM) 106.0-114.7' - dark gray (2.5Y 4/1) to dark gray 10YR 3/1), moist to very moist, dense, fine sand, non-plastic			0.0			
115 78.1	18.1	SN-7	Sandy Silt (ML) 114.7-115.8' - dark gray (10YR 4/1) to very dark gray (10YR 3/1), moist, stiff, fine sand, no to low plasticity Clayey Silt (ML) 115.8-120.5' - dark gray (10YR 4/1), moist, very stiff, few lenses of fine-grained sand, moderate plasticity, transitioning to dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/3) in 120.0-120.5'		0.1"	0.1"			
120						0.3"			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M	SHEET 5 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
73.1			Silty Sand (SM) 120.5-121.5' - dark grayish brown (2.5Y 4/2), moist to wet, loose to medium dense, fine sand, trace to few clay, non-plastic Silt with Sand and Clay (ML) 121.5-124.1' - dark grayish brown (2.5Y 4/2), moist to wet, very stiff, little clay lenses, fine-grained sand, trace coarse sand and fine gravel, low plasticity No Recovery 124.1-126.0'		0.1'				
125 68.1	126.0		Sandy Clay (CL) 126.0-127.1' - grayish brown (2.5Y 5/2), moist, very stiff, fine sand, few fine to coarse subround to round gravel, moderate plasticity Poorly Graded Sand (SP) 127.1-131.0' - dark grayish brown (2.5Y 4/2), very moist to wet, loose, fine sand, little silt, trace fine to coarse subround gravel Poorly Graded Sandy Silt (SP-SM) 131.0-136.0' - dark grayish brown (2.5Y 4/2), moist, loose, very fine sand		0.1'				
130 63.1			Poorly Graded Sand (SP) 136.0-140.0' - dark grayish brown (2.5Y 4/2), very moist, loose, fine to medium sand Poorly Graded Sandy Silt (SP-SM) 140.0-142.4' - same as 131.0-136.0' No Recovery 142.4.1-146.0'		0.0-0.1'	0.0-0.1'			
135 58.1	16.4	SN-8			0.1'				
140 53.1			Poorly Graded Sand (SP) 146.0-154.1' - same as 136.0-140.0', grain size increasing with depth		0.1'				
145 48.1	146.0				0.2'				
150								← Bentonite Chips	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M SHEET 7 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
13.1	11.0	SN-11			0.0-0.1'	0.0-0.1'	Note: Set isolation casing at 176' (8 casing), seal with bentonite pellets 170-176' bgs (3 50-lb buckets), drill from 176' bgs using telescoping 6 casing, 4 core barrel		
185 8.1	186.0				0.2'				
190 3.1			Sandy Clay (CL) 186.0-191.4' - dark greenish gray (GLE Y1 3/1), moderate stiff to very stiff, moist, moderate plastic, fine sand, some silt, trace coarse subround to subangular gravel			0.2'			
195 -1.9	20.8	SN-12	Silty with Sand (ML) 191.4-195.2' - dark greenish gray (GLE Y1 4/1) with mottle yellowish brown (10YR 4/6), moist, very stiff to hard, trace fine to coarse subround to subangular gravel, fine sand low plasticity			0.2'			
200 -6.9			Clayey Sand (SC) 195.2-199.0' - dark greenish gray (GLE Y1 4/1), moist, dense to moderate dense, no to low plasticity		0.0-0.1'	0.0-0.1'	*Ambient PID reading up to 0.1 ppm		
			Poorly Graded Sand with Silt and Clay (SP-SM) 199.0-200.2' - very dark greenish gray (GLE Y1 3/1), moderate dense to dense, fine-grained sand, trace coarse subangular gravel			0.2'			
			Silt (ML) 200.2-205.2' - dark greenish gray (GLE Y1 4/1) mottled with dark yellowish brown (10YR 4/6), moist, dense (somewhat friable), some very fine sand, little clay, non-plastic, slight increase in plasticity at bottom			0.2'			
205 -11.9	206.0		Clayey Silty Sand (ML) 205.2-206.0' - brown (10YR 4/2), moist, very dense to dense, very fine sand, non-plastic						
210			Clayey Sand (SC) 206.0-211.0' - dark grayish brown (2.5Y 4/2), very moist, very dense, fine sand, few clay and silt stringer, trace coarse sand, non-plastic						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M SHEET 8 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
-16.9				0.2'				
215 -21.9	21.1	SN-13	<p>Sandy Silt (ML) 211.0-212.5' - dark grayish brown (2.5Y 4/2), mottle with dark yellowish brown (10YR 4/6), moist to very moist, very dense, non-plastic</p> <p>Clayey Silt (ML) 212.5-214.5' - dark greenish gray (GLE Y1 4/1), dry to moist, very dense, low to no plasticity</p> <p>Silty Sandy Clay (CL) 214.5-216.25' - dark yellowish brown (10YR 4/6), moist, hard, low to moderate plasticity</p> <p>Silty Clay (CL) 216.25-222.5' - dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/3), very moist, very stiff, little very fine sand, trace coarse sand, low plasticity</p>	0.0-0.1'	0.0-0.1'			
220 -26.9				0.2'				
225 -31.9	226.0		<p>Silt with Clay (CL/ML) 222.5-225.0' - dark greenish gray (GLE Y1 4/1), dry to moist, mottling with dark yellowish brown (10YR 4/6), dark yellowish brown in 223.0-224.5', very stiff to hard, little very fine sand, low plasticity</p> <p>Sandy Silt (ML) 225.0-226.0' - dark greenish gray (GLE Y1 4/1) with dark yellowish brown (10YR 4/6), moist, very hard, non-plastic</p> <p>Sandy Silt (ML) 226.0-230.0' - very dark gray (2.5Y 3/1), very moist to wet, very stiff, non-plastic</p>	0.1'				
230 -36.9			<p>Sandy Silt (ML) 230.0-232'.0' - same as above, but moist, hard</p> <p>Sandy Silt (ML) 232.0-243.0' - very dark gray (2.5Y 3/1), wet, stiff to very stiff, fine sand, no plasticity</p>	0.2'				
235 -41.9	20.0	SN-14		0.0-0.1'	0.0-0.1'			
240				0.2'				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-M	SHEET 9 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439065.1 N, 1202358.2 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Full-sized Sonic Rig (truck mounted)

WATER LEVELS : --- START : 12/14/16 10:50 END : 12/19/16 10:40 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-46.9									
245 -51.9	246.0		Silt (ML) 243.0-245.0' - very dark gray (2.5Y 3/1), wet, stiff to very stiff, fine sand, no plasticity Silt (ML) 245.0-245.5' - very dark greenish gray (GLE Y1 3/1), moist, very stiff, some fine sand, no to low plasticity Silty Sand (SM) 245.5-246.0' - very dark greenish gray (GLE Y1 3/1), moist, moderate dense, very fine sand Clayey Silt (ML) 246.0-250.6' - dark greenish gray (GLE Y1 4/1), mottled with dark yellowish brown (10YR 4/6), very moist, very stiff, some very fine sand Clayey Sand (SC) 250.6-255.0' - olive brown (2.5Y 4/3), wet/saturated dense, fine-grained sand Clayey Sand (SC) 255.0-256.7' - same as above, but very dark greenish gray (GLE Y1 3/1) Poorly Graded Sand with Silt (SP-SM) 256.7-265.0' - very dark gray (GLE Y1 3/N), wet/saturated, dense to moderate dense, little clay, non-plastic		0.1*		*Ambient PID reading up to 0.1 ppm		
250 -56.9									
255 -61.9	19.6	SN-15				0.0	0.0		
260 -66.9						0.1*			
265 -71.9	266.0		Silty Sand (SM) 265.0-265.6' - dark greenish gray (GLE Y1 4/1), moist, dense, very fine-grained sand No Recovery 265.6-266.0' Bottom of Boring at 266.0 ft bgs on 12/19/16 10:40			0.2			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-S	SHEET 1 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439062.9 N, 1202352.2 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 12/21/16 12:50 END : 1/3/17 12:15 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)										
193.2					Cleared with vac truck/hand auger 0.0-5.0'						
5	5.0										
188.2					Poorly Graded Sand with Gravel (SP) 5.0-8.75' - yellowish brown (10YR 3/4), wet, loose, fine to medium sand, fine to coarse subround gravel						
10											
183.2			8.5	SN-1	Poorly Graded Gravel with Sand (GP) 8.75-13.5' - brown (10YR 3/3), wet, loose, fine to coarse gravel, medium to coarse sand						
15											
178.2					No Recovery 13.5-16.0'						
15	16.0										
173.2					Poorly Graded Gravel with Sand (GP) 16.0-18.4' - brown (10YR 3/3), wet, loose, fine to coarse gravel, medium to coarse sand						
20											
173.2					Poorly Graded Sand with Gravel (SP) 18.4-20.5' - dark brown (10YR 3/3), moist, loose, fine to medium sand, fine to coarse subround gravel						
25											
168.2					Poorly Graded Sand (SP) 20.5-23.5' - brown (10YR 3/3), very moist, loose, fine sand, little coarse sand and fine to coarse subround gravel						
25											
168.2					Poorly Graded Sand with Gravel (SP) 23.5-25.0' - dark brown (10YR 3/3), moist, loose, fine to medium sand, fine to coarse subround gravel						
25											
168.2					Poorly Graded Sand (SP) 25.0-28.65' - dark grayish brown (10YR 4/2), moist, loose, fine-grained, trace silt, trace coarse round to subround gravel						
25											
168.2			12.7	SN-2							
30					No Recovery 28.65-36.0'						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW02-S	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439062.9 N, 1202352.2 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 12/21/16 12:50 END : 1/3/17 12:15 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
103.2									
95 98.2	96.0		Poorly Graded Sand with Silt (SP-SM) 96.0-116.0' - very dark greenish gray (GLE Y1 3/1), very moist to wet, dense to very dense, fine to very fine sand						← Bentonite Chips ← 20/40 Sand
100 93.2									← 2" Schedule 80 - 0.010 Slot Screen
105 88.2	20.0	SN-6	- lenses of very dense silty sand/sandy silt in 105.0-105.25', 107.5-107.8', 108.5-108.75', sandy clay in 111.5-112.75', 114.5-116.0', low to medium plasticity, stiff		0.0	0.0			
110 83.2									
115 78.2	116.0		Bottom of Boring at 116.0 ft bgs on 1/3/17 12:15						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D	SHEET 2 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	SAMPLE #/TYPE										
163.1											
35 158.1	36.0				Poorly Graded Sand (SP) 36.0-43.6' - brown (10YR 4/3), moist, loose, fine to medium-grained, trace silt			0.0			
40 153.1		7.6		SN-3	No Recovery 43.6-46.0'			0.0	0.0	0.0	
45 148.1	46.0				Poorly Graded Sand with Gravel (SP) 46.0-49.5' - brown (10YR 4/3), moist, loose, fine to medium-grained sand, fine to coarse, subround gravel, trace stiff						
50 143.1		6.8		SN-4	Poorly Graded Sand (SP) 49.5-52.8' - brown (10YR 4/3) to grayish brown (10YR 5/2), moist, loose, fine-grained, trace silt, coarse subround gravel			0.0		0.0	
55 138.1					No Recovery 52.8-56.0'						
60	56.0				Poorly Graded Sand (SP) 56.0-63.75' - very dark grayish brown (10YR 4/2), moist to very moist, loose, fine to medium-grained, trace to little fine to coarse subround gravel, trace silt					0.0	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D	SHEET 3 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	SAMPLE #/TYPE										
133.1											
65 128.1	15.7		15.7	SN-5	Poorly Graded Sand with Silt (SP-SM) 63.75-69.75' - dark grayish brown (2.5Y 4/2), moist, medium dense to loose, fine-grained, trace coarse subround gravel		0.0	0.0			
70 123.1					Silty Sand (SM) 69.75-71.5' - olive brown (2.5Y 4/3), moist, dense, fine-grained		0.0				
75 118.1					Poorly Graded Sand with Silt (SP-SM) 71.5-71.7' - olive brown (2.5Y 4/3), moist, medium dense, fine-grained, trace coarse subround gravel No Recovery 71.7-76.0'		NR				
80 113.1	76.0		76.0		Poorly Graded Sand with Silt (SP-SM) 76.0-88.8' - olive brown (2.5Y 4/3), wet to moist (likely due to drilling fluid), medium dense to loose, fine-grained				No PID readings battery malfunctioned		
85 108.1											
90	12.8		12.8	SN-6	No Recovery 88.8-96.0'						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D	SHEET 5 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
73.1			Silt (ML) 120.4'-120.8' - olive brown (2.5Y 4/3), moist, stiff		0.0				
122.0			Poorly Graded Sand (SP) 120.8-122.0' - olive brown (2.5Y 4/3), moist to very moist, medium dense, fine-grained little silt (decrease with depth), trace fine to coarse subround gravel (cobbles to ??) (generalized description) Silty Clayey Sand (SC/SM) 122.0-142.0' - dark grayish brown (10YR 4/2) to very dark gray (GLEYS 1 4/1), wet, moderate dense, low plasticity						
125									
68.1									
130									
63.1	6.0	SN-9			0.0		Driller's Note: 122-142', sample all fell down hole, even with auger bit core barrel., attempt to suck it out/rewire using flapper bit, o 3rd attempt, retrieve ~6' messy/saturated recovery		
135									
58.1									
140									
53.1									
142.0			Silty Sand (SM) 142.0-148.5' - dark grayish brown (10YR 4/2), moist to wet (likely from drilling mud) medium dense, fine-grained						
145									
48.1									
150			Poorly Graded Sand with Silt (SP-SM) 148.5-151.5' - very dark gray (10YR 3/1), moist, medium dense, fine-grained						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D	SHEET 7 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
13.1	23.3	SN-12			0.1	0.0	0.0		
185 8.1					0.0				
188.0									
190 3.1			Sandy Clay (CL) 188.0-193.0' - very dark greenish gray (GLE Y1 3/1), very moist, stiff, fine-grained sand, low plasticity				0.1		
195 -1.9			Silty Clay (CL) 193.0-202.0' - dark greenish gray (GLE Y1 4/1), moist to very moist, stiff, low to medium plasticity				0.2		
200 -6.9	23.0	SN-13			0.0		0.0		
205 -11.9			Silty Clay (CL) 202.0-206.0' - dark greenish gray (GLE Y1 4/1), damp/dry to moist, stiff, low to medium plasticity				0.2		
206.0									
210			Silty Clay (CL) 206.0-216.0' - dark greenish gray (GLE Y1 4/1), very moist, stiff to medium stiff, moderate plasticity, some fine sand in 213.0-216.0'				0.0		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D	SHEET 8 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-16.9	16.5	SN-14			0.0	0.0			
215 -21.9	216.0		Clayey Sand (SP-SC) 216.0-222.0' - very dark greenish gray (GLEY1 3/1), very moist/wet, medium dense, fine-grained, non plastic		0.2			← Bentonite Chips	
220 -26.9			Poorly Graded Sand with Clay (SP-SC) 222.0-229.5' - very dark greenish gray (GLEY1 3/1), wet/very moist, moderate dense, fine-grained		0.2			← 20/40 Sand	
225 -31.9	16.4	SN-15			0.0	0.0			
230 -36.9			Poorly Graded Sand with Clay/Silt (SP/SC) 229.5-232.4' - wet, loose, fine to medium-grained		NR				
			No Recovery 232.4-236.0'						
235 -41.9	236.0		Poorly Sorted Sand with Clay (SP/SC) 236.0-238.0' - greenish black (GLEY1 2.5/1), wet, moderate dense to loose, fine-grained, trace gravel		0.0			← 2" Schedule 80 - 0.010 Slot Screen	
240			Poorly Graded Sand (SP) 238.0-238.6' - dark greenish gray (10YR 4/1), wet, loose, medium-grained, little clay		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW03-D
SHEET 9 OF 9	
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439391.3 N, 1201759.7 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Truck - Mounted - Full-sized Sonic Rig, 8" Rotary Casing with 4" x 6" Telescope Casing

WATER LEVELS : --- START : 1/4/16 14:40 END : 1/8/17 16:30 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-46.9	110.0	SN-16	Sandy Clay (CL) 238.6-239.6' - very dark gray (GLE Y1 3/1 to dark greenish gray (5G 4/1), wet/very moist, stiff, low plasticity Clayey Sand (SC) 239.6-241.0' - dark greenish gray GLE Y1 4/1), moist, dense, fine-grained sand, trace fine gravel Sandy Silt (ML) 241.0-246.0' - dark grayish brown (10YR 3/2), damp to dry, friable/crumblly stiff		0.0	0.0			
245 -51.9	246.0		Silt (ML) 246.0-250.0' - very dark grayish brown (10YR 3/2), damp to dry, very stiff, little fine sand		0.0	0.0			
250 -56.9	11.7	SN-17	Sandy Silt (ML) 250.0-252.5' - dark greenish green (GLE Y1 4/1), damp to moist, very stiff, no to low plasticity Poorly Sorted Sand with Silt (SP-SM/SP-SC) 252.5-256.0' - very dark greenish gray (GLE Y1 3/1), wet, dense, fine to medium-grained, non plastic		0.0	0.0			
255 -61.9	256.0		Bottom of Boring at 256.0 ft bgs on 1/8/17 16:30						



PROJECT NUMBER: 679580.FI.WI	BORING NUMBER: WI-CV-MW03-M	SHEET 2 OF 6
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439397.6 N, 1201756.8 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 1/10/17 15:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
163.1	7.3	SN-4	Poorly Graded Sand with Gravel (SP) 29.5-33.3' - dark grayish brown (10YR 4/2), moist to wet, loose, fine to medium-grained, fine to coarse subangular to subround gravel, trace to little silt	[Symbolic Log Pattern]	0.1	0.0			[Well Diagram Pattern]
			No Recovery 33.3-36.0'		0.0	0.0			
35 158.1	36.0		Poorly Graded Sand with Silt (SP-SM) 36.0-43.1' - brown (10YR 4/3), moist, loose, fine-grained, trace fine to coarse subangular gravel	[Symbolic Log Pattern]	NR				[Well Diagram Pattern]
			No Recovery 43.1-46.0'						
40 153.1	7.1	SN-5	Poorly Graded Sand with Silt (SP-SM) 43.1-46.0' - brown (10YR 4/3), moist, loose, fine-grained, trace fine to coarse subangular gravel	[Symbolic Log Pattern]	0.0	0.0	0.0		[Well Diagram Pattern]
			No Recovery 46.0-48.0'						
45 148.1	46.0		Poorly Graded Sand with Silt (SP-SM) 48.0-53.0' - olive brown (2.5Y 4/3) to brown (10YR 4/3), moist, loose, fine-grained, trace fine to coarse subround gravel	[Symbolic Log Pattern]	NR				[Well Diagram Pattern]
			No Recovery 53.0-56.0'						
50 143.1	56.0	SN-6	Poorly Graded Sand with Silt (SP-SM) 56.0-58.5' - olive brown (2.5Y 4/3) to brown (10YR 4/3), moist, loose, fine-grained, trace fine to coarse subround gravel	[Symbolic Log Pattern]	0.0	0.0	0.0		[Well Diagram Pattern]
			No Recovery 58.5-60.0'						
55 138.1					NR				
60					0.0				



PROJECT NUMBER: 679580.FI.WI	BORING NUMBER: WI-CV-MW03-M	SHEET 3 OF 6
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439397.6 N, 1201756.8 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 1/10/17 15:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
133.1	8.7	SN-7	Poorly Graded Sand (SP) 58.5-64.7' - dark grayish brown (10YR 4/2), very moist, loose, fine to medium-grained, trace to little silt, trace fine to coarse subround gravel	[Symbolic Log Pattern]	0.0	0.0		← Bentonite Grout	
65 128.1	66.0		No Recovery 64.7-66.0'	[Symbolic Log Pattern]					
70 123.1	9.9	SN-8	Poorly Graded Sand with Silt (SP-SM) 66.0-70.0' - olive brown (2.5Y 4/3), moist, loose to medium dense, very fine-grained sand, trace clayey silt lenses	[Symbolic Log Pattern]		NR			
75 118.1	76.0		Poorly Graded Sand with Silt (SP-SM) 70.0-75.9' - brown/olive brown (2.5Y 4/3), moist, loose to medium dense, very fine to fine-grained	[Symbolic Log Pattern]	0.0	0.0			
80 113.1	8.7	SN-9	No Recovery 75.9-76.0' Sandy Silt (ML) 76.0-76.5' - olive brown (2.5Y 4/3), wet (likely from drilling fluid) dense, nonplastic Poorly Graded Sand with Silt (SP-SM) 76.5-84.7' - brown/olive brown (2.5Y 4/3), moist, loose to medium dense, very fine to fine-grained	[Symbolic Log Pattern]	0.0	0.0			
85 108.1	86.0		No Recovery 84.7-86.0'	[Symbolic Log Pattern]					
90			Poorly Graded Sand with Silt (SP-SM) 86.0-93.6' - brown/olive brown (2.5Y 4/3), moist, loose to medium dense, very fine to fine-grained	[Symbolic Log Pattern]		NR			



PROJECT NUMBER: 679580.FI.WI	BORING NUMBER: WI-CV-MW03-M	SHEET 4 OF 6
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439397.6 N, 1201756.8 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 1/10/17 15:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
103.1	7.6	SN-10			0.0	0.0			
95			No Recovery 93.6-96.0'			0.0			
98.1	96.0					NR			
100			Poorly Graded Sand with Silt (SP-SM) 96.0-98.0' - brown/olive brown (2.5Y 4/3), moist, loose to medium dense, very fine to fine-grained						
93.1			Clay with Silt, Fine Sand (CL) 98.0-99.3' - brown (2.5Y 4/3), moist, stiff, moderate plasticity						
100			Clayey Sand (SC) 99.3-100.8' - olive brown (2.5Y 4/3), moist, dense/stiff, nonplastic						
105	10.5	SN-11	Silty Clay (CL) 100.8-102.8' - olive brown (2.5Y 4/3), very stiff, moderate plasticity		0.0	0.0			
88.1			Sandy Clay (CL) 102.8-103.1' - olive brown (2.5Y 4/3) dense, very stiff, low to moderate plasticity, trace fine subround gravel			0.0			
105			Poorly Graded Sand (SP) 103.1-106.0 - light olive brown (2.5Y 5/3), moist, loose, fine-grained, little silt						
110	106.0								
83.1			Poorly Graded Sand with Silt (SP-SM) 106.0-110.5' - olive brown (2.5Y 4/3), very moist to wet, loose to moderate dense, fine-grained, little clay			0.0			
115			Silty Sand (SM) 110.5-111.3' - olive brown (2.5Y 4/3), very moist to wet, loose to moderate dense, fine-grained, little clay		0.0	0.0			
78.1			Poorly Graded Sand (SP) 111.3-113.6' - light olive brown (2.5Y 5/3), moist, loose, fine-grained, trace to little silt, few dense silt stringers from 111.3-112.0'			0.0			
115			No Recovery 113.6-116.0'						
120	116.0								
			Clayey Sand (SC) 116.0-117.0' - dark grayish brown (2.5Y 4/2), wet (likely from drilling fluid), moderate dense, fine-grained sand, no to low plasticity, trace fine to coarse subrounded gravel			0.4			
			Sandy Clay (CL) 117.0-119.9' - dark grayish brown (2.5Y 4/2), moist, soft, fine sand, low plasticity trace fine to coarse subround to subangular grained						



PROJECT NUMBER: 679580.FI.WI	BORING NUMBER: WI-CV-MW03-M	SHEET 6 OF 6
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439397.6 N, 1201756.8 E)

ELEVATION : 193.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Sonic Drilling - Full-sized Truck - Mounted Sonic, 4" x 6"

WATER LEVELS : --- START : 1/10/17 15:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
43.1		SN-16	Silty Sand (SM) 151.5-159.75' - dark gray (10YR 3/1) to very dark greenish (GLE Y1 3/1), moist, medium dense, fine-grained						
155 38.1	156.0								
160 33.1		SN-17	Silt (ML) 159.75-161.0' - very dark greenish gray (GLE Y1 3/1) to greenish black (2.5Y 4/1), damp to moist, stiff No Recovery 161.0-162.0' Silty Sand (SM) 162.0-166.5' - dark greenish gray (GLE Y1 4/1), moist, fine-grained sand (potentially slough?)						
165 28.1	166.0		Bottom of Boring at 166.0 ft bgs on						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-M	SHEET 2 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440483.0 N, 1201341.6 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic, PS 600 Sonic Rig, 8" Casing x 7" Core Barrel

WATER LEVELS : --- START : 1/24/17 10:45 END : 1/27/17 16:00 LOGGER : D.LuBell

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
163.2	10.0	SN-4	<p>Well Graded Sand with Gravel (SW) 30.0-33.5' - very dark gray (2.5Y 3/1), moist, loose, fine to coarse-grained sand, fine gravel, rounded</p>				0.0	
35 158.2	35.0		<p>Poorly Graded Sand (SP) 33.5-37.0' - dark grayish brown (2.5Y 3/2), moist, loose, fine to medium-grained, some few fine rounded gravels (5-15%)</p>	0.1				
40 153.2	10.0	SN-5	<p>Silty Sand (SM) 37.0-39.5' - dark grayish brown (10YR 4/2), moist, loose, fine-grained, some medium cemented sand</p>					
45 148.2	45.0		<p>Poorly Graded Sand with Gravel (SW) 39.5-40.0' - dark grayish brown (10YR 4/2), moist, loose, fine-grained sand, fine rounded gravel</p> <p>Poorly Graded Sand (SP) 40.0-45.0' - dark grayish brown (10YR 4/2), dry to moist, loose, fine-grained sand</p>	0.1				
50 143.2	10.0	SN-6	<p>Poorly Graded Sand (SP) 45.0-53.0' - dark grayish brown (10YR 4/2), moist, loose to medium dense, fine-grained sand</p>	0.1				
55 138.2	55.0		<p>Silt (ML) 53.0-53.4' - gray (10YR 5/1), moist, stiff, some clay</p> <p>Clay (CL) 53.4-54.0' - gray (10YR 5/1), moist, stiff, low plasticity silt</p> <p>Clayey Sand (SC) 54.0-54.3' - gray (10YR 5/1), moist, stiff, very fine-grained sand</p> <p>Poorly Graded Sand with Silt (SP-SM) 54.3-55.0' - dark grayish brown (10YR 4/2), fine-grained sand, moist, loose</p> <p>Poorly Graded Sand (SP) 55.0-56.2' - very dark gray (10YR 3/1), moist to dry, loose, fine-grained sand</p>	0.0				
60								



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-M	SHEET 6 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440483.0 N, 1201341.6 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic, PS 600 Sonic Rig, 8" Casing x 7" Core Barrel

WATER LEVELS : --- START : 1/24/17 10:45 END : 1/27/17 16:00 LOGGER : D.LuBell

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
43.2	10.0	SN-16	Poorly Graded Sand (SP) 149.7-155.0' - very dark gray (3/N), moist, fine to very fine-grained sand, trace silt, trace clayey sand (SC) 149.7-150.5		0.0				
155 38.2	155.0		Poorly Graded Sand (SP) 155.0-160.0' - very dark gray (3/N), moist, loose, very fine to fine-grained sand, trace silt		0.0				
160 33.2	10.0	SN-17	Silt (ML) 160.0-165.0' - dark gray (4/N), moist to wet, stiff, trace very fine-grained sand		0.0				
165 28.2	165.0		Silt (ML) 165.0-167.0' - dark gray (4/N), moist, stiff		0.0				
170 23.2	10.0	SN-18	Silty Sand (SM) 167.0-171.0' - dark gray (4/N), moist, medium dense, very fine-grained sand (? sand)		0.0				
175 18.2	175.0		Poorly Graded Sand with Silt (SP-SM) 171.0-175.0' - dark gray (4/N), moist, medium dense, very fine-grained sand		0.0				
180			Clay (CL) 175.0-185.0' - dark gray (4/N), moist, very stiff, low plasticity, organic odor		0.0				

2" Schedule 80 - 0.010 Slot Screen



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-M SHEET 7 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440483.0 N, 1201341.6 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic, PS 600 Sonic Rig, 8" Casing x 7" Core Barrel

WATER LEVELS : --- START : 1/24/17 10:45 END : 1/27/17 16:00 LOGGER : D.LuBell

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
13.2	10.0	SN-19					0.0	
185 8.2		Clay (CL)/Peat (PT) 185.0-187.8' - dark greenish gray (10Y 4/1), moist to wet, stiff, organic root system, fibrous, silt, organic odor, peat		0.0				
190 3.2	10.0	SN-20		0.0				
		Silty Sand (SM) 187.8-192.5' - dark gray (4/N), moist, dense, very fine-grained sand						
		Clay (CL) 192.5-195.0' - dark gray (4/N), dry, hard						
195 -1.8	195.0	Bottom of Boring at 195.0 ft bgs on 1/27/17 16:00		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-S	SHEET 3 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440487.0 N, 1201338.3 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic, PS-600 Sonic Rig 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 1/29/2017 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
133.2	9.2	SN-7	Clayey Sand (SC) 57.9-60.3' - olive brown (2.5Y 4/3), moist, loose, fine-grained Clayey Sand (SC) 60.3-61.0' - olive brown (2.5Y 4/3), moist, dense, fine-grained Poorly Graded Sand (SP) 61.0-65.2' - olive brown (2.5Y 4/3), moist, loose, fine to very fine-grained, little silt		0.0				
65 128.2			66.0	No Recovery 65.2-66.0'		0.0			
70 123.2	8.0	SN-8	Poorly Graded Sand (SP) 66.0-67.4' - dark grayish brown (2.5Y 4/2), moist, loose, fine sand, little silt Silty Sand (SM) 67.4-69.0' - grayish brown (2.5Y 5/2) to grayish brown (2.5Y 4/2), moist, medium dense, fine sand Poorly Graded Sand (SP) 69.0-74.0' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained		0.0				
75 118.2			76.0	No Recovery 74.0-76.0'		0.0			
80 113.2	7.4	SN-9	Poorly Graded Sand with Silt (SP-SM) 76.0-83.4' - dark grayish brown (2.5Y 4/2), moist, loose, fine to very fine-grained		0.0				
85 108.2			86.0	No Recovery 83.4-86.0'		0.0			
90			Poorly Graded Sand with Silt (SP-SM) 86.0-87.4' - dark grayish brown (2.5Y 4/2), moist, loose, fine to very fine-grained Poorly Graded Sand (SP) 87.4-89.5' - olive brown (2.5Y 4/3), moist, loose, fine-grained, little silt		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-S	SHEET 4 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440487.0 N, 1201338.3 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic, PS-600 Sonic Rig 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 1/29/2017 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
103.2	3.5	SN-10	No Recovery 89.5-96.0'						
95 98.2	96.0		Poorly Graded Sand (SP) 96.0-102.0 - olive brown (2.5Y 4/3), moist, loose, very fine-grained, little to few silt			0.0			
100 93.2	6.0	SN-11	No Recovery 102.0-106.0'			0.0			
105 88.2	106.0		Poorly Graded Sand with Silt (SP-SM) 106.0-115.8' - olive brown (2.5Y 4/3), moist, medium dense, very fine-grained			0.0			
110 83.2	9.8	SN-12	No Recovery 115.8-116.0'			0.0		Bentonite Chips	
115 78.2	116.0		Poorly Graded Sand with Silt (SP-SM) 116.0-120.7' - olive brown (2.5Y 4/3), moist, moderate dense to dense, very fine-grained			0.0		20/40 Sand	
120						0.0		2" Schedule 80 - 0.010 Slot Screen	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW04-S SHEET 5 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (440487.0 N, 1201338.3 E)

ELEVATION : 193.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic, PS-600 Sonic Rig 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 1/29/2017 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
							Breathing Zone	Headspace	Above Hole		
73.2	10.4			SN-13	Silt (ML) 120.7-126.0' - dark greenish gray (GLEY1 /1) to dark gray (10YR 4/1), moist, stiff to very stiff, interbedded clay lenses, some very fine sand, low plasticity		0.0				
125 68.2	126.0				Bottom of Boring at 126.0 ft bgs on						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 2 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
160.6	10.0	SN-4	Sandy Silt (ML) 30.0-32.5' - dry, loose, 65% nonplastic fines, 30% fine subrounded sand, 5% fine subrounded gravel				31-32' - sample bag ripped upon delivery, soil was logged but not fully photographed, 100% recovery on sample		
35 155.6			Poorly Graded Sand (SP) 32.5-37.0' - dark grayish brown (2.5Y 3/2), moist, loose, 95% fine to medium subangular sand, predominately fine grained, 5% fine gravel, trace silt						
37.0	7.0	SN-5	No Recovery 37.0-40.0'			0.0			
40 150.6			Poorly Graded Sand with Gravel (SP) 40.0-47.0' - dark grayish brown (2.5Y 3/2), moist, loose, 85% fine to coarse subrounded predominately medium sand, 15% fine subrounded gravel, fines downward to dominate fine sand						0.0
45 145.6	8.0	SN-6	No Recovery 47.0-49.0'			0.0			
47.0			Poorly Graded Sand with Gravel (SP) 49.0-57.0' - dark grayish brown (2.5Y 3/2), loose, 85% fine to medium subrounded sand, 15% fine subrounded gravel						0.0
50 140.6	57.0		53.0-55.0' - no gravel			0.0			
55 135.6			Poorly Graded Sand (SP) 57.0-63.0' - dark grayish brown (2.5Y 3/2), loose, 100% fine to medium subrounded sand						
60									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M	SHEET 3 OF 9
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
130.6	8.0	SN-7	Silty Sand (SM) 63.0-65.0' - dark grayish brown (2.5Y 3/2), moist, medium dense, 85% fine to medium subrounded sand, dominately fine grained, 15% low to medium plasticity fines	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
65 125.6			No Recovery 65.0-67.0'	[Symbolic Log Pattern]	0.0				
67.0	8.0	SN-8	No Recovery 67.0-69.0'	[Symbolic Log Pattern]				[Well Diagram Pattern]	
70 120.6			Lean Clay (CL) 69.0-71.0' - dark grayish brown (2.5Y 4/2), moist, stiff, 90% fines, low to medium plasticity, slow to non dilatancy, medium dry strength, 10% fine sand	[Symbolic Log Pattern]	0.0				
75 115.6			Poorly Graded Sand with Clay (SP-SC) 71.0-77.0' - dark grayish brown (2.5Y 4/2), moist, loose, 90% fine to medium subrounded sand, 10% low to medium plastic fines, interbedded/interrelated)	[Symbolic Log Pattern]	0.0				
77.0	8.0	SN-9	No Recovery 77.0-79.0'	[Symbolic Log Pattern]				[Well Diagram Pattern] ← Bentonite Grout	
80 110.6			Poorly Graded Sand (SP) 79.0-80.5' - dark grayish brown (2.5Y 4/2), wet from drilling fluid, loose, 95% fine to medium subrounded sand, 5% fines	[Symbolic Log Pattern]	0.0				
85 105.6			Silty Sand (SM) 80.5-85.5' - dark grayish brown (2.5Y 3/2), moist, loose, 90% fine subrounded sand, 10% non to low plasticity fines	[Symbolic Log Pattern]	0.0				
87.0			Poorly Graded Sand (SP) 85.5-87.0' - dark grayish brown (2.5Y 4/2), moist, loose, 95% fine to medium subrounded sand, 5% nonplastic fines	[Symbolic Log Pattern]	0.0				
90			No Recovery 87.0-90.0'	[Symbolic Log Pattern]					



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 4 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
100.6	7.0	SN-10	Poorly Graded Sand (SP) 90.0-95.0' - dark grayish brown (2.5Y 3/2), wet, dense, 91% fine subrounded sand, 9% non to low plastic fines	[Symbolic Log]	0.0				
95.6	97.0		Sand with Silt (SP-SW) 95.0-97.0' - dark grayish brown (2.5Y 3/2), moist, dense, 90% fine subrounded sand, 10% low plastic fines	[Symbolic Log]	0.0				
100.6	5.0	SN-11	No Recovery 97.0-102.0'	[Symbolic Log]					
105.6	107.0		Poorly Graded Sand (SP) 102.0-105.5' - dark grayish brown (2.5Y 4/2), wet, loose to dense, 95% fine subrounded sand, 5% fines	[Symbolic Log]	0.0				
110.6			Silty Sand (SM) 105.5-107.0' - dark grayish brown (2.5Y 4/2), wet, medium dense, 80% fine sand, 20% low plasticity fines	[Symbolic Log]	0.0				
117.0	9.0	SN-12	No Recovery 107.0-108.0'	[Symbolic Log]					
120.6			Poorly Graded Sand (SP) 108.0-117.0' - dark grayish brown (2.5Y 4/2), medium dense, 95% fine subrounded sand, 5% fines	[Symbolic Log]	0.0				
122.0			Poorly Graded Sand (SP) 117.0-122.0' - dark grayish brown (2.5Y 4/2), medium dense, 95% fine subrounded sand, 5% fines	[Symbolic Log]	0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 5 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
70.6	10.5	SN-13	Lean Clay (CL) 122.0-125.0' - dark brown (10YR 4/1), very stiff, medium plasticity, dry strength		0.0				
125 65.6						0.0			
127.0	5.5	SN-14	No Recovery 127.0-132.0'					2/3/17	
130 60.6									
135 55.6	6.0	SN-15	Poorly Graded Sand (SP) with Clay 132.0-133.0 - dark brown (10YR 4/1), wet, loose, 90% fine to medium subrounded sand, 10% coarse plastic fines		0.0				
137.0									
140 50.6			No Recovery 137.0-141.0'						
145 45.6			Well Graded Sand (SW) 141.0-143.0' - dark gray (2.5Y 4/1), wet, loose, 95% fine to coarse subrounded sand, 5% low plasticity fines						
			Silty Sand (SM) 143.0-144.0' - dark gray (2.5Y 4/1), wet, loose, 80% fine to medium subrounded sand, 20% low plasticity fines		0.0				
			Poorly Graded Sand with Silt and Gravel (SP-SC) 144.0-145.0' - dark gray (2.5Y 4/1), wet, loose, 70% fine to medium subrounded sand, 15% low plasticity fines, 15% fine gravel						
147.0			Poorly Graded Sand (SP) 145.0-147.0' - dark gray (2.5Y 4/1), wet, loose, 95% fine to medium subrounded sand, 5% fines and sand		0.0				
150			No Recovery 147.0-148.5'						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 6 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
40.6	8.5	SN-16	Poorly Graded Sand (SP) 148.5-154.0' - dark gray (2.5Y 4/1), wet, loose, 95% fine to medium subrounded sand, 5% nonplastic fines, grades down to finer sand beginning at 154'	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
155 35.6			Poorly Graded Sand (SP) 154.0-157.0' - same as above except fine dominately fine sand		0.0				
157.0	8.0	SN-17	No Recovery 157.0-159.0'	[Symbolic Log Pattern]				← Bentonite Chips ← 20/40 Sand	
160 30.6			Poorly Graded Sand (SP) 159.0-167.0' - dark gray (2.5Y 4/1), wet, medium dense, 95% fine to medium subrounded sand, 5% nonplastic fine and fine subrounded gravel		0.0				
165 25.6			Well Graded Sand (SW) 167.0-173.5' - black (2.5Y 5/1), wet, loose, 95% fine to coarse subrounded sand, 5% fine subrounded gravel, trace fines		0.0				
167.0	10.5	SN-18	Silt (ML) 173.5-177.0' - dark gray (GLE Y1 4/N), moist, stiff, 100% nonplastic fines, no dry strength	[Symbolic Log Pattern]	0.0			← 2" Schedule 80 - 0.010 Slot Screen	
170 20.6			Silts/Lean Clay (ML/CL) 177.0-187.0' - (GLE Y1 4/O), wet, stiff, thinly laminated, low plasticity and medium plasticity fines with varying dry strengths		0.0				
175 15.6									
177.0									
180									

Backfilled two bags of bentonite from 177-170', set 8" casing at 172', fallow bentonite to hydrate 1 hour advance 8" casing to 177' bgs, telescope with 6" casing, 4" barrel

Bottom 8" casing



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 8 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-19.4	10.0	SN-21			0.0				
215 -24.4					0.0				
217.0									
220 -29.4	10.0	SN-22	Silt (ML) 217.0-227.0' - (GLE Y1 4/0), wet, stiff, 100% no plasticity fines, no dry strength		0.0				
225 -34.4					0.0				
227.0									
230 -39.4	10.0	SN-23	Silt (ML) 227.0-233.0' - (GLE Y1 4/0), wet, stiff, 100% no plasticity fines, no dry strength		0.0				
235 -44.4			Sandy Silt (ML) 233.0-237.0' - (GLE Y1 4/0), moist, medium stiff, 65% nonplastic fines, 35% fine subrounded sand		0.0				
237.0									
240			Sandy Silt (ML) 237.0-247.0' - (GLE Y1 4/0), moist, medium stiff, 65% nonplastic fines, 35% fine subrounded sand						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-M SHEET 9 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : West of runway (438254.5 N, 1201503.6 E)

ELEVATION : 190.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 8" Casing

WATER LEVELS : --- START : 2/1/17 13:00 END : 2/5/17 13:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-49.4	8.0	SN-24			0.0				
245 -54.4					0.0				
247.0									
250 -59.4	9.5	SN-25	Sandy Silt (ML) 247.0-249.0' - (GLE Y1 4/0), moist, medium stiff, 65% nonplastic fines, 35% fine subrounded sand Sandy Silt with Gravel (ML) 249.0-255.0' - (GLE Y1 4/N), moist, medium dense, 60% nonplastic fines, 25% fine subrounded sand, 15% subrounded fine gravel		0.0				
255 -64.4					0.0				
257.0			Sandy Silt (ML) 255.0-257.0' - (GLE Y1 4/0), moist, medium stiff, 65% nonplastic fines, 35% fine subrounded sand						
			Bottom of Boring at 257.0 ft bgs on 2/5/17 13:00				Backfill to 175' with 3/4" bentonite pellets		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-S	SHEET 1 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (438248.0 N, 1201506.3 E)

ELEVATION : 190.4 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic, Terrasonic short stroke with 4" X 6" Core Barrel

WATER LEVELS : --- START : 2/9/17 14:45 END : 2/10/17 14:55 LOGGER : J. Frnak

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION			SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE		Breathing Zone	Headspace	Above Hole		
	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY								
190.4	0.0		SN-1	Cleared with air knife and vac truck for utility locating 0.0-5.0'					
5	5.0								
185.4		3.0	SN-2	Well Graded Sand (SW) 5.0-20.0' - dark yellow brown (10YR 3/4), moist, loose, fine to coarse sand and gravel, coarse		0.0			
	8.0					0.0			
10						0.1			
180.4		5.0	SN-3			0.0			
	13.0			- trace cobbles		0.1			
15						0.0			
175.4		5.0	SN			0.0			
	18.0					0.2			
20						0.0			
170.4		5.0	SN-4	Well Graded Sand (SW) 20.0-22.0' - dark gray brown (10YR 3/2), moist, loose, fine to coarse sand and fine gravel		0.0			
	23.0			Poorly Graded Sand (SP) 22.0-23.0' - dark gray brown (10YR 3/2), moist, loose, fine to medium sand		0.4			
25						0.0			
165.4		5.0	SN-5	Poorly Graded Sand (SP) 23.0-28.0' - dark gray brown (10YR 3/2), moist, loose, fine to medium sand, fine to coarse gravel, trace silt		0.0			
	28.0					0.2			
30				Poorly Graded Sand (SP) 28.0-30.6' - dark gray brown (10YR 3/2), moist, loose, fine to medium sand					



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-S SHEET 2 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (438248.0 N, 1201506.3 E)

ELEVATION : 190.4 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic, Terrasonic short stroke with 4" X 6" Core Barrel

WATER LEVELS : --- START : 2/9/17 14:45 END : 2/10/17 14:55 LOGGER : J. Frnak

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
							Breathing Zone	Headspace	Above Hole		
160.4	7.5			SN-6	Well Graded Sand with Fine to Coarse Gravel (SW) 30.6-38.0' - dark brown and gray (2.5Y 3/2), moist, loose, trace silt	0.0	0.1				
35 155.4	38.0				No Recovery 38.0-42.0'		0.5		Dry in spots due to advancement rate and core barrel fracture		
40 150.4	6.0			SN-7	Poorly Graded Sand with Gravel (SP) 42.0-49.6' - dark brown and gray (2.5Y 3/2), dry to damp, loose, very fine to fine sands, subrounded gravel	0.0	0.4				
45 145.4	48.0				Poorly Graded Sand (SP) 49.6-70.7' - dark brown (10YR 3/2), moist, loose, fine to medium sands		0.1				
50 140.4	10.0			SN-8		0.0	0.2				
55 135.4	58.0				- fine to coarse gravel at 58-59'		0.1				
60					- 0.2-0.3' thick silt lenses at 59.3', 63.6' and 66.5'				Continued drilling on 2/10/17		← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW05-S SHEET 5 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (438248.0 N, 1201506.3 E)

ELEVATION : 190.4 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic, Terrasonic short stroke with 4" X 6" Core Barrel

WATER LEVELS : --- START : 2/9/17 14:45 END : 2/10/17 14:55 LOGGER : J. Frnak

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Breathing Zone									
70.4	6.0	SN-15			Poorly Graded Sand (SP) 120.5-123.5' - dark brown (2.5Y 4/3), wet, loose, very fine to fine sands	0.0					
124.0					Clay with Silt (ML-CL) 123.5-124.0' - dark brow (10YR 4/1), moist, stiff Bottom of Boring at 124.0 ft bgs on 2/10/17 14:55	0.0					



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-M SHEET 1 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437400.6 N, 1202641.2 E)

ELEVATION : 197.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic ProSonic PS600 Sonic Rig, 8" Casing x 7" Core Barrel, 6" casing x 4" Core Barrel

WATER LEVELS : --- START : 2/1/17 08:35 END : 2/5/17 13:00 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
197.9			Cleared via vac truck/hand clearance						
5 192.9	5.0		Well Graded Sand (SW) 5.0-8.0' - dark yellowish brown (10YR 3/4), wet, loose to medium dense, fine to coarse-grained, little silt, fine gravel			0.0			
8.0		3.0	SN-1						
10 187.9			Well Graded Sand (SW) 8.0-9.2' - dark yellowish brown (10YR 3/4), wet, loose to medium dense, fine to coarse-grained, little silt, fine gravel Poorly Graded Sand (SP) 9.2-12.0' - dark grayish brown (2.5Y 4/2), wet, loose to medium dense, fine to medium sand, trace coarse sand and fine gravel						
15 182.9			Poorly Graded Sand (SP) 12.0-13.75' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained, trace coarse sand, fine gravel Poorly Graded Sand with Gravel (SP) 13.75-14.5' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained, trace coarse sand, fine gravel No Recovery 14.5-16.0'			0.0			
16.0		6.5	SN-2						
20 177.9			Well Graded Sand (SW) 16.0-16.8' - dark grayish brown (10YR 4/0), wet/?, loose, fine to coarse subangular gravel Poorly Graded Sand (SP) 16.8-21.5' - dark grayish brown (10YR 4/0), moist, loose, medium-grained, trace fine to coarse subround to subangular gravel						
25 172.9			Poorly Graded Sand with Gravel (SP) 21.5-23.3' - brown (10YR 4/3), moist, loose, fine to medium sand, fine to coarse subround gravel No Recovery 23.3-26.0'			0.0			
26.0		7.3	SN-3						
30			Well Graded Gravel with Sand (GW) 26.0-27.1' - dark grayish brown (10YR 4/2), wet, loose, medium sand, fine to coarse subrounded gravel Well Graded Sand with Gravel (SW) 27.1-28.75' - dark brown (10YR 4/2) to brown (10YR 4/3), wet, loose, medium to coarse sand, fine to coarse subround gravel			0.0			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-M
SHEET 6 OF 9	
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437400.6 N, 1202641.2 E)

ELEVATION : 197.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic ProSonic PS600 Sonic Rig, 8" Casing x 7" Core Barrel, 6" casing x 4" Core Barrel

WATER LEVELS : --- START : 2/1/17 08:35 END : 2/5/17 13:00 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
47.9	6.5	SN-16	Silty Sand (SM) 148.8-149.5' - olive brown (2.5Y 4/3) with dark yellowish brown (10YR 4/3 (oxidation?)), moist, dense, fine sand, little medium sand Poorly Graded Sand (SP) 149.5-152.5' - olive brown (10YR 4/3), moist, loose to moderate dense, fine-grained, few dense silty sand lenses No Recovery 152.5-156.0'		0.0				
155 42.9	156.0		Poorly Graded Sand (SP) 156.0-158.7' - dark grayish brown (2.5Y 4/2), very moist, loose, fine-grained Poorly Graded Sand with Silt (SP-SM) 158.7-160.1' - dark grayish brown (2.5Y 4/2) ??? to dark gray (2.5Y 4/3), very moist, moderate dense to loose, fine-grained, trace fine to coarse subangular to angular gravel Sandy Silt (ML) 160.1-162.3' - olive brown (2.5Y 4/3) with trace dark yellowish brown (10YR 4/4) (oxidation staining), moist, stiff, very fine sand, low plasticity Poorly Graded Sand (SP) 162.3-164.3' - light olive brown (2.5Y 5/3)/dark yellowish brown (10YR 4/4), very moist, loose, fine-grained sand Sandy Silt (ML) 164.3-164.7' - olive brown (2.5Y 4/3) with trace dark yellowish brown (10YR 4/4) (oxidation staining), moist, stiff, very fine sand, low plasticity		0.0				
160 37.9	8.7	SN-17	No Recovery 164.7-166.0' Poorly Graded Sand (SP) 166.0-166.4' - Slough? Silt (ML) 166.4-167.5' - very dark grayish brown (2.5Y 3/1), dry to moist, very stiff, trace medium sand, no to low plasticity Silty Sand (SM) 167.5-169.0' - very dark grayish brown (2.5Y 3/1), moist, dense, very fine to fine sand Poorly Graded Sand with Silt (SP-SM) 169.0-170.0' - very dark gray (2.5Y 3/1), very moist to wet, loose, fine-grained sand Poorly Graded Sand (SP) 170.0-174.0' - very dark gray (10YR 3/1 to GLEY1 3/N), very moist to wet, loose, fine-grained, little silt Clay (CL) 174.0-175.6' - dark grayish brown (10YR 3/2), transitioning to very dark greenish gray (GLEY1 3/1), moist to damp, very stiff, low plasticity No Recovery 175.6-176.0' Poorly Graded Sand (SP) 176.0-184.3' - very dark greenish gray (GLEY1 3/1) to greenish black (2.5Y 4/1), very moist to wet, moderate dense to loose, fine-grained, gravel size increasing slightly with depth		0.0			← Bentonite Chips ← 20/40 Sand ← 2" Schedule	
165 32.9	166.0				0.0				
170 27.9	9.6	SN-18			0.0				
175 22.9	176.0				0.0				
180					0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-M SHEET 7 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437400.6 N, 1202641.2 E)

ELEVATION : 197.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic ProSonic PS600 Sonic Rig, 8" Casing x 7" Core Barrel, 6" casing x 4" Core Barrel

WATER LEVELS : --- START : 2/1/17 08:35 END : 2/5/17 13:00 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
17.9	10.5	SN-19							
185 12.9	186.0		Poorly Graded Sand with Silt (SP-SM) 184.3-185.4' - very dark grayish brown (10YR 3/2), moist, moderate dense, fine-grained		0.0				
			Silt (ML) 185.4-186.0' - dark gray (10YR 4/1), moist, very stiff, low plasticity						
	3.0	SN-20	Silt with Organics (ML/CL) 186.0-186.5' - very dark brown (10YR 2/2), stiff, non-plastic laminated organics (soil, leaf matter)						
190 7.9	191.0		Silty Sand (SM) 186.5-187.2' - very dark gray (10YR 3/1) to very dark gray (GLE Y1 3/N), wet, moderate dense, very fine-grained						
			Poorly Graded Sand with Silt (SP-SM) 187.2-189.0' - very dark gray (GLE Y1 3/N and 10YR 3/1), wet, loose, very fine sand						
			No Recovery 189.0-191.0'						
	5.6	SN-21	Poorly Graded Sand with Silt (SP-SM) 191.0-194.5' - very dark gray (GLE Y1 3/N and 10YR 3/1), wet, loose, very fine sand						
195 2.9	196.0		Silt (ML) with Organics (OL) 194.5-196.0' - dark gray (10YR 4/1), moist, stiff, somewhat friable, no to low plasticity, sand content and plasticity increase slightly with depth, some organic lenses (leaf litter, soil/peat)						
			Interbedded Sand and Sandy Silt (ML) 196.0-196.7' - grayish brown (10YR 4/2), wet, stiff, very fine sand, low plasticity		0.0				
			Organics (OL) 196.7-197.6' - wood fragments						
200 -2.1			Interbedded Sand and Sandy Silt (SP/ML) with Organics (OL) 197.6-199.2' - grayish brown (10YR 4/2), wet, stiff, very fine sand, low plasticity						
	7.6	SN-22	Silt (ML) 199.2-200.2' - dark grayish brown (10YR 4/2) and very dark brown (10YR 2/2), moist, laminated, friable organics						
			Sandy Clay (CL) 200.2-203.6' - dark gray (2.5Y 4/1), damp to moist, stiff, fine sand, low plasticity, few organics at bottom of interval						
205 -7.1	206.0		No Recovery 203.6-206.0'						
			Interbedded Sand (SP) and Clayey Sand (SC) 206.0-208.2' - dark gray (10YR 4/1) to dark gray (10YR 3/1), moist, moderate dense, fine to medium sand		0.0				
210									

Note: Set isolation casing/seal at 206', seal at 198.5-206' bgs

Begin drilling 4" x 6" (6" casing, 4" core barrel)

80 - 0.010 Slot Screen



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-M SHEET 8 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437400.6 N, 1202641.2 E)

ELEVATION : 197.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic ProSonic PS600 Sonic Rig, 8" Casing x 7" Core Barrel, 6" casing x 4" Core Barrel

WATER LEVELS : --- START : 2/1/17 08:35 END : 2/5/17 13:00 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-12.1	10.2	SN-23	Silt with Organics (ML/OL) 208.2-209.7' - very dark brown (10YR 3/2) and dark brown (10YR 3/3), dry to moist, friable, moderate stiff, laminated organics (leaf litter, soil/peat) Clayey Sand (SC) 209.7-216.0' - dark gray (10YR 4/1), moist, dense to very dense, very fine-grained sand, low plasticity		0.0				
215 -17.1	216.0		Clay (CL) 216.0-231.4' - dark gray (2.5Y 4/1), moist, stiff, low to medium plasticity, some very fine sand		0.0				
220 -22.1					0.0				
225 -27.1	19.0	SN-24	Clayey Sand (SC) 231.4-235.4' - dark gray (10YR 3/1 to GLEY1 3/N), moist to wet, dense, low plasticity		0.0				
230 -32.1					0.0				
235 -37.1	236.0		Clay (CL) 235.4-236.0' - very dark grayish brown (10YR 3/2), damp to moist, very stiff, low plasticity Clay (CL) 236.0-241.9' - very dark grayish brown (2.5Y 3/2), moist, stiff to very stiff, low to moderate plasticity		0.0				
240									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-M SHEET 9 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437400.6 N, 1202641.2 E)

ELEVATION : 197.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Rotary Sonic ProSonic PS600 Sonic Rig, 8" Casing x 7" Core Barrel, 6" casing x 4" Core Barrel

WATER LEVELS : --- START : 2/1/17 08:35 END : 2/5/17 13:00 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
-42.1	10.5	SN-25	<p>Silt (ML) 241.9-246.0' - very dark grayish brown (2.5Y 3/2) and dark brown (2.5Y 3/3), dry to moist, stiff, somewhat friable, low plasticity in 244.0-246.0', few organics</p>					
245 -47.1	246.0	<p>Clay (CL) 246.0-254.1' - dark grayish brown (2.5Y 3/2), moist (decreasing with depth), very stiff, low plasticity</p>						
250 -52.1	10.5	SN-26	<p>Silt (ML) 254.1-255.9' - very dark grayish brown (2.5Y 3/2) and very dark brown (10YR 2/1), dry, stiff, laminated</p>					
255 -57.1	256.0	<p>Poorly Graded Sand with Silt (SP-SM) Interbedded with Silt (ML) 255.9-256.0' - very dark gray (10YR 3/1), moist, moderate dense to dense, fine-grained sand, trace organics Bottom of Boring at 256.0 ft bgs on 2/5/17 13:00</p>						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-S	SHEET 1 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437394.5 N, 1202643.6 E)

ELEVATION : 198.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic ProSonic PS600 Sonic Rig, 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 2/7/17 13:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
198.0			Cleared with vac truck/air knife 0.0-6.0'						
5 193.0	6.0		Clayey Sand with Gravel (SC) 6.0-7.5' - dark brown (10YR 3/2) to very dark brown (10YR 3/3), wet, medium plasticity, fine to medium fine-grained, fine to coarse, subangular gravel Well Graded Sand with Gravel (GW) 7.5-10.6' - dark yellowish brown (10YR 3/4), wet, loose, fine to medium sand, fine to coarse subround to subangular gravel			0.0			
10 188.0	9.5	SN-1	Poorly Graded Sand (SP) 10.6-15.5' - dark brown (10YR 3/3), moist, loose, little coarse sand and fine to coarse subround gravel			0.0			
15 183.0	16.0		No Recovery 15.5-16.0'						
20 178.0	7.2	SN-2	Gravel (GW) with Sand 16.0-16.8' - dark grayish brown (10YR 4/2), wet, loose, fine to coarse round to subround gravel, medium strength Poorly to Moderate Organic Sand with Gravel (SP) 16.8-23.2' - dark gray (10YR 4/2), moist, loose, fine to medium sand, fine to coarse gravel			0.0			
25 173.0	26.0		No Recovery 23.2-26.0'						
30			Poorly Graded Gravel with Sand (GW) 26.0-30.4' - dark grayish brown (10YR 4/2), wet, loose, fine to coarse subrounded to subangular gravel, fine to coarse sand						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-S SHEET 3 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437394.5 N, 1202643.6 E)

ELEVATION : 198.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic ProSonic PS600 Sonic Rig, 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 2/7/17 13:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
138.0	7.5	SN-6	60.0-63.5'	SN-6	Poorly Graded Sand with Gravel (SP) 60.0-63.5' - dark grayish brown (2.5Y 4/2), damp to moist, fine-grained, fine to coarse subround to subangular gravel	.					Bentonite Grout
65 133.0	66.0		63.5-66.0'		No Recovery 63.5-66.0'		0.0				
70 128.0	9.1	SN-7	66.0-66.3'	SN-7	Well Graded Sand with Gravel (SW) 66.0-66.3' - very dark grayish brown (10YR 3/2), wet, loose, medium to coarse sand, fine to coarse subangular to subround gravel	.					Bentonite Grout
75 123.0			66.3-75.1'		Poorly Graded Sand (SP) 66.3-75.1' - dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/3), moist, loose, fine-grained, trace fine to coarse subangular gravel		0.0				
80 118.0	5.5	SN-8	75.1-76.0'	SN-8	Poorly Graded Sand (SP) 76.0-81.5' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained sand, little silt, gravel lens at 80.2 (leaf debris?)	.					Bentonite Grout
85 113.0			81.5-86.0'		No Recovery 81.5-86.0'		0.0				
90			86.0-91.9'		Poorly Graded Sand (SP) 86.0-91.9' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained, little silt	.		0.0			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-S	SHEET 4 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437394.5 N, 1202643.6 E)

ELEVATION : 198.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic ProSonic PS600 Sonic Rig, 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 2/7/17 13:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
108.0	5.9	SN-9	No Recovery 91.9-96.0'						
95 103.0	96.0								
100 98.0	6.5	SN-10	Poorly Graded Sand (SP) 96.0-97.1' - dark grayish brown (2.5Y 4/2), moist, loose, fine-grained, little silt Silty Sand (SM) 97.1-98.1' - dark gray (10YR 4/1), moist, dense to medium dense, fine grained sand Poorly Graded Sand with Silt (SP-SM) 98.1-100.5' - dark grayish brown (2.5Y 4/2), moist, loose to medium dense, fine sand Silty Sand (SM) 100.5-102.5' - dark grayish brown (2.5Y 4/2), moist, moderate dense (dense at 102-102.5'), very fine sand No Recovery 102.5-106.0'		0.0	0.0			
105 93.0	106.0								
110 88.0	8.1	SN-11	Slough 106.0-106.35' Silty Sand (SM) 106.35-107.8' - dark grayish brown (2.5Y 4/2), moist, dense, very fine grained sand Poorly Graded Sand with Silt (SP-SM) 107.8-110.25' - grayish brown (2.5Y 4/2), moist, loose, fine-grained sand Clayey Sand (SC) 110.25-111.4' - grayish brown (2.5Y 5/2), moist, dense, very fine sand, low plasticity Poorly Graded Sand with Silt (SP-SM) 111.4-114.1' - dark grayish brown (10YR 4/2), moist, loose, very fine to fine-grained, few dense/dry silt lense No Recovery 114.1-116.0'		0.0				
115 83.0	116.0								
120			Clayey Sand (SC) 116.0-117.6' - light olive brown (2.5Y 5.3), moist, dense, very fine sand, low plasticity Poorly Graded Sand with Silt (SP-SM) 117.6-119.6' - dark grayish brown (2.5Y 4/2), moist, medium dense, fine to very fine sand		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW06-S	SHEET 5 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (437394.5 N, 1202643.6 E)

ELEVATION : 198.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotarySonic ProSonic PS600 Sonic Rig, 6" Casing x 4" Core Barrel

WATER LEVELS : --- START : 2/7/17 13:30 END : LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
78.0	10.8	SN-12	Silt (ML) 119.6-120.4' - dark brown (2.5Y 4/3), damp to moist, dense, low plasticity Silty Sand (SM) 120.4-123.2' - dark grayish brown (2.5Y 4/2), moist, medium dense, very fine to fine-grained Clayey Sand (SC) 123.2-126.0' - light olive brown (2.5Y 5.3) to dark brown (2.5Y 4/3), moist to wet, dense, very fine sand	0.0	0.0				
125 73.0	126.0	3.2	SN-13	Clayey Sand (SC) 126.0-127.3' - olive brown (2.5Y 4.3), wet, moderate dense, very fine sand, low to no plasticity Poorly Graded Sand with Clay (SP-SC) 127.3-128.0' - dark grayish brown (2.5Y 4/2), wet, loose to medium dense, medium to coarse grained, nonplastic Clayey Sand (SC) 128.0-129.2' - olive brown (2.5Y 4.3), wet, moderate dense, very fine sand, low to no plasticity					
130 68.0	131.0		SN-14	No Recovery 129.2-131.0 Clayey Sand (SC) 131.0-132.7' - olive brown (2.5Y 4.3), wet, loose to moderate dense, very fine sand, low plasticity Poorly Graded Sand (SP) 132.7-140.9' - light olive brown (2.5Y 5/3) and dark yellowish brown (10YR 4/4), very moist to wet, loose to moderate dense, fine grained, little medium and coarse sand, little clay, no plasticity					
135 63.0	10.5			Sandy Silt (ML) 140.9-141.0' - olive brown (2.5Y 5/3) and dark yellowish brown (10YR 4/4), dry to moist, stiff, nonplastic Bottom of Boring at 141.0 ft bgs on					
140 58.0	141.0								



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-M SHEET 1 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441202.3 N, 1200339.0 E)

ELEVATION : 199.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Terrasonic Track Rig

WATER LEVELS : --- START : 1/18/17 13:30 END : 1/23/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
199.6			No Recovery 0.0-10.0'					Begin ~14:30	
5 194.6								Sample fell out	
10 189.6	10.0		Well Graded Sand (SW) 10.0-22.6' - very dark brown (7.5YR 2.5/1), moist, fine to coarse, round gravel, 4" minus, mixed lithology			0.1			
	5.0	SN-1				0.0			
15 184.6	15.0		- continued Well Graded Sand (SW)			0.0			
	4.0	SN-2				0.0			
20 179.6	20.0		- trace clay at 20-21'			0.0			
	5.5	SN-3				0.0			
25 174.6	25.0		Well Graded Sand with Silt (SW-SM) 22.6-24.6' - dark grayish brown (10YR 4/2), dry, fine to coarse sand			0.0			
	4.0	SN-4				0.3			
			Poorly Graded Sand (SP) 24.6-28.0' - dark grayish brown (10YR 4/2), dry, fine to medium-grained, increasing fine gravels			0.0			
			Cemented Well Graded Sand (SW) 28.0-28.6'						
30			Well Graded Sand with Gravel (SW) 28.6-31.1' - dark gray brown (10YR 4/2), dry, fine to coarse						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-M SHEET 2 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441202.3 N, 1200339.0 E)

ELEVATION : 199.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Terrasonic Track Rig

WATER LEVELS : --- START : 1/18/17 13:30 END : 1/23/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
169.6	30.0			0.1				
		Poorly Graded Sand (SP) 31.1-33.0' - dark grayish brown (10YR 4/2), dry, fine to medium-grained		0.0				
	4.5	Silty Sand with Gravel (SM) 33.0-52.0' - grayish brown (10YR 5/2), dry, cemented layers (stiff), 10-20% silt, fine to medium sand, fine round gravels						
35	35.0							
164.6						Wet from drilling mud at 35-38'		
	3.2							
40	40.0							
159.6		- continued Silty Sand with Gravel (SM) , weakly cemented						
	2.3							
45	45.0					Some fell out		
154.6						Stop at 45' 16:45		
	5.0			0.2				
50	50.0			0.0				
149.6		Transitional contact through very fine sand to Sandy Silt (ML) 52.0-55.11' - dark gray brown (10YR 4/2), dry, stiff, 30% very fine sand, weakly cemented						
	53.5							
55	55.0							
144.6		Poorly Graded Sand (SP) 55.11-60.0' - dark grayish brown (10YR 4/2), dry, loose, fine						
	4.3							
60								



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-M SHEET 3 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441202.3 N, 1200339.0 E)

ELEVATION : 199.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Terrasonic Track Rig

WATER LEVELS : --- START : 1/18/17 13:30 END : 1/23/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION			SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE		Breathing Zone	Headspace	Above Hole		
	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY								
139.6	60.0	4.1	SN-10	Silty Sand (SM) 60.0-62.7' - dark gray brown (10YR 4/2), moist, very stiff, very fine	0.0	0.3	0.0		
65	65.0			Poorly Graded Sand (SP) 62.7-70.0' - dark grayish brown (10YR 3/2) with organic peat 1" layer at 63.2', occasional fine gravel lenses and thin silt layers that are weakly cemented					
134.6		3.6	SN-11		0.0	0.3	0.0		
70	70.0			Silty Sand with Gravel (SM) 70.0-72.6' - moist, fine to coarse matrix					
129.6		3.4	SN-12	Poorly Graded Sand (SP) 72.6-77.9' - dark grayish brown (10YR 4/2), dry, loose, fine-grained	0.0	0.4	0.0		
75	75.0			Interbedded Silt/Clay (CL-ML) Layers in Fine Sand (SP) 77.9-81.2' - moist, hard (weakly cemented), sandy					
124.6		5.8	SN-13		0.0	0.3	0.0		
80	80.0			Poorly Graded Sand (SP) 81.2-95.0' - dark grayish brown (10YR 4/2), dry, loose but cemented layers from 83.7-85.2', fine-grained					
119.6		4.3	SN-14		0.0	0.4	0.0		
85	85.0								
114.6		4.3	SN-15		0.0	0.4	0.0		
90									

← Bentonite Chips



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-M SHEET 6 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441202.3 N, 1200339.0 E)

ELEVATION : 199.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Terrasonic Track Rig

WATER LEVELS : --- START : 1/18/17 13:30 END : 1/23/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)			SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE				Breathing Zone	Headspace	Above Hole		
49.6	150.0	3.1	SN-28	Lean Clay (CL) 150.0-160.5' - dark greenish gray (GLE Y1 4/1), moist, very stiff/hard, cohesive, medium plasticity, silty, very fine sandy intervals but no apparent stratification, couple of 3/4" - minus round pebbles		0.0	0.0	0.0	Doing 5' runs	
155 44.6	155.0	5.4	SN-29			0.0	0.0	0.0	Either till or ice margin lake, very "compact", no stratification	
160 39.6	160.0	5.7	SN-30	Elastic Silt (MH) 160.5-161.5' - 1-foot "bed" Continued Lean Clay (CL) , like above 161.5-165.0'		0.0	0.0	0.0		
165 34.6	165.0	0.0	SN-31	No Recovery 165.0-170.0' - driller said soft/easy drilling like silt		0.0	0.0	0.0		
170 29.6	170.0	7.1	SN-32	Clay (CL) 170.0-178.0' - dark gray (G14/N), moist, very stiff to hard, plastic, non-stratified		0.0	0.0	0.0	Run 33 = 170-177'	
175 24.6	177.0	2.5	SN-33	contains 1-2" round gravel at 177.5' Silty Sand (SM) to Clayey Sand (SC) 178.0-183.8' - dark gray (GLE Y1 4/N), wet, dense, fine-grained, a few pieces of round gravel		0.0	0.0	0.0		← 20/40 Sand
180						0.0	0.0	0.0		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-M SHEET 8 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441202.3 N, 1200339.0 E)

ELEVATION : 199.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Terrasonic Track Rig

WATER LEVELS : --- START : 1/18/17 13:30 END : 1/23/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)				SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
INTERVAL (FT)	RECOVERY (FT)			SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
		SAMPLE #/TYPE								
-10.4	210.0	5.2	SN-40	Grades to Lean Clay (CL) 211.6-215.0' - dark gray (GLE Y1 4/N), moist, very stiff to hard, medium to low plasticity						
215	215.0			Sandy Silt (ML) 215.0-216.5'						
-15.4		5.4	SN-41	Claystone 216.5-219.3' - brown						
220	220.0			Sandy Silt to Silty Sand (ML-SM) 219.3-221.5' - wet						
-20.4		5.2	SN-42	Claystone 221.5-225.0' - very weak friable						
225	225.0			Bottom of Boring at 225.0 ft bgs on 1/23/2017						
-25.4										



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-S SHEET 1 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441209.8 N, 1200340.5 E)

ELEVATION : 200.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --- START : 1/25/2017 END : 1/29/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
200.0									
5	5.0								
195.0			Well-Graded Sand with Gravel (SW) 5.0-14.5' - dark yellow brown (10YR 3/4) to dark gray brown (10YR 3/4), dry, dense, round gravel 3", fine to coarse sand		0.2				
10									
190.0	8.5	SN-1			0				
15									
185.0	15.0		Peat Seam 14.5-14.6'		0.2				
			Well Graded Sand with Silt and Gravel (SW-SM) 14.6-25.0' - dark brown (10YR 4/1), dry, dense, fine to coarse sand, 1-3" round gravel lenses of cemented material (SM-SW)						
20									
180.0	20.0				0		Drilling dry, slow, cuttings, hot		
25									
175.0	25.0				1.5				
			Continued Well Graded Sand with Silt and Gravel (SW-SM) , much of it broken up by drilling 25.0-30.0'						
30	5.0	SN-4			0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW07-S	SHEET 2 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : (441209.8 N, 1200340.5 E)

ELEVATION : 200.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --- START : 1/25/2017 END : 1/29/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)			SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE				Breathing Zone	Headspace	Above Hole		
170.0	30.0			Continued Well Graded Sand with Silt and Gravel (SW-SM) , shattered by drilling 30.0-35.0'						
35 165.0	7.6	SN-5		Well Graded Sand with Gravel (SW) 35.0-40.0 - very dark grayish brown (10YR 3/2), dry, dense, 20% small gravel round, fine sand			0.0			
40 160.0	40.0			Poorly Graded Sand with Silt and Gravel (SP-SM) 40.0-50.0' - dark grayish brown (10YR 4/2), dry, stiff silt/clay lenses			0.8			
45 155.0	9.9	SN-6		- pulverized more fine sand at 48'			0.0			
50 150.0	50.0			Poorly Graded Sand (SP) 50.0-54.0' - dark grayish brown (10YR 4/2), wet from drill water, loose, fine-grained			0.4		Fast drill 50-55' 50-55' recovered 1.5' loose sand	
55 145.0	5.0	SN-7		Silty Sand (SM) 54.0-59.0' - very dark brown (10YR 2/2), slightly moist, fine, organic silt, gravel lens			0.4			
60				Poorly Graded Sand (SP) 59.0-64.5' - grayish brown (10YR 5/2), dry, fine-grained						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-M
SHEET 3 OF 8	
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.5 N, 1202808.8 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 8/6", Casing 2/4" Barrel

WATER LEVELS : --- START : 2/8/2017 END : 2/12/17 10:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
145.2	4.0	SN-7	Poorly Graded Sand (SP) 61.0-62.0' - (2.5Y 4/1), moist, loose, 95% fine to medium subrounded sand, 5% fine subrounded gravel Poorly Graded Sand with Gravel (SP) 62.0-66.0' - (2.5Y 4/1), moist, loose, 75% fine to medium subrounded sand, 25% fine to medium subrounded gravel, trace fines, no recovery 62-63'		0.0				
65 140.2						0.0			
	67.0	SN-8	Poorly Graded Sand (SP) 66.0-67.0' - (2.5Y 4/1), moist, loose, 95% fine to medium subrounded sand, 5% fine subrounded gravel No Recovery 67.0-68.0'						
70 135.2						0.0			
	9.0	SN-8	Poorly Graded Sand with Gravel (SP) 68.0-70.0' - (2.5Y 4/1), moist, loose, 85% fine to medium predominately fine subrounded sand, 15% fine to coarse subrounded gravel, trace cobbles Well Graded Sand with Gravel (SW) 70.0-77.0' - (2.5Y 4/1), moist, loose, 85% fine to coarse subrounded sand, 15% fine to coarse subrounded gravel, trace cobbles and fines						
75 130.2						0.0			
	77.0	SN-9	Well Graded Sand with Gravel (SW) 78.5-87.0' - (2.5Y 4/1), moist, loose, 85% fine to coarse subrounded sand, 15% fine to coarse subrounded gravel, trace cobbles and fines						
80 125.2						0.0		Begin drilling with fluid/mud 2/9/17	
	8.5	SN-9	No Recovery 87.0-89.5'						
85 120.2						0.0			
	87.0								
90									

← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-M	SHEET 5 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.5 N, 1202808.8 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 8/6", Casing 2/4" Barrel

WATER LEVELS : --- START : 2/8/2017 END : 2/12/17 10:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
85.2	0.0	SN-13							
125 80.2	127.0		Lean Clay/Silt (CL/ML) 127.0-129.5' - (GLE Y 4/N), wet, very stiff, 100% medium plasticity fines, low to none dilatancy, varying low to medium dry strengths				2/10/17 0900		
130 75.2	11.0	SN-14	Silty Sand (SM) 129.5-132.0' - (2.5Y 4/2), wet, medium dense, 85% fine subrounded sand, 15% nonplasticity fines		0.0		Set 8" isolation casing at 132' bgs Advancing with 6" casing and 4" barrel Bentonite to 130' Hydrate for 1 hour		
135 70.2			Silt (ML) 132.0-135.5' - (GLE Y 4/N), wet, stiff, 100% nonplastic to low plasticity fines, no dry strength		0.0				
137.0			Sandy Silt (ML) 35.5-137.0' - GLE Y 4/N, wet, stiff, 70% nonplastic fines, 30% fine subrounded sand		0.0				
140 65.2	9.0	SN-15	No Recovery 137.0-138'						
			Poorly Graded Sand with Silt (SP-SM) 138.0-140.0' - (2.5Y 4/2), wet, medium dense, 90% fine subrounded sand, 10% nonplastic fines		0.0				
145 60.2			Poorly Graded Sand (SP) 140.0-147.0' - wet, dense, 95% fine subrounded sand, 5% fines, nonplastic						
147.0			No Recovery 147.0'-148.0'						
150			Poorly Graded Sand (SP) 148.0-157.0' - wet, dense, 95% fine subrounded sand, 5% fines, nonplastic					← Bentonite Chips ← 20/40 Sand	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-M	SHEET 6 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.5 N, 1202808.8 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 8/6", Casing 2/4" Barrel

WATER LEVELS : --- START : 2/8/2017 END : 2/12/17 10:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
55.2	9.0	SN-16			0.0				
155 50.2	157.0		Grades into Silty Sand (SM) 157.0-160.0' - wet, dense, 95% fine subrounded sand, 5% fines, nonplastic					<p>2" Schedule 80 - 0.010 Slot Screen</p>	
160 45.2	11.0	SN-17	Silty Sand (SM) 160.0-162.0' - (GLEYS 4/N), wet, stiff, 60% fine subrounded sand, 40% low plasticity fines		0.0				
165 40.2			Silt (ML) 162.0-167.0' - (GLEYS 4/N), wet, very stiff, 100% low to medium plasticity fines with varying low to no dry strength		0.0				
167.0			Sandy Silt (ML) 167.0-171.0' - (GLEYS 4/N), wet, stiff, 60% low plasticity fines, 25% well graded fine to coarse subrounded sand, 15% fine to coarse subrounded gravel		0.0				
170 35.2	10.5	SN-18	Silt (ML) 171.0-181.0' - (GLEYS 4/N), wet, stiff, 100% nonplastic to low plasticity fines		0.0				
175 30.2					0.0				
177.0									
180									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-M SHEET 7 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.5 N, 1202808.8 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 8/6", Casing 2/4" Barrel

WATER LEVELS : --- START : 2/8/2017 END : 2/12/17 10:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
25.2	10.5	SN-19	Lean Clay (ML) 181.0-187.0' - (GLE Y 4/N), wet, very stiff, medium plasticity, medium dry strength, trace sand		0.0				
185 20.2					0.0				
187.0									
190 15.2	10.5	SN-20	Lean Clay (ML) 187.0-191.0' - (GLE Y 4/N), wet, very stiff, medium plasticity, medium dry strength, trace sand		0.0				
195 10.2			Organic Lean Clay (OL/CL) 191.0-196.0' - (GLE Y2 5/N), wet, low to medium plasticity, medium dry strength, low to no dilatancy		0.0				
197.0			Poorly Graded Sand (SP) 196.0-197.0' - (GLE Y 4/N), wet, dense, 95% fine subrounded sand, 5% fines		0.0				
200 5.2	10.0	SN-21	Lean Clay (CL) 197.0-207.0' - (GLE Y 4/N), moist, very stiff, medium plasticity, medium dry strength		0.0				
205 0.2					0.0				
207.0									
210			Silt (ML) 207.0-217.0' - (GLE Y1 4/N), wet, stiff, low to medium plasticity, low dilatancy, non to low dry strength (varying)				2/10/17 1700 2/12/16 0830		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-M SHEET 8 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.5 N, 1202808.8 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 8/6", Casing 2/4" Barrel

WATER LEVELS : --- START : 2/8/2017 END : 2/12/17 10:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
-4.8	10.5	SN-22					0.0				
215 -9.8	217.0				Silt (ML) 217.0-227.0' - (GLEYS 4/N), wet, stiff, low to medium plasticity, low dilatancy, non to low dry strength (varying)		0.0				
220 -14.8	11.0	SN-23					0.0				
225 -19.8	227.0				Bottom of Boring at 227.0 ft bgs on 2/12/17 10:00						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-S	SHEET 1 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.8 N, 1202815.4 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 2/13/17 09:00 END : 2/13/17 08:30 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)			SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE				Breathing Zone	Headspace	Above Hole		
205.2	0.0			5' clear with vac truck prior to drilling, no description						
200.2	2.0	SN-1		Well Graded Sand (SW) 5.0-7.0' - dark gray (2.5Y 4/1), dry, loose, 100% subrounded fine to coarse sand, trace fines and gravel						
195.2	7.0			No Recovery 7.0-7.5'						
190.2				Well Graded Sand (SW) 7.5-9.0' - dark gray (2.5Y 4/1), dry, loose, 100% subrounded fine to coarse sand, trace fines and gravel						
185.2				Well Graded Sand with Gravel (SW) 9.0-17.0' - dark gray (2.5Y 4/1), dry, loose, 85% subrounded fine to coarse sand, 15% fine to coarse subrounded gravel		0.0				
180.2	9.5	SN-2		No Recovery 17.0-27.0'		0.0				
175.2										
170.2										
165.2										
160.2										
155.2										
150.2										
145.2										
140.2										
135.2										
130.2										
125.2										
120.2										
115.2										
110.2										
105.2										
100.2										
95.2										
90.2										
85.2										
80.2										
75.2										
70.2										
65.2										
60.2										
55.2										
50.2										
45.2										
40.2										
35.2										
30.2										
25.2										
20.2										
15.2										
10.2										
5.2										
0.2										

Large gravel obstructing core barrel



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-S	SHEET 2 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.8 N, 1202815.4 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 2/13/17 09:00 END : 2/13/17 08:30 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
175.2	6.5	SN-4	Silty Sand with Gravel (SM) 30.5-33.0' - dark gray (2.5Y 4/1), loose, dry, 55% fine to coarse subrounded sand, predominately fine, 30% nonplastic fines, 15% fine to coarse subrounded gravel						
35 170.2			Poorly Graded Sand (SP) 33.0-37.0' - dark gray (2.5Y 4/1), wet from drilling throughout well) 95% fine to medium subrounded sand, 5% fine subrounded gravel						
40 165.2	4.5	SN-5	No Recovery 37.0-43.5'						
45 160.2			Poorly Graded Sand (SP) 43.5-47.0' - dark gray (2.5Y 4/1), dry, loose, 90% fine to coarse subrounded sand, 10% fine subrounded gravel, trace fines, grades coarser down						
50 155.2	9.5	SN-6	No Recovery 47.0-47.5'						
55 150.2			Well Graded Sand with Gravel (SW) 47.0-55.0' - dark gray (2.5Y 4/1), dry, loose, 95% fine to medium subrounded sand						
60			Poorly Graded Sand (SP) 55.0-57.0' - dark gray (2.5Y 4/1), dry, loose, 90% fine to coarse predominately fine subrounded sand, 5% fine subrounded gravel, 5% nonplastic fines						
			No Recovery 57.0-58.0'						
								1230-1355 2/13/17 - ??	← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-S	SHEET 3 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.8 N, 1202815.4 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 2/13/17 09:00 END : 2/13/17 08:30 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
145.2	9.0	SN-7	Poorly Graded Sand with Gravel (SP) 58.0-65.0' - dark gray (2.5Y 4/1), dry, loose, 80% fine to medium subrounded sand, 15% fine to coarse subrounded gravel, 5% fines nonplastic mostly fine sand grades into coarser		0.0				
65 140.2	67.0		Well Graded Sand with Gravel (SW) 65.0-67.0' - dark gray (2.5Y 4/1), dry, loose, 85% fine to coarse subrounded sand, 15% fine to coarse subrounded gravel		0.0				
70 135.2	8.0	SN-8	Well Graded Sand with Gravel (SW) 67.0-77.0' - dark gray (2.5Y 4/1), dry, loose, 85% fine to coarse subrounded sand, 15% fine to coarse subrounded gravel		0.0				
75 130.2	77.0		No Recovery 77.0-77.5'						
80 125.2	9.5	SN-9	Well Graded Sand with Gravel (SW) 77.5-80.0' - dark gray (2.5Y 4/1), dry, loose, 85% fine to coarse subrounded sand, 15% fine to coarse subrounded gravel		0.0				
			Poorly Graded Sand (SP) 80.0-85.0' - dark gray (2.5Y 4/1), moist, loose, 95% fine to medium subrounded sand, 5% fine subrounded gravel		0.0				
85 120.2	87.0		Poorly Graded Sand (SP) 85.0-87.0' - dark gray (2.5Y 4/1), moist, medium dense, 95% fine subrounded sand, 5% nonplastic fines		0.0				
90			No Recovery 87.0-87.5'						
			Well Graded Sand with Gravel (SW) 87.5-97.0' - moist, loose, 80% fine to coarse subrounded sand, 20% fine to coarse subrounded gravel						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-S	SHEET 4 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.8 N, 1202815.4 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 2/13/17 09:00 END : 2/13/17 08:30 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
115.2	9.5	SN-10			0.0				
95 110.2					0.0				
	97.0								
			No Recovery 97.0-97.5'						
			Poorly Graded Sand (SP) 97.5-100.5' - (2.5Y 4/2), moist, medium dense, 95% fine subrounded sand, 5% nonplastic fines						
100 105.2					0.0				
	9.5	SN-11	Poorly Graded Sand (SP) 100.5-107.0' - dark gray (2.5Y 4/1), moist, medium dense, 95% fine to medium subrounded sand, 5% nonplastic fines, material grades coarser down well graded gravel , 6" lense at 102.5'						
105 100.2					0.0				
	107.0								
			No Recovery 107.0-107.5'						
	2.5	SN-12	Poorly Graded Sand with Gravel (SP) 107.5-110.0' - dark gray (2.5Y 4/1), moist, medium dense, 85% fine to medium subrounded sand, 15% fine to coarse subrounded gravel						
110.0					0.0				
			Poorly Graded Sand with Gravel (SP) 110.0-111.0' - dark gray (2.5Y 4/1), moist, medium dense, 85% fine to medium subrounded sand, 15% fine to coarse subrounded gravel						
			Poorly Graded Sand (SP) 111.0-113.0' - (2.5Y 4/2), moist, medium dense, 95% fine to medium subrounded sand, 5% nonplastic fines						
			Silty Sand (SM) 113.0-118.0' - (2.5Y 4/2), moist, loose, medium dense, 85% fine subrounded sand, 15% nonplastic fines						
	10.0	SN-13			0.0				
			Poorly Graded Sand (SP) 118.0-120.0' - (2.5Y 4/2), moist, medium dense, 95% fine to medium subrounded sand, 5% nonplastic fines						

← Bentonite Chips

← 20/40 Sand



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW08-S	SHEET 5 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (441676.8 N, 1202815.4 E)

ELEVATION : 205.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic 600C Full-sized Track Rig, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 2/13/17 09:00 END : 2/13/17 08:30 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
120.0		No Recovery 120.0-120.5' Poorly Graded Sand with Silt (SP-SM) 120.5-127.0' - (2.5Y 4/2), wet, dense, 90% fine subrounded, layered 1-2mm oxidized layering, 10% nonplastic fines Silt (ML) 127.0-130.0' - (GLE Y1 4/N), wet, stiff, fine to medium plasticity, low dilatancy, no dry strength					0.0	
	9.5	SN-14		0.0				
130.0		Bottom of Boring at 107.0 ft bgs on 2/13/17 08:30		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-M SHEET 2 OF 8
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436991.0 N, 1200530.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Tracking 8 Diameter Casing , 7 Core, 6 Casing, 4 Core

WATER LEVELS : --- START : 12/8/16 10:24 END : 12/14/16 14:20 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
157.2	10.0	SN-4	Poorly Graded Sand (SP) 30.0-37.0' - dark grayish brown (2.5Y 3/2), moist, medium dense, predominately trace fine round gravel	0			Depth to Water = 34.6' bgs prior to drilling, water may be drilling fluid, drilling with water Drilled on 12/8/16, recovered on 12/9/16 after drill rig maintenance on broken part soil length of core screening Soil screening = 0.0 ppm		
35 152.2	37.0		Poorly Graded Sand (SP) 37.0-47.0' - very dark grayish brown (2.5Y 3/2), very moist, medium dense, predominately fine-grained trace silt, no free standing water	0					
40 147.2	10.0	SN-5		0					
45 142.2	47.0		Poorly Graded Sand (SP) 47.0-57.0' - very dark grayish brown (2.5Y 3/2), moist, medium dense, very fine to fine-grained, trace silt, no free standing water						
50 137.2	10.0	SN-6							
55 132.2	57.0		Poorly Graded Sand (SP) 57.0-67.0' - very dark grayish brown (2.5Y 3/2), moist, medium dense, predominately fine to very fine, trace silt, no free standing water						
60									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-M	SHEET 3 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436991.0 N, 1200530.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Tracking 8 Diameter Casing , 7 Core, 6 Casing, 4 Core

WATER LEVELS : --- START : 12/8/16 10:24 END : 12/14/16 14:20 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
127.2	10.0	SN-7					Soil screening = 0.0 ppm		
65 122.2	67.0		Poorly Graded Sand (SP) 67.0-71.5' - very dark grayish brown (2.5Y 3/2), wet (free water), (drilling fluid?), medium dense, fine to very fine				Some of core recovery fell out of core barrel not recovered in soil bags Water in soil core 67-71.5' - likely drilling fluid Soil screening = 0.0 ppm		
70 117.2	4.5	SN-8	No Recovery 71.5-77.0'						
75 112.2	77.0		Poorly Graded Sand (SP) 77.0-87.0' - very dark grayish brown (2.5Y 3/2), moist to wet, medium dense, fine to very fine, silt lense at 82.0' bgs (wet)				Soil screening = 0.0 ppm		
80 107.2	10.0	SN-9							
85 102.2	87.0		Poorly Graded Sand (SP) 87.0-94.5' - very dark grayish brown (2.5Y 3/2), moist, medium dense, very fine to fine						
90								← Bentonite Grout	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-M	SHEET 6 OF 8
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436991.0 N, 1200530.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Tracking 8 Diameter Casing , 7 Core, 6 Casing, 4 Core

WATER LEVELS : --- START : 12/8/16 10:24 END : 12/14/16 14:20 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
37.2	152.0		Poorly Graded Sand with Silt (SP-SM) 152.0-155.5' - dark gray (5Y 4/1), very moist/wet, medium dense, very fine sand, trace fine gravel					152.0-156.0': VOC = 0.2 ppm, CO = 36 ppm	
155 32.2	8.0	SN-15	Poorly Graded Sand (SP) 155.5-162.5' - dark gray (5Y 4/1), very moist/wet, medium dense, very fine to fine					156.0-160.0': VOC = 0.1 ppm, CO = 31 ppm Soil screening: VOC = 0.0 ppm, CO = 0.0 ppm	
160 27.2	160.0		Silty Sand (SM) 162.5-164.0' - dark gray (5Y 4/1), very moist/wet, dense, fine sand					No water level measured at day start because core barrel is in hole with sample drilled on 12/13/16 160-167' bgs	
165 22.2	9.0	SN-16	Poorly Graded Sand (SP) 164.0-167.0' - dark gray (5Y 4/1), very moist/wet, medium dense, very fine to fine					160.0-164.0': VOC = 0.2 , CO = 22 164.0-167.0': VOC = 0.1 , CO = 10 Soil screening: VOC = 0.0, CO = 0.0	
170 17.2	167.0		Poorly Graded Sand (SP) 167.0-175.9' - dark gray (5Y 4/1), very moist/wet, medium dense, very fine to fine-grained					Headspace: 167.0-172.0': VOC = 0.1 , CO = 10 172.0-176.0': VOC = 0.1, CO = 12 Soil screening: VOC = 0.0, CO = 0.0 BZ: VOC = 0.0, CO = 0.0	
175 12.2	8.9	SN-17	No Recovery 175.9-183.0' - sample fell out of core barrel						
180									← Bentonite Chips



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-S	SHEET 1 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436988.9 N, 1200524.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 12/16/16 13:45 END : 12/20/16 13:25 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)			SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE				Breathing Zone	Headspace	Above Hole		
187.2	0.0			Silt (ML) 0.0-3.4' - very dark brown to yellowish brown (10YR 2/2 to 10YR 5/4), moist, medium dense, trace organics/grass, low plasticity				Headspace: 0-7: VOC = 0.1, CO = 0 Soil screening: VOC = 0.0, CO = 0 BZ: VOC = 0.0, CO = 0		
5 182.2	6.2	SN-1		Silty Sand with Gravel (SM) 3.4-7.0' - yellowish brown (10YR 5/4), moist, medium dense, fine to coarse sand and fine to coarse subrounded gravel						
10 177.2	7.0			Silty Sand with Gravel (SM) 7.0-7.6' - yellowish brown (10YR 5/4), moist, medium dense, fine to coarse sand and fine to coarse subrounded gravel Poorly Graded Sand (SP) 7.6-15.0' - very dark grayish brown (2.5Y 3/2), wet (leaves moisture on glove), medium dense, predominately fine-grained, trace coarse subrounded gravel				Headspace: 7-15: VOC = 0.5, CO = 24 Soil screening: VOC = 0.2 (max), CO = 0 BZ: VOC = 0.0, CO = 0		
15 172.2	15.0			Well Graded Sand with Gravel (SW) 15.0-17.0' - very dark grayish brown (2.5Y 3/2), moist, medium dense, gravel is well rounded to subrounded				Headspace: 15-17: VOC = 0.3, CO = 14 Soil screening: VOC = 0.0, CO = 0 BZ: VOC = 0.0, CO = 0		
20 167.2	17.0	SN-3		Well Graded Sand (SW) 17.0-20.0' - very dark grayish brown (2.5Y 3/2), very moist, medium dense, predominately fine, trace gravel				Stop 12/16/16 Start 12/19/16 Driller believes he hit a rock during drilling and pushed it down, resulting in poor recovery Headspace: 17-22: VOC = 0.3 22-27: VOC = 0.2 Soil screening: VOC = 0.0 BZ: VOC = 0.0		
25 162.2				Silty Sand (SM) 20.0-21.0' - very dark grayish brown (2.5Y 3/2), wet, medium dense, trace fine gravel, cobble at 21.0' bgs Silty Gravel with Sand (GM) 21.0-27.5' - very dark grayish brown (2.5Y 3/2), moist to dry, medium dense, fine to coarse well rounded to subrounded gravel and fine to coarse sand				Driller believes he hit a rock during drilling and pushed it down, resulting in poor recovery		
30	11.5	SN-4		Poorly Graded Sand (SP) 27.5-28.5' - very dark grayish brown (2.5Y 3/2), very moist/wet, mostly fine, trace fine gravel No Recovery 28.5-37.0'						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-S	SHEET 4 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436988.9 N, 1200524.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 12/16/16 13:45 END : 12/20/16 13:25 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
97.2			Poorly Graded Sand with Silt (SP-SM) 90.5-94.1' - dark grayish brown (2.5Y 4/2), moist, medium dense, very fine to fine-grained, some thin silt lenses 93.0-94.0' bgs						
95 92.2			No Recovery 94.1-97.0'						
97.0			Poorly Graded Sand (SP) 97.0-104.2' - dark grayish brown (2.5Y 4/2), very moist, medium dense, trace silt <10%, very fine to fine-grained, clay in lenses at 103.0-104.2' bgs				Stop 12/19/16 Start 12/20/16 Headspace: 97-102: VOC = 0.3 102-107: VOC = 0.3 Soil screening: VOC = 0.0 BZ: VOC = 0.0		
100 87.2	10.8	SN-10	Clayey Silt (ML) 104.2-107.0' - dark grayish brown (2.5Y 4/2), very moist, stiff, little very fine sand throughout						
105 82.2			Silty/Clayey Fine Sand (SM-SC) 107.0-117.8' - dark grayish brown (2.5Y 4/2), wet, stiff, color change at 117.5' to very dark gray (N 3/0), very fine to fine sand				Headspace: 107-112: VOC = 0.1 112-117: VOC = 0.2 Soil screening: VOC = 0.0 BZ: VOC = 0.0		
110 77.2	14.0	SN-11							
115 72.2			Clayey Silt (ML) (Stretch Recovery) 117.8-120.0' - very dark gray (N 3/0), very moist, stiff, low plasticity				Bottom of hole = 117' bgs 12/20/16		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW09-S SHEET 5 OF 5
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SW of Bldg 2807 (436988.9 N, 1200524.7 E)

ELEVATION : 187.2 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600C Full-size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 12/16/16 13:45 END : 12/20/16 13:25 LOGGER : R. Clennon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Breathing Zone	Headspace	Above Hole			
RECOVERY (FT)							
SAMPLE #/TYPE							
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">120.0-121.0'</div>	<p>Clayey Sand (SC) (extra recovery) 120.0-121.0' - very dark gray (N 3/0), wet, stiff/stiff, dense, very fine</p> <p>Bottom of Boring at 117.0 ft bgs on 12/20/16 13:25</p>						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D	SHEET 2 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
158.3	9.0	SN-4					Headspace: O ₂ = 20.9 LEL = 0, H ₂ S = 0 VOC = 0, CO = 0		
153.3	37.0		No Recovery 36.0-37.0'						
148.3	10.0	SN-5	Poorly Graded Sand (SP) 37.0-47.0' - dark gray (2.5Y 4/1), slightly moist 36.0-37.0', dry above, loose, trace silt and silt lenses, predominately fine and very fine sand				Drilled to 47' on 1/10/17, retrieve sample on 1/11/17 Headspace: O ₂ = 10.3 LEL = 5, H ₂ S = 2.2 VOC = 0.1, CO = 0		
143.3	47.0		Poorly Graded Sand with Silt (SP-SM) 47.0-49.0' - dark gray (2.5Y 4/1), slightly moist, loose, predominately very fine to fine, trace fine well rounded gravel and trace well rounded cobbles				Headspace: O ₂ = 20.9 LEL = 0, H ₂ S = 0 VOC = 0.1, CO = 0		
138.3	2.0	SN-6	No Recovery 49.0-51.0'				Start 1/11/17 Headspace: O ₂ = 20.1 LEL = 5, H ₂ S = 1.3 VOC = 0.5, CO = 65		
133.3	7.0	SN-7	Poorly Graded Sand wit Silt (SP-SM) 51.0-57.0' - dark gray (2.5Y 4/1), slightly moist, loose, predominately fine and very fine				Breathing zone Headspace: O ₂ = 20.5 LEL = 0, H ₂ S = 0 VOC = 0, CO = 0		
60			Poorly Graded Sand (SP) 57.0-58.7' - dark grayish brown (2.5Y 4/2), slightly moist, loose, very fine and fine sand						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D SHEET 3 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
128.3	10.0	SN-8	Gravelly Silt with Sand (ML) 58.7-63.3' - dark brown (2.5Y 4/3), slightly moist, very stiff, fine to coarse well rounded gravel and well rounded cobbles, fine to coarse sand Clay (CL) 63.3-65.8' - olive brown (2.5Y 4/3), slightly moist, very stiff					Headspace: O ₂ = 20.1 LEL = 3, H ₂ S = 5 VOC = 0.3, CO = 40	
65 123.3	67.0		Sandy Lean Clay with Gravel (CL) 65.8-67.0' - olive brown (2.5Y 4/3), slightly moist, very stiff, fine to coarse sand and fine to coarse subrounded gravel Clayey Sand (SC) 67.0-73.0' - olive brown (2.5Y 4/3), moist, medium dense, some well rounded gravel, sand is predominately fine, few clay lenses throughout, cohesive Silty Sand (SM) 73.0-77.0' - olive brown (2.5Y 4/3), dry to slightly moist, loose, now cohesive, with silt lenses, sand is fine grained, trace fine rounded gravel Note: silt lenses are cohesive/cemented					Headspace: O ₂ = 20.1 LEL = 0, H ₂ S = 0.7 VOC = 0.1, CO = 27 Headspace: O ₂ = 20.1 LEL = 3, H ₂ S = 0.6 VOC = 0, CO = 30 Headspace: O ₂ = 20.3 LEL = 0, H ₂ S = 0 VOC = 0, CO = 0 Headspace: O ₂ = 19.7 LEL = 4, H ₂ S = 1.3 VOC = 0.1, CO = 57 Headspace: O ₂ = 19.7 LEL = 0, H ₂ S = 0 VOC = 0.0, CO = 0	
70 118.3	10.7	SN-9	Poorly Graded Sand with Silt (SP-SM) 77.0-84.5' - olive brown (2.5Y 4/3), moist, medium dense, predominately fine sand, some medium to coarse grains, trace fine rounded gravel, silt also occurs in lenses with sand and is cohesive, slightly clayey					recalibrated fresh air O ₂ = 20.9% Headspace: O ₂ = 21.4 LEL = 4, H ₂ S = 0.7 VOC = 0.3, CO = 34	
75 113.3	77.0		No Recovery 84.5-87.0'					Headspace: O ₂ = 21.4 LEL = 0, H ₂ S = 0 VOC = 0, CO = 0	
80 108.3	7.5	SN-10	Clay (CL) 87.0-92.6' - olive brown (2.5Y 4/3), moist, stiff, cohesive, some mottling, fine sand, trace fine rounded gravel						
85 103.3	87.0								
90									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D	SHEET 4 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
98.3	9.3	SN-11	Poorly Graded Sand (SP) 92.6-96.3' - olive brown (2.5Y 4/3), slightly moist to dry, loose, very fine, little silt				Headspace: O ₂ = 21.8 LEL = 4, H ₂ S = 1.3 VOC = 0.2, CO = 57		
95 93.3			No Recovery 96.3-97.0'						
100 88.3	12.3	SN-12	Clay (CL) changing to Sandy Clay (SC) at 103' bgs 97.0-107.0' - brown (10YR 4/3), some mottling, moist, very stiff, sand is fine-grained and in lenses below 103' and combined with clay, some claystone fragments				Headspace: O ₂ = 21.3 LEL = 2, H ₂ S = 0.6 VOC = 0.1, CO = 36		
105 83.3			11.0					SN-13	Poorly Graded Sand (SP) 107.0-110.0' - dark yellowish brown (10YR 4/4), slightly moist, loose, very fine and fine-grained, trace silt in lenses with sand (cohesive lenses)
110 78.3	Poorly Graded Sand with Silt Lenses (SP) and (ML) 110.0-117.0' - olive brown (2.5Y 4/3), slightly moist, loose sand and stiff silt lense, sand is fine to fine grained, silt occurs in lenses, consolidated with some iron staining, silt lenses are ~ 0.4 ft thick					Headspace: O ₂ = 20.6% LEL = 0.0, H ₂ S = 0 VOC = 0, CO = 0			
115 73.3	117.0						Poorly Graded Sand (SP) 117.0-119.0' - dark grayish brown (2.5Y 4/2), moist, loose, trace coarse sand, predominately fine grained		
120									



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D	SHEET 5 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
68.3	7.2	SN-14	Silty Sand (SM) 119.0-120.7' - dark grayish brown (2.5Y 4/2), moist, dense, cohesive with oxidized mottling, fine to coarse Well Graded Sand (SW)/Sandstone with Cobbles (pulverized in sample bag) 120.7-124.2' - dark yellowish brown (10YR 4/4), dry, dense, sandstone fragments are consolidated				Headspace: O ₂ = 20.9 LEL = 0, H ₂ S = 0 VOC = 0, CO = 0		
125 63.3			No Recovery 124.2-127.0'						
127.0	1.4	SN-15	No Recovery 127.0-135.6'				Advance core barrel with water due to large rocks down hole; very hard to drill through dry. Tried first 5 ft of sample, dry and washed away after water addition, poor recovery due to water use		
130 58.3			Well Graded Sand (SW) 135.6-137.0' - dark yellowish brown (10YR 4/4), wet from drilling water, fine to coarse						
135 53.3	10.0	SN-16	Poorly Graded Sand (SP) 137.0-140.3' - dark grayish brown (10YR 4/2), wet to moist, soft to medium dense (drilling water - wetness), fine to medium-grained				0.1		
140 48.3			Clay (CL) 140.3-141.4' - dark grayish brown (10YR 4/2), moist, stiff, little silt and fine-grained sand, low to no plasticity Poorly Graded Sand (SP) 141.4-147.0' - dark grayish brown (10YR 4/2), moist, fine to medium-grained sand, trace silt and clay						
145 43.3	147.0		Well Graded Sand (SW) 147.0-149.0' - dark grayish brown (10YR 4/2), moist, loose to medium dense, fine to coarse-grained sand, trace silt and fine subangular gravel				0.2		
150			Stop at 147 on 1/12/17, log/retrieve on 1/13/17 (137' to 147') Hard drilling						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D	SHEET 6 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM				
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole						
38.3	10.0	SN-17	Clay (CL) 149.0-153.0' - yellowish brown (10YR 5/6), mottles, moist, stiff, low plasticity, trace silt		0.3								
155 33.3			Clay (CL) 153.0-157.0' - gray (4/N), moist, stiff, low plasticity							0.2			
157.0	10.0	SN-18	Silty Sand (SM) 157.0-157.6' - dark gray (4/N), moist, medium dense, fine-grained sand										
160 28.3			Poorly Graded Sand (SP) 157.6-165.3' - dark gray (4/N), moist, loose, fine-grained sand										
165 23.3			Clay (CL) 165.3-166.7' - greenish gray (5GY 5/1), dry, stiff, no plasticity										
167.0	10.8	SN-19	Clay (CL) 166.7-167.0' - black (10YR 2/1) to very dark brown (10YR 2/2), dry, medium, trace organics, peat-like										
170 18.3			Organic Soil/Peat (OL/PT) 167.0-167.7' - very dark grayish brown (10YR 3/1) to very dark brown, moist, very stiff, organic leaves and wood present							0.0			
175 13.3			Poorly Graded Sand (SP) 167.7-174.0' - very dark grayish brown (2.5Y 3/2), moist, loose, predominately fine-grained, traced oxidation mottling										
177.0	Organic Soil (OL) 174.0-175.0' - very dark gray (10YR 3/1), slightly moist, very stiff, abundant wood fragments		0.0										
180	Poorly Graded Sand (SP) 175.0-177.0' - olive brown (2.5Y 4/3), moist, loose, predominately fine-grained, traced oxidation mottling												
			Poorly Graded Sand (SP) 177.0-183.4' - very dark gray (2.5Y 3/1), moist, loose, fine and very fine-grained										



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-D	SHEET 7 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436180.8 N, 1203179.8 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C full size track rig, 8" diameter casing, 7" diameter core barrel, 6" diameter casing, 4" barrel

WATER LEVELS : --- START : 1/10/17 14:15 END : 1/16/17 17:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
8.3	11.4	SN-20	Organic Soil (OL)/Silt (ML) 183.4-186.7' - dark gray (2.5Y 4/1), slightly moist, very stiff, trace organic fibers throughout and trace oxidation					Drive casing down to 187' bgs after SN-21 then pull casing back to 155' and fill hole with bentonite to crease seal. Casing pushed to 157' through bentonite	
185 3.3			Poorly Graded Sand (SP) 186.7-187.0' - dark gray (2.5Y 4/1), moist, loose, little silt in lense						
187.0			Silt (ML) 187.0-109.0' - very dark gray (2.5Y 3/1), wet, stiff, trace fine sand sized mica flakes					187' and below drilled with 6" diameter casing and 4" diameter core barrel Stop 1/15/17 Drilling with 4" barrel x 6" casing Start 1/16/17 Drilled run dry/no drilling mud	
190 -1.8	8.9	SN-21	Poorly Graded Sand (SP) 190.5-195.9' - very dark gray (2.5Y 3/1), wet, loose, trace organics wood/branches ~3" long and fragments						
195 -6.8			No Recovery 195.9-197.0'						
197.0			Wood 197.0-198.0' - black (2.5Y 5/1), dry						
200 -11.8			Silt (ML) 198.0-200.5' - dark gray (5Y 4/1), moist, very stiff, trace fine sand, trace plant fibers			0.0			
	10.0	SN-22	Silty Sand (SM) 200.5-203.0' - dark gray (5Y 4/1), wet, medium dense						
205 -16.8			Silt (ML) 203.0-207.0' - dark gray (5Y 4/1), wet, very stiff, trace fine sand, trace plant fibers			0.0			
207.0			Bottom of Boring at 207.0 ft bgs on 1/16/17 17:00					Sample drilled 1/16/17 and retrieved from core barrel on 1/18/17	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-M SHEET 2 OF 6
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436186.1 N, 1203182.9 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 1/20/17 09:57 END : 1/22/2017 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
158.3								
35 153.3	16.5	SN-3		0.0				
40 148.3				0.0				
45 143.3		No Recovery 43.5-47.0'		0.0				
47.0				0.0				
50 138.3		Poorly Graded Sand with Gravel (SP) 47.0-49.0' - dark gray (5Y 4/1), moist, loose, predominately fine-grained, trace coarse well rounded gravel, little silt		0.0				
55 133.3		Silt with Sand (ML) 49.0-56.0' - dark grayish brown (2.5Y 4/2), dry with some slightly moist intervals, loose, very fine to fine sand some clean sand lenses		0.0				
60	16.0	Silty Sand (SM) 56.0-60.0' - dark grayish brown (2.5Y 4/2), dry to slightly moist, loose, sand is fine-grained, little fine to coarse rounded gravel		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW10-M SHEET 4 OF 6
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : SE of runway (436186.1 N, 1203182.9 E)

ELEVATION : 188.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 1/20/17 09:57 END : 1/22/2017 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
98.3	11.0	SN-7							
95 93.3			Poorly Graded Sand (SP) 94.0-97.0' - olive brown (2.5Y 4/3) and oxidized reddish, slightly moist, loose, sand is predominately fine-grained		0.0		Headspace = 0.0 ppm (every 5 ft measured)		
	97.0								
100 88.3		SN-8	Poorly Graded Sand (SP) 97.0-98.5' - olive brown (2.5Y 4/3) and oxidized reddish, slightly moist, loose, sand is predominately fine-grained Silt (ML) 98.5-107.0' - olive brown with iron staining/mottled, slightly moist, very stiff, fine sand lense at 105.5-106.5'		0.0		Headspace 97-102' VOC = 0.3 ppm		
	106								
105 83.3									
	107.0								
110 78.3		SN-9	Silt (ML) 107.0-111.0' - very dark gray (N 3/0) with dark yellowish brown mottling (10YR 4/4), slightly moist, very dense Silty/Clayey Fine Sand (SM/SC) 111.0-113.0' - dark yellowish brown (10YR 3/4), dry, medium dense, cohesive Poorly Graded Sand (SP) 113.0-115.0' - dark yellowish brown (10YR 3/4), dry, trace silt, Silt (ML) lense at 115', dry		0.0		Stop 1/20/17 Start 1/22/17 Headspace: 107-112 CO = 20 ppm VOC = 0.2 ppm		
	9.0								
115 73.3			Silty Sand (SM) 115.0-117.5' - light olive brown (2.5Y 5/2), dry, dense, predominately fine-grained Silt with Sand (ML) 117.5-120.0' - olive brown (2.5Y 5/2) with some oxidized mottling, dry, hard (siltstone), sand is fine-grained				Headspace 115-120' VOC = 0.1 ppm CO = 5 ppm		
	115.0								
120							Hard drilling		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW11-M SHEET 3 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (443696.2 N, 1199632.0 E)

ELEVATION : 202.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --- START : 1/25/2017 END : 2/1/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	RECOVERY (FT)		Breathing Zone	Headspace	Above Hole		
	SAMPLE #/TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY						
142.1	60.0							
65 137.1	8.0	SN-7						
		Poorly Graded Sand (SP) 65.0-70.0' - like above, few gravel pieces (SP)						
70 132.1	8.1	SN-8						
		Poorly Graded Sand (SP) 70.0-80.0' - like above						
75 127.1	75.0							
		- at 76 and 79', layers of Silty Sand (SM), with organics					At 1630 stop at 75' Resume 1/30/17	
80 122.1	10.0	SN-9			0			
		Poorly Graded Sand (SP) 80.0-87.0' - dark brown (10YR 3/3), dry, loose, fine, increasing 1/4" silty seams below 83" laminations						
85 117.1	85.0							
		Poorly Graded Sand (SP) 87.0-96.5' - dark brown (10YR 3/3), dry, loose, fine-grained, beach sand, silt laminations			0			
90								

← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW11-M SHEET 4 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (443696.2 N, 1199632.0 E)

ELEVATION : 202.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --- START : 1/25/2017 END : 2/1/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SAMPLE #/TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SOIL DESCRIPTION				Breathing Zone	Headspace	Above Hole		
112.1	10.0		SN-10							
95 107.1	95.0			Silty Sand (SM) 96.5-97.5' - dark gray (2.5Y 4/1), dry, fine-grained			0			
100 102.1	9.2		SN-11	Sand (SP) 100.0-113.0' - dark brown (10YR 3/3), dry, loose, fine-grained, below 103', very fine with silty laminae			0			
105 97.1	105.0			- back to (SP) to 105'			0			
110 92.1	9.0		SN-12	- very fine (SP) layer						
115 87.1	115.0			Poorly Graded Sand (SP) 113.0-125.0' - brown (10YR 4/3), dry, loose, no fines, well-sorted sand					Driller noted easy drilling	
120	7.0		SN-13	- Poorly Graded Sand (SP) , like above			0			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW11-M SHEET 5 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (443696.2 N, 1199632.0 E)

ELEVATION : 202.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT :

WATER LEVELS : --- START : 1/25/2017 END : 2/1/2017 LOGGER : G. Warren

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		Breathing Zone	Headspace	Above Hole		
	RECOVERY (FT)							
82.1								
122.5		- at 122.0', cemented silty sand layers				Stiff drilling 122.5-125' - no recovery		
125 77.1	125.0	Sand with Silt (SP-SM) 125.0-130.0' - very dark gray (2.5Y 3/1), dry, loose, fine to very fine						
130 72.1	10.0	SN-14 Poorly Graded Sand (SP) 130.0-135.0' - dark brown (10YR 3/3), dry, loose, fine-grained, same as previous (SP)		0.1		Driller noted loose/soft drilling, but stiff at 135'		
135 67.1	135.0	- cemented silt lenses at 134' Interbedded Silt/Fine Sand 135.0-139.4' - Lacustrine sediment						
140 62.1	10.0	SN-15 Lean Clay (CL) 139.4-143.0' - dark gray (GLE Y1 4/N), dry, hard, interbedded silt						
145 57.1	145.0	Poorly Graded Sand (SP) 143.0-150.0' - dark brown (GLE Y1 4/N), moist, fine, silty lenses				Stop at 145' for day		
150								



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW11-S	SHEET 4 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (443692.1 N, 1199626.4 E)

ELEVATION : 202.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic, Terrasonic Short Stroke with 4" x 6" Core Barrel

WATER LEVELS : --- START : 2/6/17 13:36 END : 2/1/2017 LOGGER : J. Frank

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
112.0	10.0	SN-12			0.0	0.1			
95 107.0									
98.0			- color change (10YR 4/2)			0.0			
100 102.0	10.0	SN-13			0.0	0.1			
105 97.0			Poorly Graded Sand (SP) 104.0-109.4' - dark grayish brown (10YR 4/2), dry, loose, very fine to fine sand						
108.0						0.0			
110 92.0	10.0	SN-14	Silt (SM-ML) 109.4-109.75' - with trace very fine sand, 2.5Y 4/1 dark gray, dry, medium dense Poorly Graded Sand (SP) 109.75-118.0' - dark grayish brown (10YR 4/2), dry, loose, very fine sand silt lense at 110.2-110.0'			0.0	0.1		
115 87.0									
118.0							0.3		
120			Silty Sand (SM) 118.0-119.5' - dark brown (2.5YR 4/2), moist, dense, very fine to fine sands						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW11-S	SHEET 5 OF 5
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (443692.1 N, 1199626.4 E)

ELEVATION : 202.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : RotoSonic, Terrasonic Short Stroke with 4" x 6" Core Barrel

WATER LEVELS : --- START : 2/6/17 13:36 END : 2/1/2017 LOGGER : J. Frank

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
82.0	10.0	SN-15	Poorly Graded Sand (SP) 119.5-127.6' - dark brown (2.5Y 4/3), dry, loose, very fine sand		0.0	0.1			
125 77.0	128.0		Sandy Silt (SM) 127.6-128.0' - dark brown (2.5Y 3/2), moist, medium dense			0.1	Ran 20 ft of core barrel to collect 128-140' run		
130 72.0			Poorly Graded Sand (SP) 128.0-130.5' - dark brown (2.5Y 4/3), moist, loose, very fine to fine sand						
			Sandy Silt (SM) 130.5-130.7' - dark brown (2.5YR 4/2), dry, medium dense, very fine sand						
			Poorly Graded Sand (SP) 130.7-136.0' - dark brown (2.5Y 4/3), moist, loose, very fine to fine sand						
135 67.0	12.0	SN-16	Sandy Silt (SM) 136.0-140.0' - dark brown (2.5YR 4/2), moist, medium dense		0.0	0.2			
140 62.0	140.0		Bottom of Boring at 140.0 ft bgs on 2/1/2017			0.1			



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-D	SHEET 2 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Field (433269.9 N, 1204130.8 E)

ELEVATION : 186.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Tracking Rig, 8" Diameter Casing, 7" Core Barrel, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 1/24/17 14:05 END : 1/26/17 15:45 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
156.9	10.0	SN-4							
35 151.9	37.0								
40 146.9	5.0	SN-5	Well Graded Sand (SW) 37.0-38.0' - very dark gray (2.5Y 3/1), moist, loose, little fine to coarse rounded gravel Poorly Graded Sand (SP) 38.0-42.0' - very dark gray (2.5Y 3/1), moist, loose, little fine to coarse rounded gravel No Recovery 42.0-47.0'				Low recovery due to sand and bags larger than sample diameter, compressed sample		
45 141.9	47.0								
50 136.9	10.0	SN-6	Poorly Graded Sand (SP) 47.0-52.0' - dark gray (5Y 4/1), moist, loose, mostly fine-grained Silty Sand (SM) 52.0-53.5' - dark gray (5Y 4/1), moist, loose, mostly fine-grained, fine to coarse rounded gravel Poorly Graded Sand (SP) 53.5-57.0' - dark gray (5Y 4/1), moist, loose, some fine to coarse rounded gravel				To increase recovery, driller switched to auger bit for core barrel		
55 131.9	57.0								
60			Well Graded Sand (SW) 57.0-67.0' - very dark grayish brown (2.5Y 3/2), moist, loose, fine to coarse-grained sand with trace fine rounded gravel						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-D	SHEET 5 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Field (433269.9 N, 1204130.8 E)

ELEVATION : 186.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Tracking Rig, 8" Diameter Casing, 7" Core Barrel, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 1/24/17 14:05 END : 1/26/17 15:45 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
66.9	10.0	SN-14					Stop 1/25/17 Start 1/26/17 Headspace: 117-122' VOC = 0.7 ppm CO = 11 ppm Headspace: 117-122' VOC = 0.7 ppm CO = 11 ppm		
125 61.9	127.0		Clayey Sand with Gravel (SC) 127.0-138.0' - very dark gray (2.5Y 3/1), moist, very stiff, fine to coarse sand, fine to coarse rounded to well rounded gravel, trace rounded cobbles, trace oxidation				Headspace: 127-132' CO = 5.0 ppm		
130 56.9	15.0	SN-15					Headspace: 132-137' CO = 13 ppm		
135 51.9			Clay (CL) 138.0-141.0' - dark grayish brown (2.5Y 4/2), moist, very stiff, ~10% fine sand, <5% fine rounded gravel			0.0			
140 46.9	142.0		Clay (CL) 141.0-142.0' - very dark gray (5Y 3/1), dry, very stiff, brittle, little fine sand			0.0			
145 41.9			Clayey Sand (SC) 142.0-142.5 - very dark grayish brown (2.5Y 3/2), moist, dense, fine to coarse-grained						
			Well Graded Sand (SW) 142.5-150.0' - very dark gray (10YR 3/1), wet, loose, fine to coarse, trace fine rounded gravel, trace silt			0.0			
150	15.0	SN-16							



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-D	SHEET 7 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Field (433269.9 N, 1204130.8 E)

ELEVATION : 186.9 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Tracking Rig, 8" Diameter Casing, 7" Core Barrel, 6" Casing, 4" Barrel

WATER LEVELS : --- START : 1/24/17 14:05 END : 1/26/17 15:45 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
6.8									
185	21.0	SN-18	Poorly Graded Sand (SP) 183.0-190.5' - dark gray (N 4/0), wet, loose, predominately very fine to fine, trace silt lenses			0.0			
185 1.8							Headspace: 187-192' CO = 4 ppm		
190			Silt (ML) 190.5-193.8' - dark gray (5Y 4/1), wet, dense/very stiff, low plasticity						
190 -3.2							Headspace: 192-197' CO = 2 ppm		
195			Organic Silt (OL) 193.8-197.0' - very dark gray (5Y 3/1) to black (5Y 2.5/1), wet, hard, low plasticity, abundant grass and wood						
195 -8.2									
	197.0		Bottom of Boring at 198.0 ft bgs on 1/26/17 15:45				Stop 1/26/17 Bottom of borehole = 198' (measured depth)		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-S SHEET 1 OF 4
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Pinfield (433273.8 N, 1204137.4 E)

ELEVATION : 187.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 1/29/17 14:05 END : 1/31/17 15:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)						Breathing Zone	Headspace	Above Hole		
187.0					Cleared 5' with vac truck, no description 0.0-5.0'						
5 182.0	5.0				No Recovery 5.0-15.0'					For two runs, driller reports hand obstruction fell on bit. Drill bit advances, but no recovery. Possibly large gravel/cobble. Top of SN-3 is moist. No water was used during drilling until 105' bgs.	
10 177.0		0.0	SN-1								
15 172.0					No Recovery 15.0-25.0'						
20 167.0		0.0	SN-2								
25 162.0		25.0			Well Graded Sand (SW) 25.0-28.0' - very dark gray (2.5Y 3/1), moist, loose, 95% fine to coarse subrounded sand, 5% small round to subrounded gravel		0.0				
30					Poorly Graded Sand (SP) 28.0-29.0' - very dark gray (2.5Y 3/1), moist, loose, 95% medium sand, 5% subrounded gravel	0.0					



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-S	SHEET 3 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Pinfield (433273.8 N, 1204137.4 E)

ELEVATION : 187.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 1/29/17 14:05 END : 1/31/17 15:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
127.0	3.5	SN-6	Poorly Graded Sand (SP) 61.5-65.0' - very dark gray (2.5Y 3/1), loose, 95% fine to medium subangular sand, 5% fine medium gravel		0.0				
65 122.0			Poorly Graded Sand (SP) 65.0-73.0' - very dark gray (2.5Y 3/1), loose, 95% fine to medium subangular sand, 5% fine medium gravel		0.0				
70 117.0	10.0	SN-7	Poorly Graded Sand (SP) 73.0-75.0' - very dark gray (2.5Y 3/1), loose, >90% fine subangular sand, <10% nonplastic fines, trace gravel		0.0				
75 112.0			No Recovery 75.0-77.5'		0.0				
80 107.0	7.5	SN-8	Poorly Graded Sand (SP) 77.5-79.0' - very dark grayish brown (2.5Y 3/2), loose, 95% fine subangular sand, 5% fine gravel and nonplastic fines Silty Sand (SM) 79.0-83.5' - very dark grayish brown (2.5Y 3/2), loose, 80% fine subangular sand, 20% nonplastic fines		0.0				
85 102.0	85.0		Poorly Graded Sand (SP) 83.5-85.0' - very dark grayish brown (2.5Y 3/2), loose, 100% fine to medium sand Poorly Graded Sand (SP) 85.0-87.5' - very dark grayish brown (2.5Y 3/2), loose, 95% fine sand, 5% gravel		0.0				
90			Poorly Graded Sand (SP) 87.5-90.0' - very dark gray (2.5Y 3/1), loose, 90% fine to medium sand, subangular, <10% nonplastic fines, grades downward to sandy clay		0.0			← Bentonite Chips	



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW12-S	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : South End of Pinfield (433273.8 N, 1204137.4 E)

ELEVATION : 187.0 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 6" Casing, 4" Core Barrel

WATER LEVELS : --- START : 1/29/17 14:05 END : 1/31/17 15:00 LOGGER : E. Bilyeu

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
97.0	10.0	SN-9	Clayey Sand (SC) 90.0-94.0' - moist, medium stiff, 65% fine sand, 35% low plasticity fines, low dilatancy, medium to high dry strength						
95.0			Well Graded Gravel with Sand (GW) 94.0-95.0' - very dark grayish brown (2.5Y 3/2), moist, loose, 65% fine to coarse gravel, subangular, 35% fine to medium subangular						
92.0			Well Graded Gravel with Sand (GW) 95.0-97.0' - very dark grayish brown (2.5Y 3/2), moist, loose, 65% fine to coarse gravel, subangular, 35% fine to medium subangular						
100.0	10.0	SN-10	Clayey Gravel with Sand (GW) 97.0-105.0' - dark gray (5Y 4/1), wet, loose, 55% fine to coarse subangular gravel, 15% fine subangular sand, 30% low plasticity fines, low dilatancy, medium to high dry strength						← 20/40 Sand
105.0			Gravelly Silt (ML) 105.0-106.5' - very dark grayish brown (2.5Y 3/2), wet, medium density, 55% low plasticity fines, 10% fine subangular sand, 35% fine subangular gravel, no dry strength						
110.0			Gravelly Lean Clay (CL) 106.5-111.0' - wet, very dark grayish brown (2.5Y 3/2), 55% low to medium plasticity fines, 10% coarse subangular sand, 35% fine subangular gravel, medium dry strength					Used water to keep casing clear. Hard rocks felt by driller at end of run.	
115.0			Silty Gravel (GM) with Sand 111.0-115.0' - very dark gray (2.5Y 3/1), moist, loose, 60% fine subangular gravel, 20% fine subangular sand, 20% nonplastic fines						2" Schedule 80 - 0.010 Slot Screen
115.0			Bottom of Boring at 115.0 ft bgs on 1/31/17 15:00						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-M SHEET 1 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437627.1 N, 1200713.2 E)

ELEVATION : 189.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 8" diameter casing, 7" diameter core barrel, 4" barrel, 6" casing

WATER LEVELS : --- START : 12/21/16 14:53 END : 1/5/17 15:15 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	Interval 1	Interval 2					Breathing Zone	Headspace	Above Hole		
189.1					Cleared with vac truck and air knife, no description 0.0-5.0'						
5	5.0										
184.1			3.0	SN-1	Well Graded Sand (SW) 5.0-7.0' - dark yellowish brown (10YR 3/4), moist, medium dense, fine to coarse, some fine to coarse gravel, rounded, some silt					Headspace: 5-7': VOC = 0.1 Soil Screening: VOC = 0.0 BZ: VOC = 0.0 Headspace: 7-12': VOC = 0.1 12-14': VOC = 0.2 Soil Screening: VOC = 0.0 BZ: VOC = 0.0	
7.0					Well Graded Sand (SW) 7.0-9.0' - very dark grayish brown (10YR 3/2), very moist, medium dense, fine to coarse, little fine to coarse rounded gravel, trace silt						
10					Well Graded Gravel (GW) with Sand 9.0-10.7' - very dark grayish brown (2.5Y 5/2), moist, medium dense, fine to coarse rounded to subrounded, sand is fine to coarse, trace silt	•••••					
179.1			7.3	SN-2	Well Graded Sand with Gravel (SW) 10.7-12.6' - very dark grayish brown (2.5Y 5/2), moist, medium dense, fine to coarse sand and gravel, rounded to subrounded	•••••					
15					Silty Gravel (GW) 12.6-14.3' - dark gray (5Y 4/1), dry, medium dense, fine to coarse rounded to well rounded, some fine to coarse sand	•••••					
174.1					No Recovery 14.3-17.0'						
17.0					Well Graded Gravel with Sand (GW) 17.0-25.25' - very dark grayish brown (2.5Y 3/2), moist to dry, medium dense, little silt, trace cobbles, fine to coarse sand and fine to coarse gravel, rounded to well rounded	•••••				Stop 12/21/16 Start 1/3/17 Headspace: 17-22' = 0.0 ppm 22-25.25' = 0.0 ppm Soil screen along core 0.0 ppm	
20			8.3	SN-3							
169.1					No Recovery 25.25-27.0'						
25					Well Graded Gravel with Silt and Sand (GW-GM) 27.0-31.0' - very dark gray (2.5Y 3/1), slightly moist to dry, medium dense, gravel is rounded to well rounded, trace cobbles	•••••				Headspace: 27-29' = 0.0 ppm 29-31' = 0.0 ppm Soil Screen = 0.0 ppm	
164.1											
27.0											
30			6.6	SN-4							



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-M SHEET 3 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437627.1 N, 1200713.2 E)

ELEVATION : 189.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 8" diameter casing, 7" diameter core barrel, 4" barrel, 6" casing

WATER LEVELS : --- START : 12/21/16 14:53 END : 1/5/17 15:15 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
129.1	8.7	SN-8							
65 124.1			No Recovery 65.7-67.0'						
67.0			Poorly Graded Sand (SP) 67.0-69.3' - very dark grayish brown (2.5Y 3/2), very moist (wet from drilling fluid), medium dense, fine to medium-grained, trace coarse grains						
70 119.1	9.0	SN-9	Poorly Graded Sand with Silt (SP-SM) 69.3-77.0' - dark grayish brown (2.5Y 4/2), slightly moist, medium dense, very fine to fine-grained						
75 114.1			Poorly Graded Sand with Silt Lenses (SP-SM) 77.0-84.3' - dark grayish brown (2.5Y 4/2), slightly moist, medium dense, very fine to fine-grained				Headspace: 77-80': 0.0 ppm 80-84.3': 0.0 ppm		
77.0									
80 109.1	7.3	SN-10							
85 104.1			No Recovery 84.3-87.0'						
87.0			Poorly Graded Sand (SP) 87.0-92.6' - dark grayish brown (2.5Y 4/2), moist, medium dense, trace silt, sand is very fine to fine-grained						
90									

← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-M	SHEET 5 OF 7
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437627.1 N, 1200713.2 E)

ELEVATION : 189.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 8" diameter casing, 7" diameter core barrel, 4" barrel, 6" casing

WATER LEVELS : --- START : 12/21/16 14:53 END : 1/5/17 15:15 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
69.1	122.0		Silty/Clayey Fine to Medium Sand (SM/SC) 122.0-137.0' - dark gray (2.5Y 4/1), moist, dense, cohesive, fine to medium sand with fine to coarse rounded/subrounded gravel, trace cobbles	[Symbolic Log Pattern]			8" diameter temporary casing set at 117.0' bgs and below drilled with 4" diameter core barrel and 6" diameter outer casing Headspace 117-119': VOC = 0.0 ppm 119-121': CO = 6 ppm, VOC = 0 ppm Stop 1/4/17 Start 1/5/17	[Well Diagram Pattern]	
125 64.1	19.5	SN-15							Headspace 122-127': CO = 20 ppm H ₂ S = 0.8 ppm 127-132': CO = 6 ppm 132-138': CO = 12 ppm Breathing zone = 0 ppm
130 59.1	137.0		137' - extra recovery - Poorly Graded Sand (SP), very moist/wet, loose, trace fine gravel, sand fine to medium, trace silt Poorly Graded Sand (SP) 137.0-155.3' - dark gray 2.5Y 4/1, very moist/wet, predominately fine-grained, trace silt	[Symbolic Log Pattern]			Headspace: 137-142': CO = 8 ppm 142-147': CO = 17 ppm 147-152': CO = 21 ppm 152-155.5': CO = 15 ppm Breathing Zone = 0.0 ppm, all parameters, O ₂ = 20.6	[Well Diagram Pattern]	
135 54.1	18.5	SN-16	140 49.1						145 44.1



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-M SHEET 6 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437627.1 N, 1200713.2 E)

ELEVATION : 189.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 8" diameter casing, 7" diameter core barrel, 4" barrel, 6" casing

WATER LEVELS : --- START : 12/21/16 14:53 END : 1/5/17 15:15 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	SOIL DESCRIPTION		SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	INTERVAL (FT)	RECOVERY (FT)		Breathing Zone	Headspace	Above Hole		
		SAMPLE #/TYPE						
39.1								
155 34.1								
157.0								
160 29.1								
165 24.1								
170 19.1	18.3	SN-17						
175 14.1								
177.0								
180								

Silty Sand (SM)
155.3-155.5' - dark gray (2.5Y 4/1), wet, medium dense, very fine-grained

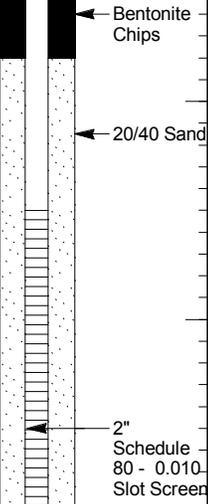
No Recovery
155.5-157.0'

Poorly Graded Sand (SP)
157.0-175.3' - dark gray (2.5Y 4/1) changing to very dark gray (2.5Y 3/1) at 170.6-175.3', very moist to wet, loose, predominately fine, trace silt

No Recovery
175.3-177.0'

Poorly Graded Sand (SP)
177.0-181.5' - dark gray (GLE Y1 N4/0), very moist/wet, loose, predominately fine-grained

Headspace:
157-162': CO = 22 ppm
162-167': 0.0 ppm
167-172': 5 ppm (CO)
172-175.3': CO = 5 ppm





PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-M SHEET 7 OF 7
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437627.1 N, 1200713.2 E)

ELEVATION : 189.1 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C Full Size Track Rig, 8" diameter casing, 7" diameter core barrel, 4" barrel, 6" casing

WATER LEVELS : --- START : 12/21/16 14:53 END : 1/5/17 15:15 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		RECOVERY (FT)	SAMPLE #/TYPE	SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM	
							Breathing Zone	Headspace	Above Hole			
9.1												
185 4.1	22.0			SN-18	Silty/Clayey Fine to Medium Sand (SM/SC) 181.5-183.3' - dark gray (N 4/0), moist, dense Silt/Clay (ML/CL) 183.3-197.0' - dark gray (5Y 4/1), moist, stiff to very stiff, cohesive					Headspace: 177-182': Co = 9 ppm 182-187': CO = 4 ppm 187-192': = 0.0 ppm 192-197': 0.0 ppm Breathing Zone = 0.0		
190 -0.9												
195 -5.9												
197.0					Bottom of Boring at 197.0 ft bgs on 1/5/17 15:15					Bottom of hole = 197' Tagged bottom of hole at 198' 1/6/17 at time of well installation		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-S	SHEET 2 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437634.6 N, 1200712.1 E)

ELEVATION : 189.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C, 6" diameter casing, 4" diameter, core barrel

WATER LEVELS : --- START : 1/8/17 09:10 END : 1/8/17 16:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
159.3	9.4	SN-5	Poorly Graded Sand (SP) 33.4-36.4' - very dark grayish brown (2.5Y 3/2), moist, loose, fine to medium, trace silt		0.0				
35 154.3									
	37.0		No Recovery 36.4-37.0'		0.0				
40 149.3	10.0	SN-6	Silty Sand (SM) 37.0-47.0' - dark gray (2.5Y 4/1), dry to moist at 45.0' bgs, loose, predominately fine, little fine to coarse gravel, rounded, trace well rounded cobbles, less silt form 45.0' to 47.0' bgs, becoming (SP)		0.0				
45 144.3	47.0		Poorly Graded Sand with Silt (SP-SM) 47.0-51.0' - very dark gray (2.5Y 3/1), moist to dry (alternating), loose, trace gravel (fine to coarse) from 50.0' to 51.0' bgs		0.0		Added water to casing - sample wet from water		
50 139.3	5.0	SN-7							
	51.0		Poorly Graded Sand with Silt (SP-SM) 51.0-57.0' - dark gray (2.5Y 4/1), dry to moist alternating, loose, predominately fine-grained, trace fine to coarse gravel (rounded)		0.0				
55 134.3	6.0	SN-8							
	57.0		Poorly Graded Sand (SP) 57.0-66.5' - dark gray (2.5Y 4/1), moist, loose, some silt lenses throughout and from 65.0' to 66.5' bgs, predominately fine-grained		0.0				
60									

← Bentonite Grout



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-S	SHEET 3 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437634.6 N, 1200712.1 E)

ELEVATION : 189.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C, 6" diameter casing, 4" diameter, core barrel

WATER LEVELS : --- START : 1/8/17 09:10 END : 1/8/17 16:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
129.3	9.5	SN-9			0.0				
65 124.3	67.0		No Recovery 66.5-67.0'		0.0				
70 119.3	9.2	SN-10	Poorly Graded Sand (SP) 67.0-76.2' - dark grayish brown (2.5Y 4/2), slightly moist, loose, very fine to fine, little silt		0.0				
75 114.3	77.0		No Recovery 76.2-77.0'		0.0				
80 109.3	9.2	SN-11	Poorly Graded Sand (SP) 77.0-86.2' - dark grayish gray (2.5Y 4/2), slightly moist, loose, very fine to fine-grained with occasional silt lenses		0.0				
85 104.3	87.0		No Recovery 86.2-87.0'		0.0				
90	6.3	SN-12	Poorly Graded Sand (SP) 87.0-91.0' - dark grayish brown (2.5Y 4/2), slightly moist, loose, very fine to fine with a few silt lenses about 0.1" thick		0.0				



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW13-S	SHEET 4 OF 4
SOIL BORING LOG		

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : NE of Bldg 2807 (437634.6 N, 1200712.1 E)

ELEVATION : 189.3 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : ProSonic 600C, 6" diameter casing, 4" diameter, core barrel

WATER LEVELS : --- START : 1/8/17 09:10 END : 1/8/17 16:00 LOGGER : N. Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
99.3	91.0		Very Fine Silty Sand (SM) 91.0-96.0' - dark grayish brown (2.5Y 4/2), slightly moist, medium dense, cohesive silt lense from 91.9' to 92.3' bgs	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
	6.4	SN-13							
95 94.3	96.0		Silt (ML) 96.0-99.0' - dark grayish brown (2.5Y 4/2), moist, medium dense, cohesive, some very fine sand	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
100 89.3			Poorly Graded Sand with Silt (SP-SM) 99.0-102.0' - dark grayish brown (2.5Y 4/2), moist, loose	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
		11.6	Silt (ML) 102.0-106.5' - dark grayish brown (2.5Y 4/2), moist, medium dense, cohesive, some fine sand	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
105 84.3			Poorly Graded Sand with Silt (SP-SM) 106.5-107.0' - dark grayish brown (2.5Y 4/2), moist, loose	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
			Poorly Graded Sand with Silt (SP-SM) 107.0-109.5' - dark grayish brown (2.5Y 4/2), wet, medium dense, very fine	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
110 79.3			Silt/Clay (ML/CL) 109.5-113.0' - dark gray (N 4/2), trace fine well rounded gravel, moist, stiff, cohesive	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
		8.0	No Recovery 113.0-115.0'	[Symbolic Log Pattern]	0.0			[Well Diagram Pattern]	
115 74.3	115.0		Bottom of Boring at 115.0 ft bgs on 1/8/17 16:00	[Symbolic Log Pattern]				[Well Diagram Pattern]	

← Bentonite Chips

← 20/40 Sand

← 2" Schedule 80 - 0.010 Slot Screen

Drilled without drilling mud, dry, sample is wet from 107' to 109.5'



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW14-M SHEET 4 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439885.8 N, 1200752.6 E)

ELEVATION : 191.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600 Sonic 8" x 7" Core Barrel

WATER LEVELS : --- START : 1/15/17 09:20 END : 1/20/17 16:14 LOGGER : D. Well/G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
101.6	10.0	SN-10			0.1				
95 96.6	96.0		Silt (ML) 96.0-98.2' - dark grayish brown (10YR 4/2), moist, interbedded fine sand lense, stiff		0.1				
100 91.6	9.1	SN-11	Silty Sand (SM) 98.2-105.1' - dark grayish brown (10YR 4/2), moist, medium dense, very fine-grained sand		0.1				
105 86.6	106.0		No Recovery 105.1-106.0'		0.1				
110 81.6	10.0	SN-12	Silt with Sand (ML) 106.0-106.6' - dark grayish brown (10YR 4/2), moist, stiff, fine-grained sand Clay (CL) 106.6-107.5' - olive brown (2.5Y 4/3), moist, very stiff, some silt, low plasticity Silt/Clay (ML/CL) 107.5-111.5' - olive brown (2.5Y 4/3), moist, stiff, low plasticity		0.0				
115 76.6	116.0		Silt (ML) 111.5-112.0' - dark olive gray (5YR 3/2), moist, stiff, little clay Clay (CL) 112.0-113.2' - dark olive gray (5YR 3/2), moist, very stiff, little silt, low plasticity Silt (ML) 113.2-114.2' - dark olive gray (5YR 3/2), stiff Clay (CL) 114.2-115.7' - dark olive gray (5YR 3/2), moist, stiff, low plasticity		0.0				
120			Silt (ML) 115.7-116.0' - olive brown (2.5Y 4/3), dry, very stiff, clay laminae, very cohesive, weakly cemented Clay with Sand and Gravel (CL) 116.0-116.5' - dark grayish brown (10YR 4/2), moist, stiff, fine-grained sand, fine subrounded gravel						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW14-M SHEET 5 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439885.8 N, 1200752.6 E)

ELEVATION : 191.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600 Sonic 8" x 7" Core Barrel

WATER LEVELS : --- START : 1/15/17 09:20 END : 1/20/17 16:14 LOGGER : D. Well/G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
71.6	10.0	SN-13	Silty Sand with Gravel (SM) 116.5-117.0' - dark grayish brown (10YR 4/2), moist, dense, fine-grained sand, fine rounded gravel, angular cobbles ~3.5" diameter Well Graded Sand with Gravel (SW) 117.0-119.0' - dark grayish brown (10YR 4/2), moist, dense, fine to coarse-grained sand, fine gravel, trace silt Silty Sand (SM) 119.0-120.5' - dark grayish brown (10YR 4/2), moist, dense, fine-grained, trace fine to coarse gravel, angular to subrounded Poorly Graded Sand with Silt (SP-SM) 120.5-122.5' - dark grayish brown (10YR 4/2), moist, dense, fine-grained sand, fine to coarse subrounded to rounded gravel Well Graded Sand with Gravel (SW) 122.5-126.0' - dark grayish brown (10YR 4/2), moist to wet, dense, fine to coarse-grained sand, fine to coarse gravel, rounded, trace cobbles, 2" diameter Well Graded Sand with Gravel (SW) 126.0-126.5' - dark grayish brown (10YR 4/2), moist to wet, dense, fine to coarse-grained sand, fine to coarse gravel, rounded, trace cobbles, 2" diameter Poorly Graded Sand (SP) 126.5-136.0' - dark grayish brown (10YR 4/2), moist, loose, fine-grained sand, trace silt, trace interbedded silty sand thin lenses		0.0				
125 66.6	126.0				0.0				
130 61.6	10.0	SN-14			0.0		Hard drilling 131.0-135.0'		
135 56.6	136.0				0.0				
140 51.6	1.5	SN-15	Poorly Graded Sand (SP) 136.0-137.5' - dark grayish brown (10YR 4/2) to dark gray (10YR 4/1), wet, dense, fine-grained sand, trace silt No Recovery 137.5-146.0'		0.0		Last sample recovery use flapper valve		
145 46.6	146.0				NA		Sample lens at tip		
150			Poorly Graded Sand (SP) 146.0-152.2' - dark grayish brown (10YR 4/2) to dark gray (10YR 4/1), wet, dense, fine-grained sand, trace silt						



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW14-M SHEET 6 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439885.8 N, 1200752.6 E)

ELEVATION : 191.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600 Sonic 8" x 7" Core Barrel

WATER LEVELS : --- START : 1/15/17 09:20 END : 1/20/17 16:14 LOGGER : D. Well/G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
41.6	6.2	SN-16	No Recovery 152.2-156.0'		0.0				
155 36.6	156.0		Poorly Graded Sand (SP) 156.0-163.5' - dark gray (10YR 4/1) to dark grayish brown (10YR 4/2), moist, dense, fine-grained sand, trace silt		0.0			Bentonite Chips	
160 31.6	7.5	SN-17	No Recovery 163.5-166.0'		0.0			20/40 Sand	
165 26.6	166.0		Poorly Graded Sand (SP) 166.0-169.3' - dark grayish brown (10YR 4/2), moist, dense, fine-grained sand					2" Schedule 80 - 0.010 Slot Screen	
170 21.6	10.0	SN-18	Poorly Graded Sand (SP) 169.3-172.8' - very dark gray (3/N), moist, dense, fine grained		0.0				
175 16.6	176.0		Silt (ML) 172.8-173.8' - dark gray (4/N), moist, stiff, trace fine-grained sand		0.0				
			Silty Sand (SM) 173.8-174.8' - dark gray (4/N), moist, dense, very fine-grained		0.0				
			Silt (ML) 174.8-175.6' - dark gray (4/N), moist, stiff		0.0				
			Silty Sand (SM) 175.6-175.8' - dark gray (4/N), moist, dense, very fine-grained		0.0				
			Silt (ML) 175.8-176.0' - dark gray (4/N), moist, stiff		0.0				
180					0.0		177.0-186.0' core lost in borehole during retrieval		



PROJECT NUMBER:	BORING NUMBER: WI-CV-MW14-M SHEET 9 OF 9
SOIL BORING LOG	

PROJECT : NAS Whidbey Island OLF Coupeville LOCATION : Coupeville, WA (439885.8 N, 1200752.6 E)

ELEVATION : 191.6 ft DRILLING CONTRACTOR : Cascade Drilling

DRILLING METHOD AND EQUIPMENT : Prosonic 600 Sonic 8" x 7" Core Barrel

WATER LEVELS : --- START : 1/15/17 09:20 END : 1/20/17 16:14 LOGGER : D. Well/G. Warren

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)		SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	PID READINGS			COMMENTS	WELL DIAGRAM
	RECOVERY (FT)	SAMPLE #/TYPE			Breathing Zone	Headspace	Above Hole		
-48.4	10.0	SN-25			0.2				
245 -53.4	246.0		Clay (CL) 246.0-266.00' - dark gray (4/N), dry to moist, stiff, low plasticity, interbedded with with clay lenses		0.2				
250 -58.4	10.0	SN-26			0.0				
255 -63.4	256.0				0.0				
260 -68.4	10.0	SN-27			0.0				
265 -73.4	266.0				0.0				
			Bottom of Boring at 266.0 ft bgs on 1/20/17 16:14						

Attachment 2
Development Logs

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/23/17
 Weather: 45°F, Partly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 01-D
 Sample ID: NA
 Sampling Team: Melanie Dickison

Total Depth:	Before: 221.40	After: 221	FT.(BTOC)
Depth to water:	(1) 141.60	142.30	FT.(BTOC)
Water Column:	79.80	78.7	FT.
Well Volume:	(x) 1103		GAL/FT.
Total Purge Vol.:	130.1		GAL.

Measuring Device: YSE
Turbidity Meter
 see field log book for specs

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 3ft bailer + megamonsoon pump

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
09:36									start surging
09:46									stop surging
10:30	4.125						> 1,000		start surging
10:33	8.25 (MD)								stop surging
10:43							> 1,000		
11:30							898		
11:36							200		
11:38	10.5	12.48	6.395	0.85	8.02	-477.9	173		
11:41	12.75	12.51	6.290	0.55	8.01	-495	112		
11:43	15.75	12.50	6.290	0.40	8.00	-496	74.3		
11:47	18.75	12.50	6.388	0.32	8.00	-506	62.3		
11:49	20.25	12.60	6.386	0.28	8.00	-479	67.9		
11:53	23.25	12.59	6.289	0.24	8.00	-476	79.9	~149	
12:01	29.25	12.49	6.381	0.21	7.99	-482	33.1	149.7	
12:06	33.0	12.48	6.380	0.17	7.99	-454	41.8	149.7	
12:13	39.25	12.55	6.378	0.16	8.00	-437	70.1		
12:20	43.50	12.55	6.377	0.16	7.99	-460	31.4	149.6	
12:25	47.25	12.55	6.377	0.16	7.99	-460			

Observations/Notes: Purge Start Time: 11:30 Purge Rate: 2 liters / 40 sec.
~0.75 gal / minute
~3.75 gal / 5 min
 YSI SN: 14810102B
C-103120

Signature(s): [Signature]

- ① Surge + bail for 30-60 min initially
- ② use pump/YSI

1 liter = 0.264 gal
 2 liters = 0.528 gal

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/23/17
 Weather: 45°F, partly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW01-D
 Sample ID: NA
 Sampling Team: Melanie Dickison

	Before	After	FT.(BTOC)
Total Depth:			FT.(BTOC)
Depth to water:	()		FT.
Water Column:			GAL/FT.
	(x)		GAL.
Well Volume:			GAL.
Total Purge Vol.:			

Measuring Device: YSI Turbidity Meter

Purge Device: 3ft bailer + mega monsoon pump

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTN	Color / Odor / Comments
Stabilization Criteria	constant	±3%	±10%	±0.1	±10 mv	<10			
12:30	61.0	12.51	0.376	0.12	7.99	-440	20		
12:35	54.75	12.55	0.378	0.13	7.99	-418	67.7	149.9	
12:40	58.5	12.51	0.373	0.12	7.99	-451	79.9		
12:45	62.25	12.53	0.373	0.12	7.99	-442	59.8	150	
12:50	66.0	12.57	0.373	0.11	7.99	-451	79.3		
12:55	69.75	12.52	0.371	0.11	7.99	-462	38.0	150.3	
13:00	73.50	12.59	0.372	0.10	7.99	-428	49.0		
13:05	77.25	12.58	0.371	0.10	7.99	-416	85.4		
13:10	81.0	12.58	0.372	0.11	7.99	-451	30.2	150.4	
13:15	84.75	12.67	0.370	0.11	7.99	-458	39.2		
13:20	88.50	12.76	0.371	0.11	7.99	-409	43.5	150.65	
13:25	92.25	12.70	0.369	0.12	7.99	-412	43.4	146.5	
13:30	96.0	12.85	0.369	2.50	8.00	-324	54.9		
13:35	99.75	12.84	0.369	2.34	8.00	-362	6.89	146.5	
13:40	103.5	12.85	0.369	2.13	8.00	-337	12.4		
13:45	107.25	12.80	0.370	1.94	8.00	-383	17.7	146.4	
13:50	111.0	12.85	0.367	1.71	8.00	-327	30.0		
13:55	114.75							146.5	

Observations/Notes: Purge Start Time: 11:30 Purge Rate: 0.75 gal/min
 YSI S/N: 14F101628
C-103120

Signature(s): [Signature]

Water was not being pumped out for ~10 seconds, then re-started - possible air bubble?

Well Development complete

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/24/17
 Weather: 45°F, cloudy, foggy

Project Number: 679580.09.F1.W1
 Well ID: WI-CV-MW01-U
 Sample ID: NA
 Sampling Team: Melanie Dickison

153 construction

	Before	After	
Total Depth:	166.9	167.3	FT.(BTOC)
Depth to water:	(1) 124.4	124.4	FT.(BTOC)
Water Column:	42.5	42.9	FT.
	(x) 16.3		GAL/FT.
Well Volume:	6.93		GAL.
Total Purge Vol.:	69.3		GAL.

Measuring Device: VSP
 Turbidity Meter
 (see field log book for specs)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 3ft Bailer
 Megamonsoon pump

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 constant ±3% ±10% ±0.1 ±10 mv <10									
08:48									start surging
08:58									stop surging
09:45	~5						71,000		
09:50									start surging
10:00									stop surging
10:56	~10						71,000		
10:57									start surging
11:15									stop surging
11:59	~15						71,000		
12:40									start surging
12:55									stop surging
13:40							71,060	124.1	stop for day
12:20								124.3	start surging
12:30									stop surging
13:00	~25						71,000		switch to pump
13:25							71,000	124.6	
13:35	45						198		
13:40	55	12.08	0.485	7.18	7.93	-362	107		

1/25

Observations/Notes: 47.5 Purge Start Time: 13:25 Purge Rate: 2 liters/min

YSI S/N 14F101008
 C-103120

Signature(s): *[Handwritten Signature]*

5-ft bailer will not go all the way down (~40 ft from bottom of well)

Use 3ft bailer → .275 gal/bail

Began using pump:

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/25/17
 Weather: 45°F, cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW02-M
 Sample ID: NA
 Sampling Team: Melanie Dickison

	Before	After	
Total Depth:	<u>116.9</u>	<u>117.3</u>	FT.(BTOC)
Depth to water:	<u>(-) 124.4</u>	<u>124.4</u>	FT.(BTOC)
Water Column:	<u>42.5</u>	<u>42.9</u>	FT.
	<u>(x) .163</u>		GAL/FT.
Well Volume:	<u>6.93</u>		GAL.
Total Purge Vol.:	<u>109.3</u>		GAL.

Measuring Device: YSI Turbidity meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: Megamason pump

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
13:45	50	11.93	0.484	4.07	8.00	-421	96.3	124.6	
13:50	55	11.90	0.486	1.63	8.01	-392	65.7	124.6	
13:55	55	11.83	0.488	0.96	7.97	-410	51.7		
14:00	57.5	12.03	0.487	0.62	7.91	-453	49.6	124.6	
14:05	60	11.94	0.488	0.49	8.00	-481	42.5		
14:10	62.5	12.01	0.488	0.36	8.00	-462	34.9	124.6	
14:15	65	11.96	0.489	0.32	7.99	-487	29.3		
14:20	67.5	12.15	0.489	0.28	7.99	-456	25.4		
14:25	70	11.91	0.489	0.26	7.98	-488	22.8		
14:30	72.5	11.99	0.489	0.25	7.99	-470	19.2	124.6	
14:35	75	12.14	0.490	0.23	8.00	-470	17.8		
14:40	77.5	12.10	0.490	0.22	7.99	-462	14.9		
14:45	80	12.19	0.490	0.21	7.98	-476	12.7		
14:50	82.5	12.14	0.491	0.20	7.99	-467	12.6	124.6	
14:55	85	12.20	0.491	0.19	7.99	-441	10.5		
15:00	87.5	12.17	0.491	0.18	7.98	-497	9.16		
15:05	90	12.22	0.491	0.16	7.97	-443	8.93		
15:10	92.5	11.93	0.491	0.15	7.98	-423	8.14	124.6	

Observations/Notes: _____ Purge Start Time: 13:25 Purge Rate: ~24/min

YSI S/N #15 MP
14F101028
C103120

Signature(s): [Signature]

2.5 gal
5min

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/25/17
 Weather: 45°F, cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW01-M
 Sample ID: NA
 Sampling Team: Melanee Dickison

	Before	After	
Total Depth:	166.9	167.3	FT.(BTOC)
Depth to water:	(-) 124.4	124.4	FT.(BTOC)
Water Column:	42.5	42.9	FT.
	(x) .163		GAL/FT.
Well Volume:	6.93		GAL.
Total Purge Vol.:	69.3		GAL.

Measuring Device: YSI
 Turbidity meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: megamonsoch pump

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
15:15	95	12.03	0.491	0.14	7.98	-425	7.64		
15:20	97.5	12.13	0.491	0.13	7.97	-448	6.54		
15:25	100	12.01	0.491	0.12	7.97	-375	6.18	124.6	
15:30	102.5	12.14	0.491	0.11	7.97	-391	5.96		
15:35	105	12.13	0.491	0.10	7.97	-490	5.38		
15:40	107.5	12.15	0.491	0.09	7.97	-503	4.72	124.6	stop-DONE

Observations/Notes: YSI S/N 14F101028
 Purge Start Time: 13:25
 Purge Rate: 2L/min
 0.5 gal/min
 C103120

Signature(s): *[Handwritten Signature]*

2L ~ ~~2.75 gal~~ ok
 .5 gallons (MD)

2.5 gal 0.5 gal/min
 10 gal
 5 min

1.75 drums full

95 gal about

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/26/17
 Weather: 45°F, Partly Cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW02-D-M
 Sample ID: NA
 Sampling Team: Melanie Dickson

Total Depth:	Before	After	FT.(BTOC)
Depth to water:	170.00	169.6	FT.(BTOC)
Water Column:	1123.75	123.7	FT.
Well Volume:	46.25	45.9	GAL/FT.
Total Purge Vol.:	(x)0.163		GAL.
	7.54		GAL.
	75.4		GAL.

Measuring Device: YSI
Turbidity meter
 See field log book for specs

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 3ft Bailert Mega monsoon pump

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DW</u>	Color / Odor / Comments
Stabilization Criteria	constant	± 3%	± 10%	± 0.1	± 10 mv	<10			
11:55									start surging
12:05									stop surging
12:50	~5						21,000		
13:04									start surging
13:15									stop surging
13:35	~7.5						21,000		switch to pump
13:55									start pumping
13:58	9						315	124.1	
14:05	12.5	12.25	0.481	6.910	7.99	-315	156		
14:10	15	12.29	0.482	3.13	8.03	-399	86.6	124.0	
14:15	17.5	12.28	0.483	1.12	8.03	-426	60.6	124.0	
14:20	20	12.27	0.482	0.62	8.03	-428	57.3	124.0	
14:25	22.5	12.26	0.483	0.35	8.03	-431	50.4		
14:30	25	12.26	0.484	0.27	8.02	-434	51.9	124.1	
14:35	27.5	12.34	0.483	0.23	8.02	-431	49.7		
14:40	30	12.28	0.483	0.19	8.02	-435	48.0		
14:45	32.5	12.22	0.484	0.17	8.02	-434	47.3		
14:50	35	12.30	0.484	0.16	8.02	-433	45.3	124.0	

Observations/Notes: Purge Start Time: 13:55 Purge Rate: 0.53 gal/min
 YSI S/N 14F101028
C-103120
pumping

Signature(s): [Signature]

2/24/17
MW02-D
M Re-do

~1 liter
30 sec

3 ft bailer used initially ~0.25 gal bail



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: ~~4/5/09~~ ~~Part MD~~ 1/26
 Weather: 45°F, partly cloudy

Project Number: 679580.09.FI.WI ~~021479~~
 Well ID: WI-CV-MW02-B-11
 Sample ID: NA
 Sampling Team: Melanie Dickson

Total Depth: 170.00 Before 169.6 FT.(BTOC)
 Depth to water: (-)123.75 After 128.7 FT.(BTOC)
 Water Column: 46.25 FT.
 Well Volume: (x) 0.113 GAL/FT.
 Total Purge Vol.: 75.4 GAL.

Measuring Device: YSE Turbidity Meter
 (see log field book for specs)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
<u>2</u>	0.163
4	0.653
6	1.469

Purge Device: 3 ft bailer + mega monsoon pump

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
15:00	40	12.27	0.483	0.14	8.01	-439	41.0		
15:10	45	12.29	0.485	0.14	8.00	-443	38.9	124.0	
15:20	50	12.29	0.484	0.1	8.00	-444	17.8		
15:30	55 60	12.29	0.485	0.07	8.00	-456	10.4		
15:40	57.5	12.29	0.482	0.06	8.00	-462	6.59	124.0	
15:45	60	12.29	0.484	0.06	8.00	-458	4.71	124.0	
15:50	62.5	12.30	0.483	0.06	8.00	-462	3.49	124.1	
15:50									Well complete
MD									

Observations/Notes: YSI S/N 14F101028
 Purge Start Time: 13:55
 Purge Rate: 0.53 gal/min

C-103120

Signature(s): Melanie Dickson

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/18/17
 Weather: 45°F, Cloudy, Rainy

Project Number: 679580.09.FI.WI *09-12412*
 Well ID: WI-CV-MW02-B M
 Sample ID: NA
 Sampling Team: Melanie Dickson

	Before	After	
Total Depth:	169.7	168.5	FT.(BTOC)
Depth to water:	(1) 123.9	122.4	FT.(BTOC)
Water Column:	45.4		FT.
	(x) 0.163		GAL/FT.
Well Volume:	7.48		GAL.
Total Purge Vol.:	74.8		GAL.

Purge Device: 3-ft. Bailer

Measuring Device: YSI
 Turbidity Meter
 (see field book for specifications)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

x10

see 3-ft. 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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
09:53									start surging
10:06									stop surging
10:15									start surging
10:25									stop surging
11:38	2.75						> 1,000		
13:07	5.50						> 1,000		
13:26	8.25						> 1,000		start surging
13:34									stop surging
13:54	11.00						> 1,000		
14:15	13.75						> 1,000		
14:16									start surging
14:26									stop surging
14:58	16.50						> 1,000		
15:17	19.25						> 1,000		
15:18									start surging
15:28									stop surging
15:54	22.00						> 1,000		

Observations/Notes: YSI S/N C-103120
 Probe Model: 600XLM-0
 Purge Start Time: 10:25
 Purge Rate: 2.75 gal / ~20 min (approximately)

Signature(s): *Melanie Dickson*

Bailer: 3ft long
 1.5 inch diameter

$$\text{Volume} = 0.03679 \text{ ft}^3 = 0.275 \text{ gal}$$

$$27.2 \text{ bailers} = 1 \text{ well volume}$$

* 5 ft. Bailer would not go all the way to the bottom,
 → Potential kink, bend in well piping - make note for future sampling.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/26/17
 Weather: 45°F, Mostly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW02-MS
 Sample ID: NA
 Sampling Team: Melanie Dickison

Total Depth: Before 112.2 After 112.3 FT.(BTOC)
 Depth to water: (1) 92.3 92.8 FT.(BTOC)
 Water Column: 19.9 19.5 FT.
 Well Volume: (x) 0.163 GAL/FT.
 Total Purge Vol.: 32.40 GAL.

Measuring Device: YSI Turbidity Meter
 → see field log for specs.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 5ft Bailert Mega Monsoon Pump

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									
		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
8:35	0.5								start surging
8:45	0.5								stop surging
8:58	2.5						291		
9:30									start pumping
9:45	5.95	11.2	0.484	6.62	8.02	57.6	8.13	98.8	some drawdown
9:48	6.64	10.89	0.486	5.76	8.01	43.4	12.4	98.1	
9:52	7.56	11.18	0.487	4.34	8.02	12.8	6.44	97.7	
9:56	8.48	11.22	0.489	3.84	8.02	2.3	5.32	97.65	
10:00	9.40	11.23	0.488	3.34	8.02	-4.1	4.24	97.50	
10:05	10.65	11.52	0.486	2.79	8.02	-12	3.14	97.50	
10:10	11.70	11.67	0.485	2.47	8.02	-20.04	2.76	97.45	
10:13	12.39	11.65	0.483	2.28	8.02	-19.9	3.01	97.45	
10:16	13.08	11.62	0.483	2.05	8.02	-17.5	2.91	97.45	
10:16									development complete.

8:35
8:45
which to pump

Observations/Notes: YSI S/N 14F101028
 Purge Start Time: 9:30
 Purge Rate: 0.5 liter/35 seconds
 = 0.132 gal/35 sec.
 = 0.23 gal/min

Signature(s):

MW02-MS Re-do - water taken out previously from 3-ft bailer (5 hours)

5ft bailer used initially. ~ 0.5 gal/bail

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/16/17
 Weather: 46°F, partly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 02 MS
 Sample ID: NA
 Sampling Team: Melanie Drucison

	Before	After	
Total Depth:	112.00	112.00	FT.(BTOC)
Depth to water:	(1) 92.20	94.9	FT.(BTOC)
Water Column:	19.80		FT.
	(x) 0.163		GAL/FT.
Well Volume:	3.23		GAL.
Total Purge Vol.:	32.80		GAL.

Measuring Device: YSI
 Turbidity Meter
 (see fieldbook for specifications)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 5ft Bailer (stainless steel)

x10

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
11:32									Start surging at 10 min
11:55	~2						>1,000		
12:05	+2						21,000		
12:13	+2						21,000		
12:27	+2						21,000		
12:35	+2						21,000		
12:43	+2						21,000		
13:05	+2						259		
13:10	~15	11.38	0.417	5.91	7.72	20	193		
13:16	16	11.27	0.325	6.03	8.20	21.8	357		
13:23	17	11.19	0.341	6.03	8.18	-31	122		
13:27	18	11.09	0.345	11.12	8.75	6.3	397		
13:33	19	10.97	0.338	13.3	8.20	-40	104		
13:38	20	11.13	0.34	12.57	8.27	1	106		
13:45	21	11.11	0.254	12.86	8.12	6.0	93.5		
13:49	22	11.09	0.269	13.20	8.17	41	114		
13:54	23	11.00	0.338	13.50	8.13	19	128		
13:57	24	11.05	0.360	13.40	8.13	12.1	122		

Observations/Notes: YSI S/N C-103120
 Probe Model: 6004LM-0
 Purge Start Time: 11:30
 Purge Rate: 1 gal/4 min approximately

VOCs - 0.00ppm

Signature(s): *Melanie Drucison*

Bailer 5ft long
 1.5 inch diameter
 Volume ~ 0.5 gal

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/16/17
 Weather: 46°F, partly cloudy

Project Number: 679580.09.FI.WI *21417*
 Well ID: WI-CV-MW02-MS
 Sample ID: NA
 Sampling Team: Melanie Dickson

Total Depth: 112.00 112.00 FT.(BTOC)
 Depth to water: (1)92.20 94.9 FT.(BTOC)
 Water Column: 19.80 FT.
 Well Volume: (x)0.163 GAL/FT.
 Total Purge Vol.: 3.23 GAL.
32.30 GAL.

Measuring Device: YSI
Turbidity Meter
 (see field log book for specifications)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
<u>(2)</u>	<u>0.163</u>
4	0.653
6	1.469

Purge Device: 5ft Bailer
(stainless steel)

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
14:00	25	11.05	0.345	13.42	8.15	-9	245		
14:06	26	11.01	0.356	13.01	8.11	21	160		
14:10	27	11.06	0.340	12.30	8.12	-40	143		
14:14	28	11.12	0.323	12.70	8.13	-5	108		
14:17	29	10.97	0.324	13.10	8.07	38	137		
14:20	30	10.93	0.268	13.30	8.12	22	240		
14:24	31	11.02	0.368	13.36	8.07	20.6	222		
14:27	32	10.92	0.365	13.10	8.09	33.6	150		
14:31	33	10.92	0.378	13.30	8.14	36.3	96.5		
14:36	34	10.94	0.393	13.10	8.04	35.0	83.9		
14:40	35	10.77	0.374	13.33	8.16	35.5	55.1		
14:45	36	10.95	0.404	13.00	8.15	13.3	86.0		
14:49	37	10.95	0.400	13.20	8.14	18.4	163.4		
14:53	38	10.79	0.413	13.55	8.10	-6.7	80.4		
14:58	39	10.89	0.425	13.32	8.03	33.5	62.3		
15:02	40	10.87	0.425	12.20	8.07	25.7	86.6	94.15	
15:30	43	10.89	0.392	10.20	7.84	82	517	92.15	
15:40	46	11.05	0.479	10.90	7.99	158	184		

Observations/Notes: Purge Start Time: 11:30 Purge Rate: 1991/3min
 YSI S/N: C-1.03120
 Probe Model: 600XLM-0
approx.

Signature(s): M. Dickson

DTW=92.15-ft
 start measuring every 6 bails
 6 bails ~ 3 gallons ~ 1 well volume

* At this time measuring technique/container is changed.
 - somewhat changes from previous "consistent" readings.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/16/17
 Weather: 40°F, partly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 02-MS
 Sample ID: NA
 Sampling Team: Melanie Dickison

Total Depth: 112.00 Before 112.00 After FT.(BTOC)
 Depth to water: (-) 92.20 94.9 FT.(BTOC)
 Water Column: 19.80 FT.
 Well Volume: (x) .163 GAL/FT.
 Total Purge Vol.: 32.30 GAL.
 Purge Device: 5ft Bailer

Measuring Device: YST
Turbidity meter
 (see field log book for specifications)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
<u>(2)</u>	<u>0.163</u>
4	0.653
6	1.469

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DIW</u>	Color / Odor / Comments
Stabilization Criteria		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
15:50	49	11.01	0.446	10.44	7.98	170	200		
15:58	52	11.17	0.450	9.40	8.12	144	129		
16:11	55	11.04	0.425	10.23	8.12	128	262		
16:13									start surging
16:24									stop surging
16:38	58	10.75	0.458	10.20	8.13	180	521		
17/17 08:07									start surging
08:17									stop surging
08:28	61	11.01	0.297	14.72	7.35	405	388		
08:39	64	11.05	0.295	12.98	8.14	320	56.4	94.9	
08:53									complete

Observations/Notes: YSI S/N C-163120
 Probe Model: 600 XLM-0
 Purge Start Time: 11:30 1/16/17
08:28 1/17/17
 Purge Rate: 1 gal / 4 min
approximately

Signature(s): Melanie Dickison

Well complete after 6 hours of development
 Well complete per Eric Epple

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/27/17
 Weather: 45°F, Mostly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW03-D
 Sample ID: NA
 Sampling Team: Melanie Dickison

	Before	After	
Total Depth:	237	237	FT.(BTOC)
Depth to water:	143.9	144.1	FT.(BTOC)
Water Column:	93.2	92.9	FT.
	(x) 0.163	0.163	GAL/FT.
Well Volume:	15.12	15.14	GAL.
Total Purge Vol:	51.2	51.4	GAL.

Measuring Device: YSI
 Turbidity meter
 (see field log book for specs)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: 3ft bailer + megamenscon pump

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									
		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
8:50									start surging
9:00									stop surging
10:10	~2.75						> 1,000		
10:12									start surging
10:22									stop surging
11:11	~5.5						21,000		
11:30	~7						21,000		switch to pumping
11:49									start pumping
12:06	10						21,000	167.4	
12:15	15						21,000	182.55	
12:25	20						21,000	182.5	
12:30									stop pumping
09:10									start surging
09:20									stop surging
10:10	23						21,000		switch to pump
10:20									start pumping
10:37	25.2						21,000	164.3	
10:45	26.24						21,000	165	

pump stopped working 1/29

Observations/Notes: Purge Start Time: 10:20 Purge Rate: 11/40 seconds
 YSI S/N: 14F101028
 C-103120
 Turbidity: C013267
 0.5 L/min = 0.264 gal/min
 ~ 0.132 gal/min

Signature(s): *Melanie Dickison*

use 3ft bailer.
 5ft bailer goes down all the way to about 5 feet above the bottom.

M
 163.5
 123.7

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC Project Number: 679580.09.FI.WI
 Location: OLF Coupeville Well ID: WI-CV-MW03-D
 Event: Well Development Sample ID: NA
 Date: 1/29/17 Sampling Team: Melanie Dickison
 Weather: 46°F, windy, Mostly cloudy

	Before	After	
Total Depth:	237	237	FT.(BTOC)
Depth to water:	(1) 143.8	144.1	FT.(BTOC)
Water Column:	93.2	92.9	FT.
Well Volume:	(x) 0.163		GAL/FT.
Total Purge Vol.:	15.2		GAL.

Measuring Device: YSI
Turbidity meter
 (see field log book for specs)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: Megamonsoon pump
Dipe & check valve system

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
10:55	26.89						71,000	161.7	
11:05	27.54						71,000	161.6	
11:15	28.19						71,000	162.5	
11:30	28.84						71,000	165.2	
11:50	29.49						799	165.1	
11:55									pump stopped
15:35									Begin bailing again
16:00	35						980	980 (MD)	
16:07	40						71,000		
16:09	45						71,000		
16:13	50						71,000		
16:16	55						71,000		
16:22	60						71,000		
16:28	65						943		
16:34	~70						540		
1/30 08:40									surge
08:51	+30=100						71,000		
09:03	+8=108						71,000		

Observations/Notes: Purge Start Time: 10:20 Purge Rate: _____
 YSI S/N 14F101028
C-103120
 Turbidity: C103207 0.5L/min
 Signature(s): Melanie Dickison
0.65

Time to recharge
 at 1 pull about
 7-8 min.

pump stopped working.
 Tried using different technique + pulled approx 40 gallons out of well + then returned to bailing/surging.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/30/17
 Weather: 45°F, mostly cloudy

Project Number: 679580.09.F1.W1
 Well ID: WI-CV-MW 03-D
 Sample ID: NA
 Sampling Team: Melanie Dickison

Total Depth:	Before 237	After 237	FT.(BTOC)
Depth to water:	(-) 143.8	144.1	FT.(BTOC)
Water Column:	93.2	92.9	FT.
Well Volume:	(x)		GAL/FT.
Total Purge Vol.:			GAL.

Measuring Device: VSI Turbidity meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: Manual lift pump + 5 ft 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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
09:22	H = 109						21,000		
09:30	H = 114								
09:41	H = 119								
09:49	130	11.07	0.367	9.40	7.11	51.0	447		
10:14	140	10.93	0.344	10.44	7.19	16.0	413		
10:38	150	11.04	0.301	9.47	7.35	-33	302		
10:48	H=165	11.18	0.363	9.42	7.34	-45	232	144.1	done/complete

~55 gal as of 1/30 start
done well complet

Observations/Notes: Purge Start Time: 8:40 Purge Rate:

YSI S/N 14E101028
C-103120

95 gal pulled 1/30

Signature(s): Melanie Dickison

* 2 pulls in between each data point
- data taken from bail sent to middle of screen.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/30/17
 Weather: 40°F, mostly cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 03-M
 Sample ID: NA
 Sampling Team: Melanie Dickison

	Before	After	
Total Depth:	162	162	FT.(BTOC)
Depth to water:	(-) 123.5	123.5	FT.(BTOC)
Water Column:	38.5	38.5	FT.
Well Volume:	(x) 163		GAL/FT.
Total Purge Vol.:	6.28		GAL.
	62.0		GAL.

Measuring Device: YSI Turbidity Meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
<u>2</u>	0.163
4	0.653
6	1.469

Purge Device: Manual lift pump + 5-ft bailer

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	constant	± 3%	± 3%	± 10%	± 0.1	± 10 mv	<10		
12:30									
12:40									start surging
13:05									stop surging
13:15									start surging
13:34	~10								stop surging
14:40	20						71,000		
14:54	22	10.73	0.288	9.11	8.03	-13	5860		
15:12	24	10.62	0.271	10.42	8.00	-34	225	123.6	
15:22	26	10.59	0.278	10.05	8.09	-96	124		
15:40	28	10.58	0.279	10.95	8.04	-68	121	123.6	
15:52	30	10.65	0.275	10.46	8.16	-90	71.1		
16:10	32	10.62	0.277	10.02	8.20	-115	208	123.6	
16:19	34	10.28	0.283	10.75	8.20	-2	410		
16:36	~37	10.5	0.284	10.64	8.18	-101	61.0	123.5	well complete

Observations/Notes: YSI S/N 14F101028 Purge Start Time: 13:30 Purge Rate: _____

C103120

well complete after 4 hours

~37gal.

Signature(s): Melanie Dickison

5-ft bailer will go down

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/9/17
 Weather: BREEZY/SHOWERS/40s

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 04DM
 Sample ID: NA
 Sampling Team: GREG WARREN

Total Depth: ~~157.9~~ 153.15 Before 158.5 After FT.(BTOC)
 Depth to water: (H) 117.9 140 FT.(BTOC) 132.4
 Water Column: N/A 18.5 FT. 26.4
 Well Volume: N/A 3.8 GAL. 4.3
 Total Purge Vol.: N/A 19 GAL.
 Purge Device: 3' SS BAILER.

Measuring Device: YSI 650 MDS, HART 210 Q
 SCHMST.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

SCREEN =
 149-159'
 TD = 159'

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		GRAY SILT.
1105	START	BAILING	(NO SURGE - TOO MUDDY)						
1300	BALLOUT SAND							152'	TD = 158.5
1302	LET RECOVER	DRAWING DOWN							
1345	RESUME	SILTY	GRAY					141'	SILTY
1500	~12	11.9	.35	9.1	8.65	-294	> 1000		
1510	~15	12.0	.34	7.2	8.67	-322	> 1000	132.4	
1520	~17	11.8	.35	4.1	8.75	-293	> 1000		
1534	~19	11.9	.35	2.2	8.77	-305	> 1000		
1537	~20	11.9	.35	2.5	8.75	-311	(311) > 100		
1540	END								

Observations/Notes: Purge Start Time: 11:05 Purge Rate: Slow.
 YSI S/N: 14F101028
 HART: C103267
 PURGED / RECHARGED 4.5 HRS. WATER GRAY & WELL PRODUCING SILT, BUT OTHERWISE PARAMETERS STABLE.
 Signature(s): 

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/8/17
 Weather: 32° Snow

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW - 0418-5
 Sample ID: NA
 Sampling Team: GREG WARREN

	Before*	After*	
Total Depth:	128'	129.2	FT.(BTOC)
Depth to water:	(-) 108.1'		FT.(BTOC)
Water Column:	19.9		FT.
	(x) 0.163		GAL/FT.
Well Volume:	3.25		GAL.
Total Purge Vol.:	5		GAL.

Measuring Device: YSI 650 MDS, HACH 2100 Q,
 SOLINST WL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

SCREEN = 112-122
 * +1.2' STICK UP

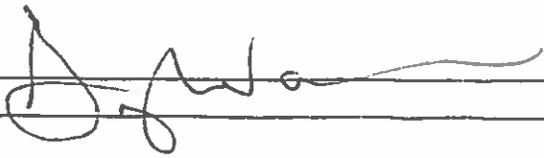
Purge Device: BAUER, 3' SS

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
1350	START	SURGING							
1405	START	BAILING							
1425	2	10.4	0.17	9.8	8.8	-176	> 1000		BROWN
1455	~ 8.6	10.2	0.21	8.2	8.5	-167	> 1000		"
1546	DRY	RECOVER.						127.9	
0830, FEB 9	RECOVER		OVERNIGHT.					109.1	
0858	10	10.8	0.32	29.6	8.3	53			
0900		11.0	0.35	18.4	8.5	3.0	> 1000	123.3	LT BROWN
0915	13	10.9	0.35	15.5	8.5	43	> 1000		
0930	RECOVER								
0945	15	11.5	0.37	12.5	8.45	27	> 1000; BUT DOES NOT LOOK MUDDY.		
1000	16	11.5	0.38	11.7	8.4	53	800	126.7	~ DRY
1005	END	DRY, STABLE							

Observations/Notes: Purge Start Time: 1405 Purge Rate: SLOW

YSIS/N 14F 101028
 HACH C 103267

Signature(s): 

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 1/31/17
 Weather: 45°F, SUNNY

Project Number: 679580.09.FI.WI ~~012416~~
 Well ID: WI-CV-MW09-D-M
 Sample ID: NA
 Sampling Team: MELANIE DICKSON

Total Depth: (MD) 185.5 ~~197.00~~ Before After 197 FT.(BTOC)
 Depth to water: (1) 114.50 126.2 FT.(BTOC)
 Water Column: (MD) 71 ~~82.50~~ 70.8 FT.
 (X) .163 .163 GAL/FT.
 Well Volume: (MD) 11.57 + 3.45 11.54 GAL.
 Total Purge Vol: (MD) 115.7 + 34.50 115.4 GAL.

Measuring Device: YSI
 Turbidity meter
 (see field log book for specs)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

Purge Device: Manual lift pump
 3 ft 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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
10:15									start surging
10:25									stop surging
12:42	~8								removed all mud/gel from bottom to reach TD 197.0 ft.
12:44									start surging
12:55									stop surging
13:30	12						21,000		
14:25	30						21,000	126.8	
14:53	40						638		
15:05	49	11.84	0.415	8.91	7.90	-70	314		
15:15	54	11.82	0.403	9.04	7.90	-108	100		
15:30	60	11.91	0.388	9.96	7.91	-98	57.3		
15:40	70	11.87	0.387	9.95	7.90	-95	56.2		
15:50	78	11.87	0.406	9.55	8.00	-160	98.2		
16:00	71	11.57	0.298	9.54	8.02	-107	111		
16:10	85	11.57	0.401	9.43	8.07	-114	82.2		
16:20	(MD) 85.87	11.74	0.402	8.45	8.00	-235	94.7	126.2	well complete

switch to Manual Lift Pump

Observations/Notes: Purge Start Time: 13:30 Purge Rate: variable based on well recharge
 YSI S/N 14F101028
 C-103120
 0.25 gal bail

Signature(s):

*lots of bentonite gel found at bottom of well
 measured TD ~185 ft
 Actual TD ~197 ft

5 ft bailer would not go down ~40 ft above bottom
 → use 3-ft bailer.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/7/16
 Weather: 30's, SOME CLOUDS

:Project Number 679580.09.FI.WI
 Well ID: WI-CV-MW - 10D
 Sample ID: NA
 :Sampling Team GREG WARREN

Total Depth:	Before*	After	FT.(BTOC)
Depth to water:	(H) 112.81	142.62	FT.(BTOC)
Water Column:	-	63.4	FT.
Well Volume:	(x) -	0.163	GAL/FT.
Total Purge Vol.:	-	10.3	GAL.
		55	GAL.

:Measuring Device YSI, HACH 2100Q, SOLINST

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

* NOTE AT BEGINNING, ~ 10' OR MORE OF DRILLING MUD IN WELL.

Purge Device: BAUER, MAN LIFT PUMP

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
0900	SURGE								
0920	BAIL - PULL OUT DRILL MUD								
1145	MUD OUT - SWITCH TO PUMP. ~ 20 gal								
1155	36	10						142.62	WL DROPPED
1245	35	9.38	0.574	7.33	7.15	-88	694	155.80	LT. BROWN
1300	42	9.47	0.582	7.52	7.09	-114	866		
1315	50	10.01	0.577	5.36	7.10	-120	496		
1330	55	9.43	0.571	5.76	7.13	-65	299	147.4	CLEARING
1340	END								

Observations/Notes: 14F101028 Purge Start Time: 0920 Purge Rate: ~ 0.5 gpm

HACH C102120 *REMOVED 10-FT OF DRILL MUD.
 MASTER LINK ON WIRE LINE BROKE AT END.

Signature(s): [Signature]



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/10/17
 Weather: Windy, Pt. Cloudy, 40°S

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW - 12 D
 Sample ID: NA
 Sampling Team: GREG WARREN

	Before	After	
Total Depth:	198.8	198.8	FT.(BTOC)
Depth to water:	58.85	160.38	FT.(BTOC)
Water Column:	39.75		FT.
	(x) 0.163		GAL/FT.
Well Volume:	65		GAL.
Total Purge Vol.:			GAL.

Measuring Device: YSI 650 MDS, HACH 2100 SOLINST WIL TAPE

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: BAILEY (3' SS), MAXIMUM LIFT PUMP.

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DTU	Color / Odor / Comments
Stabilization Criteria		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
0915	SURGE								
0935	BAIL	~ 4 gallons							
1020	PUMP								
1055	15	9.9	0.48	9.2	7.4	-79	>1000	-	BROWN
1120	22	10.5	0.53	8.5	7.2	-71	720	-	
1130	30	10.5	0.54	7.0	7.2	-91	728	160.38	RECHARGE
1215	40	10.4	0.54	3.6	7.3	-70	581	-	LT BROWN
1220	END								

Observations/Notes: YSI S/N _____
 Purge Start Time: 0935
 Purge Rate: 0.35 gpm
 PURGED 6 VOLUMES, PARAMETERS STABLE
 GOOD WELL.
 Signature(s):

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/10/17
 Weather: Cloudy BREEZY

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW-12.5
 Sample ID: NA
 Sampling Team: GREG WARREN

Total Depth: 106.4 ^{Before} 106.7 ^{After} FT.(BTOC)
 Depth to water: (-) 103.85 FT.(BTOC)
 Water Column: 2.55 FT.
 Well Volume: 0.163 (x) 0.42 GAL/FT.
 Total Purge Vol.: 0.42 GAL.
 Purge Device: 3" SS BAILER.

Measuring Device: YSI/HACH, SOLINST.

Well Dia. (Inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

** VERY LITTLE WATER
 2.5' IN WELL.
 TRY TO BAIL.*

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		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
1300	START								
1316	2 (RECOVER)	10.7	0.37	7.3	8.09	18.5	> 100	< 2' WATER	BAILER NOT FULL
1416	-3	10.4	0.37	7.2	8.2	40.2	> 100	105.3'	MOSTLY DRY
1430	-3.5	10.2	0.37	6.8	8.2	37	> 100	105.2'	DRY.
END	1430								

Observations/Notes: Purge Start Time: _____ Purge Rate: VERY SLOW
 YSI S/N _____

 Signature(s): [Signature]

KEEPS DRYING UP. PULLED OUT 8-9 VOLUMES & PARAMETERS RELATIVELY STABLE.

n n

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: ~~1/21/17~~ 2/1/17 (MD)
 Weather: 40°F, sunny

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW13 (MD) WI-CV-MW13-DM
 Sample ID: NA
 Sampling Team: Melanie Dickson

187.5 Total Depth: 182.0 Before 188 After FT.(BTOC)
 Depth to water: (1) 127.9 127.5 FT.(BTOC)
 Water Column: 54.1 60.5 FT.
 Well Volume: (MD) 8.82 11.63 GAL/FT.
 Total Purge Vol.: 88.2 98.6 GAL.

Measuring Device: YSI Turbidity Meter

Purge Device: Manual lift pump + 3ft bailer

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: DW	Color / Odor / Comments
Stabilization Criteria		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
10:23									
10:32									start surging
11:13	22								stop surging
12:00	~18						21,000		Ballney
12:50	30						21,000		
13:35	40							123.5	
14:00	50						857		
14:15	56						490		
14:27	65	11.53	0.330	10.59	7.70	144	215		
14:40	73	11.65	0.325	10.39	7.67	114	210		
14:50	79	11.72	0.337	10.01	7.70	165	389		
14:58	85	11.76	0.325	9.39	7.87	79	237		
15:06	90	11.73	0.332	9.31	7.88	74	212		
15:14	95	11.75	0.335	7.20	7.93	23	260		
15:25	98	11.67	0.336	7.88	7.98	25.0	301		
15:36	~100	11.70	0.344	8.90	7.91	41	528		well complete

Observations/Notes: Purge Start Time: 12:00 Purge Rate: variable based on recharge.
 YSI S/N: 14F101028
 C-103120

well complete after ~5 hours of development.

Signature(s): *[Handwritten Signature]*

5-ft bailer will not go down.

*Fast recharge rate

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/3/17
 Weather: 35°F, RAINY

Project Number: 679580.09.FI.WI @2/24/17
 Well ID: WI-CV-MW 13 #5
 Sample ID: NA
 Sampling Team: Melanie Dickson

	Before	After	
Total Depth:	114	114	FT.(BTOC)
Depth to water:	(-) 110.4	114	FT.(BTOC)
Water Column:	3.6	0	FT.
Well Volume:	(x) 0.163		GAL/FT.
Total Purge Vol.:	0.59		GAL.
Purge Device:	3-ft Bailer		

Measuring Device: YSI Turbidity meter

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
(2)	0.163
4	0.653
6	1.469

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	constant	± 3%	± 10%	± 0.1	± 10 mv	<10			
14:47									Begin Bailing
15:00	2								Surge bottom
15:05									stop surge
15:35	5						21,000	113.5	
15:50	7						21,000		
16:25	10						21,000	112.8	
17:20								110.35	surge bottom
18:30									stop surge
19:20									Well not recharging
09:30	12.25						21,000		
10:00								114.0	
10:15								114.0	could development

2/5

Observations/Notes: YSI S/N 14 F161028
C-103120
 Purge Start Time: _____ Purge Rate: _____
 well not recharging fast enough. After about 30 min with no recharge moved on from well. Not enough water to collect sample for water quality analysis.

Signature(s): Melanie Dickson
 * May need to revisit later.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/5/17
 Weather: 400F, cloudy

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW14-DM
 Sample ID: NA
 Sampling Team: Melanie Dickison / GREG WARRION

	Before	After	
Total Depth:	<u>175.50</u>		FT.(BTOC)
Depth to water:	<u>(1) 123.46</u>		FT.(BTOC)
Water Column:	<u>52.08</u>		FT.
Well Volume:	<u>(X) 0.163</u>		GAL/FT.
Total Purge Vol.:	<u>9.49</u>		GAL.
	<u>24.9</u>		GAL.
	<u>135</u>		

Measuring Device: YSE
Turbidity meter

Well Dia. (Inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
<u>(2)</u>	<u>0.163</u>
4	0.653
6	1.469

Purge Device: Manual Lift Pump
+ 3 ft Bailer

switch to manual lift pump

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		constant	± 3%	± 10%	± 0.1	± 10 mv	<10		
11:48									
12:00									Begin surging
12:10	1								stop surging
12:48	5						21,000		real dark grey surge
13:00									
13:55	10						21,000		stop surge
14:34	30						21,000		dark grey
15:15	45						21,000	123.00	light grey
15:30	55						21,000		
<u>RESUME 2/16/17</u>									
0830	WL =	122.52						122.52	BEFORE PUMP
0930	70								
1030	110	10.89	0.473	9.54	7.96	-265	Muddy		
1045	115	11.30	0.471	7.0	8.11	-294	2100	125.90	
1050	120	10.75	0.480		8.09	-266	2100		
1105	135	10.65	0.478		8.109	-170	2100		
1110	STOP								

Observations/Notes: _____ Purge Start Time: _____ Purge Rate: 0.7 gpm

YSI S/N 14F101028
C-103120 267

Signature(s): [Signature]

161-171' screen
 171-176' - 5ft sump



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/13/2017
 Weather: SUNNY, MID-TO UPPER 30'S°F, S WIND @ 2-4 mph

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 06S
 Sample ID: NA
 Sampling Team: MARK ENDO

PAGE 1 OF 2

	Before	After	
Total Depth:	140.08		FT.(BTOC) MEASURED ON NORTH SIDE OF PVC CASING
Depth to water:	(-) 132.21	135.82	FT.(BTOC)
Water Column:	7.87		FT.
	(X) 0.163		GAL/FT.
Well Volume:	1.28		GAL.
Total Purge Vol.:		25.0	GAL.

Purge Device: BAILEY (3'SS)

Measuring Device: YSI 650MDS (C103120), HACH 2100 (C103267), SOLONIST WLI (#2425) MULTIRAE (C103110)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (ppm) (%)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10.mv	<10		
13:23	BEGIN DEVELOPING WELL (SURFACE)							15 = 0.0, 0.2-0.8	
13:36	0.75	11.79	0.607	11.09	7.63	116.0	>1000	0	LIGHT BROWN, CLOUDY, NO ODOR
13:46	2.0	11.02	0.648	16.27	7.74	190.3	>1000	0	"
14:06	4.0	10.89	0.614	16.26	7.78	176.7	>1000	0	" SLIGHTLY LIGHTER
14:18	5.0	10.90	0.615	16.46	7.73	191.6	>1000	0	"
14:26	6.0	10.95	0.614	15.78	7.70	187.7	>1000	0	"
14:34	7.0	10.95	0.609	16.00	7.70	190.2	>1000	0	LIGHT BROWN, CLOUDY, NO ODOR
14:46	8.0	10.96	0.606	16.03	7.72	192.4	>1000	0	DTW @ 14:38 = 134.7 SF
14:56	9.0	11.09	0.606	15.54	7.67	170.0	>1000	0	VERY LIGHT BROWN, CLOUDY, NO ODOR
15:05	10.0	11.30	0.611	15.29	7.66	173.6	>1000	0	"
PAUSE DEVELOPMENT, IS TO RESUME.							>1000	0	"
15:30	11.0	11.10	0.593	15.10	7.69	177.1	>1000	0	"
15:39	12.0	10.91	0.603	14.69	7.68	181.9	>1000	0	"
15:46	13.0	10.93	0.609	14.75	7.66	184.7	>1000	0	VERY LIGHT BROWN, LESS CLOUDY, NO ODOR
15:54	14.0	10.93	0.614	14.40	7.67	186.5	>1000	0	"
16:02	15.0	10.95	0.612	14.10	7.65	188.3	>1000	0	"
16:10	16.0	10.91	0.625	14.61	7.66	188.4	>1000	0	"
16:20	17.0	10.87	0.623	13.81	7.65	194.8	>1000	0	" SLIGHTLY LESS CLOUDY

Observations/Notes: Purge Start Time: 13:23 Purge Rate: 0.13 GAL/MIN

YSI S/N _____

GOOD RECHARGE. TD = 140.4 FT. DTW = 134.8 FT. ON 02/14/2017 @ 0815.
 ON 02/13/17 ALL PARAMETERS STABLE BESIDES TURBIDITY.
 ON 02/13/17 DO, & TURBIDITY NOT STABLE. 4 HRS OF WELL DEVELOPMENT COMPLETED AND > 10 WELL CASING VOLUMES PURGED.

Signature(s): Mark Endo

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/13/17
 Weather: SUNNY, MID TO UPPER 30's °F, S winds @ 2-4 mph

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 065 PAGE 2 OF 2
 Sample ID: NA
 Sampling Team: MARK ENDO

	Before	After	
Total Depth:	<u>SEE PAGE 1</u>		FT.(BTOC)
Depth to water:	<u>✓ (-)</u>		FT.(BTOC)
Water Column:			FT.
	<u>(x)</u>		GAL/FT.
Well Volume:			GAL.
Total Purge Vol.:			GAL.

Purge Device: BAILER (3' SS)

Measuring Device: SEE PAGE 1

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLUX Other: from or (%)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10.mv	<10		
1628	18.0	10.94	0.623	13.69	7.61	101.9	723	0	VERY LIGHT BROWN COLOR, NO ODOR
STOP DEVELOPING WELL TO HOLD FOR THE DAY. CONTINUE ON 02/14/17.									
0825	23.0	10.28	0.570	12.95	7.63	216.5	529	0	VERY LIGHT GRAY, MOSTLY CLOUDY
0910	24.0	10.53	0.565	10.15	7.64	218.9	509	0	"
0920	25.0	10.49	0.574	8.64	7.66	220.1	352	0	"
STOP BAIL & SURGE.									

Observations/Notes: _____ Purge Start Time: _____ Purge Rate: _____
 YSI S/N _____

SEE PAGE 1.

Signature(s): Mark Endo

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/13/2017
 Weather: Mostly Sunny, Mid 20's to 30's °F

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 06M
 Sample ID: NA
 Sampling Team: MARK ENGE

Total Depth: 189.0 FT. (BTOC) *MEASURED ON NORTH SIDE OF WELL ON 02/14/17 (BEFORE START)*
 Depth to water: (1) 142.1 FT. (BTOC) *MEASURED ON SOUTH SIDE OF PVC WELL ON 02/13/17*
 Water Column: 47.1 FT.
 Well Volume: (X) 0.163 GAL/FT. *WELL*
 Total Purge Vol.: 80.0 GAL. *TOTAL ON 02/14/17*

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Measuring Device: YSI 650 MOS (# C103120)
HACH 2100 Q SOLIDIST WLI
(C 103 207) (# 2425)
MULTIRAE (C103110)

Purge Device: BAILER (3' SS), MANUAL LIFT PUMP

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: (ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
08:40	BEGIN well development (START)								
10:23	18 GAL	11.0	0.505	14.97	7.91	-38.3	>1000	0.0	BLACKISH BROWN, CLOUDY, NO COOL
10:43	29 GAL	10.21	0.534	13.11	7.71	-137.8	>1000	0.0	GRANISH BROWN, CLOUDY, NO COOL
11:10	40 GAL	10.97	0.532	13.91	7.63	-203.0	>1000	0.0	"
11:23	55 GAL	10.58	0.529	10.78	7.72	-101.5	950	0.0	GRAY, CLOUDY, NO COOL
11:35	70 GAL	10.69	0.538	11.45	7.62	-189.3	852	0.0	"
11:50	80 GAL	10.30	0.543	13.18	7.64	-172.3	724	0.0	LIGHT GRAY, CLOUDY, NO COOL
10:04	RESUME SURGE & PUMP ON 02/14/17 @ 0950								
10:45	89 GAL	10.57	0.544	4.68	7.65	-118.9	>1000	0.0	LIGHT BROWN, CLOUDY, NO COOL
10:14	97 GAL	10.66	0.548	5.03	7.63	-146.3	713	0.0	LIGHT GRAY, CLOUDY, NO COOL
10:24	104 GAL	10.76	0.546	4.26	7.69	-141.9	618	0.0	"
10:35	114 GAL	10.74	0.543	3.81	7.58	-187.9	512	0.0	"
10:45	124 GAL	10.69	0.548	4.06	7.58	-149.3	378	0.0	VERY LIGHT GRAY, CLOUDY, NO COOL
10:50	STOP WELL DEVELOPMENT								

Observations/Notes: Purge Start Time: 08:40 Purge Rate: 0.42 GAL/MIN
 YSI S/N _____

 All PARAMETERS STABLE BUT ORP AND TURBIDITY. > 10 WELL CASING VOLUMES PURGED FROM WELL.
 ON 02/14/17 RETURN TO WELL TO COMPLETE DEVELOPMENT. ALL PARAMETERS STABLE BUT DO, TURB, ORP. > 10 WELL CASING PURGED. 4 HRS OF WELL DEVELOPMENT COMPLETE. DTW @ COMPLETION = 144.93 FT.

Signature(s): Mark Eng MEASURED @ S. ENDR PVE.



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well Development
Date: 02/15/2017
Weather: CLOUDY, MID 40'S °F, SE WIND @ 15-20 mph

Project Number: 679580.09.FI.WI
Well ID: WI-CV-MW07S
Sample ID: NA
Sampling Team: MARK ENO

Total Depth: 144.25 Before, 144.50 After FT.(BTOC)
Depth to water: (-) 126.50 Before, 130.95 After FT.(BTOC)
Water Column: 17.75 FT.
Well Volume: (X) 0.163 GAL/FT.
Total Purge Vol.: 26.00 GAL.

SCREEN: 130-140 FTs

Measuring Device: YSI (50MDS (C103120), HACH 2100Q (C103207), SOLONIST WLT (#2425) MULTIRAR (C102673)

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, 4, 6 inch diameters.

Purge Device: 5' SURGE ROD/BLOCK, 3'-0.25 GAL SS BAKER

FIELD PARAMETERS

Main data table with columns: Time, Purge Vol. (gals), Temp. °C, Cond. mS/cm, DO mg/L, pH SU, ORP mV, Turbidity NTU, Other: (Y) or (PM), Color / Odor / Comments. Includes stabilization criteria and multiple data rows.

Observations/Notes: Purge Start Time: 10:50 on 02/05/17 Purge Rate: @ 1.8 GAL/MIN
YSI S/N
INITIAL SURGE @ 10:50, 2ND SURGE @ 11:15.
PAUSE @ 12:19 TO ALLOW RECHARGE. RESUME BAILING @ 12:31, DTW @ 13:04 = 132.20 FT BTOC. 3RD SURGE @ 13:20. STOP WELL DEVELOPMENT @ 15:00.
ALL PARAMETERS STABLE BUT ORP, TURBIDITY. >10 WELL VOLUMES PURGED, 4 HRS OF DEVELOPMENT TIME

Signature(s): Mark Eno



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
Location: OLF Coupeville
Event: Well Development
Date: 02/14/17 -> 02/20/2017
Weather: Clear, Over 30°F, SE winds 4-6 mph

Project Number: 679580.09.FI.WI
Well ID: WI-CV-MW07M
Sample ID: NA
Sampling Team: MARK ENDS

Total Depth: 191.7 (MOD SOFT BOTTOM) Before 193.0 After
Depth to water: (-) 129.32 Before 155.1 After
Water Column: 62.38 Before (X) 0.163 After
Well Volume: 10.17 Before 27.75 After
Total Purge Vol.: 10.17 Before 27.75 After

SCREENS: 170-185 Fths
SUMP: 193 Fths

Measuring Device: YSI 6500MS (C105120), HACH 2100Q (C102637), SOLONIST WLT (#2425) MULTIRAE

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows for diameters 1, 1.25, 2, 4, 6.

02/15/17 SAME EQUIPMENT, BUT MULTIRAE (C102633)
ON 02/20/17 SAME EQUIPMENT BUT USING HORIBA U-22 (C102347) AND MULTIRAE (C102922)

Purge Device: BAILEY (3'-0.25 GAL SS), 5' SURGE ROD, MANUAL LIFT PUMP

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol. (gals), Temp. °C, Cond. mS/cm, DO mg/L, pH SU, ORP mV, Turbidity NTU, MULTIRAE Other (ppm), Color / Odor / Comments. Includes stabilization criteria and various time points.

Observations/Notes: Purge Start Time: 15:49 on 02/14/17 Purge Rate:
ON 02/15/17 @ 0815 TD = 193.0 FTHS, DTW = 136.17 FTHS.
ON 02/15/17 @ 0855 THE MANUAL LIFT PUMP WILL NOT DESCEND PAST 114 FTHS.
WILL SURGE W/ 5' SURGE ROD AND BAIL. STOP WELL DEVELOPMENT, WILL RESUME UTILIZING SUBMERSIBLE PUMP.
COMPLETE WELL DEVELOPMENT @ 11:52 ON 02/20/17. 2.7 WELL VOLUMES PURGED, ALL PARAMETERS STABLE BUT TURBIDITY, pH, DO. H HAS OF WELL DEVELOPMENT. DTW = 155.1 FTHS, TD = 193.0 FTHS

Signature(s): Mark Ends

Table with 10 columns: TIME, PURGE VOL. (GALS), TEMP (C), COND (mS/cm), DO (mg/L), pH (SU), ORP (mV), TURBIDITY (NTU), MULTIRAE (C1) or (C2), COLOR / ODOR / COMMENTS. Includes handwritten entries for 10:45, 11:30, 11:39, 11:52.

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/16/2017 ~> 02/19/2016
 Weather: CLOUDY, LOW 40'S °F, ESE WINDS @ 2 mph

:Project Number 679580.09.FI.WI
 Well ID: WI-CV-MW055
 Sample ID: NA
 :Sampling Team MARK ENDO, COLLIN HALL

Before After 124.1
 Total Depth: (CHANG BOTTOM) 124.1 | 121.5 FT.(BTOC)
 Depth to water: (-) 121.5 | 121.3 FT.(BTOC)
 Water Column: 2.6 | FT.
 (x) 0.163 | GAL/FT.
 Well Volume: 0.42 | GAL.
 Total Purge Vol.: | 2.25 GAL.

:Measuring Device HORIBA U-22 (C101911), NACH 2100R (C103267), SOLONIST WLI (#2425) MULTIRAE (C102663)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: 5' SS SURGE ROD/BLOCK, 3' - 0.25 GAL SS BAILER

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other (% or ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
12:12	BEGIN	SURGE & BAIL	(BOTTOM 5' ONLY)						
12:26	0.5	11.9	0.332	9.39	9.1	NA	>1000	0.0	LIGHT BROWN, VERY CLOUDY, NO ODO
12:34	1.25	11.7	0.350	11.18	9.2	NA	>1000	0.0	"
12:39	1.5	STOP WELL DEVELOPMENT, WELL IS DRY.							
2/19/17 1237	BEGIN	BAILING							
1242		11.50	0.404	9.91	5.80	NA	>1000		DTW = 121.3'
1245	0.75	WELL DRY							

Observations/Notes: Purge Start Time: 12:12 on 02/16/17 Purge Rate: 0.08 GAL/MIN
 YSI S/N _____
 DTW = 122.59' @ 12:32. STOP DEVELOPMENT @ 12:39 NO WATER IN WELL, ALLOW WELL TO RECHARGE.
 ON 02/20/17 AFTER DISCUSSION W/ E. EPPLE & D. HOLSTEN, NO FURTHER WELL DEVELOPMENT WILL BE PERFORMED @ MW-055 DUE TO LOW WATER LEVELS. A TOTAL OF 35 MINUTES DEVELOPING THE BOTTOM 3-5FT OF WELL SCREEN.
 Signature(s): Mark Endo



WELL DEVELOPMENT DATA SHEET

Client: NAVFAC Project Number: 679580.09.FI.WI
 Location: OLF Coupeville Well ID: WI-CV-MW 05M
 Event: Well Development Sample ID: NA
 Date: 02/15/17 → 02/16/17 Sampling Team: MARLENDU
 Weather: CLOUDY, RAIN, MID 40'S°F, SE WIND @ 18-25 mph

	Before	After	
Total Depth: (MOD HARD) (HARD BOTTOM)	175.10	175.2	FT.(BTOC)
Depth to water: (HARD BOTTOM)	(+) 120.82	123.22	FT.(BTOC)
Water Column:	54.28		FT.
	(X) 0.163		GAL/FT.
Well Volume:	8.85		GAL.
Total Purge Vol.:	102.0		GAL.

SCREEN: 160-170 FT±

Measuring Device: YSI 650MDS (C103120), HACH 2100Q (C103207), SOLONIST WLT (#2425) MULTIRAE (C102633)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

ON 02/16/17 SAME INSTRUMENTS RESIDUES YSI - USED HACH 2100 Q-22 (C101911)

Purge Device: 5' SS SURGE ROD/BLOCK, 3' - 0.25 GAL SS BAIER + MANUAL LIFT PUMP.

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (% or ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
16:25	BEGIN SURGE B BAIER								
16:40	0.75	12.22	0.467	5.23	10.08	111.8	>1000	0.0	BROWNISH GRAY, VERY CLOUDY, NO O2
16:49	2.25	12.25	0.466	4.78	10.06	54.8	>1000	0.0	"
17:00	3.75	12.08	0.479	4.81	9.96	26.5	>1000	0.0	"
17:05	5.0	END DEVELOPMENT FOR THE DAY.							
ON 02/16/17 @ 0830 - RESUME DEVELOPMENT W/ MANUAL LIFT PUMP.									
09:26	18.0	11.7	0.491	7.5	7.2	NA	>1000	0.0	LIGHT BROWN, VERY CLOUDY, NO O2
09:54	38.4	11.4	0.40	9.16	8.2	NA	>1000	0.0	"
10:15	58.5	11.6	0.383	9.08	8.7	NA	>1000	0.0	"
10:32	71.86	11.8	0.383	8.28	8.5	NA	>1000	0.0	"
10:50	SURGE W/ LL.								
11:10	85.05	11.8	0.381	8.34	9.2	NA	>1000	0.0	"
11:26	90.00	11.7	0.361	8.27	9.2	NA	>1000	0.0	"
11:40	102.0	11.9	0.368	9.39	9.2	NA	>1000	0.0	"
11:45	END DEVELOPMENT								

Observations/Notes: Purge Start Time: 16:25 ON 02/15/17 Purge Rate: _____

YSI S/N _____
 STOP WELL DEVELOPMENT FOR THE DAY @ 1705, DTW = 133.40 FT BTOC.
 RESUME DEVELOPMENT ON 02/16/17 @ 0830. DTW = 124.7 FT BTOC, TD = 175.2 FT BTOC.
 STOP/COMPLETE WELL DEVELOPMENT @ 11:45 - ALL PARAMETERS STABLE BUT ORP AND TURBIDITY. > 10 WELL VOLUMES PURGED AND 4 HRS OF WELL DEVELOPMENT REACHED.

Signature(s): _____

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC :Project Number 679580.09.FI.WI
 Location: OLF Coupeville Well ID: WI-CV-MW08S
 Event: Well Development Sample ID: NA
 Date: 02/17/17 :Sampling Team MARK ENDO
 Weather: MOSTLY SUNNY, MID 40'S°F, S WIND @ 2-4 mph

SCREEN: 120-130 FT bgs (NO SUMP)
 Total Depth: (HAND BOTTOM) Before 130.9 FT.(BTOC) :Measuring Device HORIBA U-22 (C101911), HACH 2100A
 Depth to water: (-) 117.68 FT.(BTOC) (C103267), SOLONIST WLE (#2425)
 Water Column: 13.22 FT. MULTIRAE (C102922)
 Well Volume: (X) 0.163 GAL/FT.
 Total Purge Vol.: 2.15 GAL.

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: 5' SS SURGE ROD/BLOCK, 3'-0.25 GAL SS BAILER.

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (A) (ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
10:30	BEGIN	WELL DEVELOPMENT, SURGE UP/ 5' SS SURGE ROD/BLOCK AND BAIL W/ 3'-0.25 GAL SS BAILER							SIGNIFICANT AM FINE SAND SIFT SETTLING
10:51	0.5	11.9	0.538	4.55	9.5	NA	>1000	0.0	LIGHT VERY BROWN, CLOUDY, NO ODO
11:18	1.75	12.2	0.541	5.49	9.2	NA	>1000	0.0	"
11:25	PAUSE DEVELOPMENT								
11:50	6.5	RESUME DEVELOPMENT (BAILING) Y1					>1000	0.6	LIGHT VERY BROWN, CLOUDY, NO ODO
12:35	6.5	13.5	0.565	5.77	8.9	NA	>1000	0.0	"
12:51	8.0	12.3	0.570	6.84	8.8	NA	>1000	0.0	"
13:07	9.5	11.6	0.575	7.10	8.7	NA	>1000	0.0	"
2/17/0820	RESUME DEV.	SURGING FOR 10 min THEN BAIL W/ 3' bailer							DARK BROWN DTW=117.6'ht

Observations/Notes: Purge Start Time: 10:30 on 02/17/17 Purge Rate: _____

YSI S/N _____ STOP WELL DEVELOPMENT @ 13:07 ON 02/17/17 FOR END OF DAY, DTW= 117.77 FT btoC

Signature(s): _____

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 2/16/17 → 02/17/17
 Weather: 50° 4 MPH WSW Cloudy

:Project Number 679580.09.FI.WI
 Well ID: WI-CV-MW08M
 Sample ID: NA WI-CV-MW08M
 :Sampling Team Collin Hall, Mark Endo

	Before	After	
Total Depth:	128	165.4	FT.(BTOC)
Depth to water:	(-) NA	132.4	FT.(BTOC)
Water Column:	NA	33.0	FT.
	(X)	0.163	GAL/FT.
Well Volume:	150.72	5.379	GAL.
Total Purge Vol.:	36.7		GAL.

SCREEN: 150 - 160 FT bgs
 Sump @ 165' bgs : Measuring Device Horiba (C101911) Hach 2100 Q (C1037)
 MultiRae (C102663), Solinst WL1 (H2435)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

ON 02/17/17 USE SAME EQUIPMENT BUT MULTIRAE (C02922) UTILIZED.

Purge Device: 3FE 0.25 gal SS boiler
 5' SS SURGE TANK/BACK
 MANUAL LIFT PUMP.

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (%) or (ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
13:40	begin well development								
13:57	2.0								Too thick to measure
14:09	2.75	11.9	0.904	4.94	10.1	NA	>1000		Thick grey nodal, cloudy
14:27	4.75	11.7	0.715	4.4	11.4	NA	>1000		"
14:30	Break for lunch, resume @ 14:45								
15:05	7.5	12.0	0.823	6.38	11.3	NA	>1000		grey, no odor, cloudy
15:26	9.25	12.0	0.695	6.35	11.9	NA	>1000		"
15:45	11.25	11.6	0.675	4.21	11.1	NA	>1000		"
16:07	13.00	11.5	0.671	3.12	11.5	NA	>1000		"
16:15	begin surge								
16:35	13.75	11.3	0.609	4.7	11.2	NA	>1000		"
16:55	STOP WELL DEVELOPMENT FOR END OF DAY TOTAL PURGE = 16.5 gal								
08:38	ON 02/17/17 DTW = 122.1 FT BTOC. RESUME PUMPING WELL (UTILIZE MANUAL LIFT PUMP)								
08:59	20.4	10.8	0.704	6.20	9.8	NA	>1000	0.0	LIGHT VERY BROWN, CLOUDY, NO ODOR
09:07	23.4	11.1	0.636	7.92	9.7	NA	>1000	0.0	" DTW = 123.1 FT BTOC
09:22	25.4	11.0	0.598	3.84	9.6	NA	>1000	0.0	LIGHT VERY BROWN, CLOUDY, NO ODOR
09:33	30.9	11.5	0.576	3.68	9.7	NA	>1000	0.0	"
09:45	36.7	11.5	0.567	4.70	9.7	NA	>1000	0.0	"

Observations/Notes: Purge Start Time: 13:40 on 02/16/17 Purge Rate: 0.10 GAL/MIN

YSI S/N _____

 TD 128 FE VERY SOFT UNCONFIRMED TOTAL DEPTH, WATER LEVEL INDICATOR NO SIGNAL, NO RECORDED WATER, COLUMN MAY BE FULL OF MUD - 2/16/17 13:35
 2/16/17 15:10 CHECK W/L 132.4 FE + RECHARGING, TD = 165.3 FE
 (HARD BOTTOM)
 @ 16:55 TD = 165.4 FT BTOC, DTW = 125.36 FT BTOC (RECHARGING), STOP DEVELOPMENT.

Signature(s): Mark Endo @ 09:45, 4 HRS OF DEVELOPMENT COMPLETE, > 6.8 WELL VOLUMES PURGED ONLY PH STABILIZED. TD = 165.4 FT BTOC (HARD BOTTOM), DTW = 127.1 FT BTOC (RECHARGING).

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/14/17 → 02/20/17
 Weather: Cloudy, mid 30's°F, SE winds @ 8-10 mph

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW 11 S
 Sample ID: NA
 Sampling Team: MARK ENDO

	Before	After	
Total Depth:	140.4	140.4	FT.(BTOC)
Depth to water:	(-) 131.38	135.35	FT.(BTOC)
Water Column:	8.72		FT.
Well Volume:	(X) 0.163		GAL/FT.
Total Purge Vol.:	1.42	7.0	GAL.

Measuring Device: YSI 6500DS (C103120), HACH 2100Q (C103207), SOLONIST WLI (#2425) MULTIFLARE (#C102727)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

ON 02/20/17
 HORIZA U-22 (C102307)
 MULTIFLARE (C102922)

Purge Device: BAILEY (3' - 0.25 GAL SS), 5' SS SURGE ROD/BLOCK

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLARE Other: (CA) or (PDM)	Color / Odor / Comments
Stabilization Criteria		constant	± 3%	± 10%	± 0.1	± 10 mv	< 10		
14 25	BEGIN	TO BAIL WELL + SURGE							
14 42	1.75	10.27	0.325	8.89	7.95	-66.9	> 1000	0-0	LIGHT BROWN BRND, CLOUDY, NO ODO
14 52	3.75	10.24	0.298	9.57	7.58	-146.2	> 1000	0-0	"
2/19/17 1400	BEGIN	BAILING 3' boiler							
14 20	1	10.20	0.308	10.25	6.80	NA	> 1000		
14 30	1.5	10.20	0.303	9.89	6.90	NA	917		
14 36	2.25	10.20	0.300	9.92	7.00	NA	951		
14 57	3.5	9.80	0.326	8.58	7.2	NA	71000		
WELL DRY									
08:15	ON 02/20/2017 DTW = 132.7' WTR, BEGIN SURGE W/ 5' SS SURGE ROD/BLOCK.								
08:45	STOP SURGE, BEGIN BAILING W/ 3' - 0.25 GAL SS BAILEY.								
09:05	5.25	10.85	0.404	9.59	6.19	104	> 1000	0-0	(MINIMAL SETTLING, SEDIMENT LIGHT BROWN, CLOUDY, NO ODO
09:47	6.0	11.01	0.368	9.83	6.85	73	777	0-0	LIGHT BROWN, CLOUDY, NO ODO
09:55	7.0	WELL DRY.							

Observations/Notes: Purge Start Time: 14:25 ON 02/14/17 Purge Rate: 0.13 GAL/MIN
 YSI S/N _____
 WATER LEVEL WITHIN 2' OF TD. STOP WELL DEVELOPMENT TO ALLOW RECHARGE @ 1455.
 PAUSE-RESUME WELL DEVELOPMENT @ 08:15 ON 02/20/17. PAUSE DEVELOPMENT @ 09:18. RESUME @ 09:45. WELL DRY @ 09:55, DTW = 139.6 FT BTOC.
 @ 13:00 DTW = 135.86 FT BTOC. @ 13:44 DTW = 135.35 FT BTOC. A TOTAL OF 2 HAS AND 37 MIN DEVELOPMENT ON WELL, 4.9 WELL VOLUMES PURGED, NO PARAMETERS STABLE. DUE TO SLOW RECHARGE AND PURGING, WELL DRY, NO MORE DEVELOPMENT WILL BE PERFORMED.

Signature(s): Mark Endo

WELL DEVELOPMENT DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville
 Event: Well Development
 Date: 02/14/2017
 Weather: CLOUDY, MID TO UPPER 30'S OF SE WIND @ 8-10 mph

Project Number: 679580.09.FI.WI
 Well ID: WI-CV-MW11M
 Sample ID: NA
 Sampling Team: MARK ENDOPHERUS SILVER

	Before	After	
Total Depth:	161.85	165.2	FT.(BTOC)
Depth to water:	(-) 105.64	145.95	FT.(BTOC)
Water Column:	56.21		FT.
	(X) 0.163		GAL/FT.
Well Volume:	9.162		GAL.
Total Purge Vol.:		42.75	GAL.

Measuring Device: YSI 650MDS (C103120), HACH 21000 (C03207), SOLONIST WLI (#2425)
 MULTIRATE (#C102727)

Well Dia. (inches)	Volume (gallons/foot)
1	0.041
1.25	0.064
2	0.163
4	0.653
6	1.469

Purge Device: BAILEY (3' SS), 5' SURGE ROD/BLOCK, MANUAL LIFT PUMP

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRATE Other: (%) or (ppm)	Color / Odor / Comments
Stabilization Criteria		constant	±3%	±10%	±0.1	±10 mv	<10		
1203	BEGIN BA	LINK SOLIDS FROM BOTTOM OF WELL TO CLEAR SCREEN.							
1234	3.75	10.85	0.363	5.14	9.46	-130.6	>1000	0.0	LIGHT BROWN, VERY CLEAR, NO COC
1330	SURGE W/	5' SURGE ROD AND BAIL W/ 3' SS BAILEY.							
1342	4.25	10.92	0.370	3.44	9.39	-219.6	>1000	0.0	"
1353	6.0	10.51	0.370	2.24	9.35	-203.5	>1000	0.0	"
1402	6.75	10.42	0.446	7.35	7.18	-50.5	>1000	0.0	LIGHT BROWN, VERY CLEAR, NO COC
1417 1400									SLIGHTLY MORE CLEAR
1417 1515	0								DTW = 125.1'
1530	5	12.76	0.420	5.53	8.82	-215	>1000	0	DTW = 131.8' btoe TO 02/14
1540	10	14.10	0.534	2.75	8.67	-225	>1000	0	DTW = 161.1' btoe
1550	12.5	13.74	0.550	2.40	8.56	-208	>1000	0	162.1'
1600	15	13.56	0.602	1.82	8.43	-183	>1000	0	161.7'
1610	18	13.51	0.620	1.79	8.31	-160	>1000	0	159.5'
1620	20	13.50	0.639	1.80	8.27	-159	>1000	0	160.5'
1630	25	PUMP WOULD NOT TO LET WATER AT OBSERVED RATE FACTOR TO SITE.							
		UNABLE TO PUSH WATER TO SURFACE.							
		TOP OF PUMP @ 160' btoe bottom @ 163' btoe							

Observations/Notes: Purge Start Time: 12:03 ON 02/14/2017 Purge Rate: 0.125 GAL/MIN ON 02/14/17

YSI S/N _____

 INITIAL TOTAL DEPTH HAS VERY SOFT BOTTOM. ABOUT 8.5 FT OF SILT/SAND TO SUMP @ 170 FT BTOE. MANUAL LIFT PUMP WILL NOT DESCEND PAST 69 FT btoe. SURGE WITH 5' SURGE ROD AND BAIL W/ 3' (0.25 GAL) SS BAILEY. STOP WELL DEVELOPMENT @ 1402, WILL CONTINUE WHEN NEW PUMP ARRIVES ON-SITE.
 2/14/17 TD = 170.4' btoe DTW = 131.59' btoe WATER WATEL LMS BECOMING NATURALLY TURBID PRIOR TO PUMP FAILURE.
 2/17/17 TD = 170.4' btoe DTW = 129.5' btoe

Signature(s): Mark Endopherus Silver

Attachment 3
Survey Reports

NAS Coupeville, WA

Survey Date: February, 2017

Pt.#	Northing	Easting	Monitoring Wells		Description
			Top of Metal	Top of PVC	
			Case Elev.	Casing Elev	
108	439611.38	1202426.49	194.97	194.61	MW01M
109	439604.95	1202430.71	194.99	194.58	MW01D
106	439062.88	1202352.24	193.53	193.17	MW2
107	439065.11	1202358.17	193.57	193.11	MW2M
111	439397.60	1201756.79	193.50	193.14	MW3M
110	439391.27	1201759.66	193.49	193.07	MW3D
112	440487.00	1201338.34	193.53	193.20	MW4S
113	440483.04	1201341.55	193.54	193.19	MW4M
117	438248.04	1201506.33	190.93	190.38	MW5S
118	438254.53	1201503.60	190.99	190.64	MW5M
100	437394.46	1202643.62	198.40	197.97	MW6S
101	437400.58	1202641.22	198.38	197.87	MW6M
123	441209.76	1200340.48	200.54	200.02	MW7S
124	441202.27	1200339.00	200.32	199.57	MW7M
114	441676.84	1202815.43	205.53	205.17	MW8S
115	441676.52	1202808.83	205.42	205.21	MW8M
126	436988.92	1200524.67	187.57	187.15	MW9S
127	436991.02	1200530.74	187.55	187.23	MW9M
104	436186.13	1203182.90	188.58	188.33	MW10M
105	436180.75	1203179.80	188.62	188.25	MW10D
121	443692.06	1199626.40	202.44	202.01	MW11S
122	443696.16	1199632.00	202.57	202.14	MW11M
102	433273.82	1204137.37	187.38	186.97	MW12S
103	433269.90	1204130.83	187.28	186.85	MW12D
119	437634.55	1200712.10	189.56	189.28	MW13S
120	437627.11	1200713.17	189.37	189.11	MW13M
116	439885.76	1200752.61	191.95	191.61	MW14M
125	437210.89	1200752.91	190.69	* 188.40	MWAAX557
128	439301.20	1202094.00	197.40	* 196.04	MW

NOTES

1. HORIZONTAL DATUM: NAD83/11. WASHINGTON STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD83-11
WSDOT MONUMENT USED FOR PROJECT

COUPEVILLE 3" BRASS DISK W/ PUNCH IN CONC "USC & GS COUPEVILLE 1954"

GP15525-16 3" BRASS DISK W/ PUNCH IN CONC

Y 344 3" BRASS DISK IN CONC "USC & GS Y334 1952"

J 328 3" BRASS DISK W/ PUNCH IN CONC 0.40 ABOVE SURFACE "USC & GS J328 1952"

GP15020-1 3" BRASS DISK W/ PUNCH IN CONC

2. VERTICAL DATUM: NAVD88

BENCHMARK USED COUPEVILLE ELEV 199.347

BENCHMARK USED J328 ELEV 199.754

BENCHMARK USED GP15020-1 ELEV 233.011

3. BENCH MARK: 2" BRASS DISC CITY OF SEATTLE SNV-2541, LOCATED AT BACK OF SIDEWALK AT NE QUADRANT
OF INTERSECTION OF EAST BOSTON STREET AND 24TH AVE EAST ELEVATION 73.167 FEET

4. * ELEV AT GRD - UNABLE TO OPEN DUE TO RUSTY BOLTS

5. EQUIPMENT USED LEIKA GS15 GPS SYSTEM

LEICA DNA 3 DIGITAL LEVEL



Outlying Field Coupeville, NAS Whidbey Island, Oak Harbor Washington

True North Project Number: J16-192

Date of Survey: February 21-23, 2017

Survey Crew: Ivan Steele (Party Chief) and Stephan Wilson (Instrument person)

Equipment Used:

- GPS Leica GS15 Viva System
- Level Leica DNA 3 Electronic Level with Bar coded Rod

Horizontal Datum

- Washington State Plane Coordinate System North Zone NAD83/11 based on the following 5 WSDOT GPS Monuments
 1. Coupeville
 2. J328
 3. GP15020-1
 4. GP115525-16
 5. Y344

Vertical Datum

- NAVD88 based on the following three site benchmarks
 1. Coupeville Elevation 199.347 feet
 2. J328 Elevation 199.754 feet
 3. GP15020-1 Elevation 196.778 feet

Purpose of The Survey

The purpose of the survey was to establish horizontal and vertical position of 16 to 20 new monitoring wells and two existing monitoring wells.

Survey Procedures

Horizontal Position of all monitoring wells was based on GPS observations using a Leica GS 15 RTK System. 5 WSDOT GPS Control monuments were tied twice during the course of the survey. The occupations were done over the course of two days. A report showing the residuals for the GPS is attached.

Vertical Position of the wells was established by differential levels using a Leica DNA 3 digital level and a bar coded rod. All level loops were closed and adjusted if the closure was greater than 0.02 feet. All elevations were taken on the metal rim and on the northerly side of the PVC Casing. Per Scope of Work, the PVC casing was turned through for all wells.

Daily report

On February 21, 2017 the survey crew left their Seattle office and headed to Coupeville to meet up with Eric Epple at Outlying Field in Coupeville Washington. Once at the site the crew went through a safety briefing and then was shown the locations of the wells. The tasks for the day included establishing elevations on the monitoring wells and to located 5 WSDOT GPS monuments. The crew began running levels from the Benchmark "Coupeville". The benchmark in located near the north end of the air strip. The survey crew ran to 4 wells then closed their level loop back to "Coupeville" The error of closure was 0.019 feet. No adjustment was needed on the 4 wells. A second loop was run from "Coupeville" to 4 more wells. The loop was closed back to "Coupeville". The error of closure was 0.025 feet. The elevations of the 4 wells were adjusted based on proportioning. The proportioning is based on dividing the error of closure to the number of turns. The maximum adjustment to the monitoring wells was 0.01 feet. Prior to leaving the site the crew surveyed three WSDOT GPS Control Monuments, "Coupeville", "J328", and "GP15020-1" The crew notified CH2M Hill that they were leaving the site for the day then proceeded to tie two more WSDOT GPS Control Monuments, "GP15525-16" and "Y344".

Day 2 started with the second GPS observations of the five WSDOT Monuments, two of which were off site. The other three were within Outlying Field. Prior to working on the airfield, a safety briefing took place, then the crew continued tying the WSDOT monuments. The next task was to establish horizontal location of each monitoring well. That was done by RTK GPS. After the horizontal location of the MW's were completed, the crew continued establishing elevations for the wells. The first loop of the day started from the Benchmark "Coupeville" and ended at the Benchmark "J328". The closure between the benchmarks was 0.011 feet. No adjustment was needed. 8 wells were surveyed within the first loop. The second level loop began at "J328" and ended at BM GP15020-1, 4 monitoring wells were elevated. The closure was 0.011 feet. Elevations were not adjusted. The third level loop of the day began at "GP15020-1 and closed back to the same Benchmark. 4 Monitoring Wells were elevated. The error of closure was 0.021 feet. The 4 Monitoring Wells were adjusted based on proportion the error. A maximum adjust of

0.014 was applied to the wells. The day ended after checking out with the CH2M Hills representative.

Day 3 started with a safety briefing then the crew started the final level loop. The loop started from "Coupeville and closed to Benchmark "J328". 9 wells were elevated. The error of closure was 0.012 feet. No adjustment was required.

The GPS was processed by Jerry Reed and the levels were reduced by Tim Ingraham. Input of the data into the spread sheet was done by Nelson Ortiz and checked by Tim.

Twostep - Transformation Report

Processed: 03/13/2017 11:38:18

Project Information

	System A	System B
Project name:	WHIDBEY COUPEVILLE FOR REPORT	Whidbey Coupeville w/2-step Ground

Coordinate System Information System B

Coordinate system name:	WA N NAD83 12A
Created:	-
Transformation name:	-
Transformation type:	-
Height mode:	-
Residuals:	-
Local Ellipsoid:	GRS 1980
Projection:	WA N NAD83
Geoid model:	Geoid12a GRS80
CSCS model:	-

Transformation details

Height mode:	Orthometric
Pre-transformation name:	NULL

3D-Helmert transformation

Number of common points:	5
Transformation model:	Bursa-Wolf

No.	Parameter	Value
1	Shift dX	0.0000 fts
2	Shift dY	0.0000 fts
3	Shift dZ	0.0000 fts
4	Rotation about X	0.00000 "
5	Rotation about Y	0.00000 "
6	Rotation about Z	0.00000 "
7	Scale	0.0000 ppm

2D-Helmert transformation

Number of common points:	5
Sigma a priori:	1.0000
Sigma a posteriori:	0.0059
Rotation origin:	X0: 438140.0637 fts
	Y0: 1202772.5027 fts

No.	Parameter	Value	rms
1	dE	-0.0404 fts	0.0086 fts
2	dN	-0.0141 fts	0.0086 fts
3	Rotation	-0° 00' 00.06860"	0° 00' 00.25374"
4	Scale	-0.9011 ppm	1.2302 ppm

Height transformation

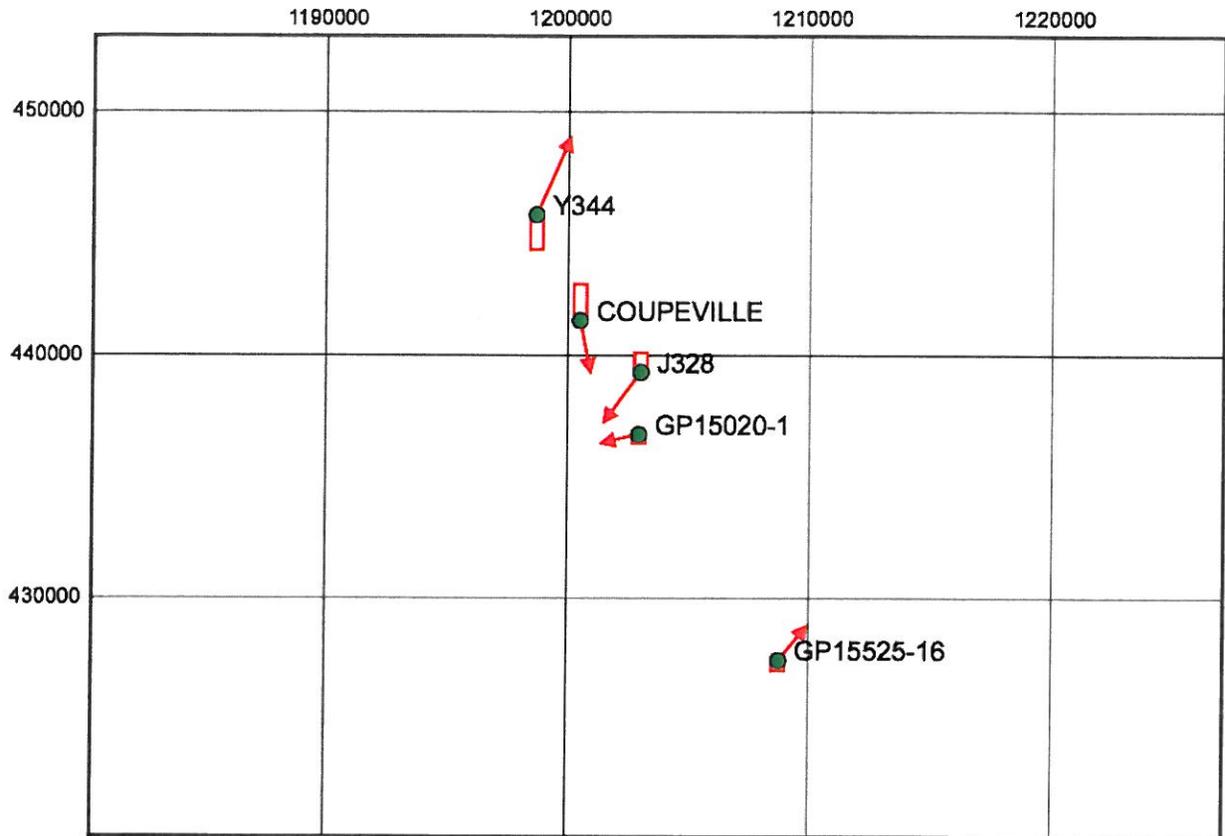
Number of common points:	5		
Mean transformation accuracy:	0.0144 fts		
Parameters:	-0.00002798	-0.00000446	74.2728 fts
Inclination of height in X:	-0° 00' 05.77129"		
Inclination of height in Y:	-0° 00' 00.91994"		

Residuals

Grid:

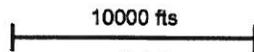
System A	System B	Point type	dE [fts]	dN [fts]	dHgt [fts]
COUPEVILLE	COUPEVILLE	Position + height	0.0038 fts	-0.0186 fts	0.0132 fts
GP15020-1	GP15020-1	Position + height	-0.0132 fts	-0.0033 fts	-0.0033 fts
GP15525-16	GP15525-16	Position + height	0.0103 fts	0.0123 fts	-0.0039 fts
J328	J328	Position + height	-0.0132 fts	-0.0181 fts	0.0069 fts
Y344	Y344	Position + height	0.0122 fts	0.0277 fts	-0.0129 fts

Graphical overview:

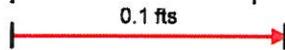


Scale:

Coordinates



Residuals



- Show Point Id
- Show Residuals Position
- Show Residuals Height
- Show Grid

Attachment 4
Groundwater Sampling Data Sheets



P3 1/2

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUDEVILLE
 Event: SPRING 2017 GW SAMPLING
 Date: 3/4/17
 Weather: 410%, OVERCAST

Project Number: 679580.09.FI.WS
 Well ID: WI-CU-MW07M
 Sample ID: WI-CU-GW07M-0317
 Sampling Team: EROS & BILBEU

Total Depth: 193.0 FT.(BTOC)
 Depth to water: (+) 129.35 FT.(BTOC)
 Water Column: 63.65 FT.
(x) 0.163 GAL/FT.
 Well Volume: 10.37 GAL.
 Total Purge Vol.: 8.0 GAL.

Measuring Device: HANNA O-22
 Date and Time: 3/4/17 1445

Purge Device: BEST PANACEA 200

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

SAMPLE DATA

Date: <u>3/4/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u> <u>btoC</u>	Color / Odor / Comments
Time:								
Method:								

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
1445	0	11.40	0.464	5.62	6.25	-72	57.8	130.1	<u>CLUSTAN/COAGULS</u>
1450	0.3	11.54	0.455	2.52	6.81	-119	50.3	131.5	
1455	0.6	11.71	0.453	1.95	7.38	-153	45.6	132.4	
1500	0.9	11.76	0.451	1.53	7.69	-169	29.0	133.4	
1505	1.2	11.44	0.451	1.33	7.95	-180	8.8	135.2	
1510	1.6	11.56	0.449	1.25	7.99	-190	10.4	136.1	
1515	1.9	11.74	0.449	1.17	8.04	-195	8.1	136.9	
1520	2.2	11.66	0.449	1.10	8.01	-199	12.0	137.45'	
1525	2.5	11.32	0.449	1.10	8.04	-202	12.5	138.2	
1530	2.8	11.75	0.448	1.03	8.03	-206	19.1	139.5	
1540	3.4	11.69	0.449	1.32	8.04	-192	27.2	141.6	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>PCC 537/mon</u>	<u>PER</u>	<u>125 ml HOPE</u>	<u>2</u>

Observations/Notes: 100 psi 20-30 sec discharge 10-20 second discharge 200-250 ml/min
 Pump Start Time: VOC Reading: 0.0 ppm wellhead OBSERVABLE DRAWDOWN W/ STABILIZATION @ 144-145!
 Pump Depth: 185' bottom of pump USE BOOSTER PUMP IN FUTURE.
 Sample Time: 1715 collect WI-CU-GW07M-0317
 MS/MSD: NA Duplicate ID No.: NA
 Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF CONVENTVILLE
Event: SPRING 2017 CW SAMPLING
Date: 3/4/17
Weather: 40'S, OVERCAST

Project Number: 679580.09, FJWS
Well ID: WI-CU-MW07M
Sample ID: WI-CU-GW07M-0317
Sampling Team: ERIC A. BILBY

Total Depth: 193.0 FT.(BTOC)
Depth to water: (-) 129.35 FT.(BTOC)
Water Column: 63.65 FT.
Well Volume: 10.37 GAL.
Total Purge Vol.: 8.0 GAL.

Measuring Device: HORIZBA 0-22
Date and Time: 3/4/17 1445

Purge Device: BEST PANACEA 200

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, 4.

SAMPLE DATA

Table with 9 columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments.

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Includes handwritten data rows from 1550 to 1650.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers. Includes handwritten entry for EPA 537/mn.

Observations/Notes: 100 psi 20-30 sec recharge 10-20 sec discharge 125 ml/30 sec 250-300 ml/min

Pump Start Time: 1445
Pump Depth: 185' bottom of pump
Sample /Time: 1715 COLLECT
MS/MSD: NA
Signature(s): [Handwritten Signature]



pg 1/2

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF COUDEVILLE
Event: SPRTS CW SAMPLING 2017
Date: 3/4/17
Weather: 40-50° & OVERCAST

Project Number: 679580.09.FI.CWS
Well ID: WI-CU-MW075
Sample ID: WI-CU-GW075-0317
Sampling Team: ERIC A. BILKE

Total Depth: 144.5 FT.(BTOC)
Depth to water: (-) 126.42 FT.(BTOC)
Water Column: 18.08 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.94 GAL.
Total Purge Vol.: 3.4 GAL.

Measuring Device: HANNA U-22
Date and Time: 3/4/17 1200

Purge Device: BEST PRACTICE 200

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, and 4 inches.

SAMPLE DATA table with columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color/Odor/Comments.

FIELD PARAMETERS table with columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color/Odor/Comments.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers.

Observations/Notes: 70 psi @ ~40 sec recharge 20 sec discharge 100-125 ml/min
Pump Start Time: 1200 3/4/17
Pump Depth: 140' btoe
Sample Time: 140' btoe
MS/MSD: NA
Duplicate ID No.: NA
Signature(s): [Handwritten Signature]



pg 2/2

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: CLF COUPEVILLE
Event: SPRING 2012 GW SAMPLING
Date: 3/4/17
Weather: 400% OVERCAST

Project Number: 679580.09.PI.WS
Well ID: WI-CU-MW075
Sample ID: WI-CU-GW075-0317
Sampling Team: Eos A. Bilypo

Total Depth: 144.5 FT.(BTOC)
Depth to water: (-) 126.42 FT.(BTOC)
Water Column: 18.08 FT.
(x) 0.163 GAL/FT.
Well Volume: 2.94 GAL.
Total Purge Vol.: 3.4 GAL.

Measuring Device: HOPTISA U-22
Date and Time: 3/4/17

Purge Device: BEST PANACEA 200

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, and 4.

SAMPLE DATA

Table with 9 columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments.

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Contains multiple rows of data.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers.

Observations/Notes:

Pump Start Time: VOC Reading:
Pump Depth: SEE PAGE 1 3/4/17 1325 WI-CU-GW075-0317

Sample Time: MS/MSD NA Duplicate ID No.: NA

Signature(s): [Handwritten signatures]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OFF CAMPBELL
Event: SPRING 2017 GW SAMPLING
Date: 3/3/17
Weather: 40's, RAINY, WINDY 20 mph

Project Number: 679580.09.FL.WS
Well ID: WI-CU-MW135
Sample ID: WI-CU-GW135-0317
Sampling Team: EROS D. BLUTEU P6

Total Depth: 114.70 FT.(BTOC)
Depth to water: (-)110.25 FT.(BTOC)
Water Column: 4.45 FT.
(x)0.163 GAL/FT.
Well Volume: 0.73 GAL.
Total Purge Vol.: 0.75 GAL.

Measuring Device: HANNA U-22
Date and Time:

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, and 4 inches.

Purge Device: 3' disposable bailer

SAMPLE DATA table with columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color/Odor/Comments.

FIELD PARAMETERS table with columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color/Odor/Comments.

Table for Sample information: method, container number, size, and type, preservative used.

Observations/Notes:
Pump Start Time: NA
Pump Depth: NA
VOC Reading: 0.0 ppm wellhead
Sample Time: 1705 WI-CU-GW135-0317
MS/MSD NR Duplicate ID No.: NA
Signature(s):

Handwritten signature



pg 1

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF COURTYARD
Event: SPRING 2017 GW SAMPLING
Date: 3/1/17
Weather: 40's, RAINY

Project Number: 679580, 09, FI, WS
Well ID: WI-CU-MW12S
Sample ID: WI-CU-601 NA 3/1/17
Sampling Team: ERIC A. BILBY P.C.

Total Depth: 106.5 FT.(BTOC)
Depth to water: (-)106.1 FT.(BTOC)
Water Column: 0.4 FT.
(x) 0.163 GAL/FT.
Well Volume: GAL.
Total Purge Vol.: 0 GAL.

Measuring Device: HORIBA U22
Date and Time: 3/1/17

Purge Device: BAILER

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, and 4 inch diameters.

SAMPLE DATA

Table with 9 columns: Date, Time, Method, Temp. (C), Cond. (mS/cm), DO (mg/L), pH (SU), ORP (mV), Turbidity (NTU), Other (DTW), Color / Odor / Comments.

FIELD PARAMETERS

Table with 9 columns: Time, Purge Vol. (gals), Temp. (C), Cond. (mS/cm), DO (mg/L), pH (SU), ORP (mV), Turbidity (NTU), Other (DTW), Color / Odor / Comments. Includes handwritten note 'UNABLE TO RETRIEVE WATER'.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers. Includes handwritten 'NA'.

Observations/Notes:

Pump Start Time: NA
Pump Depth: NA
Sample Time: NA
MS/MSD: NA
Duplicate ID No.: NA
VOC Reading: UNABLE TO RETRIEVE GROUNDWATER W/ BAILER
Signature(s): [Handwritten Signature]

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 679580.09.FI.WS
 Location: OLE COUPEVILLE Well ID: WI-CU-KWGH-MWIZD @ 3/1/17
 Event: SPRING GW SAMPLING 2017 Sample ID: WI-CU-GWIZD-0317
 Date: 3/1/2017 Sampling Team: EROS A BILYEU P.C.
 Weather: 40°, OVERCAST

Total Depth: 197.6 FT.(BTOC)
 Depth to water: (-) 160.82 FT.(BTOC)
 Water Column: 36.78 FT.
(x) 0.163 GAL/FT.
 Well Volume: 6 GAL GAL.
 Total Purge Vol.: 6.8 GAL.

Measuring Device: HORIBA U-22
 Date and Time: 3/1/17

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

Purge Device: BEST PANACEA 200

SAMPLE DATA									
Date: <u>3/1/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW btec</u>	Color / Odor / Comments	
Time: <u>1545</u>									
Method: <u>LOW FLOW VOLUME</u>		<u>0.51</u>							

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L ^{0.2}	pH SU ^{0.1}	ORP mV ¹⁰	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
<u>1545</u>	<u>500ml</u>	<u>11.42</u>	<u>0.595</u>	<u>3.68</u>	<u>5.92</u>	<u>-84</u>	<u>58.9</u>	<u>160.85</u>	
<u>1550</u>	<u>1.25L</u>	<u>11.15</u>	<u>0.574</u>	<u>2.28</u>	<u>6.22</u>	<u>-121</u>	<u>63.9</u>	<u>160.85</u>	<u>PUMP BATTERY DEAD</u>
<u>1600</u>	<u>1.50L</u>	<u>10.69</u>	<u>0.573</u>	<u>1.95</u>	<u>6.68</u>	<u>-135</u>	<u>58.1</u>	<u>160.85</u>	<u>PUMP ON</u>
<u>1605</u>	<u>2.25L</u>	<u>10.84</u>	<u>0.571</u>	<u>1.55</u>	<u>6.70</u>	<u>-138</u>	<u>18.2</u>	<u>160.87</u>	<u>CLEAR, COVILLES</u>
<u>1610</u>	<u>3.0L</u>	<u>10.96</u>	<u>0.569</u>	<u>1.71</u>	<u>6.74</u>	<u>-135</u>	<u>23.4</u>	<u>160.90</u>	<u>3/1/17</u>
<u>1615</u>	<u>1 GAL</u>	<u>10.95</u>	<u>0.569</u>	<u>1.63</u>	<u>6.79</u>	<u>-135</u>	<u>22.2</u>	<u>160.90</u>	
<u>1620</u>	<u>5.25L</u>	<u>10.86</u>	<u>0.568</u>	<u>1.60</u>	<u>6.85</u>	<u>-133</u>	<u>27.1</u>	<u>160.90</u>	
<u>1625</u>	<u>5.25</u>	<u>10.84</u>	<u>0.569</u>	<u>1.61</u>	<u>6.86</u>	<u>-131</u>	<u>29.0</u>	<u>160.92</u>	
<u>1630</u>	<u>6.0L</u>	<u>10.67</u>	<u>0.569</u>	<u>1.58</u>	<u>6.89</u>	<u>-129</u>	<u>26.6</u>	<u>160.92</u>	
<u>1635</u>	<u>6.75L</u>	<u>10.73</u>	<u>0.569</u>	<u>1.48</u>	<u>6.90</u>	<u>-128</u>	<u>11.3</u>	<u>160.92</u>	<u>PUMP OFF</u>

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>DFC USEPA 537/MOD</u>	<u>ICE</u>	<u>125 ml HDPE</u>	<u>2</u>

Observations/Notes: 100-110 PSI 12-15 sec discharge / 30 sec recharge @ 250 ml/min

Pump Start Time: 1545 VOC Reading: 0.0 ppm wellhead

Pump Depth: 190' btec bottom of pump

Sample /Time: 1630 WI-CU-GWIZD-0317 MSMSD

MS/MSD WI-CU-GWIZD-0317 (MS/MSD) Duplicate ID No.: NA

Signature(s): [Signature]

45
3/1/17



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GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF COUPEVILLE
Event: SPRING 2017 GW SAMPLING
Date: 2/28/17
Weather: 30-40s, BREEZY, WINDY

Project Number: 679580, 09.FL.WS
Well ID: WI-CV-MW04S
Sample ID: WI-CV-BW04S-0317
Sampling Team: Eric A. Bitgen P.G.

Total Depth: 126.60 FT.(BOC)
Depth to water: (-) 106.40 FT.(BOC)
Water Column: 20.2 FT.
(x) 0.163 GAL/FT.
Well Volume: 3.3 GAL.
Total Purge Vol.: 10 GAL.

Measuring Device: HANNA U-22
Date and Time: 3/1/17 1410

Purge Device: BEST PANACEA 200

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, 4.

SAMPLE DATA

Table with 10 columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments.

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Includes handwritten notes like 'AIR IN LINE, NO LEAKS'.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers. Includes handwritten entry for PFC analysis.

Observations/Notes: 65-75 PSI PUMP INITIALLY @ 117' btoe moved to 125' to assist w/ recharge. purged with significant air in line @ 1 min recharge, 10 sec discharge.
Pump Start Time: 2/28/17 1410
Pump Depth: 125' btoe bottom of pump

Sample Time: 3/1/2017 1325 WI-CV-BW04S-0317
MS/MSD: NA Duplicate ID No.: WI-CV-MW04SP-0317

Handwritten signature and initials.



05 1/2

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUPEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/24/17
 Weather: 40's, RAINY, SNOWY, DRY

Project Number: 674580.09.FI.WS
 Well ID: WI-CU-MW04M
 Sample ID: WI-CU-GW04M-0217
 Sampling Team: Erin A. Blyden P.G.

Total Depth: 158.70 FT.(BTOC)
 Depth to water: (-)123.43 FT.(BTOC)
 Water Column: 35.27 FT.
(x) 0.163 GAL/FT.
 Well Volume: 5.74 GAL.
 Total Purge Vol.: 18 GAL.

Measuring Device: HORIBA U-22,1
 Date and Time: 2/24/17

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

Purge Device: BEST PANACEA 200 w/ 6' 1 1/2" VOLUME BOOSTER

SAMPLE DATA								
Date: <u>2/24/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW 1640</u>	Color / Odor / Comments
Time: <u>1010</u>								
Method: <u>LOW FLOW VOLUMIZ</u>								

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
1010	100 ml	6.14	0.574	8.95	5.99	126	>1000	124.5	DARK GREY, ODORLESS
1020	200 ml	7.82	0.438	2.36	7.94	-160	>1000	125.1	
1030	300 ml	7.60	0.447	1.16	9.99	-191	>1000	126.2	
1040	1.5L	8.02	0.427	1.54	8.40	-206	>1000	126.5	
1050	1 GAL	9.07	0.434	9.68	8.64	-116	>1000	126.1	AIR BUBBLES IN LINE
1100	5L	9.00	0.427	10.64	8.61	-99	>1000	126.5	↓
1110	5.5L	8.96	0.425	11.96	8.72	-80	>1000	126.1	
1120	6.0L	7.98	0.430	1.51	8.71	-224	>1000	125.7	
1130	6.1L	8.12	0.437	3.98	8.69	716	>1000	125.5	
1140	6.5L	7.58	0.430	1.51	8.71	-224	>1000	125.0	PUMP NOT PRODUCEING RECHARGING PUMP
1350	6.75L	9.35	0.397	8.14	8.45	-89	984	123.6	REPAIRED FILTER, 10 OHMS VOLUMIZ BOOSTER

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes: 85 PSI 70-40 sec / 1 min discharge between w/ volume booster

Pump Start Time: 02/24/17 1010 VOC Reading: 0.0 ppm wellhead See pg 2.

Pump Depth:
 Sample /Time: 1000 2/25/17 WI-CU-GW04M-0217

MS/MSD: NA Duplicate ID No.: NA

Signature(s): [Signature]

pg 2/2



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUPEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/24/17
 Weather: 40% RAINY

Project Number: 679580_09.FI.WS
 Well ID: WI-CU-MW04M
 Sample ID: WI-CU-GW04M-0217
 Sampling Team: EROS A. Bilge P.G.

Total Depth: 158.70 FT.(BTOC)
 Depth to water: (-) 123.43 FT.(BTOC)
 Water Column: 35.27 FT.
(x) 0.163 GAL/FT.
 Well Volume: 5.74 GAL.
 Total Purge Vol.: 18 GAL.

Measuring Device: Horiba U-22
 Date and Time: 2/24/17

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

Purge Device: BEST PRACTICE 200 w/ 6' 1/2" volume booster

SAMPLE DATA								
Date: <u>2/24/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
Time: <u>1400</u>							<u>1600</u>	
Method: <u>LOW FLOW / VOLUME</u>								

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
1400	2	11.08	0.395	1.14	8.44	-263	930	125.1	
1410	3	11.28	0.392	0.88	8.46	-275	836	127.2	
1420	4	11.27	0.393	0.69	8.47	-283	810	129.1	
1430	5	11.67	0.387	0.74	8.43	-278	712	129.5	
1440	6	11.79	0.382	1.88	8.38	-230	373	129.6	CLEAR, ODDORLESS
1450	7.5	11.06	0.372	2.69	8.25	-169	116	129.9	
1500	8.5	11.12	0.368	5.65	8.24	-171	94.2	128.2	
1510	10	11.12	0.371	5.12	8.25	-162	93.1	125.2	
1520	11								FILTER CLOGGED, NO RECHARGE
0900	15	10.14	0.382	8.35	8.35	-167	76.2	128.5	
0930	18	10.96	0.387	8.31	8.31	-157	26.7	128.9	FILTER CLOGGED, NO RECHARGE

2/25/17
2/25/17
1030

Sample information: method, container number, size, and type, preservative used. 125.6

Analysis	Preservative	Container requirements	No. of containers
<u>DFC USEPA 537/mo</u>	<u>ICE</u>	<u>150 ml HDPE</u>	<u>2</u>

Observations/Notes: 85 PSI, 30-40 sec discharge / 1min recharge w/ volume booster. 24 volume

Pump Start Time: 2/24/17 10:00 VOC Reading: BOOSTER MAY GET LOGGED. RECOMMEND 1 1/2" VOL BOOSTER.

Pump Depth: 153' bloc' bottom of pump ISSUES w/ STONE FILTER CLOGGING PREVENTING RECHARGE.

Sample /Time: 1000 WI-CU-GW04M-0217 UNABLE TO STABILIZE PRESSURE SURFACE

MS/MSD NA Duplicate ID No.: NA

Signature(s): [Signature] P.G.



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GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COURTESVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/22/17
 Weather: 40's, OVERCAST

Project Number: 679 580-09, FI. WS
 Well ID: WI-CU-MW05M
 Sample ID: WI-CU-GW05M
 Sampling Team: Eros Bilgen P.G

Total Depth: 175.0 FT.(BTOC)
 Depth to water: (-)123.65 FT.(BTOC)
 Water Column: 51.35 FT.
(x)0.163 GAL/FT.
 Well Volume: 8.4 GAL.
 Total Purge Vol.: 15 GAL.

Measuring Device: HERON Pro. motion meter
YSI 600, HACH TURBIDIMETER 2000
 Date and Time: 2/23/17 1215

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

Purge Device: BEST PAXA 200

SAMPLE DATA									
Date:	Time:	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
<u>2/22/17</u>	<u>1215</u>							<u>123.6</u>	
Method: <u>LOW FLOW</u>									

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
<u>1215</u>	<u>0</u>	<u>10.19</u>	<u>0.366</u>	<u>10.94</u>	<u>8.57</u>	<u>185.4</u>	<u>71000</u>	<u>123.6</u>	<u>OBTAINING PUMP SETTINGS</u>
<u>1220</u>	<u>0.1</u>	<u>10.70</u>	<u>0.359</u>	<u>9.98</u>	<u>8.54</u>	<u>184.6</u>	<u>71000</u>	<u>123.6</u>	<u>EXERCISE LOW FLOW</u>
<u>1225</u>	<u>0.5</u>	<u>10.60</u>	<u>0.364</u>	<u>9.47</u>	<u>8.54</u>	<u>185.3</u>	<u>71000</u>	<u>123.6</u>	
<u>1230</u>	<u>0.9</u>	<u>10.79</u>	<u>0.364</u>	<u>9.56</u>	<u>8.54</u>	<u>186.2</u>	<u>286</u>	<u>123.6</u>	
<u>1235</u>	<u>1.2</u>	<u>11.09</u>	<u>0.368</u>	<u>9.50</u>	<u>8.54</u>	<u>186.3</u>	<u>316</u>	<u>123.6</u>	
<u>1240</u>	<u>1.6</u>	<u>10.50</u>	<u>0.360</u>	<u>8.93</u>	<u>8.55</u>	<u>188.5</u>	<u>289</u>	<u>123.6</u>	
<u>1245</u>	<u>2.0</u>	<u>10.55</u>	<u>0.357</u>	<u>9.06</u>	<u>8.55</u>	<u>188.4</u>	<u>286</u>	<u>123.6</u>	
<u>1250</u>	<u>2.4</u>	<u>10.56</u>	<u>0.360</u>	<u>8.74</u>	<u>8.56</u>	<u>188.3</u>	<u>432</u>	<u>123.6</u>	
<u>1255</u>	<u>2.8</u>	<u>10.65</u>	<u>0.343</u>	<u>8.64</u>	<u>8.55</u>	<u>189.7</u>	<u>425</u>	<u>123.6</u>	
<u>1300</u>	<u>3.2</u>	<u>10.55</u>	<u>0.362</u>	<u>8.37</u>	<u>8.55</u>	<u>189.6</u>	<u>416</u>	<u>123.6</u>	
<u>1305</u>	<u>3.6</u>	<u>11.21</u>	<u>0.362</u>	<u>9.20</u>	<u>8.56</u>	<u>190.1</u>	<u>412</u>	<u>123.6</u>	

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PFC USEPA 537/mod</u>	<u>Ice</u>	<u>150 ml HDPE</u>	<u>2</u>

Observations/Notes: 20 sec / 20 sec discharge recharge @ 95 psi @ ± 300 ml/min
 Pump Start Time: 1215 VOC Reading: 0.0 ppm
 Pump Depth: 165' BOTTOM OF PUMP
 Sample /Time: 1545 COLLECT WI-CU-GW05M-0217
FOR PFC USEPA 537 MOD
 MS/MSD: NA Duplicate ID No.: NA
 Signature(s): [Signature]

Eros Bilgen P.G

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: G79580.09.FI.WS
 Location: OLF COUPEVILLE Well ID: WI-CU-MW05M
 Event: FEB 2017 GWS SAMPLING Sample ID: WI-CU-GW05M
 Date: 2/23/17 Sampling Team: Erin A. Bilge P.G.
 Weather: 30°, SNOW, RAINY

Total Depth: 175.0 FT.(BTOC) Measuring Device: HERZON Piezometre meter YSI 600, NACHTURSDIMETER
 Depth to water: (-) 123.65 FT.(BTOC) Date and Time: 2/23/17 1215
 Water Column: 51.35 FT.
 (x) 0.163 GAL/FT.

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

Well Volume: 8.4 GAL.
 Total Purge Vol.: 15 GAL.
 Purge Device: BFSST PANACEA 200

SAMPLE DATA								
Date:	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
Time:							<u>1 blue</u>	
Method:								

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
1310	4.0	11.47	0.364	9.18	8.56	189.3	425	<u>123.6</u>	<u>GRIZY, CLOUDY, NO ODOM</u>
1315	4.4	11.32	0.364	9.72	8.55	189.7	430		
1320	4.8	11.23	0.348	9.00	8.56	190.1	379		
1325	5.2	10.93	0.362	9.92	8.55	190.5	401		
1336	5.6	11.05	0.362	10.18	8.53	192.9	257		
1335	6.0	10.92	0.362	9.75	8.55	191.4	245		
1340	6.4	11.00	0.357	9.62	8.55	191.9	236		
1345	6.8	10.99	0.358	9.35	8.55	191.4	240		
1350	7.2	10.99	0.358	9.36	8.54	191.2	225		
1355	7.6	10.99	0.358	9.25	8.54	191.3	216		
1400	8.0	10.98	0.359	9.12	8.53	192.3	205		

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>SEE PAGE 2</u>			

Observations/Notes:

Pump Start Time: _____ VOC Reading: _____

Pump Depth: SEE PAGE 1

Sample /Time: _____

MS/MSD NR Duplicate ID No.: NR

Signature(s): 

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COURSEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/23/17
 Weather: 30's, SUNNY

Project Number: CFR500 09.FI.US
 Well ID: WI-CU-MW05M
 Sample ID: WI-CU-CW05M-0217
 Sampling Team: Tom A. Bilyea P.G.

Total Depth: 175.0 FT.(BTOC)
 Depth to water: (-)123.65 FT.(BTOC)
 Water Column: 51.35 FT.
(x) 0.163 GAL/FT.
 Well Volume: 9.4 GAL.
 Total Purge Vol.: 15 GAL.

Measuring Device: YSI 600 HEIZON Piezometric meter, HACH TURBIDIMETER
 Date and Time: 2/23/17 12:15

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

Purge Device: BESSI PANACEA 200

SAMPLE DATA									
Date: <u>2/23/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments	
Time: <u>12:15</u>									
Method: <u>LOW FLOW</u>									

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u> <u>1 btoe</u>	Color / Odor / Comments
1405	8.4	11.16	0.369	9.72	8.50	200.1	192	123.6	GREY, CLOUDY, NO ODOR
1410	8.8	11.05	0.370	9.02	8.49	212.1	206		
1415	9.2	11.14	0.371	8.02	8.49	216.5	174		
1420	9.6	11.36	0.369	9.57	8.45	210.2	195		
1425	9.8	11.62	0.368	10.26	8.42	200.5	182		
1430	10	11.72	0.362	10.33	8.46	197.8	190		
1435	10.4	11.79	0.360	10.58	8.46	195.9	167		
1440	10.8	11.36	0.411	10.40	8.47	183.8	162		
1445	11.2	11.24	0.396	9.75	8.47	182.8	145		
1450	11.6	11.29	0.400	9.25	8.46	181.2	137		
1455	11.8	11.15	0.370	9.54	8.45	181.4	122		

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>SPRAC 2</u>			

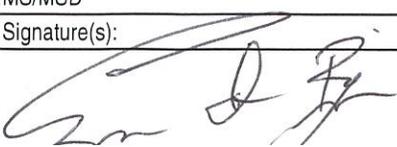
Observations/Notes:

Pump Start Time: _____ VOC Reading: _____

Pump Depth: SEE PAGE 2

Sample /Time: _____

MS/MSD _____ Duplicate ID No.: _____

Signature(s): 

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLE COLLEGE
 Event: FEB 2017 GW SAMPLING
 Date: 2/23/17
 Weather: 30S, RAINY, SNOWY

Project Number: 679580.09.FI.WS
 Well ID: WI-CU-MW05M
 Sample ID: WI-CU-GW05M-0217
 Sampling Team: Eros A. Blyu, P.G.

Total Depth: 175.0 FT.(BTOC)
 Depth to water: (-) 123.65 FT.(BTOC)
 Water Column: 51.35 FT.
(x) 0.163 GAL/FT.
 Well Volume: 8.4 GAL.
 Total Purge Vol.: 15 GAL.

Measuring Device: ISI GW HEAD TRANSDUCER 2002
 Date and Time: 2/23/17 1215

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

Purge Device: BEST PANACEA 200

SAMPLE DATA									
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	Other:	Color / Odor / Comments	
<u>2/23/17</u>	°C	mS/cm	mg/L	SU	mV	NTU	<u>DTW</u>		
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

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
1500	12	11.07	0.360	8.97	8.44	181.6	127	123.6	GREY, CLOUDY, 0.004m
1505	12.3	11.22	0.358	8.84	8.43	181.7	132		
1510	12.7	11.34	0.357	8.84	8.42	181.5	125		
1515	13.1	11.46	0.356	8.74	8.42	180.8	116		
1520	13.5	11.54	0.355	8.73	8.41	180.3	101		
1525	14.2	11.48	0.355	8.75	8.41	179.6	600		
1530	15	11.40	0.355	8.75	8.41	179.8	96		PUMP OFF

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PPL USEPA 537/mud</u>	<u>Ice</u>	<u>150 ml HDPE</u>	<u>2</u>
<u>SRB PROB A</u>			

Observations/Notes: 20 Sec / 20 Sec discharge/recharge @ 95 Psi @ approx 300 ml/min
 Pump Start Time: 2/23/17 1215 VOC Reading: 0.0 ppm wellhead
 Pump Depth: 165' + blow bottom of pump 1545 COLLECT WI-CU-MW05M-0217
 Sample /Time: 2/23/17 1545 For PPL 537/mud USEPA
 MS/MSD: NA Duplicate ID No.: NA
 Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF ConPerVile
Event: Feb 17 GW Sampling
Date: 2/24/17
Weather: clear, 37°F, No wind

Project Number: 679580, 09.FI, WS
Well ID: WI-CV-MW055
Sample ID: WI-CV-GW055-0217
Sampling Team: Collin Hall, Eric Bilgen

Total Depth: 124.00 FT.(BTOC)
Depth to water: (-)120.58 FT.(BTOC)
Water Column: 3.42 FT.
(x)0.163 GAL/FT.
Well Volume: 0.56 GAL.
Total Purge Vol.: 1000 mL GAL

Measuring Device: YSI 600, HACH TURBIDIMETER 2100
Date and Time: 2/24/17 1730

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 0.163, and 4.

Purge Device: BEST PANACEA 200

SAMPLE DATA

Table with 10 columns: Date, Time, Method, Temp. °C, Cond. mS/cm, DO mg/L, pH SU, ORP mV, Turbidity NTU, Other: DTW, Color / Odor / Comments.

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol. (gals), Temp. °C, Cond. mS/cm, DO mg/L, pH SU, ORP mV, Turbidity NTU, Other: DTW, Color / Odor / Comments. Includes handwritten entries for 1110, 1730, and 1730.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers. Includes handwritten entry for PCL USEPA 537/Mod, ICE, 150 ml HDPE, 2.

Observations/Notes: 80 psi 30 sec/20 sec Recharge/Discharge.

Pump Start Time: 1110 VOC Reading: 0.0 ppm @ well head

Pump Depth: 121.50-122.00 (had to lower in order to get sample) (TOP OF PUMP)

Sample /Time: WI-CV-GW055-0217 1730

MS/MSD Duplicate ID No.: NA

Signature(s): J. G. [Signature]

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLE COUPEVILLE
 Event: FEB 17 GW SAMPLING
 Date: 2/19/17
 Weather: 40°i, RAINY, WINDY 28 mph

Project Number: 679580, 09, FZ, WE-600 WS
 Well ID: WI-CU-MW101D
 Sample ID: WI-CU-MW101D - 0217
 Sampling Team: EROS A. BELYEU P.G.

Total Depth: 206.30 FT.(BTOC)
 Depth to water: (-) 142.12 FT.(BTOC)
 Water Column: 64.18 FT.
(x) 0.163 GAL/FT.
 Well Volume: 10.46 GAL.
 Total Purge Vol.: 32 GAL.

Measuring Device: HORIBA U-22
SI 600, HERON Piezometer meter
 Date and Time: 2/19/17

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

Purge Device: BEST DANACEA 200

SAMPLE DATA

Date: <u>2/19/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u> <u>btc</u>	Color / Odor / Comments
Time:								
Method: <u>LOW FLOW / VOLUME</u>								

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
1230	0	12.56	0.692	10.15	7.12	12	71000	140.3	CLEAR, COLORLESS, ODOURLESS
1240	1	12.45	0.712	10.23	7.08	-3	102	140.3	↓
1250	1.5	12.36	0.683	9.89	6.95	-15	67.3	140.3	↓
1300	2.0	12.12	0.641	9.70	6.89	-20	53.1	140.3	↓
1310	2.5	12.10	0.635	9.69	6.71	-37	45.3	140.3	PUMP ISSUES
1330	3	12.05	0.625	10.29	6.75	-40	99.1	140.3	CLEAR, COLORLESS, ODOURLESS
1340	4.5	12.05	0.618	10.15	6.83	-16	43.1	140.3	↓
1350	5.5	12.15	0.623	9.99	6.90	-28	26.2	140.3	↓
1400	7.0	12.25	0.615	9.83	6.85	-41	16.2	140.3	↓
1410	8.0	12.10	0.623	9.92	6.90	-57	5.3	140.3	↓
1420	9.0	12.10	0.617	10.35	6.95	-63	3.6	140.3	MINIMUM PUMP 25(S)

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
PfC's USEPA 537 MODIFIED SOP49	ICE	(2) ³⁵ 250 mL HDPE @ 2/20/17	2

Observations/Notes: 20 seconds discharge / 20 seconds recharge @ 110' PSI

Pump Start Time: 2/19/17 1230 VOC Reading: 0.0 ppm @ wellhead

Pump Depth: BOTTOM/SUCTION @ 146' btoC SAMPLE WI-CU-GW101D-0217 COLLECTED

Sample /Time: (2) 250 mL HDPE BOTTLES unpreserved for Pfc's @ 6°C

MS/MSD NA Duplicate ID No.: NA

Signature(s): 

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUPEVILLE
 Event: 10 2017 GW SAMPLING
 Date: 2/19/17
 Weather: 40's, RAINY, WINDY, 28 mph

Project Number: 679580, 09 FL WT GW
 Well ID: WI-CJ-MW10D
 Sample ID: WI-CJ-GW10D-0217
 Sampling Team: EROS A. BILYU P.G.

Total Depth: 206.30 FT.(BTOC)
 Depth to water: (-) 142.12 FT.(BTOC)
 Water Column: 64.18 FT.
(x) 0.163 GAL/FT.
 Well Volume: 10.46 GAL.
 Total Purge Vol.: 32 GAL.

Measuring Device: HORIZA U-22 YSI 600, HEIDON Piezometer meter
 Date and Time: 2/19/17

Purge Device: BEST PANACEA 200

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

SAMPLE DATA

Date: <u>2/19/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW</u>	Color / Odor / Comments
Time: <u>1430</u>								
Method: <u>LOW FLOW VOLUME</u>								

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
1430	10	12.10	0.618	10.92	6.74	-67	71000	140.3	<u>CLEAR, COLORLESS, ODORLESS</u>
1440	11	11.40	0.539	8.93	6.85	-76	55.7	140.3	
1450	12	11.19	0.541	9.39	7.11	-118	18.2	140.3	<u>PUMP ISSUES</u>
1525	12.5	11.36	0.543	9.85	7.06	-88	17.6	140.3	
1535	13.5	11.32	0.543	8.95	7.00	-83	18.1	140.3	
1545	14.5	11.83	0.536	8.71	6.95	-85	14.5	140.3	
1600	15.5	11.70	0.538	8.90	6.94	-85	27.9	140.3	
1610	16.5	11.58	0.539	10.12	6.94	-84	26.0	140.3	
1620	18.0	11.43	0.540	10.84	6.95	-84	12.9	140.3	
1630	19.5	11.32	0.534	9.34	6.94	-83	8.1	140.3	<u>MINOR PUMP ISSUES</u>
1650	<u>21.0</u>	11.23	0.534	8.68	6.95	-84	47.2	140.3	

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>PFCS USEPA 537 modified</u>	<u>ICE</u>	<u>125-250 ml HDPE</u>	<u>2</u>
		<u>@ 2/2/17</u>	

Observations/Notes: 20 s/20 sec discharge/recharge @ 110 psi Compressor P(psi) = $[0.432 \frac{\text{psi}}{\text{ft}}] \times \text{pump suction depth (ft)} + 25 \text{ psi}$

Pump Start Time: 2/19/17 1230 VOC Reading: 0.0 ppm wellhead

Pump Depth: BOTTOM/SECTION @ 196' btoC PUMP CONTROL ON TIME: 20 sec OFF TIME: 20 sec @ 110 PSI

Sample /Time: 2/20/17 1145

MS/MSD NA Duplicate ID No.: NA

Signature(s): [Signature] P.G.



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUPEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/19/17
 Weather: 40's, RAINY

Project Number: 679580, 09, FI, GW WJ
 Well ID: WI-CU-MW10D
 Sample ID: WI-CU-GW10D-0217
 Sampling Team: EROS A. BILYRU P.L.

Total Depth: 206.3 FT.(BTOC)
 Depth to water: (-)142.12 FT.(BTOC)
 Water Column: 64.18 FT.
(X)0.163 GAL/FT.
 Well Volume: 10.46 GAL.
 Total Purge Vol.: 32 GAL.

Measuring Device: HORIZA-U-22 VSI 600, HERON Piezometric meter
 Date and Time: 2/19/17 - 2/20/17

Purge Device: BEST PANACEA 200

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

SAMPLE DATA									
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	Other:	Color / Odor / Comments	
<u>2/19/17</u>	°C	mS/cm	mg/L	SU	mV	NTU	<u>DTW</u>		
Time: <u>1705</u>									
Method: <u>Low Flow / Volume</u>									

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
<u>1705</u>	<u>21</u>	<u>11.25</u>	<u>0.534</u>	<u>8.68</u>	<u>6.95</u>	<u>-85</u>	<u>24.2</u>	<u>140.3</u>	<u>PUMP ISSUES</u>
<u>2/20/17 0930</u>	<u>22</u>	<u>10.37</u>	<u>0.506</u>	<u>8.81</u>	<u>6.92</u>	<u>13.1</u>	<u>1.57</u>	<u>140.3</u>	<u>SWITCHED TO 4SI @ 20 WPM</u>
<u>0940</u>	<u>23</u>	<u>10.54</u>	<u>0.506</u>	<u>9.98</u>	<u>7.04</u>	<u>-11.3</u>	<u>1.21</u>	<u>140.3</u>	<u>CLEAR, COLORLESS & ODORLESS</u>
<u>0950</u>	<u>24</u>	<u>10.53</u>	<u>0.506</u>	<u>9.13</u>	<u>7.09</u>	<u>-20.4</u>	<u>1.17</u>	<u>140.3</u>	
<u>1000</u>	<u>25</u>	<u>10.37</u>	<u>0.506</u>	<u>9.12</u>	<u>7.11</u>	<u>-25.0</u>	<u>1.49</u>	<u>140.3</u>	
<u>1000</u>	<u>26</u>	<u>10.57</u>	<u>0.506</u>	<u>8.92</u>	<u>7.12</u>	<u>-29.1</u>	<u>1.32</u>	<u>140.3</u>	
<u>1020</u>	<u>27</u>	<u>10.58</u>	<u>0.507</u>	<u>9.29</u>	<u>7.13</u>	<u>-30.5</u>	<u>1.50</u>	<u>140.3</u>	
<u>1030</u>	<u>28</u>	<u>10.57</u>	<u>0.508</u>	<u>9.57</u>	<u>7.14</u>	<u>-31.1</u>	<u>1.64</u>	<u>140.3</u>	
<u>1040</u>	<u>29</u>	<u>10.57</u>	<u>0.506</u>	<u>9.84</u>	<u>7.24</u>	<u>-17.3</u>	<u>1.54</u>	<u>140.3</u>	
<u>1050</u>	<u>30</u>	<u>10.56</u>	<u>0.527</u>	<u>8.52</u>	<u>7.15</u>	<u>-36.9</u>	<u>3.08</u>	<u>140.3</u>	
<u>1110</u>	<u>32</u>	<u>10.57</u>	<u>0.507</u>	<u>8.48</u>	<u>7.14</u>	<u>-40.1</u>	<u>1.63</u>	<u>140.3</u>	<u>PUMP OFF</u>

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PFC'S USEPA 537 modified / 5049</u>	<u>TCE</u>	<u>125 250 ml HDPE</u> <u>2/20/17</u>	<u>2</u>

Observations/Notes: 20s/20s discharge/recharge @ 110 psi;
 Pump Start Time: 2/19/17 1230 VOC Reading: 0.0 ppm wellhead
 Pump Depth: 196' dice bottom
 Sample /Time: 2/20/17 1145
 MS/MSD: NA Duplicate ID No.: NA
 Signature(s): [Signature]

[Signature]

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OCF COUPEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/21/17
 Weather: 40's, RAINY

Project Number: 679580, OCF, FI-600 WS
 Well ID: WI-CU-~~M0105~~ MW10M
 Sample ID: WI-CU-~~G0105~~-0217 MW10M
 Sampling Team: EROS R. BILYEU P.G.

Total Depth: 159.20 FT.(BTOC)
 Depth to water: (-)136.05 FT.(BTOC)
 Water Column: 23.15 FT.
(x) 0.165 GAL/FT.
 Well Volume: 3.77 GAL.
 Total Purge Vol.: 11.5 GAL.

Measuring Device: YSI 600, HACH TUBERIMETER-2100
 Date and Time: 2/21/17 1200

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

Purge Device: BEST PANACEA 200

SAMPLE DATA									
Date: <u>2/21/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW bto</u>	Color / Odor / Comments	
Time: <u>1200</u>									
Method: <u>LOW FLOW / VOLUME</u>									

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: <u>DTW bto</u>	Color / Odor / Comments
1200	0	11.62	0.549	9.27	7.51	13.0	24.0	136.2	
1205	0.5	11.58	0.578	8.17	7.48	19.8	46.4	136.2	
1210	0.6	11.58	0.585	7.90	7.48	23.5	32.6	136.2	
1215	0.6	10.89	0.580	7.32	7.48	28.1	27.6	136.2	PUMP ISSUES
1420	2.0	11.89	0.576	5.77	7.48	216.1	36.1	136.1	PUMP ISSUES
1450	4.0	11.16	0.575	9.61	7.45	220.1	32.3	136.2	
1500	4.5	10.66	0.574	6.91	7.48	227.4	36.0	136.2	
1510	5.1	10.61	0.515	6.68	7.47	227.0	28.0	136.2	
1520	5.6	10.62	0.574	6.72	7.47	227.0	29.1	136.2	
1530	6.2	10.56	0.515	6.75	7.47	228.2	26.1	136.2	PUMP ISSUES
1550	6.7	10.63	0.575	6.81	7.47	229.7	3.16	136.2	

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers

Observations/Notes: 10 SEC/10 SEC DISCHARGE/RECHARGE @ 85-90 PSI. NO FLOW THRU.
300-400 ml / 200-300 ml/min
 Pump Start Time: 2/21/17 1200
 Pump Depth: BOTTOM @ 150' bto
 VOC Reading: 0.0 ppm
 FLOW THRU CREATES ADDITIONAL UNACCOUNTED HEAD PRESSURE, ADDITIONAL AIR SUPPLY CREATES WITH AIR IN WATER LINE.

Sample /Time: _____
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): [Signature]

GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF COUPEVILLE
 Event: FEB 2017 GW SAMPLING
 Date: 2/21/17
 Weather: 40's, RAINY

Project Number: 679580, 09, FLO-GWWS
 Well ID: WI-CU-~~60105~~ MW10M
 Sample ID: WI-CU-~~60105~~-0217 MW10M
 Sampling Team: Eric A. Beyer P.G.

Total Depth: 159.20 FT.(BTOC)
 Depth to water: (-)136.05 FT.(BTOC)
 Water Column: 23.15 FT.
(x)0.163 GAL/FT.
 Well Volume: 3.77 GAL.
 Total Purge Vol.: 11.5 GAL.

Measuring Device: YSI 600, HACH TURBIDIMETER HEAD ON POTENTIAL MENTRE METERS
 Date and Time: 2/21/17 1200

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

Purge Device: BEST PANACEA 200

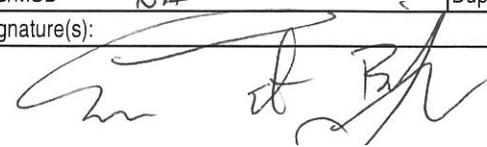
SAMPLE DATA									
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	Other:	Color / Odor / Comments	
<u>2/21/17</u>	°C	mS/cm	mg/L	SU	mV	NTU	<u>DTW</u>		
Time:							<u>dtw</u>		
Method:	<u>LOW FLOW, VOLUME</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other:	Color / Odor / Comments
1600	7.3	10.63	0.515	6.81	7.47	228.7	3.16	136.2	CLEAR, OPALINESCES
1610	7.8	10.70	0.516	6.99	7.47	228.8	4.17	136.2	
1620	8.3	10.62	0.516	7.72	7.46	221.3	3.96	136.2	
1630	8.8	10.68	0.517	7.18	7.46	221.8	2.39	136.2	
1640	9.3	10.50	0.517	7.51	7.47	219.3	2.12	136.2	
1650	9.8	10.18	0.518	9.90	7.47	224.0	2.32	136.2	
1700	10.3	10.17	0.518	7.64	7.49	216.0	1.86	136.2	
1720	11.5	10.15	0.518	7.51	7.49	215.9	1.52	136.2	Dump off

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PFL USEPA 537/MODIFIED</u>	<u>ICE</u>	<u>150 ml HDPE</u>	<u>2</u>

Observations/Notes: 10 sec / 10 sec discharge/recharge @ 85/90 PSI. NO-FLO THRU CELL
 Pump Start Time: 2/21/17 1200 VOC Reading: 0.0 ppm wellhead
 Pump Depth: 150' BOTTOM OF PUMP OVERFLOW CONTINUOUS REARINES TO PREVENT ADDITIONAL HEAD PRESSURE FROM RESTRICTING WATER LINE.
 Sample /Time: 2/22/17 1000 WI-CU-GW105-0217

MS/MSD: NA Duplicate ID No.: NA

Signature(s): 



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF-COUPVILLE, WA
 Event: GW SAMPLING EVENT 1
 Date: 02/22/17
 Weather: Mostly sunny, 40's°F, NW winds @ 4-6 mph

Project Number: 679580-09.F1.W1 PAGE 1 of 2
 Well ID: W1-CV-MW13M
 Sample ID: W1-CV-GW13M-0217
 Sampling Team: M. ENDO

Total Depth: 187.5 FT.(BTOC)
 Depth to water: (+) 128.62 FT.(BTOC)
 Water Column: 59.48 FT.
(x) 0.163 GAL/FT.
 Well Volume: 9.69 GAL.
 Total Purge Vol.: 5.5 GAL.

Measuring Device: SOLONIST #25273, MULTIRAE (C102922)
 Date and Time: 62/22/17

HONDA G-22 (C102357)

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

Purge Device: PANACEA 200 (#02675) CONTROLLER
HUSKY AIR COMPRESSOR # 085633X
HONDA GENERATOR # 1050322

SAMPLE DATA								
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	MULTIRAE Other: (C) or (ppm)	Color / Odor / Comments
<u>02/22/17</u>	°C	mS/cm	mg/L	SU	mV	NTU		
Time: <u>16:21</u>								
Method: <u>Low Flow</u>	<u>12.67</u>	<u>0.462</u>	<u>6.33</u>	<u>7.81</u>	<u>-71</u>	<u>1.7</u>	<u>0.0</u>	<u>MOSTLY CLEAR, NO ODOR</u>

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (C) or (ppm)	Color / Odor / Comments
1511	0.75	12.63	0.401	3.60	7.68	-50	147	0.0	SLIGHTLY Hazy CLOUDY, NO ODOR DTW=128 FT BTOC
1514	0.96	12.42	0.477	2.97	7.76	-64	124	0.0	"
1517	1.1	12.51	0.476	2.79	7.77	-72	115	0.0	"
1520	1.31	12.35	0.476	2.58	7.83	-84	108	0.0	"
1525	1.54	12.34	0.474	2.35	7.81	-92	83.7	0.0	" DTW=127.75 FT BTOC
1530	1.79	12.27	0.474	2.77	7.86	-106	73.8	0.0	MOSTLY CLEAR, NO ODOR
1535	2.15	12.31	0.472	3.74	7.84	-91	74.7	0.0	"
1540	2.59	12.20	0.470	4.51	7.85	-83	72.8	0.0	"
1545	2.87	12.10	0.468	4.06	7.84	-77	67.0	0.0	"
1550	3.00	12.10	0.467	5.28	7.84	-78	48.6	0.0	"
1556	3.65	12.13	0.466	5.92	7.80	-73	55.1	0.0	"

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>537 MGD</u>	<u>26°C</u>	<u>125 mL POLY HOPE</u>	<u>2</u>

Observations/Notes: PUMP CONTROL PRESSURE SETTINGS
 $P = 0.4657 * 177.5 + 25$
 Pump Start Time: 14:42 VOC Reading: 0.0 ppm = 107.66 psi
 Pump Depth: 177.5 FT BTOC FINAL "ON" (DISCHARGE) TIME = 10 SEC. "OFF" (RECHARGE) TIME = 26 SEC.
DISCHARGE RATE = 270 mL/min
 Sample / Time: 1625 COMPLETE SAMPLING @ 16:30. DTW = 127.65 FT BTOC.
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): M. Endo



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: _____
 Event: _____
 Date: _____
 Weather: _____

Project Number: _____
 Well ID: W1-CV-MW13M
 Sample ID: _____
 Sampling Team: _____

Total Depth: _____ FT.(BTOC)
 Depth to water: (-) FT.(BTOC)
 Water Column: _____ FT.
(x) GAL/FT.
 Well Volume: _____ GAL.
 Total Purge Vol.: _____ GAL.

Measuring Device: _____
 Date and Time: _____

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

Purge Device: _____

SAMPLE DATA									
Date:	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments	
Time:	Method:	FIELD PARAMETERS							
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: (L) or (ppm)	Color / Odor / Comments
1604	3.92	12.09	0.465	6.07	7.81	-72	59.4	0.0	MOSTLY CLEAR, NO CO ₂
1606	4.23	12.09	0.464	6.38	7.82	-71	102.0	0.0	"
1611	4.62	12.08	0.464	6.40	7.83	-72	114	0.0	"
1616	5.19	12.06	0.463	6.35	7.80	-71	98.6	0.0	"
1621	5.5	12.07	0.462	6.33	7.81	-71	1.7	0.0	"
PARAMETERS STABLE, PROCEED TO SAMPLE									

DTW = 12' ±
FASTO

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers

Observations/Notes:
 Pump Start Time: _____ VOC Reading: _____
 Pump Depth: _____
 Sample /Time: _____
 MS/MSD _____ Duplicate ID No.: _____
 Signature(s): M and [unclear]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 679580.09.F1.W1
 Location: OLF - COUPEVILLE, WA Well ID: W1-CV-MW06S
 Event: GW SAMPLING EVENT 1 Sample ID: W1-CV-GW06S-0217
 Date: 02/22/17 Sampling Team: M. ENDO
 Weather: MOSTLY SUNNY, 40°F, SE WIND @ 4-8 mph

Total Depth: 140.0 FT.(BTOC) SCREENS: 130-140 FT bgs Measuring Device: SOLONIST #25273, MULTIRAE (C102921)
 Depth to water: (-) 134.95 FT.(BTOC) NO SUMP. Date and Time: 02/22/17 @ 940
 Water Column: 5.05 FT.
 (X) 0.163 GAL/FT. HORIZA U-22 (C102387)

Well Volume: 0.82 GAL. 3 WELL VOL = 2.47 GAL
 Total Purge Vol.: 2.0 GAL.

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

Purge Device: PANACEA 200 #82675 + CONTROLLER
HUSKY AIR COMPRESSOR #UB5633X
HONDA GENERATOR #1050322

SAMPLE DATA								
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	MULTIRAE Other: (ppm)	Color / Odor / Comments
<u>02/22/17</u>	°C	mS/cm	mg/L	SU	mV	NTU		
Time: <u>1155</u>								
Method: <u>LOW FLOW</u>	<u>12.56</u>	<u>0.596</u>	<u>2.95</u>	<u>7.28</u>	<u>261</u>	<u>0.0</u>	<u>0.0</u>	<u>CLEAR, NO ODOR.</u>

FIELD PARAMETERS										
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIRAE Other: (ppm)	Color / Odor / Comments	
<u>1055</u>	<u>NA</u>	<u>9.87</u>	<u>0.617</u>	<u>7.42</u>	<u>6.07</u>	<u>241</u>	<u>0.0</u>	<u>0.0</u>	<u>CLEAR, NO ODOR DTW=134.95</u>	
<u>1115</u>	<u>1.0</u>	<u>11.30</u>	<u>0.611</u>	<u>3.47</u>	<u>6.72</u>	<u>227</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1120</u>	<u>1.09</u>	<u>11.87</u>	<u>0.605</u>	<u>2.99</u>	<u>6.91</u>	<u>220</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1125</u>	<u>1.22</u>	<u>12.03</u>	<u>0.605</u>	<u>2.88</u>	<u>7.04</u>	<u>215</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1130</u>	<u>1.30</u>	<u>11.82</u>	<u>0.602</u>	<u>2.81</u>	<u>7.11</u>	<u>212</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1135</u>	<u>1.42</u>	<u>12.06</u>	<u>0.599</u>	<u>2.85</u>	<u>7.16</u>	<u>209</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1140</u>	<u>1.48</u>	<u>12.22</u>	<u>0.600</u>	<u>2.88</u>	<u>7.21</u>	<u>206</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1145</u>	<u>1.63</u>	<u>12.47</u>	<u>0.597</u>	<u>2.88</u>	<u>7.24</u>	<u>204</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1150</u>	<u>1.83</u>	<u>12.46</u>	<u>0.596</u>	<u>2.88</u>	<u>7.27</u>	<u>202</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
<u>1155</u>	<u>2.0</u>	<u>12.50</u>	<u>0.596</u>	<u>2.95</u>	<u>7.28</u>	<u>201</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>	
PARAMETERS		STABLE, PROCEED TO SAMPLE								

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>537 MOD</u>	<u>< 6°C</u>	<u>125ML POLY HDPE</u>	<u>4</u>

Observations/Notes: PUMP CONTROL PRESSURE SETTING:
 $P = 0.4657 \times 138 + 25 = 89.27 \text{ psi}$
 Pump Start Time: 10:25 VOC Reading: 0.0 ppm
 Pump Depth: 138.0 Ftb TOC FINAL "ON" (DISCHARGE) TIME = 6 SEC. "OFF" (RECHARGE) TIME = 25 SEC
 DISCHARGE RATE = 97 ML/MIN
 END SAMPLE TIME = 12:15. FINAL DTW = 134.95 Ftb TOC

MS/MSD Duplicate ID No.: W1-CV-GW06S/SP-0217 [SAMPLE TIME = 1105]
 Signature(s):



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 679.588 679.588.09.F1.WI
 Location: OLF-COPEVILLE, WA Well ID: HW-01 W1-CV-MW06M
 Event: GW SAMPLING EVENT 1 Sample ID: W1-CV-GW06M-0217, W1-CV-GW06M-0217-MS, W1-CV-GW06M-02
 Date: 02/21/2017 Sampling Team: MARK ENOC SI
 Weather: Mostly sunny, mid 40's, NW winds @ 2-6 mph

Total Depth: 189.0 FT FT.(BTOC) Measuring Device: SOLINST WLI (#25273)
 Depth to water: (-) 145.35 FT.(BTOC) [144.92 FT BTOC w/ no pump] Date and Time: 02/21/17 1106
 Water Column: 43.65 FT.

Well Volume: (x) 0.163 GAL/FT.
 Total Purge Vol.: 3.0 GAL.

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

MULTIFLARE (C102922)
 HORIZA U-22 (C102387)

Purge Device: PANACEA 200 + PUMP CONTROLLER (#82675)
HUSKY AIR COMPRESSOR.

SAMPLE DATA									
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	MULTIFLARE Other: (C/O) or (P/N)	Color / Odor / Comments	
Time:	°C	mS/cm	mg/L	SU	mV	NTU			
02/21/2017									
14:17	11.65	0.634	0.81	7.08	-95	0.0	0.0	CLEAR, NO ODOR	
FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLARE Other: (C/O) or (P/N)	Color / Odor / Comments
1328	NA	12.55	0.679	2.45	6.32	-46		0.0	MOSTLY CLEAR, NO ODOR
1405	2.5	12.17	0.632	0.98	7.02	-93	0.0	0.0	CLEAR, NO ODOR
1408	2.58	11.86	0.637	0.89	7.04	-93	0.0	0.0	"
1411	2.69	11.75	0.636	0.84	7.05	-94	0.0	0.0	"
1414	2.82	11.69	0.635	0.82	7.06	-94	0.0	0.0	"
1417	2.91	11.65	0.634	0.81	7.08	-95	0.0	0.0	"
PARAMETERS STABLE, PROCEEDED TO SAMPLE.									

DTW = 145.45

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
537 MOD	4°C	125ML POLY HOPE	6

Observations/Notes: DTW MEASUREMENTS TAKEN W/ PUMP IN WELL. FINAL SCREEN INTERVAL: 174-184 FT BGS. SUMP DEPTH: 189 FT BGS. PUMP START TIME: 12:28. VOC Reading: 0.0 ppm. PRESSURE SETTINGS = 0.4657 * 179 * 25 = 108.36 PSI. FINAL "OFF" (RECHARGE) TIME = 40 SEC. FINAL "ON" (DISCHARGE) TIME = 9 SEC. END SAMPLING @ 1428. FINAL DTW = 145.45 FT BGS.

MS/MSD YES. Duplicate ID No.: NA

Signature(s): Mark Enoc



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 679580.09.F1.W1 PAGE 1 of 1
 Location: OLF-COPEVILLE, WA Well ID: W1-CV-MW09M
 Event: GW SAMPLING EVENT 1 Sample ID: _____
 Date: 02/23/17 Sampling Team: M. ENDO
 Weather: MOSTLY SUNNY, LOW 40'S OF, ESE WIND @ 2-4mph

Total Depth: 197.0 FT.(BTOC)
 Depth to water: (-) 126.55 FT.(BTOC)
 Water Column: 70.45 FT.
(x) 0.163 GAL/FT.
 Well Volume: 11.48 GAL.
 Total Purge Vol.: 6.52 GAL.

Measuring Device: SOLONIST (#25273), MULTIFLARE (C1025122)
 Date and Time: 02/23/17 13:28

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

HORIBA U-22 (C102387)

Purge Device: PANACEA 200 (#82689) + CONTROLLER
HUSKEY AIR COMP. (V83633X)
HONDA GENERATOR (16510322)

SAMPLE DATA								
Date:	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLARE Other: (Y/N) or PPM	Color / Odor / Comments
Time:								
Method:	11.85	0.431	2.82	7.57	-152	17.4	0.0	CLEAR, NO ODOOR

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLARE Other: (Y/N) (ppm)	Color / Odor / Comments
		±0.1	+0.1 to -0.2	+0.05 to -0.2					
1514	BEGIN PURGE								
1539	1.65	11.72	0.97	0.40	6.01	-84	8.4	0.0	CLEAR, NO ODOOR, DTW = 126.9 FT
1547	1.92	11.53	0.96	2.62	6.54	-140	16.4	0.0	"
1552	2.31	11.63	0.95	2.12	6.71	-147	22.2	0.0	"
1557	2.67	12.02	0.94	2.15	6.86	-153	5.8	0.0	"
1602	3.04	12.07	0.94	2.08	6.98	-156	3.4	0.0	"
1607	3.46	12.04	0.93	2.51	7.07	-154	8.6	0.0	"
1612	4.12	12.04	0.93	2.72	7.16	-152	25.7	0.0	"
1617	4.58	11.93	0.93	2.72	7.23	-153	0.0	0.0	"
1622	5.42	11.84	0.432	5.90	7.55	-145	11.2	0.0	"
1638	5.75	12.02	0.432	3.67	7.56	-155	12.3	0.0	"

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
537 MOD	4°C	125 mL HDPE Poly	2

Observations/Notes: @ 16:21 DISCHARGE TIME > FILL TIME. CONTROL DIAL VISITED OFF OF SETTINGS, PUSHING AIR THROUGH HORIBA FLOW CELL.
 Pump Start Time: 1514 VOC Reading: 0.0 PPM
 Pump Depth: 187.0 FT BTOC
 Sample Time: 1655
 SCREEN INTERVAL: 182-192 FT bgs
 SUMP DEPTH: 197 FT bgs
 PUMP CONTROL PRESSURE SETTINGS = $P = 0.4657 * 187 + 25 = 112.09 \text{ psi}$
 FINAL "ON" (DISCHARGE) TIME = 20 SEC. "OFF" (RECHARGE) TIME = 20 SEC.
 DISCHARGE RATE = 270 mL/min
 END SAMPLE TIME = 1700, FINAL DTW = 126.91 FT BTOC

MS/MSD NA Duplicate ID No.: NA
 Signature(s): Mark Endo



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 679580.09.F1.W1
 Location: OLF-COUCHEVILLE Well ID: W1-CV-MW135
 Event: GW SAMPLING EVENT 1 Sample ID: W1-CV-GW135-0217
 Date: 02/23/17 & 2/24/2017 Sampling Team: M. ENOC, B. PRENTICE
 Weather: MOSTLY SUNNY, LIGHT RAIN, LOW 50'S °F, WSW WINDS @ 4-6 mph.

Total Depth: 114.0 FT.(BTOC)
 Depth to water: (-) 110.41 FT.(BTOC) 110.31' on 2/24/2017
 Water Column: 3.59 FT.
(X) 0.163 GAL/FT.
 Well Volume: 0.59 GAL.
 Total Purge Vol.: 0.8 GAL.

Measuring Device: SELCONIST (#25273), MULTIRAE (C102922)
 Date and Time: 02/23/17 09:04

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

HORIBA U-22 (C102387)

Purge Device: PANACEA 200 (#82675) + CONTROLLER
HUSKY AIR COMPRESSOR (UR5033X)
PANACEA 200 (#82689) HONDA GENERATOR (10510322)

2/24/17

SAMPLE DATA

Date: <u>02/24/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1045</u>								
Method: <u>PURGE DRY</u>	<u>NA</u>	<u>NOT ENOUGH WATER HEIGHT IN WELL TO SAMPLE AND TAKE WQP DATA [NO RECHARGE CAPACITY]</u>						

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
<u>0940</u>	<u>BEGIN PURGE.</u>								
<u>1050</u>	<u>WELL DRY.</u>								
<u>1020</u>	<u>FOAM RETURN TO WELL ON 02/24/17. BEGIN PUMPING. DTW = 110.31 FT BTOC.</u>								
<u>1035</u>	<u>MINIMAL RECHARGE, LOWERED PUMP TO WITHIN 1 FT FROM BOTTOM AND SAMPLED WELL. AGITATED DISCHARGE DUE TO LOW VOLUME IN PUMP CHAMBER.</u>								

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>537 MOD</u>	<u>Z6°C</u>	<u>125 mL HDPE POLY</u>	<u>1</u>

Observations/Notes: GETTING DRAWDOWN @ 30 mL/min - PROCEED TO PURGE WELL DRY. WELL PURGED DRY @ 1050 - DTW = 111.4 FT BTOC [TOP OF PUMP]. CONTINUE PUMPING TO LOWER WATER LEVEL EQUAL TO PUMP INTAKE - END @ 1105.

Pump Start Time: 09:40 ON 02/24/17 VOC Reading: 0.0 ppm
10:20 ON 02/24/17
 Pump Depth: 113.0 FT BTOC ON 02/23/17. 113.0 ON 02/24/17.
112.5

PUMP CONTROL PRESSURE SETTING = 0.4657 * 113 + 25 = 77.62 PSI
FINAL "ON" (DISCHARGE) TIME = 40s. "OFF" (RECHARGE) TIME = 60s
DISCHARGE RATE = NA
END SAMPLE TIME = 11:00. FINAL DTW = 110.82 FT BTOC

Sample / Time: 1045 1055
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): M. Enoc



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC Project Number: 079580-09-F1-V8
 Location: OLF - COUPEVILLE Well ID: WI-CV-GW115-02175
 Event: GW SAMPLING EVENT 1 Sample ID: WI-CV-MW115
 Date: 02/24/17 Sampling Team: M. ENDO, B. PRENTICE
 Weather: Mostly Sunny, Low 40's °F, SE winds @ 4-6 mph

Total Depth: 140 FT.(BTOC) Measuring Device: Solenist, MULTIFLUE (C102922)
 Depth to water: (-) 131.25 FT.(BTOC) Date and Time: 02/24/17 @ 14:35
 Water Column: 8.75 FT. Hour SA U22 (C102387)
 (X) 0.163 GAL/FT.
 Well Volume: 1.43 GAL.
 Total Purge Vol.: 2.59 GAL.

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

Purge Device: PANACEA 200 (# 82689) + CONTRA
HUSKY AIR COMPRESSOR
HONDA GENERATOR

SAMPLE DATA								
Date: <u>2/26/17</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1630</u>								
Method: <u>low flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	MULTIFLUE Other: (1.2) or (ppm)	Color / Odor / Comments
<u>1600</u>	<u>BEGIN PURGE. SET @ "OFF" TIME = 40 SEC, "ON" = 7 SEC, @ 50 ML/min.</u>								
<u>1713</u>	<u>0.58</u>	<u>10.13</u>	<u>0.416</u>	<u>9.77</u>	<u>6.08</u>	<u>184</u>	<u>21.9</u>	<u>0.0</u>	<u>MOSTLY CLEAR, NO COC</u>
<u>1015</u>	<u>begin purge set @ "OFF" = 50 SEC "ON" = 9 SEC</u>								
<u>1015</u>	<u>280ML</u>	<u>7.35</u>	<u>0.525</u>	<u>12.93</u>	<u>5.81</u>	<u>226</u>	<u>0.0</u>	<u>0.0</u>	<u>Clear, colorless, odorless</u>
<u>1030</u>	<u>0.5 mL</u>	<u>8.0</u>	<u>0.404</u>	<u>11.67</u>	<u>7.04</u>	<u>216</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>
<u>1035</u>	<u>1.5 gal</u>	<u>7.94</u>	<u>0.404</u>	<u>11.35</u>	<u>7.27</u>	<u>199</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>
<u>1040</u>	<u>1.75 gal</u>	<u>7.67</u>	<u>0.400</u>	<u>11.40</u>	<u>7.42</u>	<u>200</u>	<u>0.0</u>	<u>0.0</u>	<u>"</u>
<u>1220</u>	<u>well dry, total Purged 2.5 gal</u>								
<u>1425</u>	<u>begin purge again for sampling</u>								
<u>1430</u>	<u>2.00</u>	<u>7.21</u>	<u>0.435</u>	<u>13.67</u>	<u>7.79</u>	<u>133</u>	<u>3.3</u>		
<u>1430</u>	<u>SAMPLE TAKEN WI-CV-GW115-0217</u>								

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>537 MOD</u>	<u><6°C</u>	<u>125ML HDPE POLY</u>	

Observations/Notes: MAX DISCHARGE TIME = 12 SEC. CONTINUOUS CYCLE @ "OFF" = 30 SEC, "ON" = 6 SEC @ 60 ML/min
Final DTW: 132.8 FT BTOC
 Pump Start Time: 16:00 on 02/24/17 VOC Reading: 0.0 ppm PRESSURE SETTING = 0.4657 * 138 + 25 = 89.27 psi
 Pump Depth: 138 FT BTOC

Sample /Time: WI-CV-GW115-0217
 MS/MSD: NA Duplicate ID No.: NA
 Signature(s): J. C. [unclear]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF CAMPVILLE
 Event: GW SAMPLING 1
 Date: 2/26/17
 Weather: cloudy, showers 43°F

Project Number: 679580.09.FI.WS
 Well ID: WF-CV-MW11M
 Sample ID: WF-CV-GW11M-0217
 Sampling Team: B. Prentice
C. Hall

Total Depth: 110.0 FT.(BTOC)
 Depth to water: (-) 131.8 FT.(BTOC)
 Water Column: 39.2 FT.
(x) 0.163 GAL/FT.
 Well Volume: 6.227 GAL.
 Total Purge Vol.: 3.75 GAL.

Measuring Device: Haniba 4-53
 Date and Time: 2/26/17

Purge Device: Paracea BEST Pump

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

SAMPLE DATA									
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	Other: _____	Color / Odor / Comments	
Time:	°C	mS/cm	mg/L	SU	mV	NTU			
<u>2/26/17</u>									
<u>1435</u>									
Method: <u>LOW FLOW</u>									

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
<u>1325</u>	<u>Begin Purge</u>				<u>157.8</u>	<u>Set @</u>	<u>"off" = 205</u>	<u>"on" = 105</u>	<u>Pressure = 80PSI</u>
<u>1335</u>	<u>0.5</u>	<u>7.86</u>	<u>0.660</u>	<u>4.81</u>	<u>7.95</u>	<u>130</u>	<u>0.0</u>		<u>cloudy, gray - turb red</u>
<u>1356</u>	<u>2</u>	<u>8.47</u>	<u>0.704</u>	<u>4.13</u>	<u>6.74</u>	<u>90</u>	<u>1.3</u>		<u>slightly cloudy, gray</u>
<u>1405</u>	<u>2.3</u>	<u>8.19</u>	<u>0.676</u>	<u>3.71</u>	<u>7.57</u>	<u>65</u>	<u>18.3</u>		
<u>1410</u>	<u>2.5</u>	<u>7.93</u>	<u>0.681</u>	<u>4.87</u>	<u>7.76</u>	<u>60</u>	<u>34.8</u>		<u>"</u>
<u>1420</u>	<u>3.0</u>	<u>8.03</u>	<u>0.685</u>	<u>3.87</u>	<u>7.80</u>	<u>56</u>	<u>43.5</u>		<u>"</u>
<u>1430</u>	<u>3.2</u>	<u>7.99</u>	<u>0.692</u>	<u>3.94</u>	<u>7.92</u>	<u>61</u>	<u>41.0</u>		
<u>1435</u>	<u>3.75</u>	<u>8.02</u>	<u>0.686</u>	<u>2.97</u>	<u>7.86</u>	<u>57</u>	<u>43.0</u>		
<u>1435</u>	<u>Sample taken WF-CV-GW11M-0217</u>								

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PFCs MDAEPA 537</u>	<u>None, <6°C</u>	<u>2, 125ml Poly HOPC</u>	<u>2</u>

Observations/Notes: Final DTW: 136.15 FT BTOC
 Pump Start Time: 1325 VOC Reading: 0.0 PPM
 Pump Depth: 157.8 feet
 Sample /Time: WF-CV-GW11M-0217 1435
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Cow Deville
 Event: GW Sample Event 1
 Date: 2/27/2017
 Weather: cloudy, rainy 37°F

Project Number: 1679580.09.FI.WJ
 Well ID: W1-CV-MW03M
 Sample ID: W1-CV-GW03M-0217
 Sampling Team: B. Peatrice
C. Hall

Total Depth: 160 FT.(BTOC)
 Depth to water: (-)123.35' FT.(BTOC)
 Water Column: 36.65 FT.
(x)0.143 GAL/FT.
 Well Volume: 5.97 GAL.
 Total Purge Vol.: 3.3 GAL.

Measuring Device: Solonist, Mott Mac (C-102633)
 Date and Time: 2/27/2017 9:30

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

Purge Device: Panacea 260 + control
Husky Air compressor
Honda Generator

SAMPLE DATA								
Date: <u>2/27/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>13:15</u>								
Method: <u>Low flow</u>								

±0.1 FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
12:30	.5	6.87	.408	2.70	6.43	231	0.0		light gray cloudy
12:40	1.5	7.01	.404	3.56	7.02	147	0.0		"
12:45	2.0	7.58	.380	2.90	7.31	157	0.0		"
12:50	2.3	7.86	.380	2.55	7.54	135	0.0		"
12:55	2.6	7.80	.379	3.10	7.70	122	0.0		"
13:00	3.0	7.82	.381	2.17	7.68	120	0.0		"
13:05	3.3	7.84	.380	3.09	7.73	116	0.0		"
*Parameters stabilized sample W1-CV-GW03M-0217									

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PPL's Mod USEPA 537</u>	<u>None, <6°F</u>	<u>2-125ml Poly HDPE</u>	<u>2</u>

Observations/Notes: Final DTW: 123.35', Horiba well not reporting NTU, recalibrated @ 12:35, still not showing any results

Pump Start Time: 12:20 VOC Reading: 0.0ppm

Pump Depth: 150'

Sample /Time: 2/27/2017 13:15

MS/MSD N/A Duplicate ID No.: N/A

Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Campanile
 Event: GW sample event 1
 Date: 2/27/2017
 Weather: partly cloudy, 39°F

Project Number: 1079580.09.F1.W5
 Well ID: W1-CV-MW03D
 Sample ID: W1-CV-GW03D-0217
 Sampling Team: B. Prentice
C. Hall

Total Depth: 237 FT.(BTOC)
 Depth to water: (-) 142.95 FT.(BTOC)
 Water Column: 94.15 FT.
(x) 0.163 GAL/FT.
 Well Volume: 15.35 GAL.
 Total Purge Vol.: 3.75 GAL.

Measuring Device: Solinst, MultiPac (C-102633)
 Date and Time: 2/27/2017 9:30

Purge Device: Panacea 200 + control
Husky Air compressor
Honda Generator

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

SAMPLE DATA								
Date: <u>2/27/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1705</u>								
Method: <u>Low Flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
16:10	1.5	6.90	0.522	4.61	7.46	60	0.0		light gray cloudy
16:15	1.5	6.21	0.530	3.43	7.44	12	0.0		"
16:20	2.25	6.32	0.534	3.20	7.45	-12	0.0		*air tubing popped off
16:50	2.5	6.44	0.537	2.22	7.33	-73	0.0		"
16:55	2.8	6.72	0.529	2.60	7.36	-77	0.0		"
17:00	3.2	6.81	0.531	2.55	7.38	-80	0.0		"
17:05	3.75	6.75	0.534	2.53	7.39	-78	0.0		"
* parameters stabilized, sample W1-CV-GW03D-0217									"

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PPCs mod USEPA 537</u>	<u>NONE, <6°C</u>	<u>125ml Poly HDPE</u>	<u>2</u>

Observations/Notes: Final DTW: 143.26' Horiba was not calculating turbidity accurately
 Pump Start Time: 15:40 VOC Reading: 0.0ppm
 Pump Depth: 227'
 Sample / Time: W1-CV-GW03D-0217 17:05
 MS/MSD N/A Duplicate ID No.: N/A
 Signature(s): BSP



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF CO. JEFFERSONVILLE
 Event: GW Sample Event 1
 Date: 2/28/2017
 Weather: cloudy, snow 36°F

Project Number: 1079580.09.FI.US
 Well ID: WI-CV-MW01M
 Sample ID: WI-CV-GW01M-0217
 Sampling Team: B. Prentice
M. Witmer

Total Depth: 1103 FT.(BTOC)
 Depth to water: (-)124.35 FT.(BTOC)
 Water Column: 38.65 FT.
(x)0.163 GAL/FT.
 Well Volume: 6.30 GAL.
 Total Purge Vol.: 5 GAL.

Measuring Device: Solinst, Maticare (C-10295)
 Date and Time: 2/28/2017 9:30

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

Purge Device: Panacea 700 + control
HUSKY Air Compressor
Honda Generator

SAMPLE DATA								
Date:	Temp.	Cond.	DO	pH	ORP	Turbidity	Other: _____	Color / Odor / Comments
<u>2/28/2017</u>	°C	mS/cm	mg/L	SU	mV	NTU		
Time: <u>1100</u>								
Method: <u>Low flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
<u>10:25</u>	<u>2</u>	<u>8.08</u>	<u>0.575</u>	<u>2.39</u>	<u>6.49</u>	<u>144</u>	<u>0.0</u>		<u>clear, no odor</u>
<u>10:30</u>	<u>2.5</u>	<u>8.45</u>	<u>0.567</u>	<u>2.34</u>	<u>7.02</u>	<u>51</u>	<u>0.0</u>		
<u>10:35</u>	<u>3</u>	<u>8.99</u>	<u>0.562</u>	<u>3.02</u>	<u>7.50</u>	<u>14</u>	<u>0.0</u>		
<u>10:40</u>	<u>3.5</u>	<u>9.07</u>	<u>0.560</u>	<u>3.42</u>	<u>7.62</u>	<u>10</u>	<u>0.0</u>		
<u>10:45</u>	<u>4</u>	<u>9.11</u>	<u>0.560</u>	<u>2.89</u>	<u>7.67</u>	<u>12</u>	<u>0.0</u>		
<u>10:50</u>	<u>4.5</u>	<u>9.19</u>	<u>0.559</u>	<u>2.76</u>	<u>7.72</u>	<u>13</u>	<u>0.0</u>		
<u>10:55</u>	<u>5</u>	<u>9.23</u>	<u>0.558</u>	<u>2.85</u>	<u>7.73</u>	<u>10</u>	<u>0.0</u>		
<u>* Parameters stabilized, sample WI-CV-GW01-0217</u>									

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>PPCs Mod USEPA-537</u>	<u>None, <6°C</u>	<u>125ml poly HDPE</u>	<u>2</u>

Observations/Notes: Final DTW = 124.4'
 Pump Start Time: 9:45 VOC Reading: 0.0 ppm
 Pump Depth: 153'
 Sample /Time: WI-CV-GW01M-0217 @ 11:00
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): BP



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Carpenters, WA
 Event: GW Sample Event 1
 Date: 2/28/2017
 Weather: partly cloudy, 45°F
 Total Depth: 217 FT.(BTOC)
 Depth to water: (-) 141.58 FT.(BTOC)
 Water Column: 75.42 FT.
(x) 0.163 GAL/FT.
 Well Volume: 12.29 GAL.
 Total Purge Vol.: 4 GAL.

Project Number: 679580.09.FI.WS
 Well ID: WI-CV-MW01D
 Sample ID: WI-CV-GW01D-0217
 Sampling Team: B. Prentice
M. Witmer

Measuring Device: Solinst, MultiLine (C-102941)
 Date and Time: 2/28/2017 9:30

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

Purge Device: Panacea 200 + Control
Husky Air Compressor
Honda Generator

SAMPLE DATA								
Date: <u>2/28/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1400</u>								
Method: <u>low flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
1305	0.5	8.77	0.342	6.54	8.02	42	0.0		clean, no odor
1310	1	8.71	0.373	4.56	7.95	38	0.0		"
1336	1.5	9.33	0.372	2.52	7.96	2	0.0		* last pressure
1335	2	9.54	0.375	2.18	7.95	-44	0.0		clean no odor
1340	2.5	9.56	0.373	2.09	7.96	-57	0.0		
1345	3	9.57	0.375	1.95	7.95	-65	0.0		
1350	3.5	9.49	0.375	2.06	7.95	-61	0.0		
1355	4	9.44	0.375	2.02	7.93	-67	0.0		
* parameters stabilized proceed to sample WI-CV-GW01D-0217									

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>RFC MOD USEPA-537</u>	<u>None, <6°C</u>	<u>125 ml Poly HDPE</u>	<u>2</u>

Observations/Notes: Final DTW = 141.8'
 Pump Start Time: 12:30 VOC Reading: 0.0 ppm
 Pump Depth: 207'
 Sample /Time: WI-CV-GW01D-0217 @ 1400
 MS/MSD N/A Duplicate ID No.: N/A
 Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Coupeville, WA
 Event: GW Sample Event 1
 Date: 3/1/2017
 Weather: Cloudy/rainy, 40°

Project Number: 679580.09.FI.WS
 Well ID: WI-CV-MW025
 Sample ID: WI-CV-GW025-0217
 Sampling Team: B. Prentice

Total Depth: 105 FT.(BTOC)
 Depth to water: (-) 92.40 FT.(BTOC)
 Water Column: 12.6 FT.
(x) 0.103 GAL/FT.
 Well Volume: 205 GAL.
 Total Purge Vol.: 2.5 GAL.

Measuring Device: Solinst, Multi Rae (C-1026)
 Date and Time: 3/1/2017 8:30

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

Purge Device: Panacea 200 + control
Husky Air Compressor
Honda Generator

SAMPLE DATA								
Date: <u>3/1/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>11:00</u>								
Method: <u>Low Flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
<u>1015</u>		<u>7.78</u>	<u>0.669</u>	<u>9.79</u>	<u>6.62</u>	<u>239</u>	<u>0.0</u>		<u>clear, no odor</u>
<u>1020</u>		<u>7.82</u>	<u>0.668</u>	<u>2.97</u>	<u>6.97</u>	<u>232</u>	<u>0.0</u>		
<u>1025</u>		<u>7.87</u>	<u>0.668</u>	<u>2.99</u>	<u>7.19</u>	<u>219</u>	<u>0.0</u>		
<u>1030</u>		<u>7.94</u>	<u>0.668</u>	<u>2.93</u>	<u>7.27</u>	<u>209</u>	<u>0.0</u>		
<u>1035</u>		<u>8.00</u>	<u>0.667</u>	<u>2.94</u>	<u>7.31</u>	<u>193</u>	<u>0.0</u>		
<u>1040</u>		<u>8.03</u>	<u>0.667</u>	<u>2.91</u>	<u>7.34</u>	<u>187</u>	<u>0.0</u>		
<u>1045</u>		<u>8.11</u>	<u>0.666</u>	<u>2.87</u>	<u>7.36</u>	<u>177</u>	<u>0.0</u>		
<u>1050</u>		<u>8.16</u>	<u>0.666</u>	<u>2.83</u>	<u>7.37</u>	<u>170</u>	<u>0.0</u>		
<u>1055</u>		<u>8.18</u>	<u>0.667</u>	<u>2.80</u>	<u>7.38</u>	<u>168</u>	<u>0.0</u>		
* Parameters stabilized, proceed to sample WI-CV-GW025-0217 <u>WI-CV-GW025-0217</u>									

Sample information: method, container number, size, and type, preservative used.			
Analysis	Preservative	Container requirements	No. of containers
<u>DPCs MOD EPA-537</u>	<u>None, <6°C</u>	<u>125ml poly HDPE</u>	<u>2</u>

Observations/Notes: Final DTW = 92.73'
 Pump Start Time: 0920 VOC Reading: 0.0ppm
 Pump Depth: 100'
 Sample/Time: WI-CV-GW025-0217 @ 11:00
 MS/MS D N/A Duplicate ID No.: WI-CV-GW025/SP-0317
 Signature(s): B.P.



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: OLF Campville, WA
Event: G W Sample Event 1
Date: 3/1/2017
Weather: cloudy, 46°F

Project Number: 079580, 09. Pl. WS
Well ID: W1-CV-MW02M
Sample ID: W1-CV-GW02M-0317
Sampling Team: B. Prentice

Total Depth: 167.5 FT.(BTOC)
Depth to water: (-) 123.8 FT.(BTOC)
Water Column: 43.7 FT.
(x) 0.163 GAL/FT.
Well Volume: 7.12 GAL.
Total Purge Vol.: 3 GAL.

Measuring Device: Solinst, MultiPac C-102633
Date and Time: 3/1/2017 8:30

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, (2), and 4.

Purge Device: Panacea 200 + control
Musky Air Compressor
Honda Generator

SAMPLE DATA table with columns: Date, Time, Method, Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments.

FIELD PARAMETERS table with columns: Time, Purge Vol., Temp., Cond., DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Includes a vertical arrow pointing down and a note about stabilized parameters.

Table for Sample information: method, container number, size, and type, preservative used. Includes columns for Analysis, Preservative, Container requirements, and No. of containers.

Observations/Notes: Final DTW = 123.8'
Pump Start Time: 12:45
Pump Depth: 157.5'
VOC Reading: 0.0 ppm
Sample /Time: W1-CV-GW02M-0317 @ 1355
MS/MSD: N/A
Duplicate ID No.: N/A
Signature(s): [Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Capitan, WA
 Event: GW Sample Event 1
 Date: 3/2/2017
 Weather: rainy, 39°F

Project Number: 679580.09.PI.W5
 Well ID: MW-085
 Sample ID: WL-CV-GW085-0317
 Sampling Team: B. Prunice

Total Depth: 135 FT.(BTOC)
 Depth to water: (+) 117.8 FT.(BTOC)
 Water Column: 17.2 FT.
 (x) 0.103 GAL/FT.
 Well Volume: 2.80 GAL.
 Total Purge Vol.: 3 GAL.

Measuring Device: Solinst, MultiPac C-10263
 Date and Time: 3/2/2017 830

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

Purge Device: Panacea 200 + control
Husky Air compressor
Honda generator

SAMPLE DATA								
Date: <u>3/2/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>10:50</u>								
Method: <u>low flow</u>								

FIELD PARAMETERS									
Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
1000	.25	8.18	0.510	7.56	5.80	285	0.0		Orange cloudy, no odor
1005	.5	8.46	0.503	6.71	6.74	293	0.0		
1010	.75	8.70	0.506	6.61	6.95	272	0.0		
1015	1	8.92	0.509	6.73	7.07	252	0.0		
1020	1.25	9.00	0.511	6.72	7.13	229	0.0		
1025	1.5	8.37	0.518	6.23	7.23	186	0.0		
1030	1.75	8.30	0.514	6.13	7.24	181	0.0		
1035	2	8.31	0.515	6.08	7.25	178	0.0		
1040	2.25	8.30	0.515	6.10	7.21	177	0.0		
1045	2.50	8.31	0.514	6.11	7.24	181	0.0		

*Parameters stabilized, proceed to sample WL-CV-GW085-0317

Analysis	Preservative	Container requirements	No. of containers
PPCS Mod EPA-537	None, <6°C	125ml poly HDPE	2

Observations/Notes: FINAL DTW = 117.85'
 Pump Start Time: 9:30 VOC Reading: 00 ppm
 Pump Depth: 125'
 Sample Time: WL-CV-GW085-0317 @ 10:50
 MS/MSD NA Duplicate ID No.: NA
 Signature(s): [Signature]



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GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF Cooper Hill, WA
 Event: GW Sample Event 7
 Date: 3/4/2017
 Weather: cloudy 40°

Project Number: WMS0-09-101-WS
 Well ID: MW-08M
 Sample ID: WL-CV-GW08M-0317
 Sampling Team: B. Prunty

Total Depth: 1105 FT.(BTOC)
 Depth to water: (1) 122.8 FT.(BTOC)
 Water Column: 42.2 FT.
(x) 0.143 GAL/FT.
 Well Volume: 6.88 GAL.
 Total Purge Vol.: 3.5 GAL.

Measuring Device: Solinst, MultiRae C-1020
 Date and Time: 3/4/2017 9:05

Purge Device: Panacea 200 + control
HUSKY air compressor
Honda Generator

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

SAMPLE DATA

Date: <u>3/4/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1200</u>								
Method: <u>LOW FLOW</u>								

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
1058	.25	7.07	0.580	9.11	7.23	204	0.0		Orange cloudy, no odor
1103	.50	7.37	0.578	7.22	7.52	185	0.0		
1108	.75	7.71	0.573	6.24	7.62	170	0.0		
1113	1	7.94	0.570	5.19	7.70	154	0.0		
1118	1.25	8.11	0.567	4.77	7.75	140	0.0		
1123	1.50	8.13	0.563	4.12	7.79	123	0.0		
1128	1.75	8.13	0.563	3.72	7.82	115	0.0		
1133	2	8.25	0.560	3.34	7.84	109	0.0		
1138	2.25	8.61	0.559	3.08	7.86	111	0.0		
1143	2.50	8.45	0.560	3.03	7.88	103	0.0		
1148	2.75	9.12	0.538	2.62	7.88	84	0.0		

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>PPCS MOD EPA-537</u>	<u>None, 4°C</u>	<u>125ml poly HDPE</u>	<u>2</u>

Observations/Notes: FINAL DTW = 123.2' BTDC

Pump Start Time: 9:30am VOC Reading: 0.0ppm

Pump Depth: 155' BTDC

Sample / Time: WL-CV-GW08M-0317 @ 1200

MS/MSD NA Duplicate ID No.: NA

Signature(s): [Signature]



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GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
Location: DLF Capeville WA
Event: GW Sample Event 1
Date: 3/4/2017
Weather: Cloudy 40°F

Project Number: 079520.09.FI.WS
Well ID: MW-08M
Sample ID: W1-CV-GW08M-0317
Sampling Team: B. Prendite

Total Depth: 165 FT.(BTDC)
Depth to water: (-) 122.8 FT.(BTDC)
Water Column: 42.2 FT.
(x) 0.163 GAL/FT.
Well Volume: 6.88 GAL.
Total Purge Vol.: 3.5 GAL.

Measuring Device: Solinst, MultiPar C10263
Date and Time: 3/4/2017 9:05

Table with 2 columns: Well Dia. (inches) and Volume (gallons/foot). Rows include 1, 1.25, 2, and 4 inches.

Purge Device: Panacea 200 + controls
Husky Air compressor
Honda Generator

SAMPLE DATA

Table with 9 columns: Date, Time, Temp, Cond, DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Includes handwritten entries for 3/4/2017, 1200, and Low Flow method.

FIELD PARAMETERS

Table with 10 columns: Time, Purge Vol, Temp, Cond, DO, pH, ORP, Turbidity, Other, Color / Odor / Comments. Includes handwritten data for 1153 and 1158, and a note about parameter stability.

Sample information: method, container number, size, and type, preservative used.

Table with 4 columns: Analysis, Preservative, Container requirements, No. of containers. Includes handwritten entries for PPTS MOD EPA-537, None, 4°C, 125 ml Poly HDPE, and 2.

Observations/Notes: FINAL DTW=123.2' BTDC

Pump Start Time: 9:30 VOC Reading: 0.0 ppm

Pump Depth: 155' BTDC

Sample Time: W1-CV-GW08M-0317 @ 1200

MS/MSD N/A Duplicate ID No.: N/A

Signature(s): [Handwritten Signature]



GROUNDWATER SAMPLING DATA SHEET

Client: NAVFAC
 Location: OLF CAMPANILE, WA
 Event: GW Sample Event 1
 Date: 3/4/2017
 Weather: Cloudy 45°F

Project Number: 679580.09.F1.W5
 Well ID: MW-14M
 Sample ID: W1-CV-GW14M-0317
 Sampling Team: B. Prentice
M. Wimmer

Total Depth: 176 FT.(BTOC)
 Depth to water: (+)123.54 FT.(BTOC)
 Water Column: 52.46 FT.
(x) 0.163 GAL/FT.
 Well Volume: 8.55 GAL.
 Total Purge Vol.: 2.5 GAL.

Measuring Device: Solinst, MultiPac (C-102635)
 Date and Time: 3/4/2017 9:05

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

Purge Device: Panacea 200 + Control
Husky Air Compressor
Honda Generator

SAMPLE DATA

Date: <u>3/4/2017</u>	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
Time: <u>1700</u>								
Method: <u>Low Flow</u>								

FIELD PARAMETERS

Time	Purge Vol. (gals)	Temp. °C	Cond. mS/cm	DO mg/L	pH SU	ORP mV	Turbidity NTU	Other: _____	Color / Odor / Comments
<u>1602</u>	<u>.2</u>	<u>8.33</u>	<u>0.587</u>	<u>3.03</u>	<u>7.68</u>	<u>101</u>	<u>0.0</u>		<u>Clear, no odor</u>
<u>1607</u>	<u>.4</u>	<u>8.68</u>	<u>0.593</u>	<u>2.05</u>	<u>7.63</u>	<u>-11</u>	<u>0.0</u>		
<u>1603</u>	<u>.7</u>	<u>8.69</u>	<u>0.596</u>	<u>1.85</u>	<u>7.61</u>	<u>-37</u>	<u>0.0</u>		
<u>1608</u>	<u>1.25</u>	<u>8.63</u>	<u>0.600</u>	<u>1.67</u>	<u>7.58</u>	<u>-57</u>	<u>0.0</u>		
<u>1622</u>	<u>1.25</u>	<u>8.59</u>	<u>0.601</u>	<u>1.58</u>	<u>7.56</u>	<u>-74</u>	<u>0.0</u>		
<u>1627</u>	<u>1.5</u>	<u>8.59</u>	<u>0.601</u>	<u>1.50</u>	<u>7.55</u>	<u>-82</u>	<u>0.0</u>		
<u>1634</u>	<u>1.75</u>	<u>8.42</u>	<u>0.600</u>	<u>1.45</u>	<u>7.55</u>	<u>-93</u>	<u>0.0</u>		
<u>1639</u>	<u>2.0</u>	<u>8.34</u>	<u>0.596</u>	<u>1.39</u>	<u>7.55</u>	<u>-100</u>	<u>0.0</u>		
<u>1644</u>	<u>2.1</u>	<u>8.30</u>	<u>0.598</u>	<u>1.34</u>	<u>7.56</u>	<u>-102</u>	<u>0.0</u>		
<u>1649</u>	<u>2.25</u>	<u>8.29</u>	<u>0.598</u>	<u>1.31</u>	<u>7.56</u>	<u>-106</u>	<u>0.0</u>		<u>* lost pressure clear no odor</u>
<u>1654</u>	<u>2.5</u>	<u>8.23</u>	<u>0.599</u>	<u>1.30</u>	<u>7.56</u>	<u>-108</u>	<u>0.0</u>		

Sample information: method, container number, size, and type, preservative used.

Analysis	Preservative	Container requirements	No. of containers
<u>DPCS MOD EPA-537</u>	<u>175ml Poly HDPE</u>	<u>None, <6°F</u>	<u>2</u>

Observations/Notes: Final DTW = 122.5' BTOC - initial depth taken before volume booster was dropped.

Pump Start Time: 1530 VOC Reading: 0.0ppm

Pump Depth: ~164' BTOC

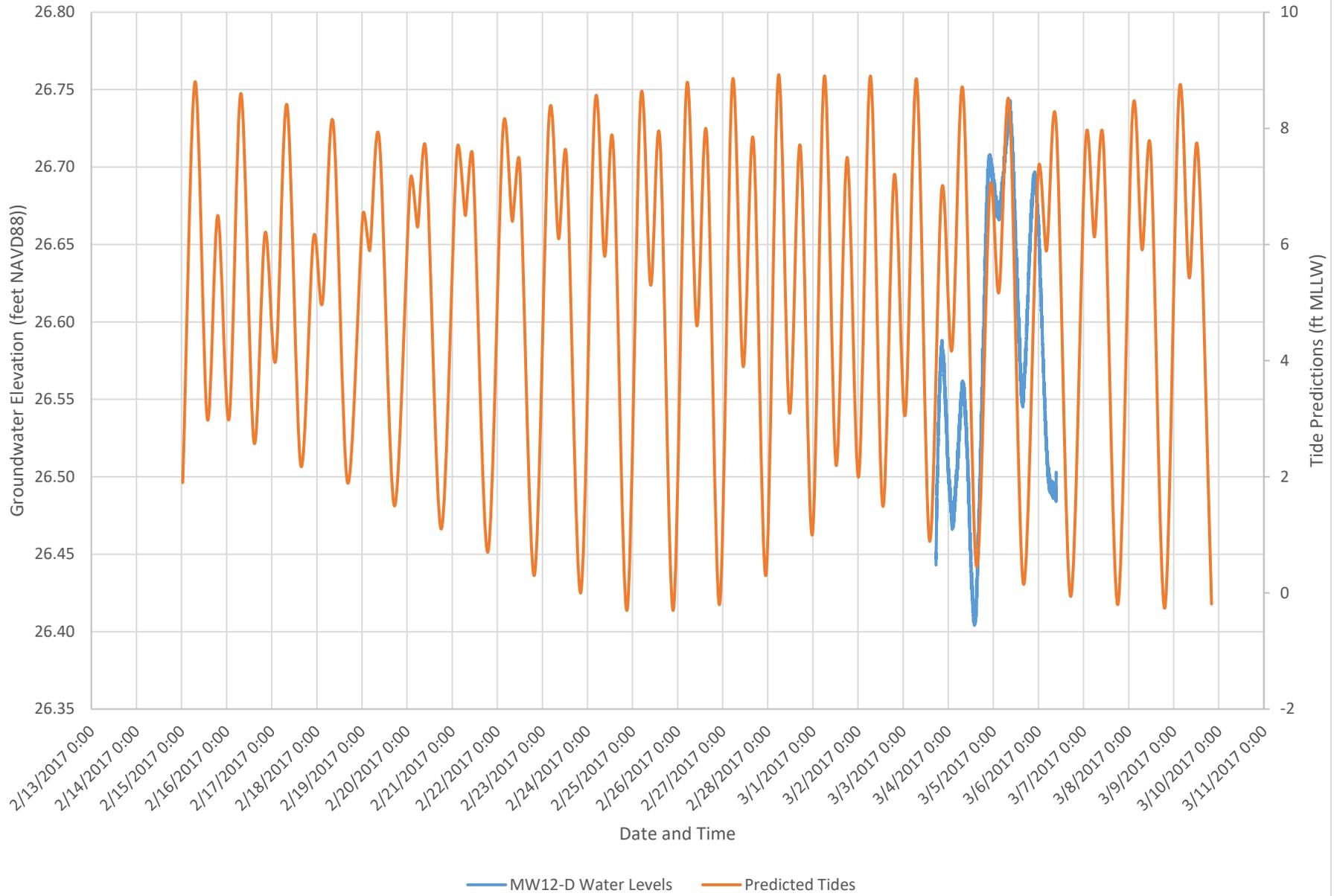
Sample Time: W1-CV-GW14M-0317 @ 1700

MS/MSD: N/A Duplicate ID No.: N/A

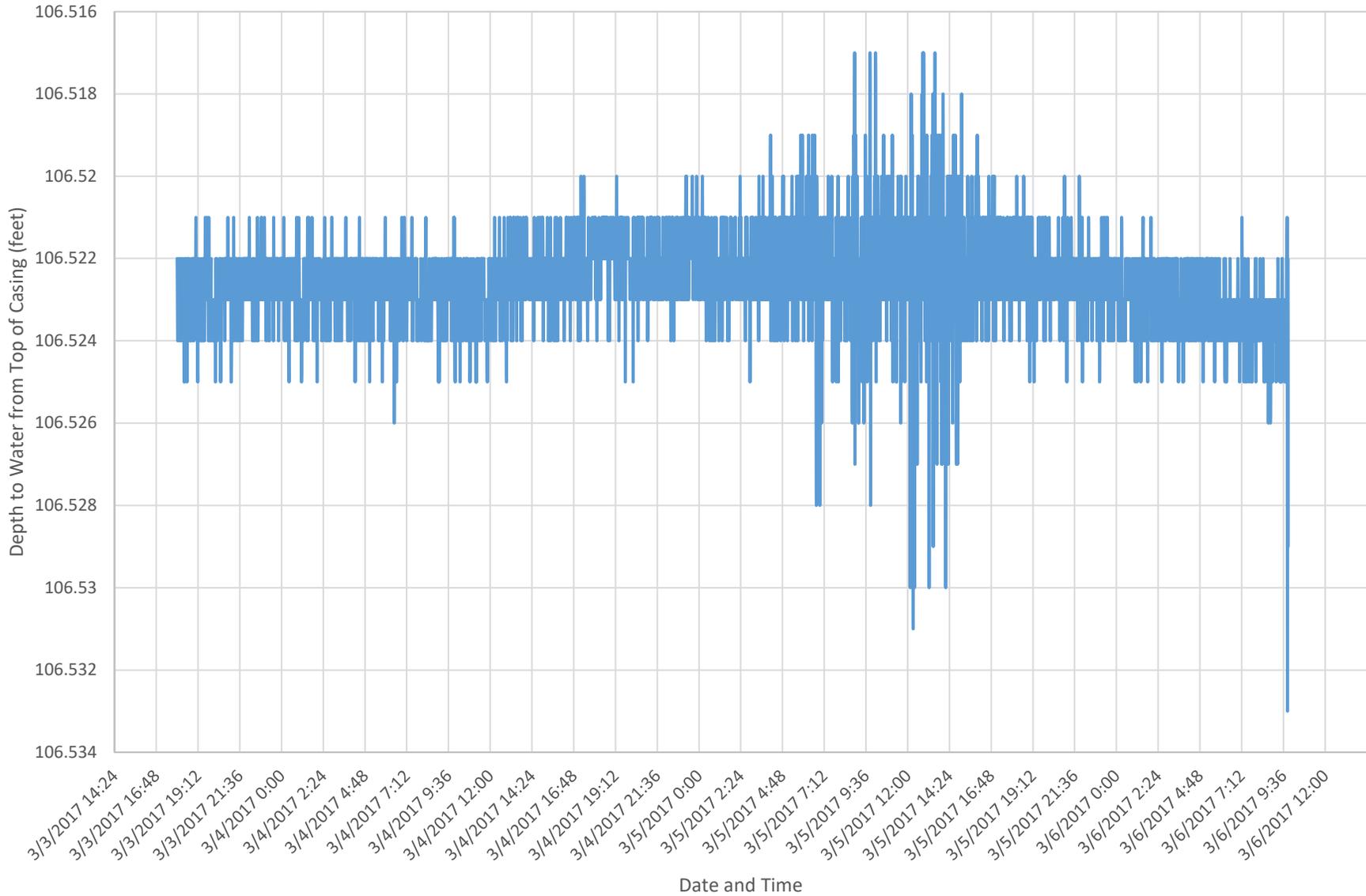
Signature(s): [Signature]

Attachment 5
Groundwater Elevation Study
Hydrographs

MW12-D Water Elevation



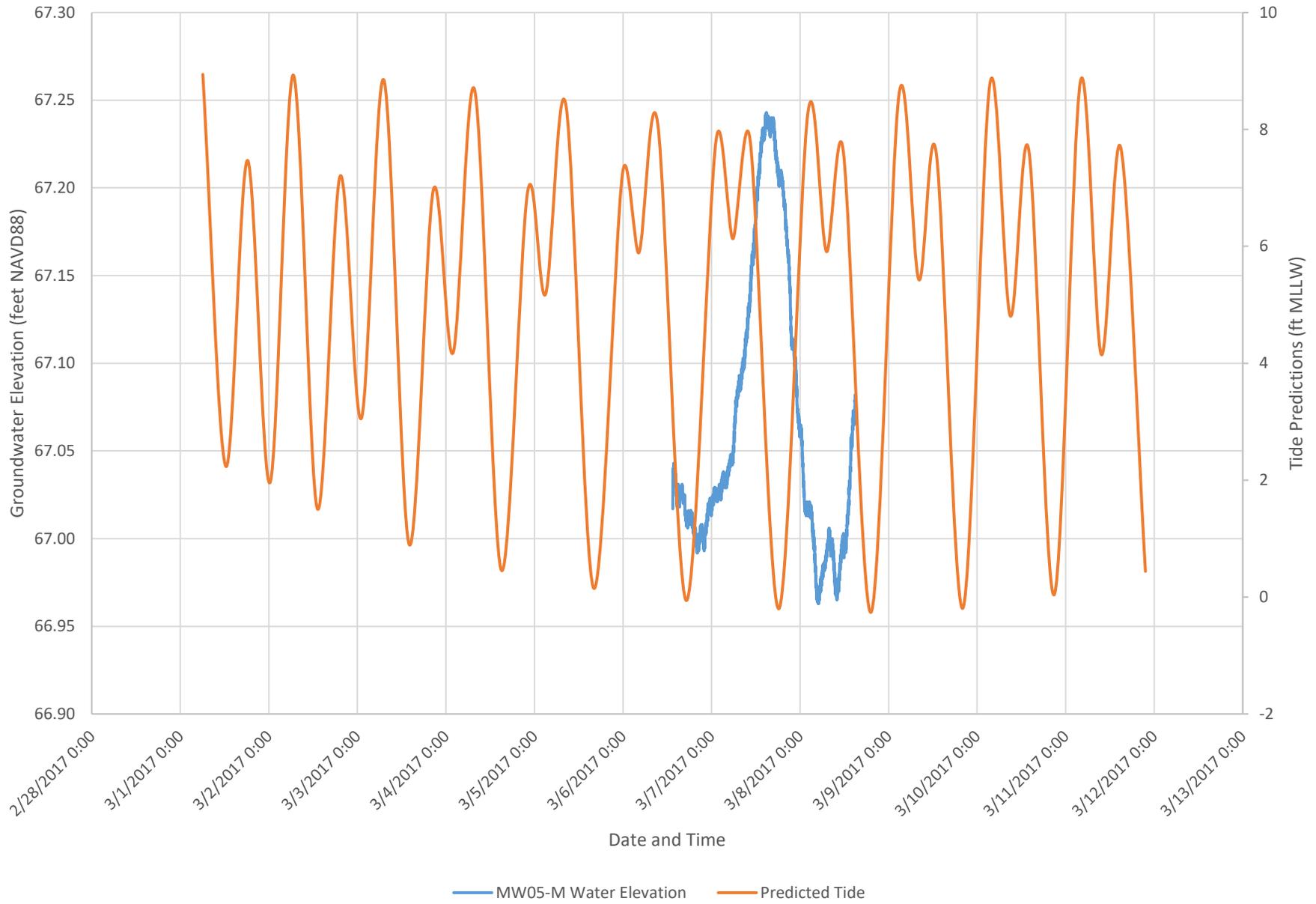
MW12-S Water Levels (Dry Well)



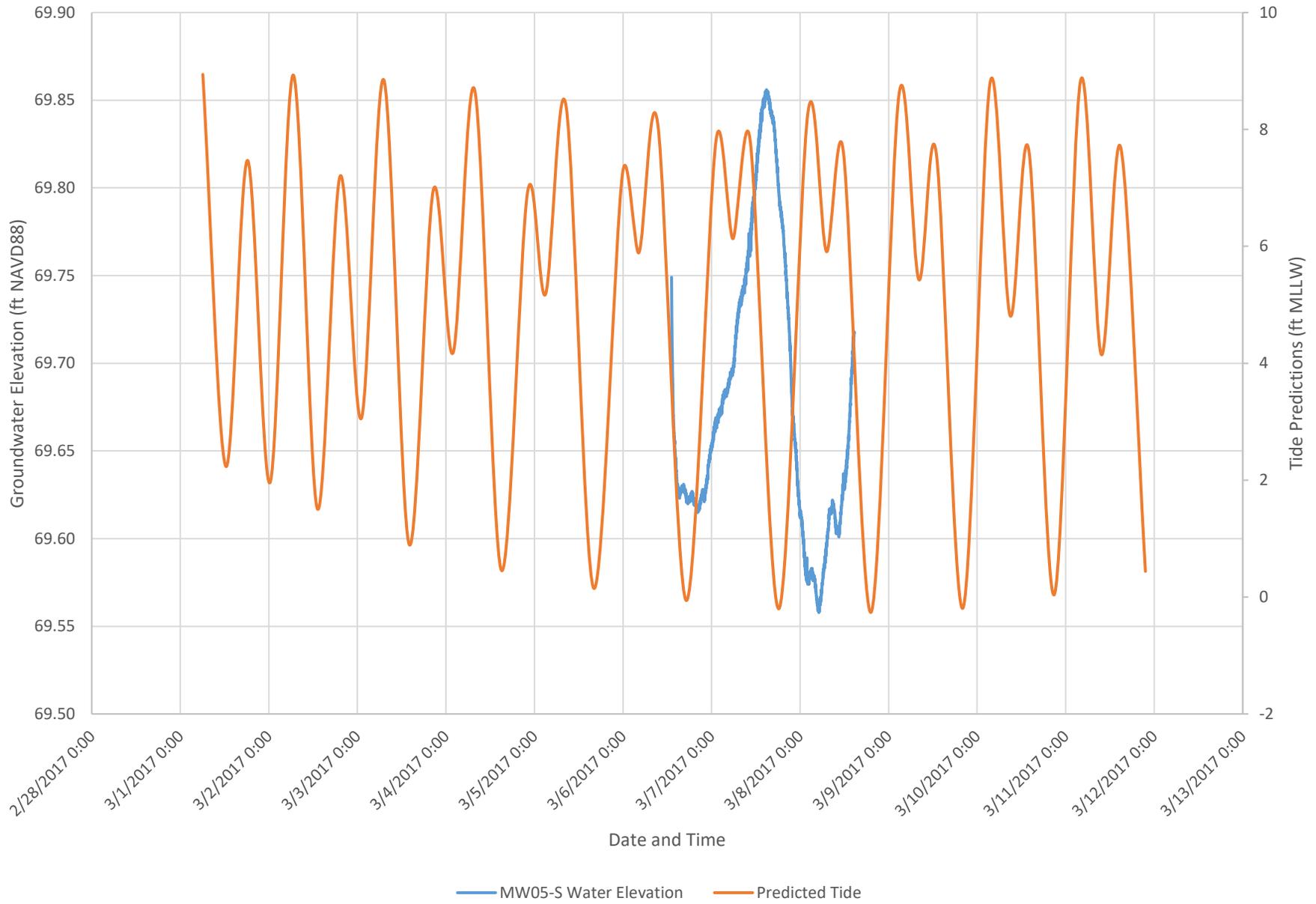
— MW12-S Water Levels

Note: This well is dry.

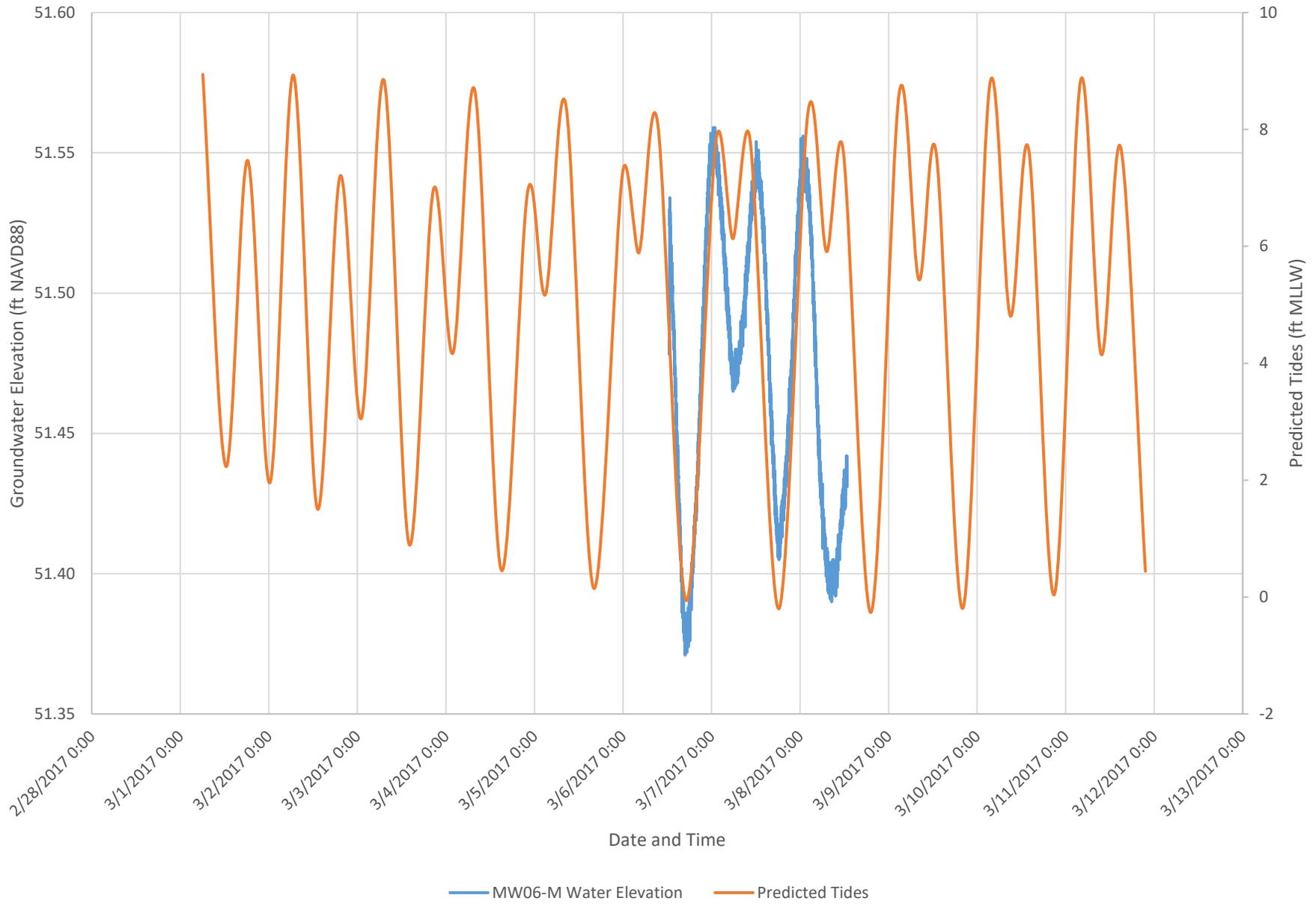
MW05-M Water Elevation



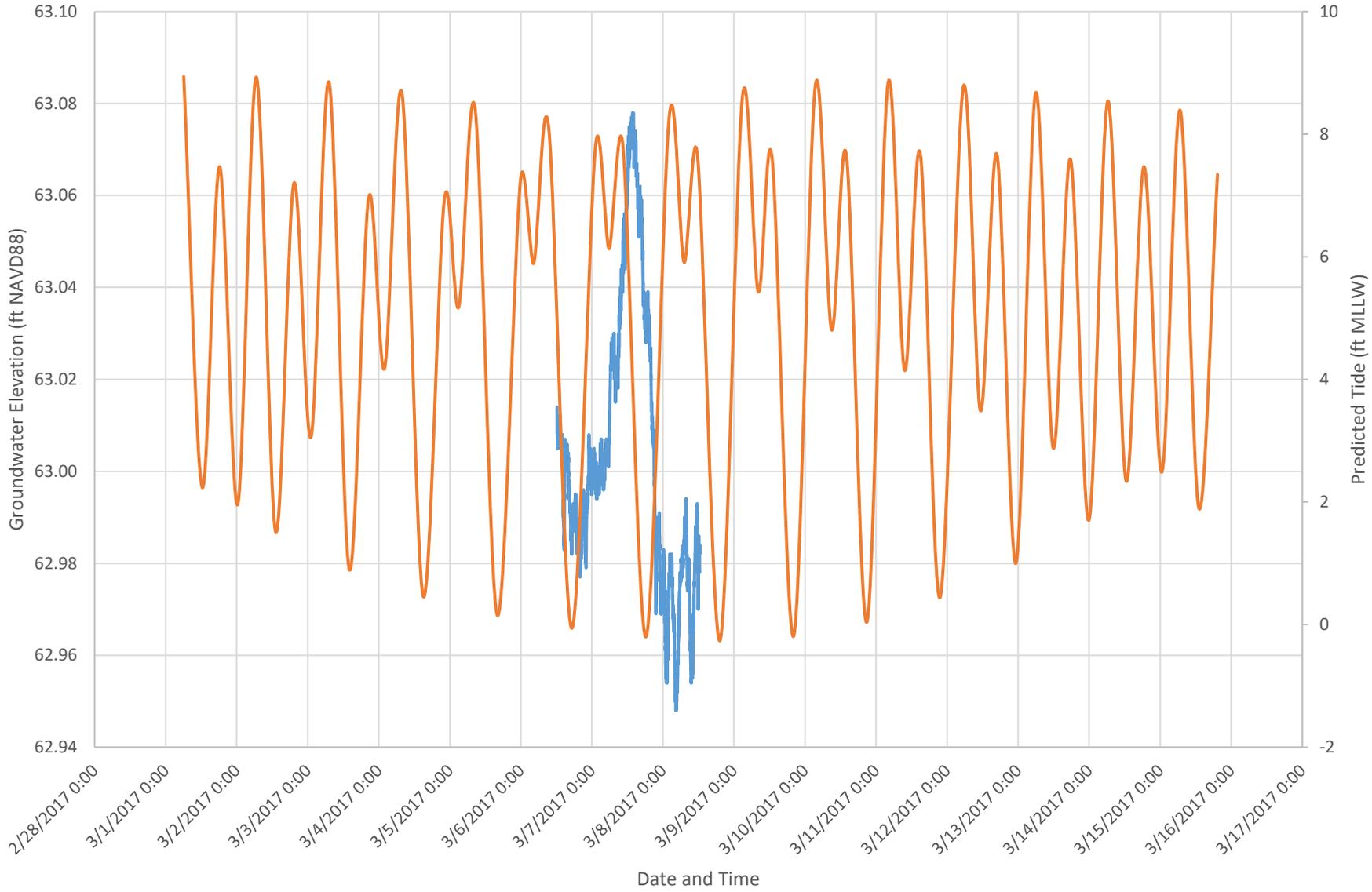
MW05-S Water Elevation



MW06-M Water Elevation

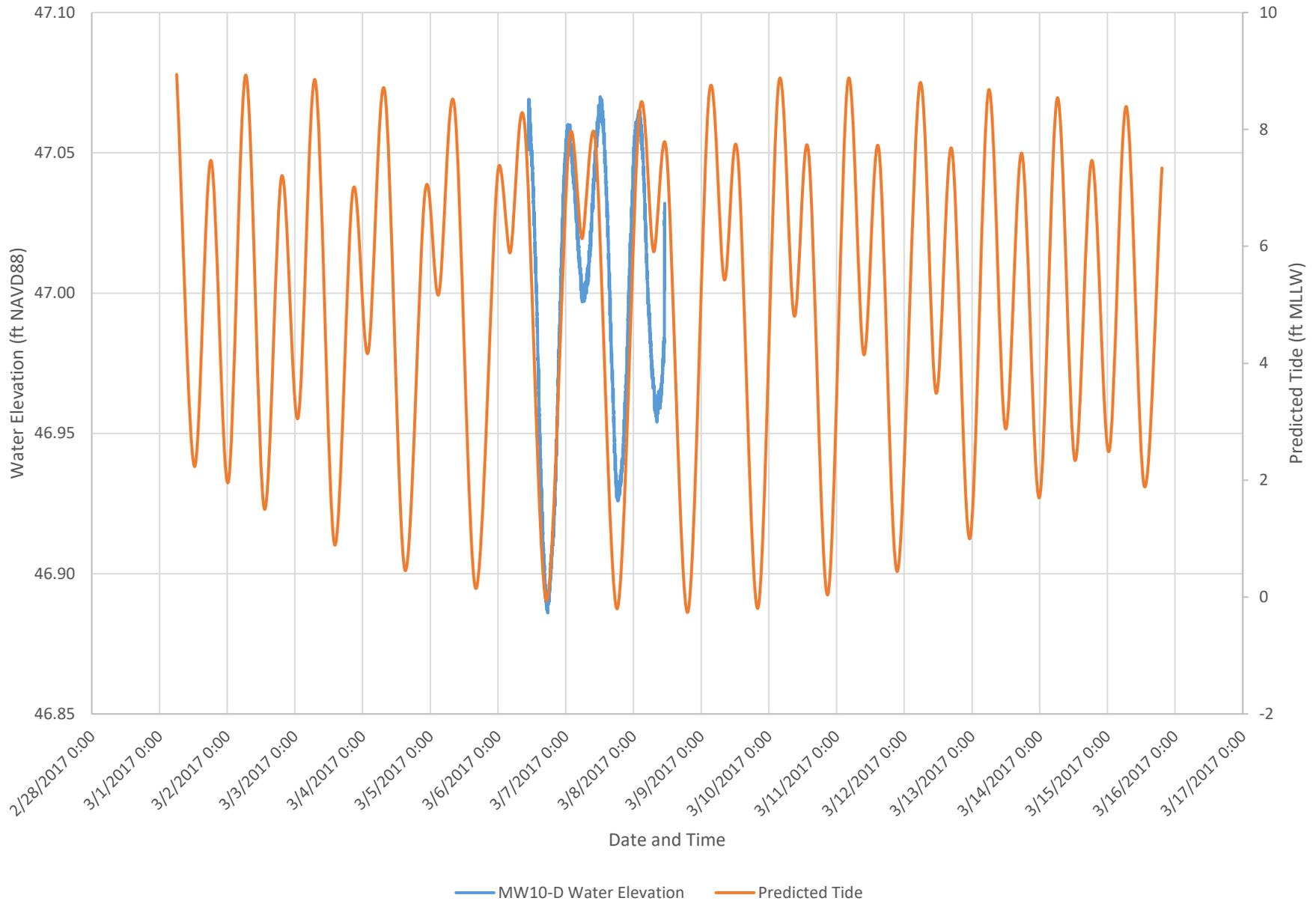


MW06-S Water Elevation

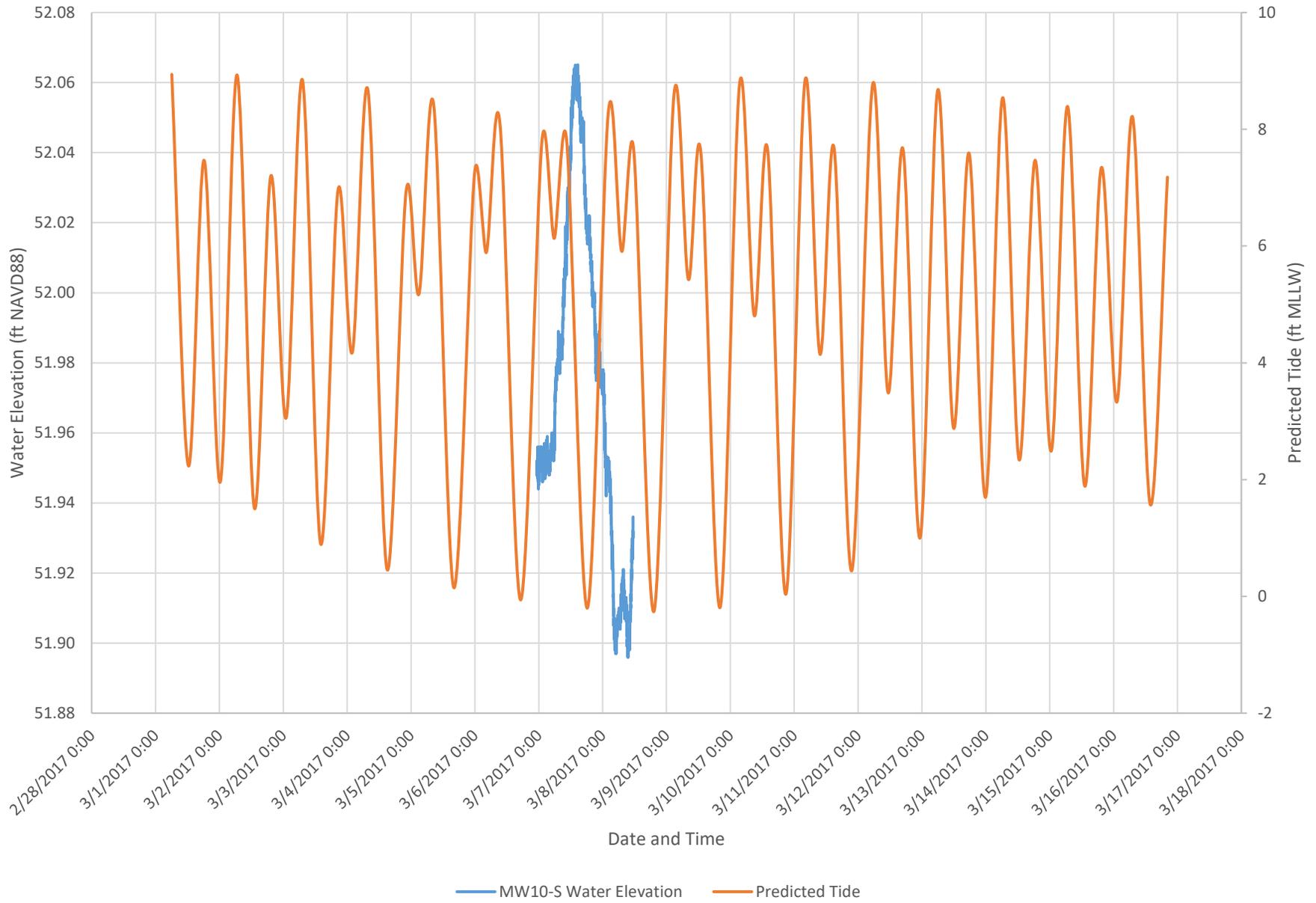


— MW06-S Water Elevation — Predicted Tide

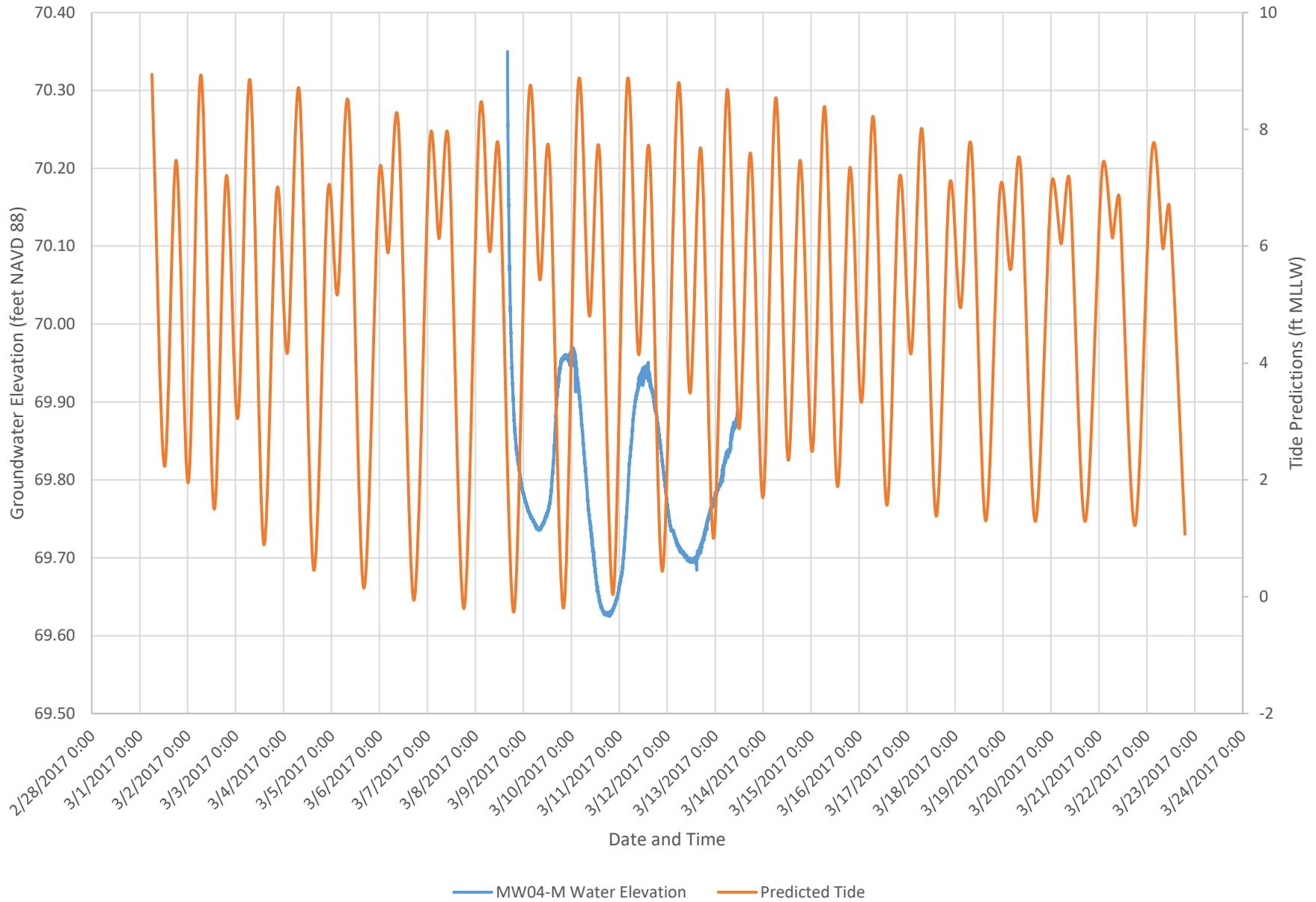
MW10-D Water Elevation



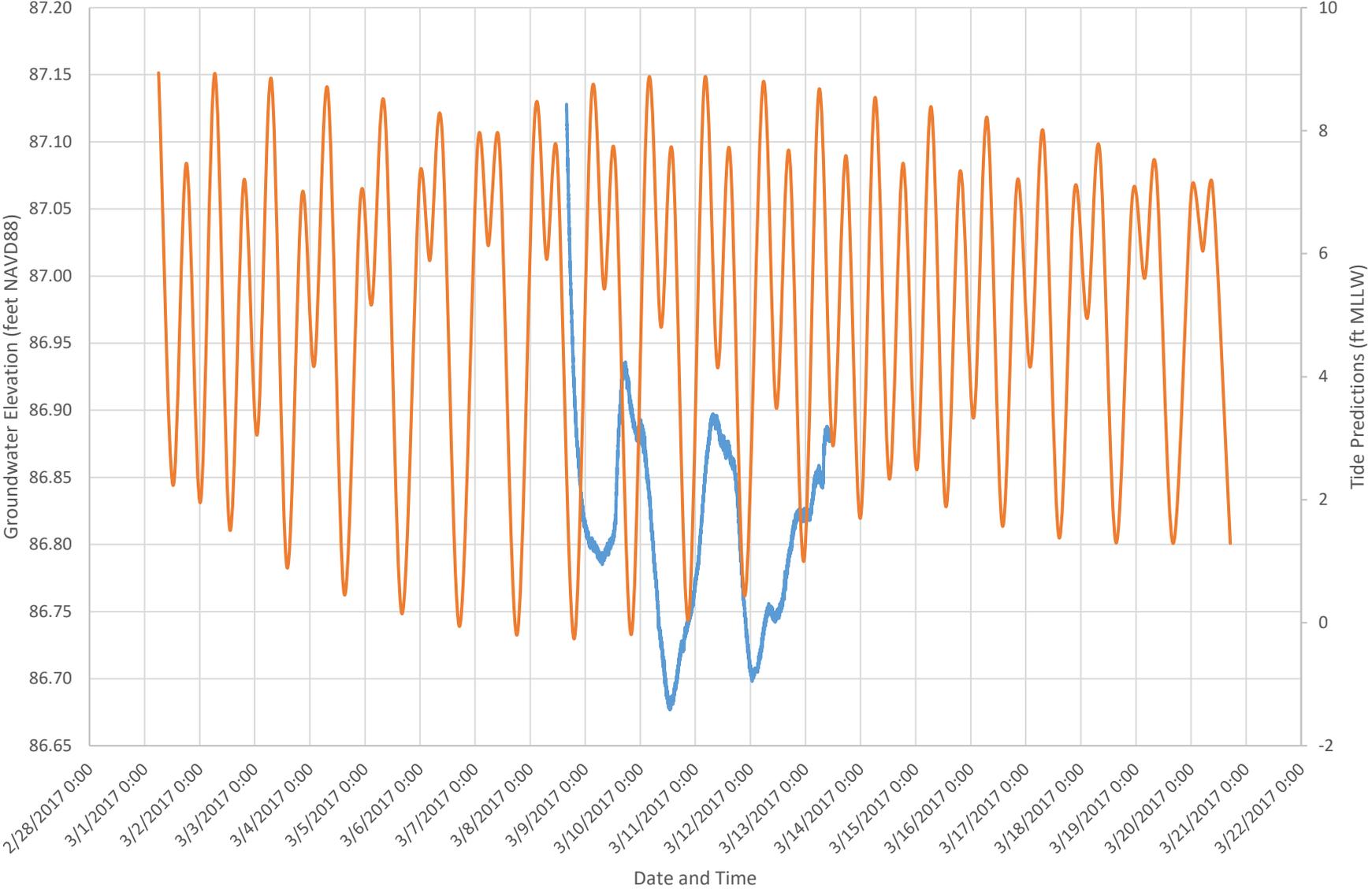
MW10-M Water Elevation



MW04-M Water Elevation

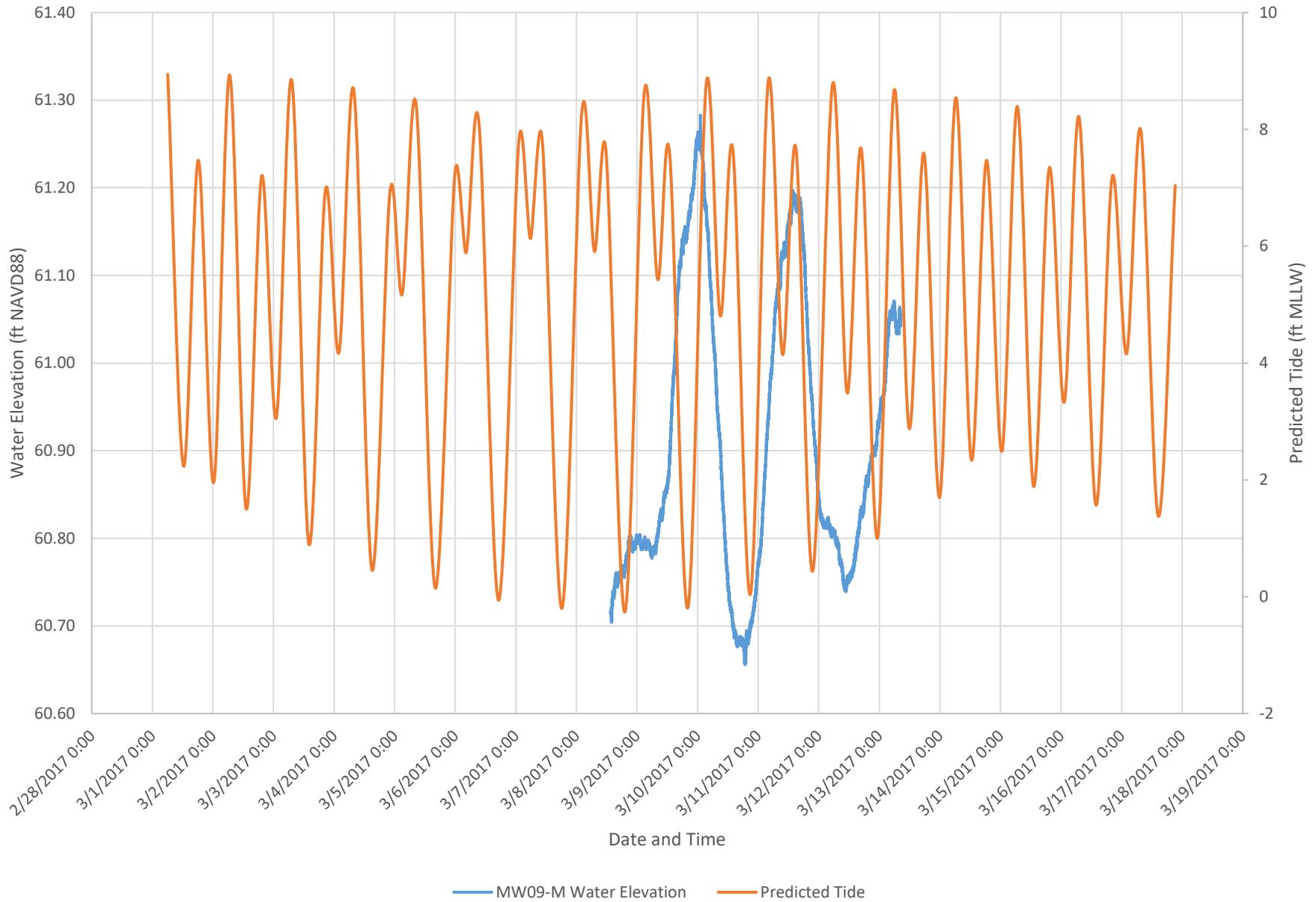


MW04-S Water Elevation

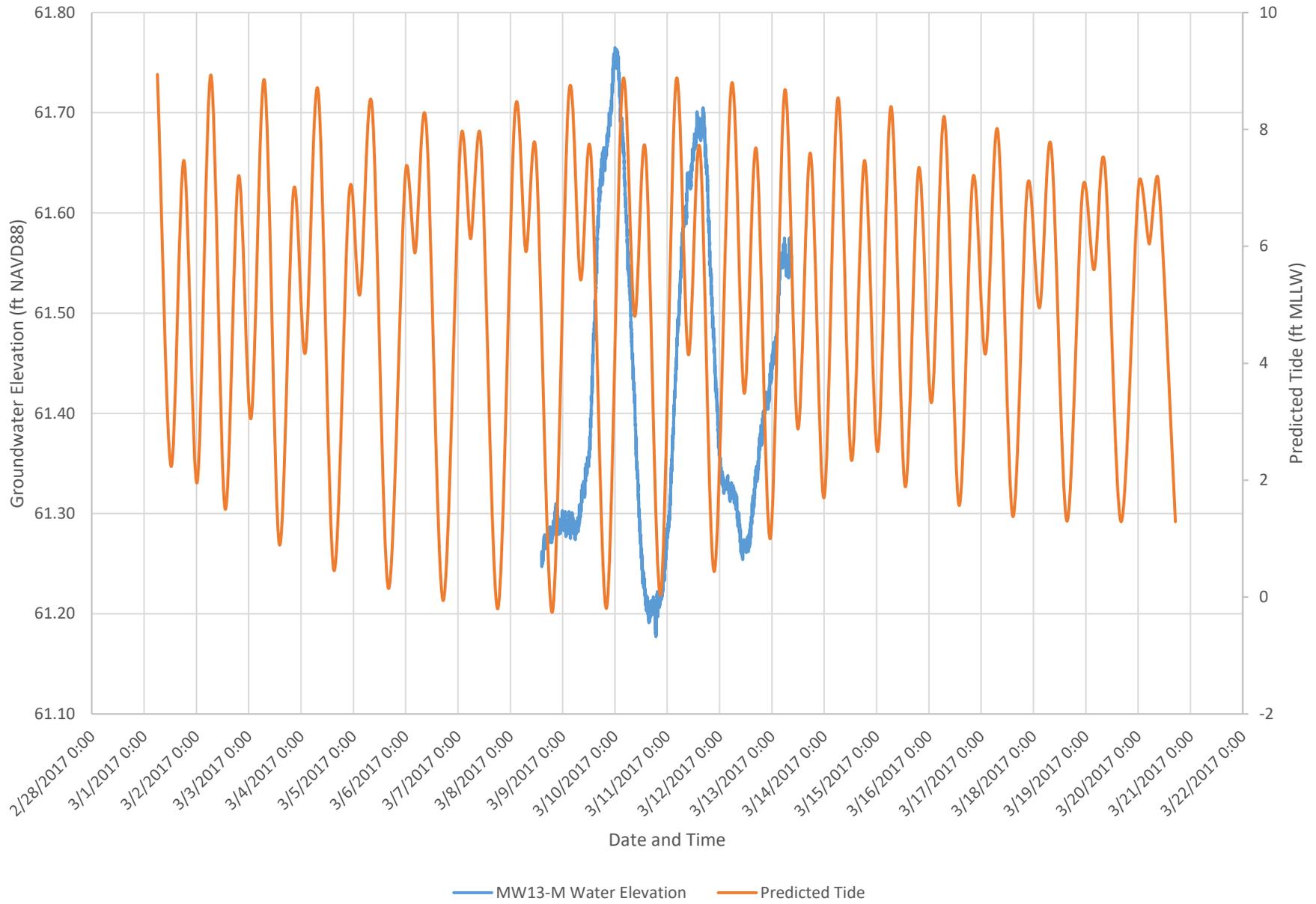


— MW04-S Water Elevation — Predicted Tides

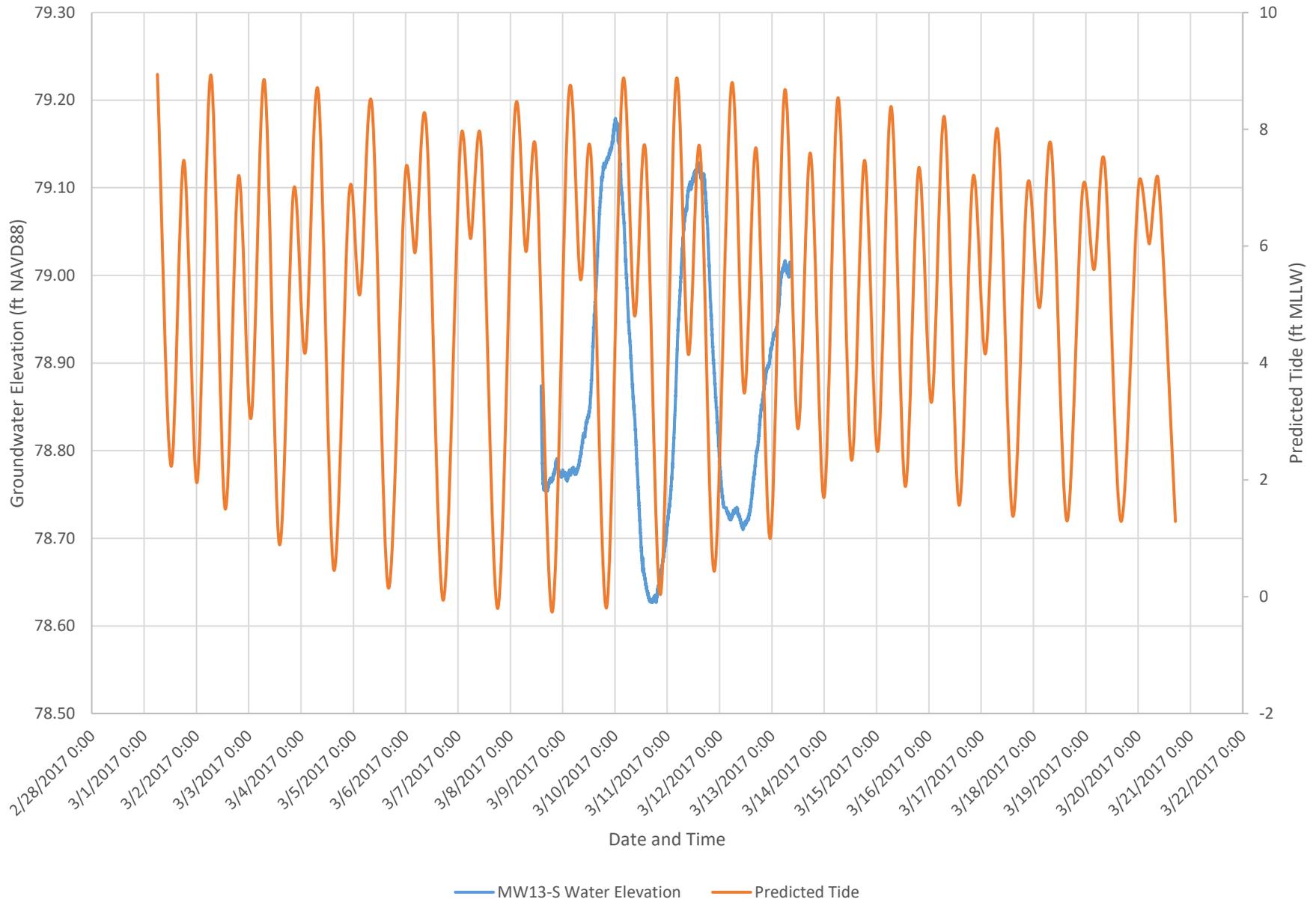
MW09-M Water Elevation



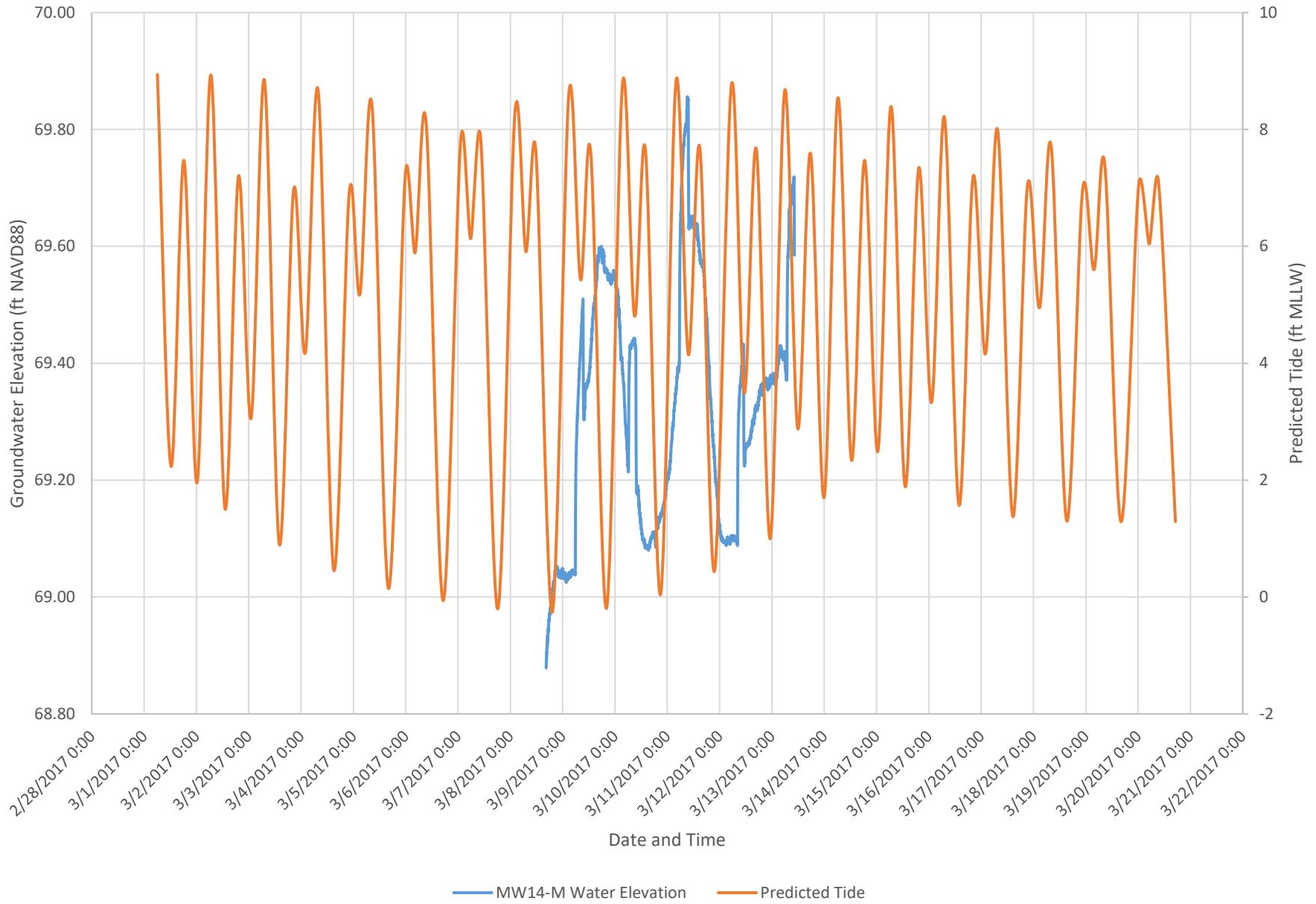
MW13-M Water Elevation



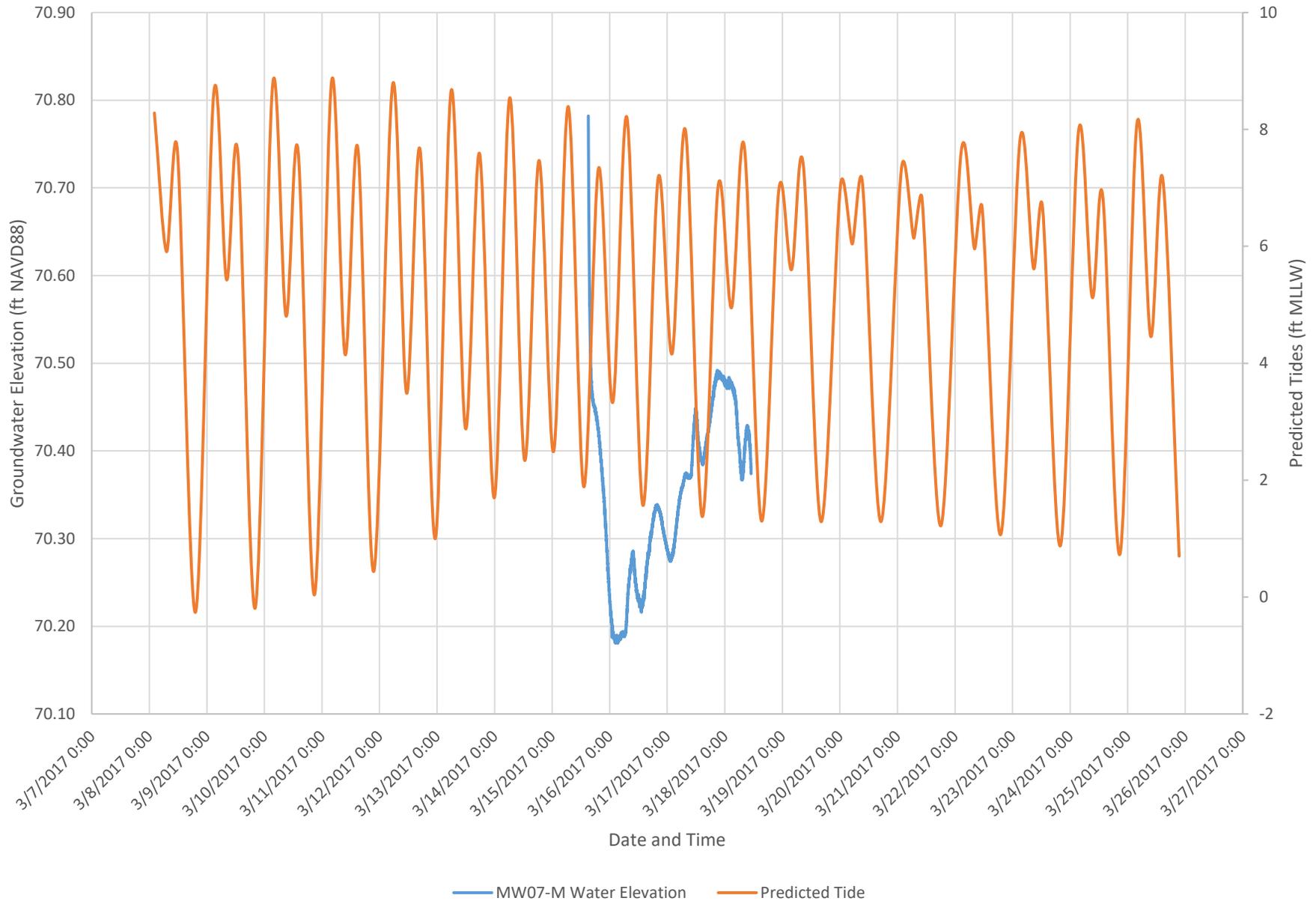
MW13-S Water Elevation



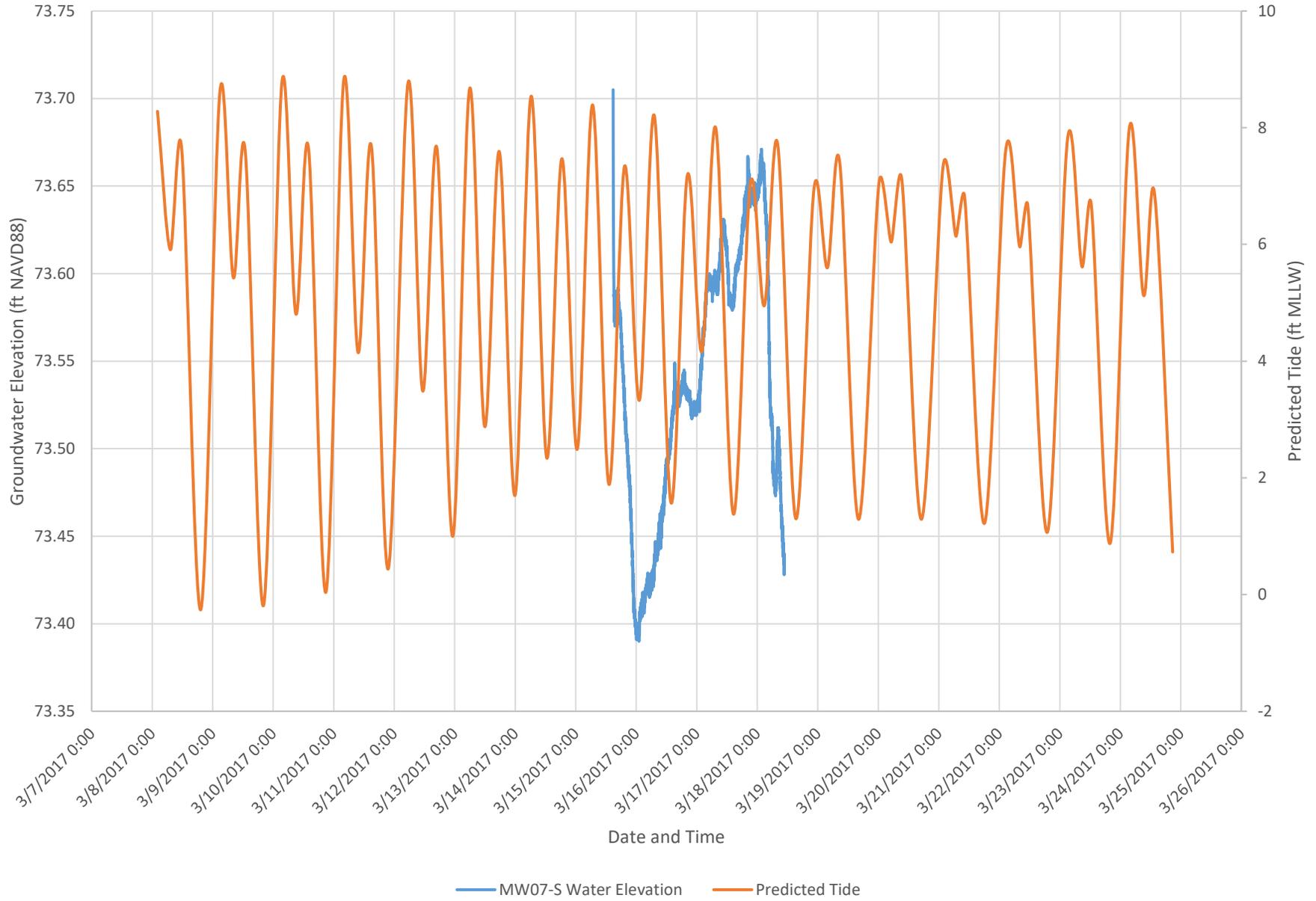
MW14-M Water Elevation



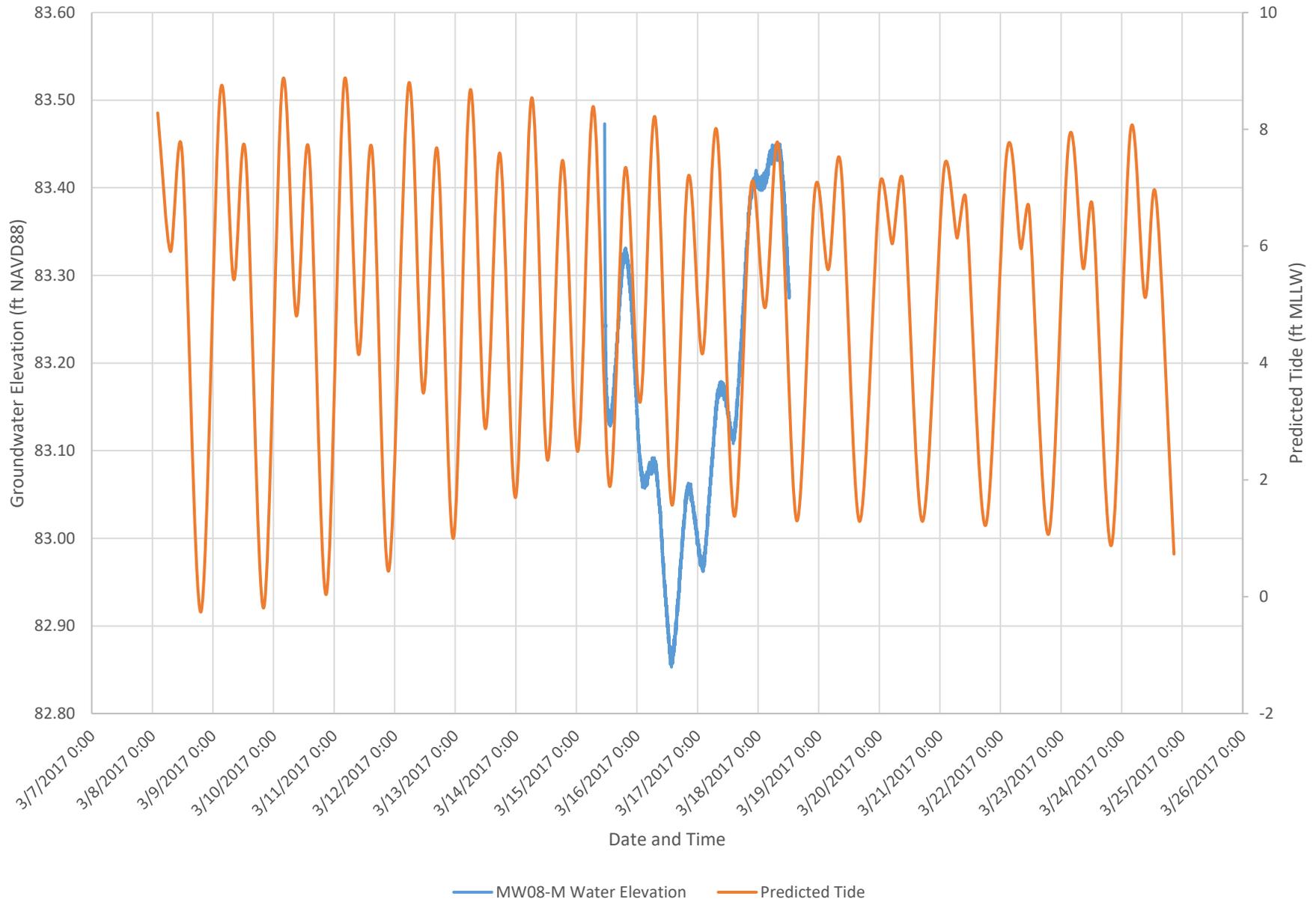
MW07-M Water Elevation



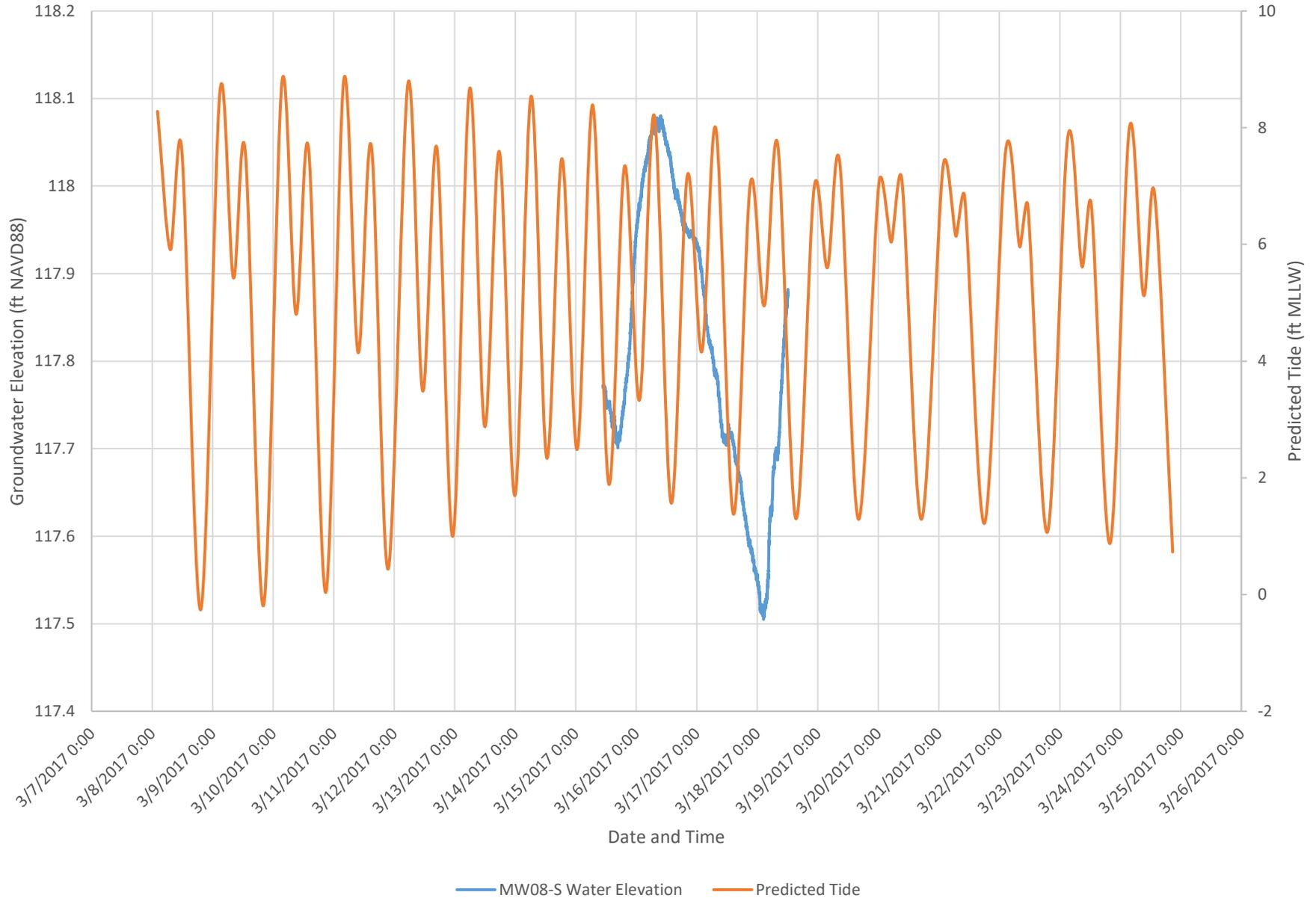
MW07-S Water Elevation



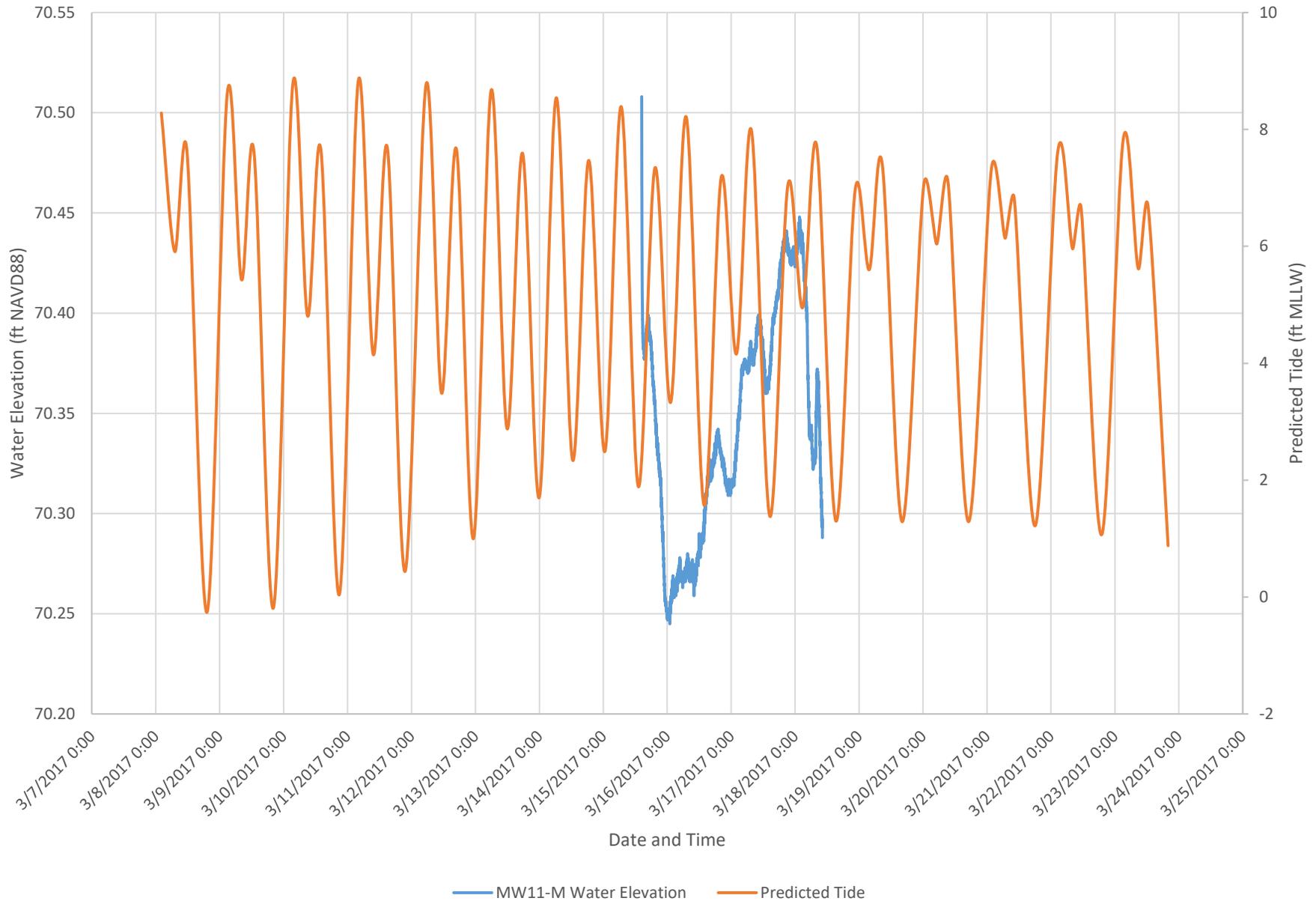
MW08-M Water Elevation



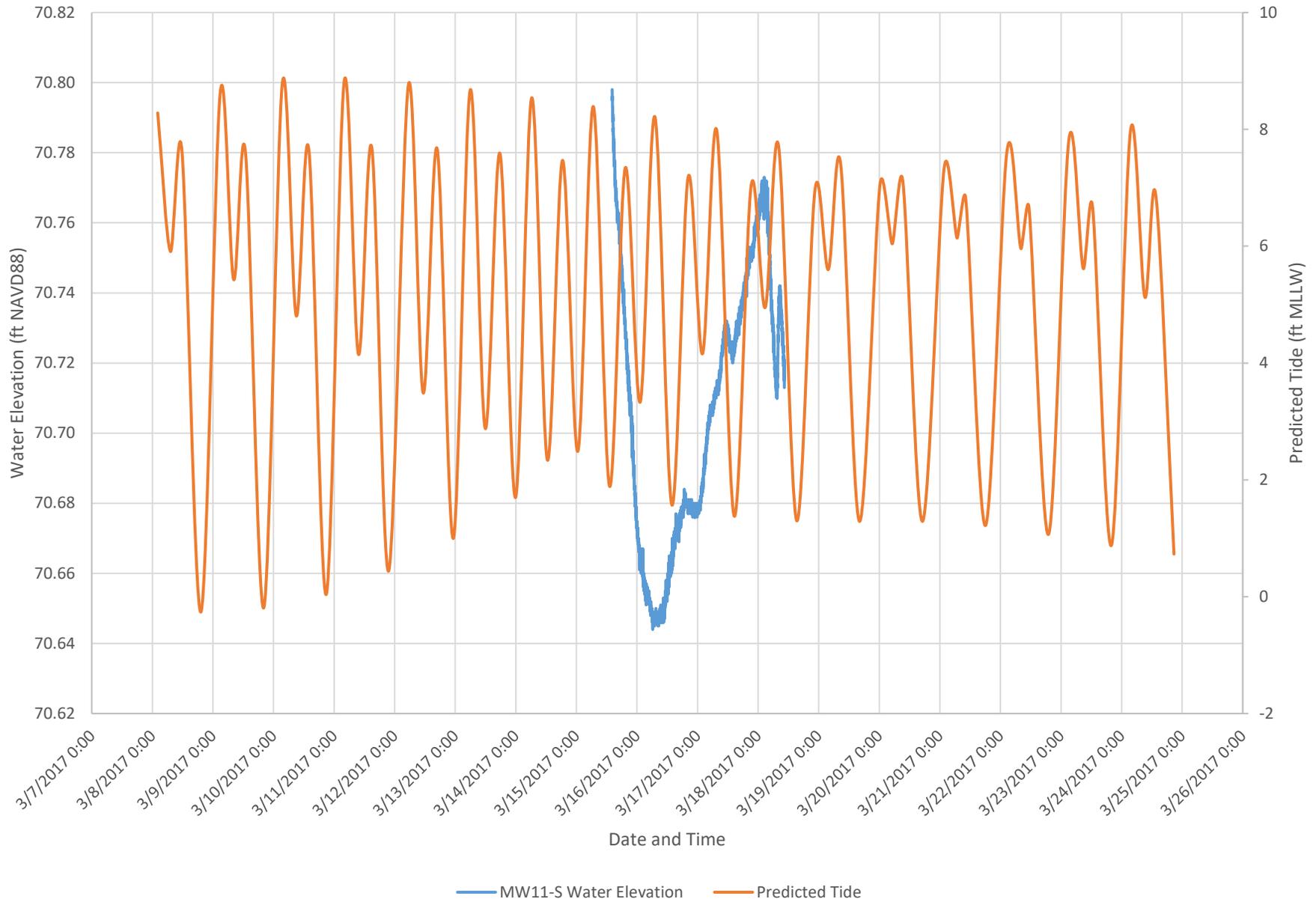
MW08-S Water Elevation



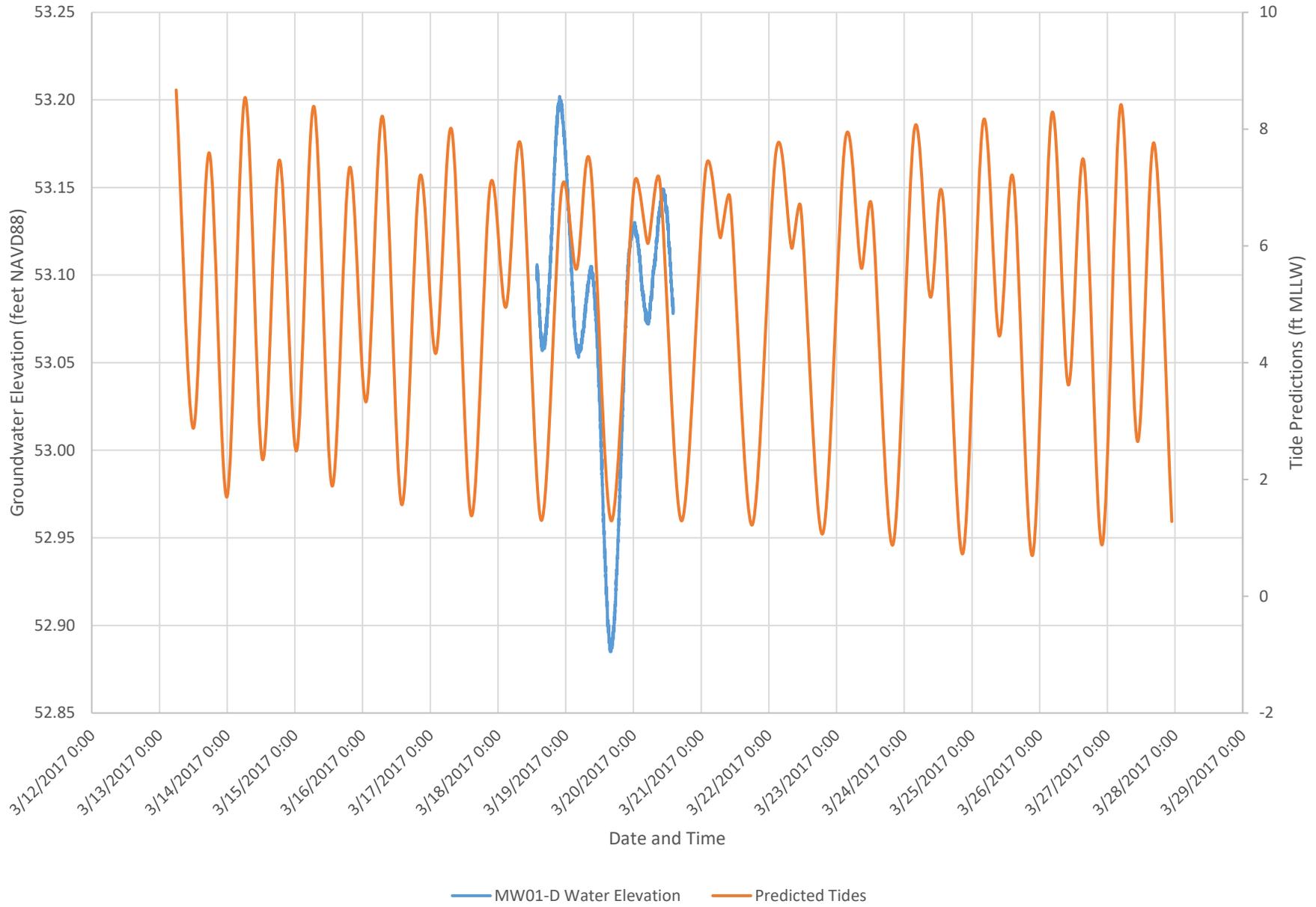
MW11-M Water Elevation



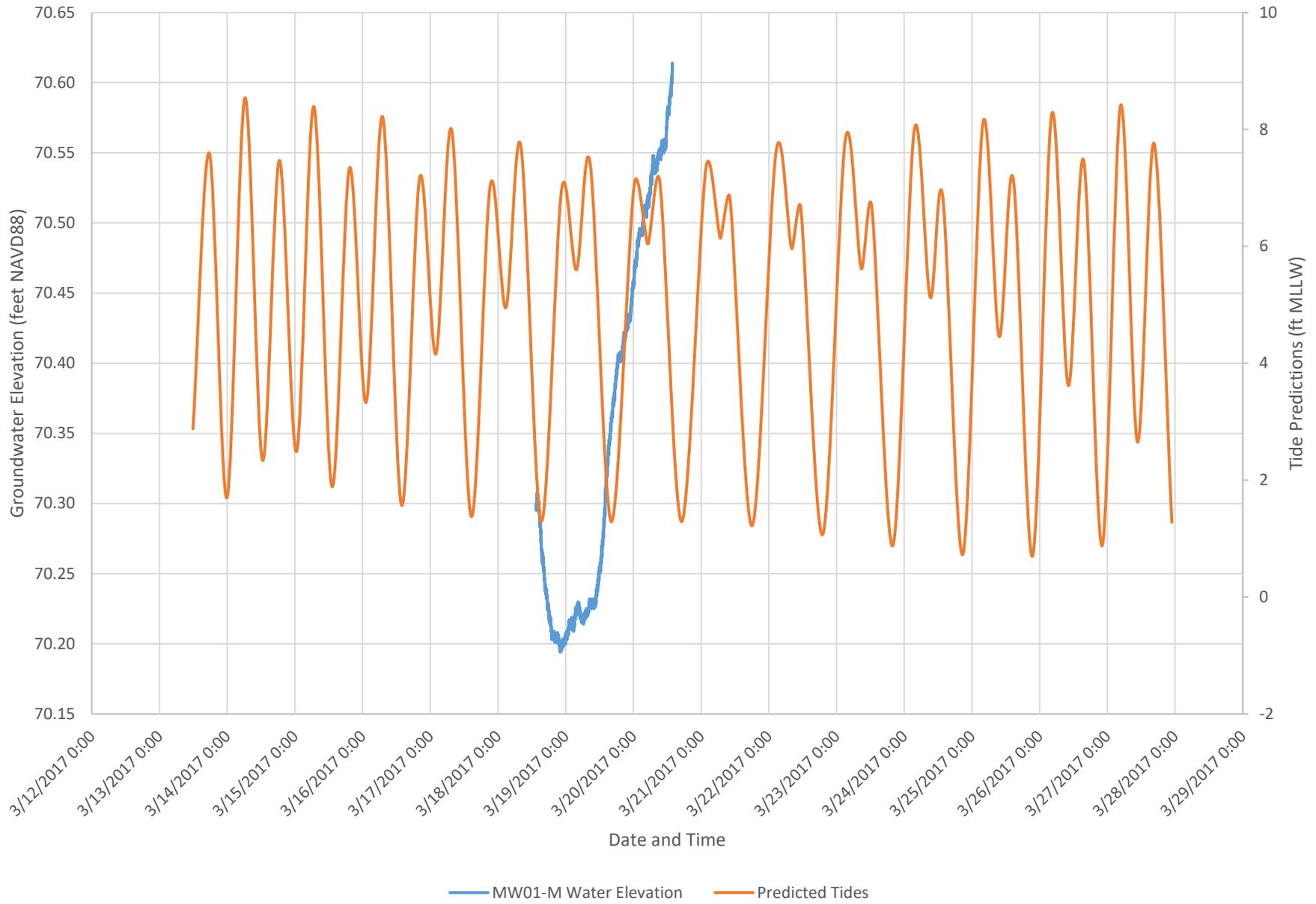
MW11-S Water Elevation



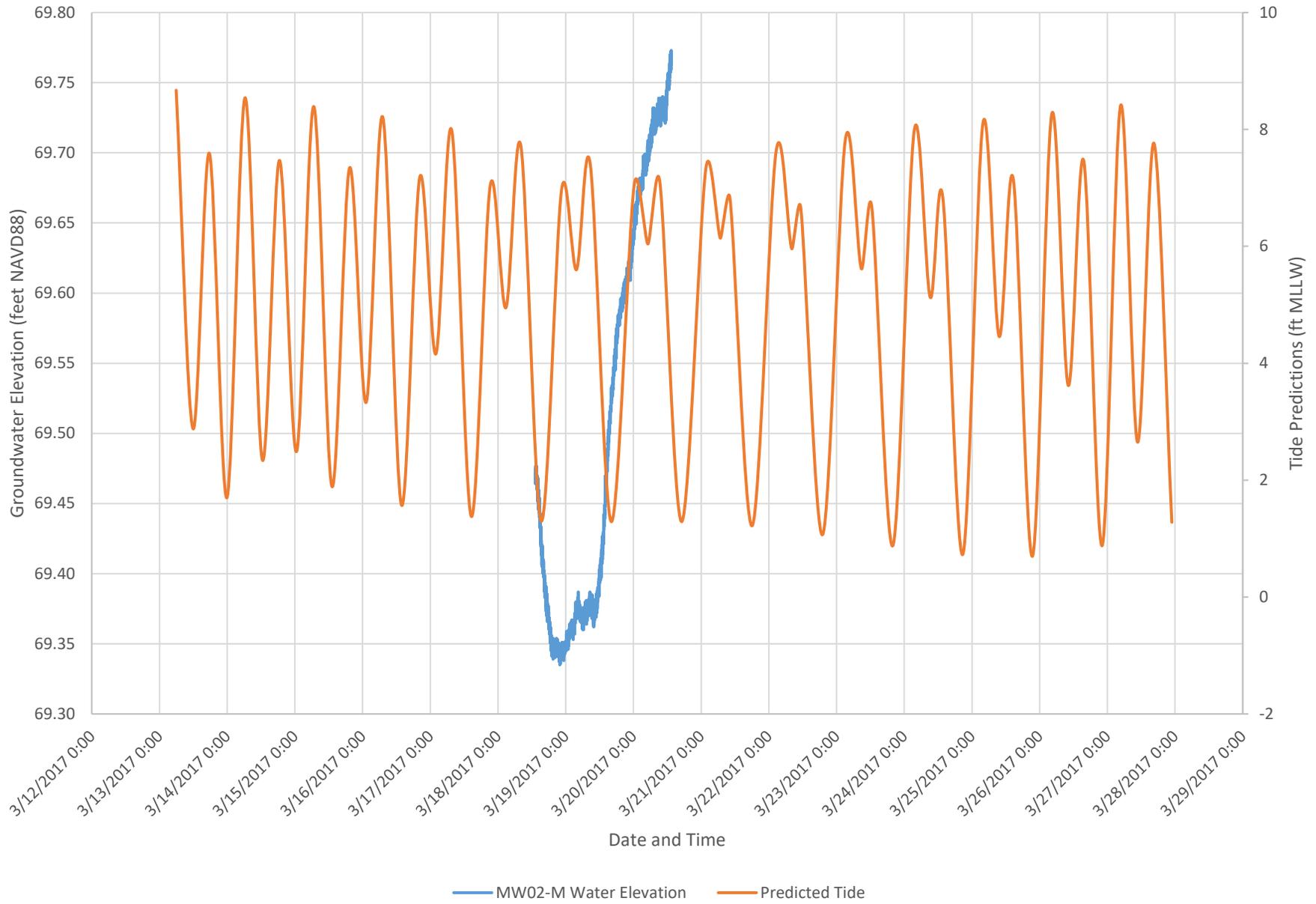
MW01-D Water Elevation



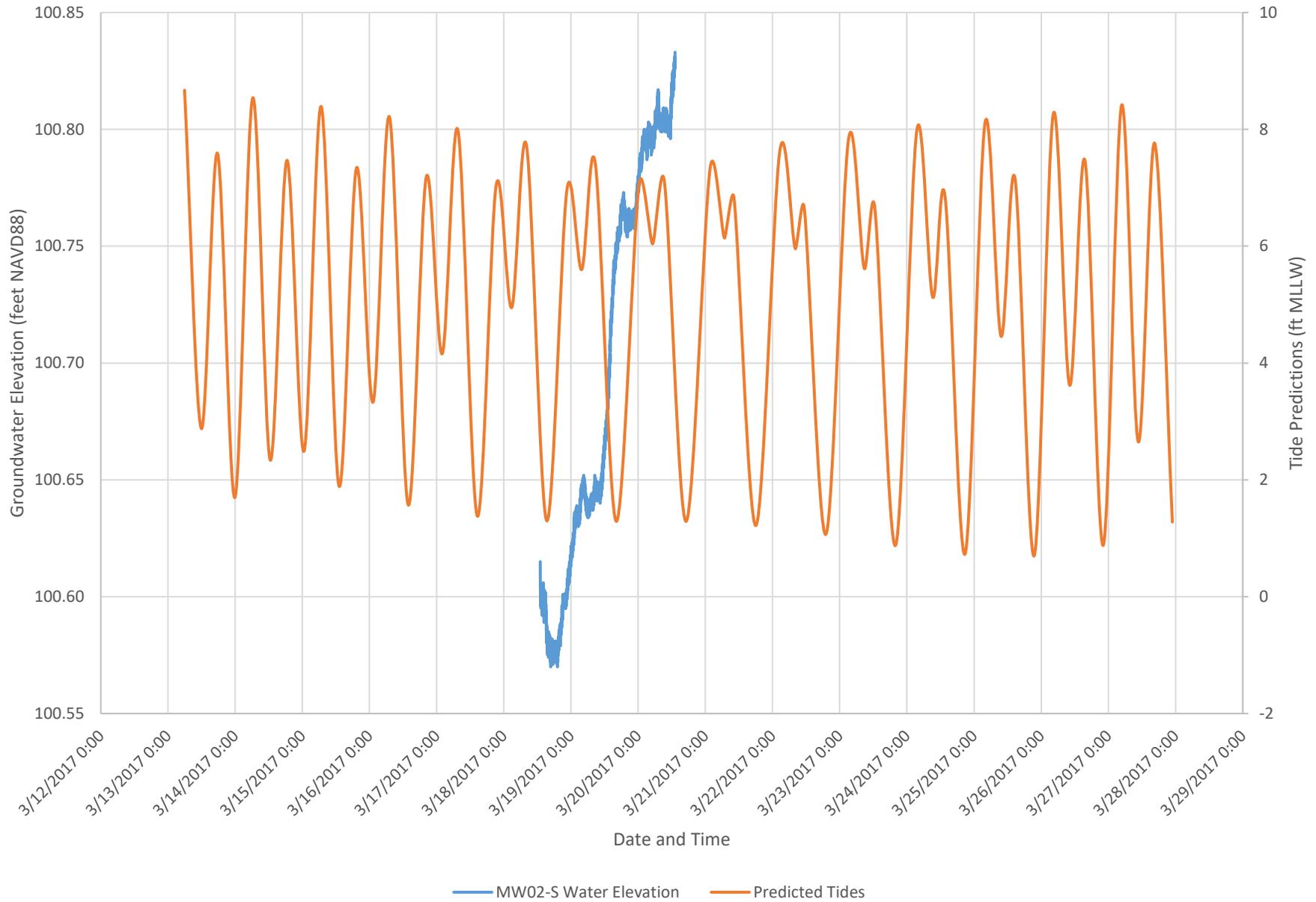
MW01-M Water Elevation



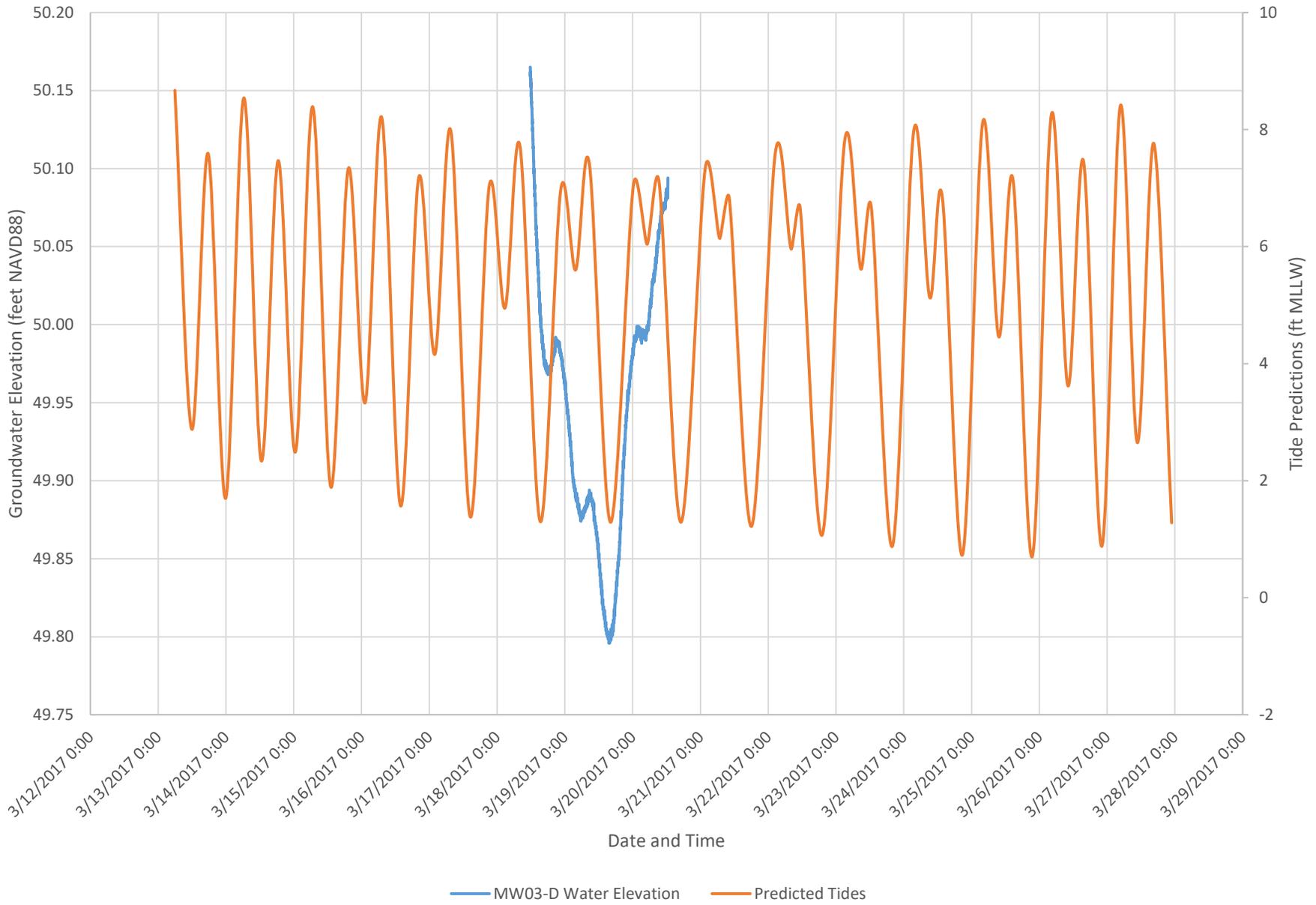
MW02-M Water Elevation



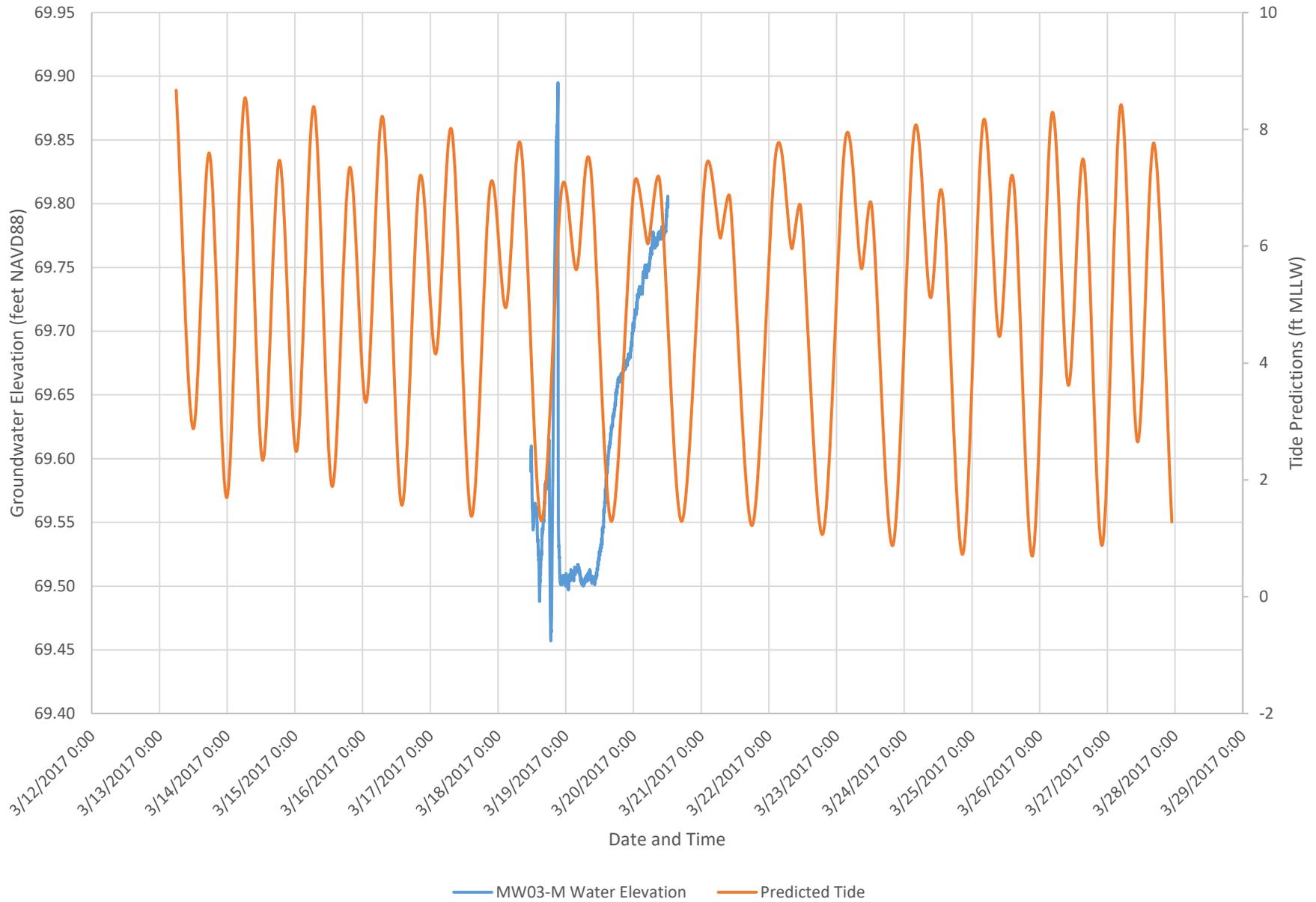
MW02-S Water Elevation



MW03-D Water Elevation



MW03-M Water Elevation



Attachment 6
Raw Data Tables

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW01D-0217	WI-CV-GW01M-0217	WI-CV-GW02M-0317	WI-CV-GW02S-0317	WI-CV-GW02SP-0317	WI-CV-GW03D-0217	WI-CV-GW03M-0217	WI-CV-GW04M-0217	WI-CV-GW04S-0317	WI-CV-GW04SP-0317
Sample Date	2/28/17	2/28/17	3/1/17	3/1/17	3/1/17	2/27/17	2/27/17	2/28/17	3/1/17	3/1/17
Chemical Name										
Semivolatile Organic Compounds (NG/L)										
Perfluorobutanesulfonic acid (PFBS)	4 U	3.94 U	3.88 U	332	357	3.91 U	3.88 U	4.03 U	3.91 U	3.82 U
Perfluorooctane Sulfonate (PFOS)	0.9 U	0.886 U	0.872 U	54.7	53	0.914 J	0.872 U	0.907 U	0.879 U	0.859 U
Perfluorooctanoic acid (PFOA)	2 U	1.97 U	1.94 U	571	564	1.95 U	1.94 U	2.02 U	1.95 U	1.91 U

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Notes:
 J - Analyte present. Value may or may not be accurate or precise
 NG/L - Nanograms per liter
 NS - Not sampled
 U - The material was analyzed for, but not detected

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW05M-0217	WI-CV-GW05S-0217	WI-CV-GW06M-0217	WI-CV-GW06S-0217	WI-CV-GW06SP-0217	WI-CV-GW07M-0317	WI-CV-GW07S-0317	WI-CV-GW08M-0317	WI-CV-GW08S-0317
Sample Date	2/23/17	2/24/17	2/21/17	2/22/17	2/22/17	3/4/17	3/4/17	3/4/17	3/2/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	473	12.9	3.91 U	3.97 U	3.94 U	3.91 U	4.39 U	3.91 U	3.85 U
Perfluorooctane Sulfonate (PFOS)	3.26 J	0.922 U	0.879 U	0.893 U	0.886 U	0.844 J	0.987 U	0.879 U	0.865 U
Perfluorooctanoic acid (PFOA)	1,190	9.87	1.95 U	1.98 U	1.97 U	1.95 U	2.19 U	1.95 U	1.92 U

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW09M-0217	WI-CV-GW10D-0217	WI-CV-GW10M-0217	WI-CV-GW11M-0217	WI-CV-GW11S-0217	WI-CV-GW12D-0317	WI-CV-GW13M-0217	WI-CV-GW13S-0317	WI-CV-GW14M-0317
Sample Date	2/23/17	2/20/17	2/22/17	2/26/17	2/26/17	3/1/17	2/22/17	3/3/17	3/4/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	11.2	3.85 U	3.07 J	7.66 U	3.91 U	3.97 U	139	4.07 U	111
Perfluorooctane Sulfonate (PFOS)	0.915 U	0.865 U	0.938 U	1.72 U	1 U	0.893 U	0.872 U	0.915 U	0.898 J
Perfluorooctanoic acid (PFOA)	2.03 U	1.92 U	2.08 U	3.83 U	1.95 U	1.98 U	20.4	2.03 U	166

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW01D-0217	WI-CV-GW01M-0217	WI-CV-GW02M-0317	WI-CV-GW02S-0317	WI-CV-GW02SP-0317	WI-CV-GW03D-0217	WI-CV-GW03M-0217	WI-CV-GW04M-0217	WI-CV-GW04S-0317	WI-CV-GW04SP-0317
Sample Date	2/28/17	2/28/17	3/1/17	3/1/17	3/1/17	2/27/17	2/27/17	2/28/17	3/1/17	3/1/17
Chemical Name										
Semivolatile Organic Compounds (NG/L)										
Perfluorobutanesulfonic acid (PFBS)	4 U	3.94 U	3.88 U	332	357	3.91 U	3.88 U	4.03 U	3.91 U	3.82 U
Perfluorooctane Sulfonate (PFOS)	0.9 U	0.886 U	0.872 U	54.7	53	0.914 J	0.872 U	0.907 U	0.879 U	0.859 U
Perfluorooctanoic acid (PFOA)	2 U	1.97 U	1.94 U	571	564	1.95 U	1.94 U	2.02 U	1.95 U	1.91 U

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- Shading indicates detection

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW05M-0217	WI-CV-GW05S-0217	WI-CV-GW06M-0217	WI-CV-GW06S-0217	WI-CV-GW06SP-0217	WI-CV-GW07M-0317	WI-CV-GW07S-0317	WI-CV-GW08M-0317
Sample Date	2/23/17	2/24/17	2/21/17	2/22/17	2/22/17	3/4/17	3/4/17	3/4/17
Chemical Name								
Semivolatile Organic Compounds (NG/L)								
Perfluorobutanesulfonic acid (PFBS)	473	12.9	3.91 U	3.97 U	3.94 U	3.91 U	4.39 U	3.91 U
Perfluorooctane Sulfonate (PFOS)	3.26 J	0.922 U	0.879 U	0.893 U	0.886 U	0.844 J	0.987 U	0.879 U
Perfluorooctanoic acid (PFOA)	1,190	9.87	1.95 U	1.98 U	1.97 U	1.95 U	2.19 U	1.95 U

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- Shading indicates detection

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	WI-CV-GW08S-0317	WI-CV-GW09M-0217	WI-CV-GW10D-0217	WI-CV-GW10M-0217	WI-CV-GW11M-0217	WI-CV-GW11S-0217	WI-CV-GW12D-0317	WI-CV-GW13M-0217	WI-CV-GW13S-0317	WI-CV-GW14M-0317
Sample Date	3/2/17	2/23/17	2/20/17	2/22/17	2/26/17	2/26/17	3/1/17	2/22/17	3/3/17	3/4/17
Chemical Name										
Semivolatile Organic Compounds (NG/L)										
Perfluorobutanesulfonic acid (PFBS)	3.85 U	11.2	3.85 U	3.07 J	7.66 U	3.91 U	3.97 U	139	4.07 U	111
Perfluorooctane Sulfonate (PFOS)	0.865 U	0.915 U	0.865 U	0.938 U	1.72 U	1 U	0.893 U	0.872 U	0.915 U	0.898 J
Perfluorooctanoic acid (PFOA)	1.92 U	2.03 U	1.92 U	2.08 U	3.83 U	1.95 U	1.98 U	20.4	2.03 U	166

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- Shading indicates detection

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	USEPA Lifetime Health Advisory (May 2016)	USEPA Tapwater RSLs, HQ = 1.0 (May 2016)	WI-CV-GW01D-0217	WI-CV-GW01M-0217	WI-CV-GW02M-0317	WI-CV-GW02S-0317	WI-CV-GW02SP-0317	WI-CV-GW03D-0217	WI-CV-GW03M-0217
Sample Date			2/28/17	2/28/17	3/1/17	3/1/17	3/1/17	2/27/17	2/27/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	--	380,000	4 U	3.94 U	3.88 U	332	357	3.91 U	3.88 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.9 U	0.886 U	0.872 U	54.7	53	0.914 J	0.872 U
Perfluorooctanoic acid (PFOA)	70	--	2 U	1.97 U	1.94 U	571	564	1.95 U	1.94 U

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- - No screening criteria available
- Shading indicates detection
- Bolded text indicated exceedance of USEPA Lifetime Health Advisory**
- Underlined text indicated exceedance of USEPA Tapwater RSLs, HQ = 1.0 (May 2016)

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	USEPA Lifetime Health Advisory (May 2016)	USEPA Tapwater RSLs, HQ = 1.0 (May 2016)	WI-CV-GW04M-0217 2/28/17	WI-CV-GW04S-0317 3/1/17	WI-CV-GW04SP-0317 3/1/17	WI-CV-GW05M-0217 2/23/17	WI-CV-GW05S-0217 2/24/17	WI-CV-GW06M-0217 2/21/17	WI-CV-GW06S-0217 2/22/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	--	380,000	4.03 U	3.91 U	3.82 U	473	12.9	3.91 U	3.97 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.907 U	0.879 U	0.859 U	3.26 J	0.922 U	0.879 U	0.893 U
Perfluorooctanoic acid (PFOA)	70	--	2.02 U	1.95 U	1.91 U	1,190	9.87	1.95 U	1.98 U

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Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- - No screening criteria available
- Shading indicates detection
- Bolded text indicated exceedance of USEPA Lifetime Health Advisory**
- Underlined text indicated exceedance of USEPA Tapwater RSLs, HQ = 1.0 (May 2016)

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	USEPA Lifetime Health Advisory (May 2016)	USEPA Tapwater RSLs, HQ = 1.0 (May 2016)	WI-CV-GW06SP-0217	WI-CV-GW07M-0317	WI-CV-GW07S-0317	WI-CV-GW08M-0317	WI-CV-GW08S-0317	WI-CV-GW09M-0217	WI-CV-GW10D-0217
Sample Date			2/22/17	3/4/17	3/4/17	3/4/17	3/2/17	2/23/17	2/20/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	--	380,000	3.94 U	3.91 U	4.39 U	3.91 U	3.85 U	11.2	3.85 U
Perfluorooctane Sulfonate (PFOS)	70	--	0.886 U	0.844 J	0.987 U	0.879 U	0.865 U	0.915 U	0.865 U
Perfluorooctanoic acid (PFOA)	70	--	1.97 U	1.95 U	2.19 U	1.95 U	1.92 U	2.03 U	1.92 U

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Notes:
 J - Analyte present. Value may or may not be accurate or precise
 NG/L - Nanograms per liter
 NS - Not sampled
 U - The material was analyzed for, but not detected
 -- - No screening criteria available
 Shading indicates detection
Bolded text indicated exceedance of USEPA Lifetime Health Advisory
Underlined text indicated exceedance of USEPA Tapwater RSLs, HQ = 1.0 (May 2016)

NAS Whidbey Island
 OLF Coupeville SI
 PFAS Groundwater Results
 February/March 2017

Sample ID	USEPA Lifetime Health Advisory (May 2016)	USEPA Tapwater RSLs, HQ = 1.0 (May 2016)	WI-CV-GW10M-0217 2/22/17	WI-CV-GW11M-0217 2/26/17	WI-CV-GW11S-0217 2/26/17	WI-CV-GW12D-0317 3/1/17	WI-CV-GW13M-0217 2/22/17	WI-CV-GW13S-0317 3/3/17	WI-CV-GW14M-0317 3/4/17
Chemical Name									
Semivolatile Organic Compounds (NG/L)									
Perfluorobutanesulfonic acid (PFBS)	--	380,000	3.07 J	7.66 U	3.91 U	3.97 U	139	4.07 U	111
Perfluorooctane Sulfonate (PFOS)	70	--	0.938 U	1.72 U	1 U	0.893 U	0.872 U	0.915 U	0.898 J
Perfluorooctanoic acid (PFOA)	70	--	2.08 U	3.83 U	1.95 U	1.98 U	20.4	2.03 U	166

C:\Users\jamison\Desktop\CTO 08 PFAS Coupeville Groundwater TM\Attachments\Att6_Raw Data Tables\OLF Coupeville_SI_GW_PFAS_val_table_032

Notes:

- J - Analyte present. Value may or may not be accurate or precise
- NG/L - Nanograms per liter
- NS - Not sampled
- U - The material was analyzed for, but not detected
- - No screening criteria available
- Shading indicates detection
- Bolded text indicated exceedance of USEPA Lifetime Health Advisory**
- Underlined text indicated exceedance of USEPA Tapwater RSLs, HQ = 1.0 (May 2016)

Attachment 7
Data Validation Report

**DATA VALIDATION SUMMARY REPORT
COUPEVILLE, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
 SDG: 1700261
 Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
 Site: Coupeville, CTO-0008, Washington
 Date: March 24, 2017

PFCs			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	WI-CV-GW10D-0217	1700261-01	Water
2	WI-CV-EB01-022017	1700261-02	Water
3	WI-CV-GW06S-0217	1700261-03	Water
4	WI-CV-GW06SP-0217	1700261-04	Water
5	WI-CV-GW10M-0217	1700261-05	Water
6	WI-CV-EB03-022217	1700261-06	Water
7	WI-CV-GW06M-0217	1700261-07	Water
7MS	WI-CV-GW06M-0217MS	1700261-07MS	Water
7MSD	WI-CV-GW06M-0217MSD	1700261-07MSD	Water
8	WI-CV-EB02-022117	1700261-08	Water
9	WI-CV-EB04-022317	1700261-09	Water
10	WI-CV-GW13M-0217	1700261-10	Water

A full data validation was performed on the analytical data for six water samples and four aqueous equipment blank samples collected on February 20-23, 2017 by CH2M HILL at the Coupeville site in Washington. The samples were analyzed under the EPA Method "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)".

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537 Modified

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (July 2013) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA "Contract Laboratories Program National Functional Guidelines for Superfund Organic Methods Data Review," August 2014;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate recovery (%R)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Ongoing Precision and Recovery (OPR)
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes. There were no qualifications.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

Initial Calibration

- All percent difference (%D) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent difference (%D) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- The field blank samples exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
WI-CV-EB01-022017	None - ND	-	-	-
WI-CV-EB03-022217	None - ND	-	-	-
WI-CV-EB02-022117	None - ND	-	-	-
WI-CV-EB04-022317	Perfluorobutanesulfonate	2.99	None	All associated ND
	Perfluorooctanoic Acid	2.55	None	All associated ND
WI-CV-FB01-030217 (SDG 1700293)	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD sample exhibited acceptable %R and RPD values.

Ongoing Precision and Recovery (OPR)

- The OPR samples exhibited acceptable percent recoveries (%R) values.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

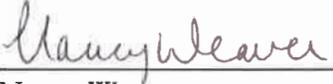
- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below.

Compound	WI-CV-GW06S-0217 ng/L	WI-CV-GW06SP-0217 ng/L	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed: 
Nancy Weaver
Senior Chemist

Dated: 3/24/17

Data Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples.

Sample ID: WI-CV-GW10D-0217

Modified EPA Method 537

Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700261-01	Date Received:	24-Feb-2017 7:32	
Project:	NavyClean OLF Coupeville	Sample Size:	0.130 L		QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58	
Date Collected:	20-Feb-2017 11:45				Date Analyzed:	01-Mar-17 18:30 Column: BEH C18			
Location:	WI-CV-MW10D								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.72	3.85	7.67		IS 13C3-PFBS	88.5	60 - 150	
PFOA	ND	0.624	1.92	7.67		IS 13C2-PFOA	97.0	60 - 150	
PFOS	ND	0.773	0.865	7.67		IS 13C8-PFOS	93.5	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

W31241.7

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Sample ID: WI-CV-EB01-022017						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700261-02	Date Received:	24-Feb-2017 7:32		
Project:	NavyClean OLF Coupeville	Sample Size:	0.118 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58		
Date Collected:	20-Feb-2017 12:00			Date Analyzed:	01-Mar-17 18:43 Column: BEH C18				
Location:	Equipment Blank								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.89	4.24	8.46		IS 13C3-PFBS	107	60 - 150	
PFOA	ND	0.689	2.12	8.46		IS 13C2-PFOA	95.4	60 - 150	
PFOS	ND	0.854	0.953	8.46		IS 13C8-PFOS	107	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

New 3/24/17

3

Sample ID: WI-CV-GW06S-0217					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700261-03	Date Received:	24-Feb-2017 7:32	
Project:	NavyClean OLF Coupeville	Sample Size:	0.126 L		QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58	
Date Collected:	22-Feb-2017 12:05								
Location:	WI-CV-MW06S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.77	3.97	7.93		IS 13C3-PFBS	114	60 - 150	
PFOA	ND	0.645	1.98	7.93		IS 13C2-PFOA	102	60 - 150	
PFOS	ND	0.800	0.893	7.93		IS 13C8-PFOS	99.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

W31241.7

4

Sample ID: WI-CV-GW06SP-0217					Modified EPA Method 537				
Client Data			Sample Data		Laboratory Data				
Name:	CH2M Hill		Matrix:	Groundwater	Lab Sample:	1700261-04	Date Received:	24-Feb-2017 7:32	
Project:	NavyClean OLF Coupeville		Sample Size:	0.127 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58	
Date Collected:	22-Feb-2017 11:05				Date Analyzed:	01-Mar-17 19:08 Column: BEH C18			
Location:	WI-CV-MW06S Spike								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.77	3.94	7.90		IS 13C3-PFBS	102	60 - 150	
PFOA	ND	0.643	1.97	7.90		IS 13C2-PFOA	106	60 - 150	
PFOS	ND	0.797	0.886	7.90		IS 13C8-PFOS	104	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

31241.7

Sample ID: WI-CV-GW10M-0217						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700261-05	Date Received:	24-Feb-2017 7:32		
Project:	NavyClean OLF Coupeville	Sample Size:	0.120 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58		
Date Collected:	22-Feb-2017 10:00			Date Analyzed:	01-Mar-17 19:20 Column: BEH C18				
Location:	WI-CV-MW10S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	3.07	1.87	4.17	8.35	J	IS 13C3-PFBS	95.9	60 - 150	
PFOA	ND	0.679	2.08	8.35		IS 13C2-PFOA	90.3	60 - 150	
PFOS	ND	0.842	0.938	8.35		IS 13C8-PFOS	100	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers
 Only the linear isomer is reported for all other analytes.

ww-31241.7

6

Sample ID: WI-CV-EB03-022217						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700261-06	Date Received:	24-Feb-2017 7:32		
Project:	NavyClean OLF Coupeville	Sample Size:	0.119 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58		
Date Collected:	22-Feb-2017 11:15			Date Analyzed:	01-Mar-17 19:33 Column: BEH C18				
Location:	Equipment Blank								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.88	4.20	8.38		IS 13C3-PFBS	110	60 - 150	
PFOA	ND	0.682	2.10	8.38		IS 13C2-PFOA	105	60 - 150	
PFOS	ND	0.845	0.945	8.38		IS 13C8-PFOS	97.3	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

NW 3/24/17

7

Sample ID: WI-CV-GW06M-0217					Modified EPA Method 537							
Client Data			Sample Data		Laboratory Data							
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700261-07		Date Received:	24-Feb-2017 7:32		
Project:	NavyClean OLF Coupeville		Sample Size:	0.128 L		QC Batch:	B7B0118		Date Extracted:	24-Feb-2017 10:58		
Date Collected:	21-Feb-2017 14:25							Date Analyzed:	01-Mar-17 19:45 Column: BEH C18			
Location:	WI-CV-MW06M											
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers			
PFBS	ND	1.75	3.91	7.81		IS 13C3-PFBS	107	60 - 150				
PFOA	ND	0.635	1.95	7.81		IS 13C2-PFOA	106	60 - 150				
PFOS	ND	0.787	0.879	7.81		IS 13C8-PFOS	110	60 - 150				

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers

Only the linear isomer is reported for all other analytes.

W312417

Sample ID: WI-CV-EB02-022117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700261-08	Date Received:	24-Feb-2017 7:32	
Project:	NavyClean OLF Coupeville		Sample Size:	0.124 L		QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58	
Date Collected:	21-Feb-2017 16:10					Date Analyzed:	01-Mar-17 20:23 Column: BEH C18			
Location:	Equipment Blank									
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers	
PFBS	ND	1.81	4.03	8.07		IS 13C3-PFBS	91.5	60 - 150		
PFOA	ND	0.657	2.02	8.07		IS 13C2-PFOA	96.8	60 - 150		
PFOS	ND	0.815	0.907	8.07		IS 13C8-PFOS	95.4	60 - 150		

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW-3124/1.7

9

Sample ID: WI-CV-EB04-022317						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700261-09	Date Received:	24-Feb-2017 7:32		
Project:	NavyClean OLF Coupeville	Sample Size:	0.122 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58		
Date Collected:	23-Feb-2017 12:05			Date Analyzed:	01-Mar-17 21:51	Column:	BEH C18		
Location:	Equipment Blank								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	2.99	1.84	4.10	8.23	J	IS 13C3-PFBS	86.5	60 - 150	
PFOA	2.55	0.670	2.05	8.23	J	IS 13C2-PFOA	107	60 - 150	
PFOS	ND	0.830	0.922	8.23		IS 13C8-PFOS	105	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3124/17

Sample ID: WI-CV-GW13M-0217					Modified EPA Method 537				
Client Data			Sample Data		Laboratory Data				
Name:	CH2M Hill		Matrix:	Groundwater	Lab Sample:	1700261-10	Date Received:	24-Feb-2017 7:32	
Project:	NavyClean OLF Coupeville		Sample Size:	0.129 L	QC Batch:	B7B0118	Date Extracted:	24-Feb-2017 10:58	
Date Collected:	22-Feb-2017 16:25				Date Analyzed:	01-Mar-17 22:03	Column:	BEH C18	
Location:	WI-CV-MW13M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	139	1.74	3.88	7.78		IS 13C3-PFBS	92.2	60 - 150	
PFOA	20.4	0.633	1.94	7.78		IS 13C2-PFOA	117	60 - 150	
PFOS	ND	0.785	0.872	7.78		IS 13C8-PFOS	106	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

20170324

**DATA VALIDATION SUMMARY REPORT
COUPEVILLE, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 1700268
Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
Site: Coupeville, CTO-0008, Washington
Date: March 24, 2017

PFCs			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	WI-CV-GW09M-0217	1700268-01	Water
2	WI-CV-GW05M-0217	1700268-02	Water
3	WI-CV-GW05S-0217	1700268-03	Water
4	WI-CV-GW11M-0217	1700268-04	Water
5	WI-CV-GW11S-0217	1700268-05	Water
6	WI-CV-EB06-022617	1700268-06	Water
7	WI-CV-EB05-022417	1700268-07	Water

A full data validation was performed on the analytical data for five water samples and two aqueous equipment blank samples collected on February 23-26, 2017 by CH2M HILL at the Coupeville site in Washington. The samples were analyzed under the EPA Method "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)".

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537 Modified

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (July 2013) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA "Contract Laboratories Program National Functional Guidelines for Superfund Organic Methods Data Review," August 2014;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate recovery (%R)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Ongoing Precision and Recovery (OPR)
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes as qualified for the data quality indicator criteria as detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedences of QC criteria.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

Initial Calibration

- All percent difference (%D) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent difference (%D) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- The field blank samples were free of contamination except for the following.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
WI-CV-EB06-022617	Perfluorooctanesulfonate	1.12	U	5
WI-CV-EB05-022417	None - ND	-	-	-
WI-CV-FB01-031217 (SDG 1700293)	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- A MS/MSD sample was not collected.

Ongoing Precision and Recovery (OPR)

- The OPR samples exhibited acceptable percent recoveries (%R) values.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- Several samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:

Nancy Weaver
Senior Chemist

Dated: _____

Data Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples.

Sample ID: WI-CV-GW09M-0217

Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700268-01	Date Received:	28-Feb-2017 7:28
Project:	Navy Clean CTO-0008 OLF Coupeville	Sample Size:	0.123 L	QC Batch:	B7C0003	Date Extracted:	01-Mar-2017 8:54
Date Collected:	23-Feb-2017 16:55			Date Analyzed:	06-Mar-17 17:30	Column:	BEH C18
Location:	MW09M						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	11.2	1.82	4.07	8.12		IS 13C3-PFBS	95.8	60 - 150	
PFOA	ND	0.661	2.03	8.12		IS 13C2-PFOA	86.1	60 - 150	
PFOS	ND	0.819	0.915	8.12		IS 13C8-PFOS	93.9	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

NW 3/24/17

2

Sample ID: WI-CV-GW05M-0217	Modified EPA Method 537
------------------------------------	--------------------------------

Client Data	Sample Data	Laboratory Data
Name: CH2M Hill	Matrix: Groundwater	Lab Sample: 1700268-02 Date Received: 28-Feb-2017 7:28
Project: Navy Clean CTO-0008 OLF Coupeville	Sample Size: 0.0655 L	QC Batch: B7C0012 Date Extracted: 01-Mar-2017 8:54
Date Collected: 23-Feb-2017 15:45		Date Analyzed: 05-Mar-17 16:07 Column: BEH C18
Location: MW05M		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	473	3.42	7.63	15.3		IS 13C3-PFBS	103	60 - 150	
PFOA	1190	1.24	3.82	15.3		IS 13C2-PFOA	84.9	60 - 150	
PFOS	3.26	1.54	1.72	15.3	J	IS 13C8-PFOS	98.7	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/24/17

3

Sample ID: WI-CV-GW05S-0217						Modified EPA Method 537					
Client Data			Sample Data			Laboratory Data					
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700268-03		Date Received:	28-Feb-2017 7:28	
Project:	Navy Clean CTO-0008 OLF Coupeville		Sample Size:	0.122 L		QC Batch:	B7C0003		Date Extracted:	01-Mar-2017 8:54	
Date Collected:	24-Feb-2017 17:30					Date Analyzed:	06-Mar-17 17:43		Column:	BEH C18	
Location:	MW05S										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers		
PFBS	12.9	1.83	4.10	8.17		IS 13C3-PFBS	75.3	60 - 150			
PFOA	9.87	0.665	2.05	8.17		IS 13C2-PFOA	75.9	60 - 150			
PFOS	ND	0.824	0.922	8.17		IS 13C8-PFOS	78.8	60 - 150			

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

NW 3/24/17

4

Sample ID: WI-CV-GW11M-0217						Modified EPA Method 537					
Client Data			Sample Data			Laboratory Data					
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700268-04		Date Received:	28-Feb-2017 7:28	
Project:	Navy Clean CTO-0008 OLF Coupeville		Sample Size:	0.0653 L		QC Batch:	B7C0012		Date Extracted:	01-Mar-2017 8:54	
Date Collected:	26-Feb-2017 14:35					Date Analyzed:	05-Mar-17 16:20 Column: BEH C18				
Location:	MW11M										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers	
PFBS	ND	3.43	7.66	15.3		IS	13C3-PFBS	90.6	60 - 150		
PFOA	ND	1.25	3.83	15.3		IS	13C2-PFOA	87.4	60 - 150		
PFOS	ND	1.55	1.72	15.3		IS	13C8-PFOS	86.1	60 - 150		

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

MW 3/24/17

5

Sample ID: WI-CV-GW11S-0217						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700268-05	Date Received:	28-Feb-2017 7:28		
Project:	Navy Clean CTO-0008 OLF Coupeville	Sample Size:	0.128 L	QC Batch:	B7C0003	Date Extracted:	01-Mar-2017 8:54		
Date Collected:	26-Feb-2017 16:30			Date Analyzed:	06-Mar-17 17:55	Column:	BEH C18		
Location:	MW11S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.75	3.91	7.83		IS 13C3-PFBS	79.6	60 - 150	
PFOA	ND	0.637	1.95	7.83		IS 13C2-PFOA	93.0	60 - 150	
PFOS	1.00 <i>u</i>	0.790	0.879	7.83	<i>J</i>	IS 13C8-PFOS	89.8	60 - 150	<i>EBL</i>

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/29/17

6

Sample ID: WI-CV-EB06-022617						Modified EPA Method 537					
Client Data			Sample Data			Laboratory Data					
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700268-07		Date Received:	28-Feb-2017 7:28	
Project:	Navy Clean CTO-0008 OLF Coupeville		Sample Size:	0.106 L		QC Batch:	B7C0003		Date Extracted:	01-Mar-2017 8:54	
Date Collected:	26-Feb-2017 17:45					Date Analyzed:	06-Mar-17 18:08 Column: BEH C18				
Location:	Eq. Blank										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers	
PFBS	ND	2.10	4.72	9.40		IS	13C3-PFBS	86.8	60 - 150		
PFOA	ND	0.765	2.36	9.40		IS	13C2-PFOA	84.2	60 - 150		
PFOS	1.12	0.948	1.06	9.40	J	IS	13C8-PFOS	91.9	60 - 150		

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3/24/17

7

Sample ID: WI-CV-EB05-022417						Modified EPA Method 537				
Client Data			Sample Data		Laboratory Data					
Name:	CH2M Hill		Matrix:	Groundwater		Lab Sample:	1700268-08	Date Received:	28-Feb-2017 7:28	
Project:	Navy Clean CTO-0008 OLF Coupeville		Sample Size:	0.127 L		QC Batch:	B7C0003	Date Extracted:	01-Mar-2017 8:54	
Date Collected:	24-Feb-2017 11:35						Date Analyzed:	06-Mar-17 18:20 Column: BEH C18		
Location:	Eq. Blank									
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers	
PFBS	ND	1.77	3.94	7.90		IS 13C3-PFBS	97.9	60 - 150		
PFOA	ND	0.643	1.97	7.90		IS 13C2-PFOA	88.7	60 - 150		
PFOS	ND	0.797	0.886	7.90		IS 13C8-PFOS	99.8	60 - 150		

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3/24/17

**DATA VALIDATION SUMMARY REPORT
COUPEVILLE, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
 SDG: 1700280
 Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
 Site: Coupeville, CTO-0008, Washington
 Date: March 24, 2017

PFCs			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	WI-CV-GW03M-0217	1700280-01	Water
2	WI-CV-GW03D-0217	1700280-02	Water
3	WI-CV-EB07-022717	1700280-03	Water
4	WI-CV-GW04M-0217	1700280-04	Water
5	WI-CV-GW01M-0217	1700280-05	Water
6	WI-CV-EB08-022817	1700280-06	Water
7	WI-CV-GW01D-0217	1700280-07	Water

A full data validation was performed on the analytical data for five water samples and two aqueous equipment blank samples collected on February 27-28, 2017 by CH2M HILL at the Coupeville site in Washington. The samples were analyzed under the EPA Method “Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)”.

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537 Modified

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (July 2013) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA “Contract Laboratories Program National Functional Guidelines for Superfund Organic Methods Data Review,” August 2014;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate recovery (%R)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Ongoing Precision and Recovery (OPR)
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes. There were no qualifications.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

Initial Calibration

- All percent difference (%D) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent difference (%D) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- The field blank samples were free of contamination except for the following.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
WI-CV-EB07-022717	None - ND	-	-	-
WI-CV-EB08-022817	Perfluorooctanesulfonate	1.16	-	None - All Associated ND
WI-CV-FB01-031217 (SDG 1700293)	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- A MS/MSD sample was not collected.

Ongoing Precision and Recovery (OPR)

- The OPR samples exhibited acceptable percent recoveries (%R) values.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

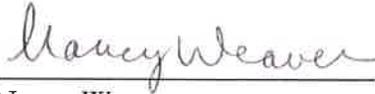
- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 3/24/17

Data Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples.

Sample ID: WI-CV-GW03M-0217

Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-01	Date Received:	02-Mar-2017 10:14
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.129 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25
Date Collected:	27-Feb-2017 13:15			Date Analyzed:	05-Mar-17 16:32	Column:	BEH C18
Location:	MW03M						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.74	3.88	7.76		IS 13C3-PFBS	92.1	60 - 150	
PFOA	ND	0.631	1.94	7.76		IS 13C2-PFOA	85.2	60 - 150	
PFOS	ND	0.782	0.872	7.76		IS 13C8-PFOS	95.0	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

MW 3/24/17

2

Sample ID: WI-CV-GW03D-0217						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-02	Date Received:	02-Mar-2017 10:14		
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.128 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25		
Date Collected:	27-Feb-2017 17:05			Date Analyzed:	05-Mar-17 16:45 Column: BEH C18				
Location:	MW03D								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.75	3.91	7.81		IS 13C3-PFBS	86.7	60 - 150	
PFOA	ND	0.635	1.95	7.81		IS 13C2-PFOA	83.5	60 - 150	
PFOS	0.914	0.788	0.879	7.81	J	IS 13C8-PFOS	101	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers
 Only the linear isomer is reported for all other analytes.

MW312417

Sample ID: WI-CV-EB07-022717						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-03	Date Received:	02-Mar-2017 10:14		
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.115 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25		
Date Collected:	27-Feb-2017 17:10			Date Analyzed:	05-Mar-17 16:57 Column: BEH C18				
Location:	Eq. Blank								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.95	4.35	8.69		IS 13C3-PFBS	88.9	60 - 150	
PFOA	ND	0.708	2.17	8.69		IS 13C2-PFOA	86.3	60 - 150	
PFOS	ND	0.877	0.978	8.69		IS 13C8-PFOS	88.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers
 Only the linear isomer is reported for all other analytes.

nw 3/24/17

4

Sample ID: WI-CV-GW04M-0217					Modified EPA Method 537				
Client Data			Sample Data		Laboratory Data				
Name:	CH2M Hill		Matrix:	Groundwater	Lab Sample:	1700280-04	Date Received:	02-Mar-2017 10:14	
Project:	Navy Clean CTO 8 OLF Coupeville		Sample Size:	0.124 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25	
Date Collected:	28-Feb-2017 10:00				Date Analyzed:	05-Mar-17 17:10 Column: BEH C18			
Location:	MW04M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.80	4.03	8.06		IS 13C3-PFBS	92.3	60 - 150	
PFOA	ND	0.656	2.02	8.06		IS 13C2-PFOA	95.1	60 - 150	
PFOS	ND	0.813	0.907	8.06		IS 13C8-PFOS	107	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

MW 3/24/17

5

Sample ID: WI-CV-GW01M-0217						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-05	Date Received:	02-Mar-2017 10:14		
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.127 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25		
Date Collected:	28-Feb-2017 11:00			Date Analyzed:	05-Mar-17 17:22	Column:	BEH C18		
Location:	MW01M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.76	3.94	7.88		IS 13C3-PFBS	90.0	60 - 150	
PFOA	ND	0.641	1.97	7.88		IS 13C2-PFOA	93.2	60 - 150	
PFOS	ND	0.795	0.886	7.88		IS 13C8-PFOS	110	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers

Only the linear isomer is reported for all other analytes.

nw 3/24/17

6

Sample ID: WI-CV-EB08-022817						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-06	Date Received:	02-Mar-2017 10:14		
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.110 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25		
Date Collected:	28-Feb-2017 12:30			Date Analyzed:	05-Mar-17 17:35 Column: BEH C18				
Location:	Eq. Blank								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	2.04	4.55	9.12		IS 13C3-PFBS	103	60 - 150	
PFOA	ND	0.742	2.27	9.12		IS 13C2-PFOA	93.8	60 - 150	
PFOS	1.16	0.920	1.02	9.12	J	IS 13C8-PFOS	85.8	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/24/17

Sample ID: WI-CV-GW01D-0217**Modified EPA Method 537**

Client Data		Sample Data		Laboratory Data			
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700280-07	Date Received:	02-Mar-2017 10:14
Project:	Navy Clean CTO 8 OLF Coupeville	Sample Size:	0.125 L	QC Batch:	B7C0012	Date Extracted:	03-Mar-2017 8:25
Date Collected:	28-Feb-2017 14:00			Date Analyzed:	05-Mar-17 17:47	Column:	BEH C18
Location:	MW01D						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.79	4.00	8.00		IS 13C3-PFBS	98.2	60 - 150	
PFOA	ND	0.651	2.00	8.00		IS 13C2-PFOA	93.2	60 - 150	
PFOS	ND	0.807	0.900	8.00		IS 13C8-PFOS	82.8	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

NW 3/24/17

**DATA VALIDATION SUMMARY REPORT
COUPEVILLE, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
 SDG: 1700293
 Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
 Site: Coupeville, CTO-0008, Washington
 Date: March 24, 2017

PFCs			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	WI-CV-GW02S-0317	1700293-01	Water
2	WI-CV-GW02SP-0317	1700293-02	Water
3	WI-CV-GW04S-0317	1700293-03	Water
4	WI-CV-GW04SP-0317	1700293-04	Water
5	WI-CV-GW02M-0317	1700293-05	Water
6	WI-CV-GW12D-0317	1700293-06	Water
6MS	WI-CV-GW12D-0317MS	1700293-06MS	Water
6MSD	WI-CV-GW12D-0317MSD	1700293-06MSD	Water
7	WI-CV-EB09-030117	1700293-07	Water
8	WI-CV-GW08S-0317	1700293-08	Water
9	WI-CV-FB01-030217	1700293-09	Water
10	WI-CV-EB10-030217	1700293-10	Water
11	WI-CV-EB11-030217	1700293-11	Water

A full data validation was performed on the analytical data for seven water samples, three aqueous equipment blank samples, and one field blank sample collected on March 1-2, 2017 by CH2M HILL at the Coupeville site in Washington. The samples were analyzed under the EPA Method “Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)”.

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537 Modified

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (July 2013) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA “Contract Laboratories Program National Functional Guidelines for Superfund Organic Methods Data Review,” August 2014;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate recovery (%R)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Ongoing Precision and Recovery (OPR)
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes. There were no qualifications.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

Initial Calibration

- All percent difference (%D) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent difference (%D) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- The field blank samples were free of contamination except for the following.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
WI-CV-EB09-030117	None - ND	-	-	-
WI-CV-FB01-030217	None - ND	-	-	-
WI-CV-EB10-030217	None - ND	-	-	-
WI-CV-EB11-030217	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD sample exhibited acceptable %R and RPD values.

Ongoing Precision and Recovery (OPR)

- The OPR samples exhibited acceptable percent recoveries (%R) values.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- Several samples were analyzed at various dilutions due to high concentrations of the target compounds. Reporting limits were adjusted accordingly. No action was required.

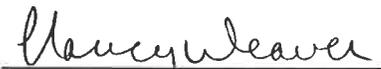
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	WI-CV-GW02S-0317 ng/L	WI-CV-GW02SP-0317 ng/L	RPD	Qualifier
PFBS	332	357	7%	None
PFOA	571	564	1%	
PFOS	54.7	53.0	3%	

Compound	WI-CV-GW04S-0317 ng/L	WI-CV-GW04SP-0317 ug/L	RPD	Qualifier
None - ND	-	-	-	-

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:  Dated: 3/24/17
 Nancy Weaver
 Senior Chemist

Data Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples.

Sample ID: WI-CV-GW02S-0317

Modified EPA Method 537

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	332	17.1	38.2	76.3	∅	IS 13C3-PFBS	112	60 - 150	∅
PFOA	571	0.621	1.91	7.63		IS 13C2-PFOA	78.6	60 - 150	
PFOS	54.7	0.770	0.859	7.63		IS 13C8-PFOS	94.0	60 - 150	

Client Data
Name: CH2M Hill
Project: Navy Clean CTO-08
Date Collected: 01-Mar-2017 11:00
Location: MW-02S

Sample Data
Matrix: Groundwater
Sample Size: 0.131 L

Laboratory Data
Lab Sample: 1700293-01 Date Received: 04-Mar-2017 9:49
QC Batch: B7C0017 Date Extracted: 06-Mar-2017 8:15
Date Analyzed: 06-Mar-17 18:45 Column: BEH C18
07-Mar-17 09:51 Column: BEH C18

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

MW 3124/17

2

Sample ID: WI-CV-GW02SP-0317						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700293-02	Date Received:	04-Mar-2017 9:49		
Project:	Navy Clean CTO-08	Sample Size:	0.129 L	QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15		
Date Collected:	01-Mar-2017 11:05			Date Analyzed:	06-Mar-17 18:58 Column: BEH C18				
Location:	MW-02S				07-Mar-17 10:04 Column: BEH C18				
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	357	17.3	38.8	77.4	✓	IS 13C3-PFBS	112	60 - 150	✓
PFOA	564	0.630	1.94	7.74		IS 13C2-PFOA	86.4	60 - 150	
PFOS	53.0	0.781	0.872	7.74		IS 13C8-PFOS	90.4	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/24/17

3

Sample ID: WI-CV-GW04S-0317					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-03	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.128 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	01-Mar-2017 13:25	Date Analyzed: 06-Mar-17 19:10 Column: BEH C18							
Location:	MW-04S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.75	3.91	7.83		IS 13C3-PFBS	98.7	60 - 150	
PFOA	ND	0.637	1.95	7.83		IS 13C2-PFOA	83.2	60 - 150	
PFOS	ND	0.790	0.879	7.83		IS 13C8-PFOS	94.8	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

MW 3124117

4

Sample ID: WI-CV-GW04SP-0317					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-04	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.131 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	01-Mar-2017 13:35	Date Analyzed: 06-Mar-17 19:23 Column: BEH C18							
Location:	MW-04S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.71	3.82	7.64		IS 13C3-PFBS	93.1	60 - 150	
PFOA	ND	0.621	1.91	7.64		IS 13C2-PFOA	82.6	60 - 150	
PFOS	ND	0.770	0.859	7.64		IS 13C8-PFOS	89.8	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3/24/17

5

Sample ID: WI-CV-GW02M-0317						Modified EPA Method 537			
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-05	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.129 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	01-Mar-2017 13:55	Date Analyzed: 06-Mar-17 20:13 Column: BEH C18							
Location:	MW-02M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.74	3.88	7.76		IS 13C3-PFBS	96.4	60 - 150	
PFOA	ND	0.631	1.94	7.76		IS 13C2-PFOA	86.0	60 - 150	
PFOS	ND	0.783	0.872	7.76		IS 13C8-PFOS	96.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3/24/17

6

Sample ID: WI-CV-GW12D-0317						Modified EPA Method 537			
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-06	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.126 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	01-Mar-2017 16:50								
Location:	MW-12D								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.78	3.97	7.96		IS 13C3-PFBS	88.9	60 - 150	
PFOA	ND	0.648	1.98	7.96		IS 13C2-PFOA	82.0	60 - 150	
PFOS	ND	0.803	0.893	7.96		IS 13C8-PFOS	84.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

MW 3124/17

7

Sample ID: WI-CV-EB09-030117						Modified EPA Method 537			
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-07	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.115 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	01-Mar-2017 14:00				Date Analyzed:	06-Mar-17 20:38 Column: BEH C18			
Location:	EB-09								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.94	4.35	8.69		IS 13C3-PFBS	90.8	60 - 150	
PFOA	ND	0.707	2.17	8.69		IS 13C2-PFOA	86.1	60 - 150	
PFOS	ND	0.877	0.978	8.69		IS 13C8-PFOS	95.5	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers

Only the linear isomer is reported for all other analytes

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8

Sample ID: WI-CV-GW08S-0317					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-08	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.130 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	02-Mar-2017 10:50								
Location:	MW-08S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.72	3.85	7.71		IS 13C3-PFBS	101	60 - 150	
PFOA	ND	0.627	1.92	7.71		IS 13C2-PFOA	92.3	60 - 150	
PFOS	ND	0.777	0.865	7.71		IS 13C8-PFOS	76.9	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

NW 3/24/17

9

Sample ID: WI-CV-FB01-030217					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-09	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.119 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	02-Mar-2017 13:00								
Location:	FB01								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.87	4.20	8.37		IS 13C3-PFBS	103	60 - 150	
PFOA	ND	0.681	2.10	8.37		IS 13C2-PFOA	85.9	60 - 150	
PFOS	ND	0.845	0.945	8.37		IS 13C8-PFOS	84.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

new 3/24/17

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Sample ID: WI-CV-EB10-030217						Modified EPA Method 537			
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-10	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.0930 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	02-Mar-2017 13:15	Date Analyzed: 06-Mar-17 21:16 Column: BEH C18							
Location:	EB10								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	2.41	5.38	10.8		IS 13C3-PFBS	105	60 - 150	
PFOA	ND	0.875	2.69	10.8		IS 13C2-PFOA	92.4	60 - 150	
PFOS	ND	1.08	1.21	10.8		IS 13C8-PFOS	97.0	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

W 3/24/17

11

Sample ID: WI-CV-EB11-030217						Modified EPA Method 537			
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700293-11	Date Received:	04-Mar-2017 9:49	
Project:	Navy Clean CTO-08	Sample Size:	0.118 L		QC Batch:	B7C0017	Date Extracted:	06-Mar-2017 8:15	
Date Collected:	02-Mar-2017 13:30	Date Analyzed: 06-Mar-17 21:28 Column: BEH C18							
Location:	EB11								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.89	4.24	8.46		IS 13C3-PFBS	103	60 - 150	
PFOA	ND	0.689	2.12	8.46		IS 13C2-PFOA	85.0	60 - 150	
PFOS	ND	0.854	0.953	8.46		IS 13C8-PFOS	97.5	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/24/17

**DATA VALIDATION SUMMARY REPORT
COUPEVILLE, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
 SDG: 1700296
 Laboratory: Vista Analytical Laboratory, El Dorado Hills, California
 Site: Coupeville, CTO-0008, Washington
 Date: March 24, 2017

PFCs			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	WI-CV-GW08M-0317	1700296-01	Water
2	WI-CV-EB12-030317	1700296-02	Water
3	WI-CV-GW07S-0317	1700296-03	Water
4	WI-CV-EB13-030417	1700296-04	Water
5	WI-CV-GW14M-0317	1700296-05	Water
6	WI-CV-GW13S-0317	1700296-06	Water
7	WI-CV-GW07M-0317	1700296-07	Water
8	WI-CV-EB14-030417	1700296-08	Water

A full data validation was performed on the analytical data for five water samples and three aqueous equipment blank samples collected on March 3-4, 2017 by CH2M HILL at the Coupeville site in Washington. The samples were analyzed under the EPA Method “Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)”.

Specific method references are as follows:

Analysis
PFCs

Method References
USEPA Method 537 Modified

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (July 2013) and the USEPA National Functional Guidelines for Organic Data Review as follows:

- The USEPA “Contract Laboratories Program National Functional Guidelines for Superfund Organic Methods Data Review,” August 2014;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate recovery (%R)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Ongoing Precision and Recovery (OPR)
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Level IV) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no rejections of data.

Overall the data is acceptable for the intended purposes. There were no qualifications.

Perfluorinated Compounds (PFCs)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

Initial Calibration

- All percent difference (%D) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent difference (%D) and RRF criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- The equipment blank samples were free of contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
WI-CV-EB12-030317	None - ND	-	-	-
WI-CV-EB13-030417	None - ND	-	-	-
WI-CV-EB14-030417	None - ND	-	-	-
WI-CV-FB01-030217 (SDG 1700293)	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- A MS/MSD sample was not collected.

Ongoing Precision and Recovery (OPR)

- The OPR samples exhibited acceptable percent recoveries (%R) values.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/24/17

Data Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The analyte is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the samples.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the samples.

Sample ID: WI-CV-GW08M-0317**Modified EPA Method 537**

Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700296-01	Date Received:	07-Mar-2017 10:32	
Project:	Navy Clean CTO-08	Sample Size:	0.128 L		QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40	
Date Collected:	04-Mar-2017 12:00				Date Analyzed:	09-Mar-17 16:51 Column: BEH C18			
Location:	MW-08M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.74	3.91	7.79		IS 13C3-PFBS	117	60 - 150	
PFOA	ND	0.634	1.95	7.79		IS 13C2-PFOA	91.9	60 - 150	
PFOS	ND	0.786	0.879	7.79		IS 13C8-PFOS	110	60 - 150	

DL - Detection limit

RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.

Only the linear isomer is reported for all other analytes.

Sample ID: WI-CV-EB12-030317					Modified EPA Method 537				
Client Data			Sample Data		Laboratory Data				
Name:	CH2M Hill		Matrix:	Groundwater	Lab Sample:	1700296-02	Date Received:	07-Mar-2017 10:32	
Project:	Navy Clean CTO-08		Sample Size:	0.121 L	QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40	
Date Collected:	03-Mar-2017 17:15				Date Analyzed:	09-Mar-17 17:03 Column: BEH C18			
Location:	EB12								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.85	4.13	8.28		IS 13C3-PFBS	105	60 - 150	
PFOA	ND	0.674	2.07	8.28		IS 13C2-PFOA	81.9	60 - 150	
PFOS	ND	0.836	0.930	8.28		IS 13C8-PFOS	101	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

Sample ID: WI-CV-GW07S-0317						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700296-03	Date Received:	07-Mar-2017 10:32		
Project:	Navy Clean CTO-08	Sample Size:	0.114 L	QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40		
Date Collected:	04-Mar-2017 13:25			Date Analyzed:	09-Mar-17 17:16 Column: BEH C18				
Location:	MW-07S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.97	4.39	8.81		IS 13C3-PFBS	112	60 - 150	
PFOA	ND	0.717	2.19	8.81		IS 13C2-PFOA	91.0	60 - 150	
PFOS	ND	0.889	0.987	8.81		IS 13C8-PFOS	123	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

MW 3/24/17

Sample ID: WI-CV-EB13-030417 **Modified EPA Method 537**

Client Data Name: CH2M Hill Project: Navy Clean CTO-08 Date Collected: 04-Mar-2017 14:30 Location: EB-13	Sample Data Matrix: Groundwater Sample Size: 0.124 L	Laboratory Data Lab Sample: 1700296-04 Date Received: 07-Mar-2017 10:32 QC Batch: B7C0034 Date Extracted: 08-Mar-2017 8:40 Date Analyzed: 09-Mar-17 17:28 Column: BEH C18
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Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.81	4.03	8.08		IS 13C3-PFBS	101	60 - 150	
PFOA	ND	0.657	2.02	8.08		IS 13C2-PFOA	89.1	60 - 150	
PFOS	ND	0.815	0.907	8.08		IS 13C8-PFOS	107	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

new 3/24/17

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Sample ID: WI-CV-GW14M-0317 **Modified EPA Method 537**

Client Data		Sample Data		Laboratory Data			
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700296-05	Date Received:	07-Mar-2017 10:32
Project:	Navy Clean CTO-08	Sample Size:	0.123 L	QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40
Date Collected:	04-Mar-2017 17:00			Date Analyzed:	09-Mar-17 17:41	Column:	BEH C18
Location:	MW-14M						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	111	1.82	4.07	8.14		IS 13C3-PFBS	95.5	60 - 150	
PFOA	166	0.662	2.03	8.14		IS 13C2-PFOA	95.4	60 - 150	
PFOS	0.898	0.821	0.915	8.14	J	IS 13C8-PFOS	122	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

MW 31241.7

6

Sample ID: WI-CV-GW13S-0317						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700296-06	Date Received:	07-Mar-2017 10:32		
Project:	Navy Clean CTO-08	Sample Size:	0.123 L	QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40		
Date Collected:	03-Mar-2017 17:05			Date Analyzed:	09-Mar-17 17:53 Column: BEH C18				
Location:	MW-13S								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.81	4.07	8.11		IS 13C3-PFBS	101	60- 150	
PFOA	ND	0.660	2.03	8.11		IS 13C2-PFOA	89.4	60- 150	
PFOS	ND	0.818	0.915	8.11		IS 13C8-PFOS	119	60- 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

MW3/24/17

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Sample ID: WI-CV-GW07M-0317					Modified EPA Method 537				
Client Data		Sample Data			Laboratory Data				
Name:	CH2M Hill	Matrix:	Groundwater		Lab Sample:	1700296-07	Date Received:	07-Mar-2017 10:32	
Project:	Navy Clean CTO-08	Sample Size:	0.128 L		QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40	
Date Collected:	04-Mar-2017 17:15				Date Analyzed:	09-Mar-17 18:06 Column: BEH C18			
Location:	MW-07M								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.75	3.91	7.80		IS 13C3-PFBS	112	60 - 150	
PFOA	ND	0.635	1.95	7.80		IS 13C2-PFOA	90.0	60 - 150	
PFOS	0.844	0.787	0.879	7.80	J	IS 13C8-PFOS	124	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

mw 3/24/17

Sample ID: WI-CV-EB14-030417						Modified EPA Method 537			
Client Data		Sample Data		Laboratory Data					
Name:	CH2M Hill	Matrix:	Groundwater	Lab Sample:	1700296-08	Date Received:	07-Mar-2017 10:32		
Project:	Navy Clean CTO-08	Sample Size:	0.128 L	QC Batch:	B7C0034	Date Extracted:	08-Mar-2017 8:40		
Date Collected:	04-Mar-2017 17:45			Date Analyzed:	09-Mar-17 18:18 Column: BEH C18				
Location:	EB-14								
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard	%R	LCL-UCL	Qualifiers
PFBS	ND	1.75	3.91	7.82		IS 13C3-PFBS	110	60 - 150	
PFOA	ND	0.636	1.95	7.82		IS 13C2-PFOA	102	60 - 150	
PFOS	ND	0.789	0.879	7.82		IS 13C8-PFOS	114	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

rev 3/24/17