FINAL

June 2023

PFAS REMEDIAL INVESTIGATION

CONCEPTUAL SITE MODEL TECHNICAL MEMORANDUM

Yakima Training Center

Yakima, Washington

Joint Base Lewis-McChord Public Works – Environmental Division

IMLM-PWE

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LIST OF ACRONYMS AND ABBREVIATIONS

mg/kg	milligram per kilogram
ng/L	nanogram per liter
AFFF	aqueous film-forming foam
AOI	Area of Interest
Arcadis	Arcadis US, Inc.
bgs	below ground surface
CRB	Columbia River Basalt
CSM	Conceptual Site Model
ECC	Environmental Chemical Corporation
Fm	Formation
HAL	Health Advisory Level
msl	mean sea level
OSD	Office of the Assistant Secretary of Defense
PA/SI	Preliminary Assessment / Site Inspection
PFAS	per- and polyfluoroalkyl substance
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexane sulfonate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RSL	Risk Screening Level
USEPA	U.S. Environmental Protection Agency
WSU	Washington State University
XRF	X-ray Fluorescence
YTC	Yakima Training Center

1 INTRODUCTION

This Conceptual Site Model (CSM) Technical Memorandum presents the CSM relevant to the per- and polyfluoroalkyl substances (PFAS) remedial investigation (RI) at the United States (U.S.) Army Yakima Training Center (YTC) in Yakima, Washington (**Figure 1**) and is an update to the CSM presented in the Preliminary Assessment/Site Inspection (PA/SI; Arcadis 2019). It incorporates the results of recent surface geophysical surveys, baseline sampling, and boundary monitoring well installations completed in accordance with the Baseline Sampling Work Plan (ECC/Arcadis, 2023a) and the Boundary Investigation Technical Memorandum Work Plan (and Revisions 1 and 2) (ECC/Arcadis, 2023b).

This RI is being conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 under United States Army Environmental Command Contract Number W9124J18D0004, Delivery Order Number W9124J22F0144 by Environmental Chemical Corporation (ECC) and Arcadis U.S., Inc. (Arcadis). This RI addresses the characterization and on- and off-post delineation of PFAS at YTC associated with the areas of interest (AOIs; **Figure 2**) previously identified in the PA/SI (Arcadis, 2019). This CSM incorporates data sets and interpretations generated during the boundary investigation, which included characterization of subsurface structural geology and identification of geologic features that may potentially act as preferential groundwater and PFAS migration pathways along YTC boundaries. In addition, this CSM includes supplemental baseline sediment, surface water, and groundwater analytical results. The CSM provides a framework useful for identifying data needs for the RI and will be used to establish the scope of the RI Phase I investigation that will be presented in the RI Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP), which is forthcoming under separate cover.

The seven AOIs identified for the RI at YTC are situated within the Yakima River basin aquifer system, which consists of 1) basin-fill sedimentary deposits, 2) the Columbia River Basalt Group, and 3) deep bedrock consisting of Eocene and Oligocene-age volcanic and fluvial deposits. YTC is situated in a tectonically active zone known as the Yakima Fold Belt of south-central Washington, also referred to as the Yakima Fold and Thrust Belt. **Exhibit 1** depicts mapped geologic structures associated with the Yakima Fold and Thrust Belt, which are expected to influence both regional and local hydrogeology and groundwater flow.

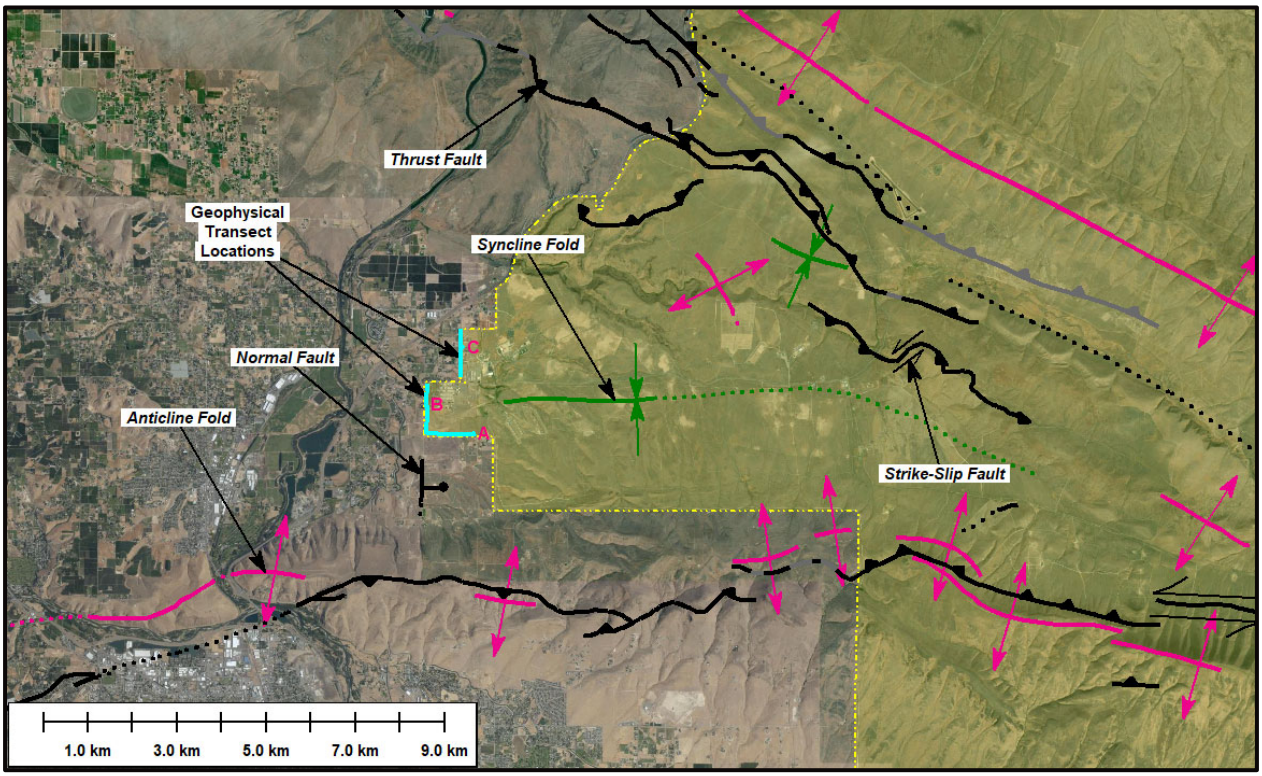

Exhibit 1. Major Structural Features of the Yakima Fold and Thrust Belt and Location of the Completed Geophysical Transects

Extensive folding of the sedimentary and Columbia River basalt strata in the area has created a complex hydrogeologic system with highly variable groundwater chemistry, hydraulic properties, depths to water, and flow directions at YTC. Contaminant transport within the subsurface is correspondingly complex.

The drinking water supply for YTC is provided entirely from groundwater sources. Wells provide water for three permitted drinking water distribution systems located in the cantonment area, at the Yakima Research Station and the Multi-Purpose Range Complex (Department of Defense, Department of the Army, 2010). The supply well located at the Selah Airstrip is currently not in use, due to detections of PFAS in associated water quality samples. Areas west and southwest of the YTC cantonment area source drinking water from multiple sources including the Pomona Water District and private water supply wells drilled to various depths, which pump from a variety of water bearing zones.

As part of the PA/SI, a total of 301 drinking water samples were collected from 299 potable water supply wells located downgradient of the Installation. Sampling activities and results for the off-post well sampling events are documented in the 2023 PA/SI Addendum (Arcadis, 2023). The area included in the off-post evaluation is shown on **Figure 3**. Perfluorooctane sulfonate (PFOS) was detected in 151 samples and 145 samples had detections of perfluorooctanoic acid (PFOA). In

total, 155 had detections of either PFOS, PFOA or both, while 146 samples were reported as non-detect for both PFOS and PFOA. Of the 151 samples with PFOS detections, concentrations ranged from 0.49 J (the 'J' qualifier denotes an estimated concentration) nanograms per liter (ng/L) to 1,500 ng/L. Of the 145 samples with PFOA detections, concentrations ranged from 0.62 J ng/L to 150 ng/L. Sixty-two residential samples (collected from wells at 61 properties) had combined concentrations of PFOS and PFOA that exceeded the U.S. Environmental Protection Agency (USEPA) Health Advisory Level (HAL) of 70 ng/L (individually or combined if both are detected). The remaining 93 samples with detections of PFOS and/or PFOA had combined concentrations below the HAL.

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2 SITE INVESTIGATION ACTIVITIES

The boundary investigation and baseline sampling are part of a data-driven, sequenced approach to the PFAS RI at YTC. The following investigation activities were designed to build on the findings of the SI and are being incorporated into the CSM to develop a comprehensive investigation approach for the RI UFP-QAPP.

2.1 Surface Geophysics

Electrical resistivity and seismic data sets were collected along the three transects shown on **Figure 4**. The alignment of the transects target YTC boundaries, where PFAS-impacted groundwater is migrating from the Installation into downgradient private drinking water wells. Each transect is approximately 3,640 linear feet, providing resolution of geophysics data to approximately 300 to 400 feet below ground surface (bgs).

Electrical resistivity and seismic velocity are used to estimate porosity and permeability and are useful in identifying preferential groundwater pathways. These two geophysical methods were performed congruently to address potential ambiguities common to each method. Analysis of the electrical resistivity was used as the primary means of estimating the depth of the water table and identifying different materials within the subsurface. Resistivity data were used to differentiate between basalt flows and the sedimentary Ellensburg Formation (Fm), to map the topography of contacts between formations, and provide an estimate of the relative permeability within the heterogeneous sediments of the Ellensburg Fm.

The combined surface geophysical data sets were evaluated to develop interpreted subsurface profiles and for the preliminary identification of subsurface anomalies likely to be the more permeable zones. Geophysical profiles for Transect A, Transect B and Transect C, are provided on **Figures 5, 6, and 7**, respectively. A total of 19 anomalies of interest were identified and formed the basis for siting monitoring wells. A subset of eight anomalies were identified as initial targets for boundary well installation and were selected based on proximity to downgradient receptors, upgradient PFAS source areas, and site topography.

A summary of key geologic interpretations from the geophysical profiles is provided for each of the following transects:

- Transect A (**Figure 5**) is located along the installation boundary to the south of the cantonment area. The electrical resistivity data along Transect A show variable elevation of the basalt flow top underlying the Ellensburg Fm. These variations correspond to seismic anomalies and suggest significant structural deformation and/or displacement along interpreted faults. Above the basalt, the unsaturated Ellensburg Fm generally exhibits low resistivity, which suggests units of lower permeability and high clay content. Notable increases in resistivity are observed in the zone below the interpreted water table. This, in addition to thicker sedimentary deposits overlying the basalt flow in this area may be

interpreted as a more permeable alluvial channel deposit (refer to anomaly A5 on **Figure 5**).

- Transect B (**Figure 6**) was generally consistent with the observations along Transect A. Sediments of the Ellensburg Fm overlie a basalt flow in this area and show an irregular contact interpreted as structural deformation (i.e., folding and faulting). The basalt unit between anomalies B4 and B5 (**Figure 5)** appears offset and exhibits a lower resistivity relative to the basalt to the north and south. These resistivity observations correspond to a sharp decline in seismic shear wave velocity and suggests that this basalt may be less competent and more permeable relative to basalt along the rest of transect B. This may be indicative of either faulting and/or fracturing. Within the saturated Ellensburg Fm, zones of higher resistivity were identified at anomalies B1 and B6 and are likely representative of sand/sandstone deposited within alluvial channels.
- Transect C (**Figure 7**) resistivity results show the presence of a shallow basalt unit (interpreted to be the Pomona Member) overlying the Ellensburg Fm, and a deeper basalt unit below. High shear wave velocities and resistivity values observed in the basalts along Transect C suggest a lower permeability, competent basalt. The resistivity profile shows significant irregularity in the elevation of the bottom of the Pomona Member and may be a result of basalt flows infilling paleo-surface features, displacement due to faulting, or some combination of the two.

While preliminary interpretation of the geophysical results was used to identify hydrostratigraphic zones of interest, refinement of the interpretations was made possible by correlating the electrical resistivity and seismic signals with borehole logging. Drilling observations, chip logging, and borehole geophysical results generally showed favorable correlation with features identified in the surface geophysical survey.

2.2 Boundary Well Installation

Installation of the eight boundary wells was completed in accordance with the Boundary Investigation Technical Memorandum Work Plan (ECC/Arcadis, 2023b) to establish an initial monitoring network along the perimeter of the Installation and preliminarily characterize subsurface conditions to support the developing CSM. The boundary wells are positioned along the geophysical transect lines shown in **Figure 4.**

Objectives for the boundary wells included:

- Lateral and vertical delineation of PFAS plumes along the western Installation boundary.
- Characterization of preferential flow pathways or geologic conditions that may be influencing groundwater flow regime(s).

- Refine geologic interpretations through the correlation of surface geophysics and borehole geophysics.

Boreholes for monitoring wells were advanced to the target depths using air-rotary drilling methods. Borehole depths ranged from 142 to 236 feet bgs. Basalt chip samples were retained from each basalt unit observed during drilling. Select basalt chip samples were submitted to the Washington State University (WSU) GeoAnalytical Lab for geochemical fingerprinting using X-ray fluorescence (XRF), as discussed below. In addition, during advancement of the boreholes, grab groundwater samples were collected from the first water-bearing zone encountered in each borehole for laboratory analysis of PFAS. The results of groundwater grab sampling will be presented under separate cover.

2.2.1 Borehole Geophysics

Selection of the screened interval for each boundary well was based on lithologic interpretations from rock chip logging during drilling and review of borehole geophysics results. Borehole geophysics were conducted in the open boreholes and/or in boreholes with temporary casing, depending on the stability of the surrounding formation. Borehole geophysical measurements included natural gamma ray, spontaneous potential and single point resistance, and 3-arm caliper. Select boreholes were surveyed with an optical televiewer probe to provide a three-dimensional visualization of the borehole. Boring logs, including lithologic descriptions and geophysical data are presented in **Attachment 1**.

2.2.2 Well Construction and Development

Monitoring wells were installed in accordance with the Boundary Investigation Technical Memorandum Work Plan (ECC/Arcadis, 2023b). Monitoring wells were constructed with screened intervals in transmissive zones interpreted as potential corollaries to downgradient private wells with screen lengths ranging from 10 to 20 feet based on observed lithology. Boring logs, including well construction information, are presented in **Attachment 1**.

Following construction, the monitoring wells were developed using surge and purge methods (bailing and pumping) and sampled using low-flow methods. The results of low-flow sampling will be presented under separate cover.

2.2.3 Geochemical Analysis of Basalt Chips

Basalt chip samples were collected during drilling from three boreholes: MW-02 at 110 ft bgs and 210 ft bgs; MW-03 at 189 ft bgs; and MW-06 at 235 ft bgs. and analyzed for geochemical fingerprinting using XRF. WSU compared the geochemical fingerprints obtained from the samples to a library of geochemical profiles of Columbia River Basalts (CRBs) to determine the origin formation/member. Results of the geochemical analysis and comparison to known CRBs are provided in **Attachment 2** and are preliminarily interpreted as follows:

Sample Name	Interpreted Formation	Interpreted Member
YTC_MW-02_110	Saddle Mountains	Weippe-Pomona
YTC_MW-02_210	Grande Ronde	Fields Spring (or Mount Horrible)
YTC_MW-03_189+	Saddle Mountains	Weippe-Pomona
YTC_MW-06_235*	Grande Ronde	Meyer Ridge (or Sentinel Bluffs)

Notes:

+Likely represents material transported following deposition.

*The WSU lab analyst indicated the sample was significantly weathered and therefore the results were less definitive. The chemical signature correlates strongly with the Grande Ronde Formation (Meyer Ridge or Sentinel Bluffs Members), as well as the Saddle Mountains Formation (Buford Member), which has a wide range of geochemical signatures.

While the XRF results are informative, they also present the potential for a more complex geologic environment than previously understood. This may include larger structural offsets and/or deformation than what simple correlation of units between boreholes would suggest. Additional structural analysis is needed to interpret the significance of these results and to more accurately depict the geologic units and structural features that are influencing groundwater migration.

2.3 Boundary Well Installation

The baseline sampling event was completed during February 2023 in accordance with the Baseline Sampling Work Plan (ECC/Arcadis, 2023a). Baseline samples were analyzed in compliance with Quality Systems Manual 5.4, Table B-15, Method 537 modified, as noted in the existing QAPP Addendum for YTC (Arcadis, 2020).

A total of two co-located surface water and sediment samples, six sediment samples, and nine groundwater samples from existing monitoring wells (MMP-1, MMP-2, MTS-2, MTS-3, MTS-4, MRC-2, TVR-2, TVR-3, and TVR-6) were collected during the baseline sampling event. Baseline sampling locations are presented on **Figures 8 through 11**. Surface water was present only in two out of the eight surface water sample locations; however, sediment samples were collected from all eight locations. Monitoring well ARC-2 was added to the sampling network during the planning phase; however, this well could not be located and appears to have been abandoned or destroyed during recent construction activities nearby. Surface water and sediment sampling was completed at on-post drainages, outfalls, and surface water bodies adjacent and/or downgradient to the AOIs.

Analytical results from samples collected from the baseline sampling event are presented for groundwater in **Table 1**, for surface water in **Table 2**, and for sediment in **Table 3**. Sample locations and PFOS, PFOA, perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA) and perfluorohexane sulfonate (PFHxS) analytical results for all media are presented on **Figures 8 through 11**. Data Validation Reports for the baseline sampling event are compiled in **Attachment 3**.

3 CONCEPTUAL SITE MODEL

The results discussed in **Section 2** were used in conjunction with historical data to refine the CSM for the YTC PFAS RI with a focus on understanding groundwater occurrence, preferential groundwater migration pathways, PFAS distribution, and identification of data gaps.

3.1 Geology and Hydrogeology

Structural deformation of the sedimentary and CRB strata, as well as variable permeability within the basalt flows and sediments, has created a complex hydrogeologic system with highly variable groundwater chemistry, hydraulic properties, depths to water and flow directions beneath YTC. Contaminant transport within the subsurface is correspondingly complex.

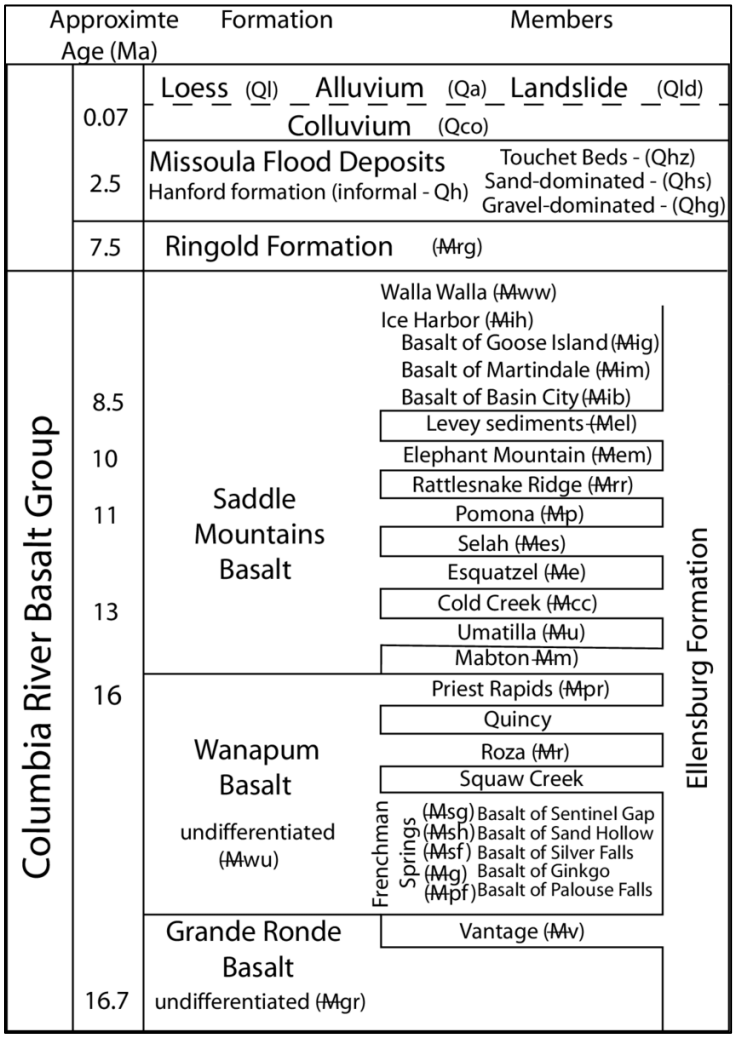

Exhibit 2. Stratigraphy of Sedimentary Interbeds and Columbia River Basalt Group (Reidel *et al.*, 2020).

The youngest basalt flow identified during investigation activities is encountered near the surface on the northern portion of the cantonment area and has been interpreted as the Pomona Member Basalt (Pomona Member; **Exhibit 2**) based on both geochemical composition of the XRF sample collected from MW-02 (**Attachment 2**), and geologic maps of the region. The Pomona Member is notably absent within the southern portion of the cantonment area. **Figure 4** shows the inferred horizontal extent of the Pomona Member. Geophysical logging of borings penetrating the Pomona Member suggests that the Pomona Member at the site is generally massive, competent, and sparsely fractured, conclusions corroborated by the high resistivity and seismic shear wave velocities which correspond with the occurrence of the Pomona Member along Transect C. Groundwater within the Pomona Member occurs only within limited fractured zones, which are generally encountered at or near the base of the basalt flow (see monitoring well log YTC-MW-02 in **Attachment 1** for geophysical imaging of the basalt) and exhibit confined behavior due to

the overlying massive basalt. Each of the existing monitoring wells at YTC are screened near the base of the Pomona Member, with the possible exception of the monitoring wells located at the Former Fire Training Pit (YTC-FTP-1, YTC-FTP-13, YTC-FTP-14, YTC-FTP-15, and YTC-FTP-16). Here, the first water encountered in the Pomona Member is significantly shallower and may or may not be hydraulically linked to the groundwater encountered in the other monitoring wells. Groundwater occurring within the Pomona Member is referred to as "perched water" in previous investigation reports (e.g., Final Groundwater Monitoring Report: Fire Training Pit and Tracked Vehicle Repair/Old Mobilization and Training Equipment Site [Tetra Tech, 2017]), has limited production potential, and is not known to be used as a potable water source near YTC. The flow direction of perched groundwater within the Pomona Member is generally to the west and southwest, and off-post toward the Yakima River (Tetra Tech, 2017).

A sedimentary interbed of the Ellensburg Fm underlies the Pomona Member on the northern portion of the cantonment area and is the shallowest bedrock unit in the southern portion of the cantonment area. The Ellensburg Fm sediments observed along all transects primarily consist of low permeability clays and claystone, with zones of poorly sorted sands, gravels, and sandstones present in some areas. The sediments are generally poorly consolidated, as evidenced by recurring borehole collapse during air-rotary drilling. Groundwater occurs within permeable alluvial sands and gravels within the Ellensburg Fm and is encountered under both unconfined and confined conditions, depending on the permeability of overlying strata. Thick sequences of sandstone are present along Transects A and B (anomaly A5 on **Figure 5** and anomalies B1 and B6 shown on **Figure 6**). Additional water-bearing basal sands/gravels are encountered just above the surface of the underlying basalt. The sandstones within the Ellensburg Fm are utilized by many private water supply wells located downgradient of YTC. Groundwater flow direction within the sandstones of the Ellensburg is unknown; however, it is expected to mirror groundwater flow within the Pomona Basalt (to the west and southwest, and off-post toward the Yakima River).

The deepest lithology encountered during investigation activities at YTC is a basalt unit underlying the Ellensburg Fm. This basalt unit was observed in borings completed for YTC-MW-02, YTC-MW-03, YTC-MW-05, and YTC-MW-06 (**Attachment 2**) and based on correlation with the geophysical profiles (**Figures 5 through 7**), is present across the YTC cantonment area. Geochemical profiles of samples collected from the top of the lower basalt at YTC-MW-02 and YTC-MW-06 (**Attachment 2**) correspond most closely with basalts of the Grande Ronde Fm; however, the samples from YTC-MW-06 exhibited significant weathering, which diminished the confidence of the result. Additionally, a rock chip sample collected from the top surface of the lower basalt at YTC-MW-03 (**Attachment 2**) was a geochemical match for the Pomona Member of the Saddle Mountain Fm, which suggests that the chip sample submitted for analysis may represent transported material rather than autogenetic basalt. Geophysical profiles of the surface of the basalt show evidence of significant vertical displacement along suspected faults, as well as a roughly east-west trending syncline shown in plan view on **Figure 4**, and in cross-section on **Figure 6** (between anomalies B6 and B8). The upper contact zone of the lower basalt is heavily

vesiculated and weathered. A silty material present immediately above the lower basalt across the cantonment area exhibits a significant natural gamma response and is consistent with a felsic volcanic ash deposit. Several private water supply wells located near YTC are completed in the lower basalt, although data on construction and lithology are not available for the majority of the wells. The nature of the water-bearing zones in the lower basalt at and near YTC is not well documented or characterized. Groundwater within the basalt is likely present within the weathered and fractured contact zones and sedimentary interbeds.

A high-yield regional basalt aquifer underlies the cantonment area, which serves as the primary drinking water supply for YTC, as well as the Pomona Artesian Irrigation Company water system, which provides drinking water to approximately 60 homes and businesses near the Installation. These water supply wells are screened at depths greater than 350 feet bgs. Groundwater in this regional aquifer occurs in basalt fractures and intercalated sediments. Regional groundwater generally flows west toward the Yakima River, with a more northwesterly flow component closer to the river (Arcadis, 2021). The Pomona well operated by YTC and the Pomona Artesian Irrigation Company well are located within the YTC cantonment area and operate under artesian conditions. The Pomona well is completed in the Wanapum and/or Grande Ronde Fm, with open borehole completion between depths of approximately 353 and 407 feet bgs. Historical surveys indicate that groundwater enters the Pomona well at approximately 401 feet bgs, along a sedimentary interbed or fracture zone (Tetra Tech, 2017). This flow system is presumably recharged from an area that is considerably higher in elevation to the east (up slope) and under confined pressure beneath less permeable basalt or fine-grained sediment (USACE, 2012). The upward hydraulic gradients encountered at YTC, in addition to the overlying low permeability materials that contribute to the observed artesian conditions, have thus far prevented the downward migration of contaminants from shallower aquifers.

3.2 PFAS Areas of Interest

A discussion of PFAS source areas, summary of PFAS concentrations in soil, sediment, surface water, and groundwater, interpreted relevant migration pathways and the current understanding of the relationship between source area and downgradient groundwater, is included below.

Former Fire Training Pit (AOI 1) and Bird Bath Wash Rack (AOI 2)

The Former Fire Training Pit and the Bird Bath Wash Rack are directly adjacent and located in the northeast portion of the cantonment area (**Figure 2**). Groundwater samples collected from shallow bedrock wells in this area during the SI contained PFOS, PFOA, PFBS, PFHxS and PFNA at concentrations exceeding the risk screening levels (RSLs) (Office of the Assistant Secretary of Defense [OSD], 2022). The highest concentrations of each PFAS constituent were identified in groundwater collected from monitoring well YTC-FTP-1 positoned in the center of the Former Fire Training Pit: PFOS at 45,000 ng/L; PFOA at 5,200 ng/L; PFBS at 5,900 ng/L;PFHxS at 23,000 ng/L; and PFNA at 75 ng/L. Soil was not sampled at the Former Fire Training Pit or the

Bird Bath Wash Rack because the ground has been significantly reworked during previous Installation Restoration Program and/or construction activities. Two baseline sediment samples collected in the irrigation canal downgradient of the AOIs (**Figure 8**) were reported as non-detect for PFAS, which suggests that PFAS impacted groundwater is likely not discharging to the canal. Groundwater samples from monitoring wells MTS-2, -3, and -4 (considered to be downgradient of the AOIs based on perched groundwater flow directions) exhibited detections of PFAS at concentrations several orders of magnitude below the concentrations indentified at the AOIs (**Figure 8**). Monitoring well MRC-2, located at the western Installation boundary is considered downgradient of the AOIs from a regional groundwater flow perspective, and contained PFOS, PFOA, and PFHxS at concentrations of 1,100 ng/L, 51 ng/L, and 860 ng/L respectively. Groundwater sampled at the AOI 1 originated within vesiculated basalt at a significantly higher elevation (approximately 1,440 feet above mean sea level [msl]) than the screened intervals of downgradient monitoring wells sampled during the baseline event (approximately 1,190 to 1,250 feet msl). Wells MTS-2, -3, -4, and MRC-2 are each screened in fractured basalt at or near the base of the Pomona Member. The potential for hydraulic communication between these shallow and deep flow zones is considered a data gap.

AFFF Storage Area (Building 821) (AOI 3)

Building 821 is located north of Firing Center Road (**Figure 2**). SI soil samples from Building 821 contained PFAS at concentrations below the OSD 2022 RSL. However, groundwater in side-gradient/downgradient monitoring wells TVR-5 and 815-2 exhibited PFOS concentrations of 180 ng/L and 260 ng/L respectively, exceeding the OSD 2022 RSL. In addition, groundwater samples collected from three existing upgradient and side-gradient monitoring wells during the baseline event contained PFAS exceeding the OSD 2022 RSL (**Figure 9**). AOI 1 is located upgradient of Building 821. Baseline groundwater sampling results suggest that PFAS observed in groundwater around Building 821 may be associated with AOI 3. One baseline surface water sample (SW-04) collected at the drainage ditch along the north side of Firing Center Road (which bounds AOI 3 to the south) contained PFOS, PFOA, PFBS, PFNA, and PFHxS at concentrations exceeding the OSD 2022 RSLs (**Figure 10**). This location receives surface runoff from both Building 821 and the Refractometer Solutions Test Area, and it is unclear from which AOI, if not both, the PFAS in the drainage ditch originates. Addtionally, the surface water sample was collected from standing water in a channel depression, not actively flowing surface water, and as such, may not be representative of surface water discharge. The potential for ongoing discharges through this pathway is being evaluated.

Refractometer Solutions Test Area (AOI 4), Fire Station 29 (Building 346, AOI 5), and AFFF Storage Area (Building 321, AOI 6)

The Refractometer Solutions Test Area, Building 346, and Building 321 are located on the south side of Firing Center Road (**Figure 2**). Two soil samples were from this area during the SI, and

two existing monitoring wells (MMP-1 and MMP-2) screened at the lower interface of the Pomona Member were sampled, all of which contained PFOS concentrations exceeding applicable OSD 2022 RSL. In addition, PFOA, PFNA, and PFHxS concentrations exceeded the OSD 2022 RSL in the two groundwater samples. MMP-1 and MMP-2 were resampled during the baseline event and exhibit similar results to the SI samples (**Figure 10**). Sediment collected from the drainage ditch immediately north of the refractometer testing area during the SI contained PFOS at a concentration of 0.10 milligrams per kilogram (mg/kg), which exceeds the soil OSD 2022 RSL. PFOS detected in baseline sediment sample SED-05 collected approximately 250 feet downstream of the SI sample location was below the soil OSD 2022 RSL (**Figure 10**). The detections in sediment indicate that overland transport of PFAS from the AOIs to the drainage ditches has occurred. The potential for ongoing discharges through this pathway is being evaluated.

Mettie Airstrip (AOI 7) (formerly Selah Airstrip)

The Mettie Airstrip AOI is located approximately 6 miles northeast of the main cantonment area (see inset on **Figure 11**). Due to the distance between the cantonment AOIs and the Mettie Airstrip, in conjunction with the complex regional geology, the causal correlation of PFAS in the subsurface between these areas is unlikely. A groundwater sample collected in 2019 from the Airstrip supply well (screened from approximately 73 to 91 feet bgs) contained PFOA at a concentration of 100 ng/L (Arcadis, 2021). Soil samples collected from within the limits of the former crash truck parking area (a suspected aqueous film-forming foam [AFFF] release area) associated with the AOI, contained PFOS concentrations exceeding the OSD 2022 RSL at a maximum detection of 0.12 mg/kg. Local geologic and hydrogeologic conditions are poorly understood due to a lack of subsurface data at and near the Mettie Airstrip, and it is unclear if the supply well is positioned downgradient or side-gradient of the former crash truck parking area. PFAS was not detected in the surface water sample collected downgradient of the Selah Spring during the baseline sampling event. This sample was collected to evaluate potential PFAS impacts in groundwater discharging to Selah Creek. Sediment samples collected from a dry creekbed both upgradient and downgradient of Mettie Airstrip contained PFOS below the OSD 2022 RSL (**Figure 11**).

3.3 Contaminant Fate and Transport Pathways

PFAS impacts have been identified in soil, sediment, and groundwater associated with the AOIs and the potential source areas described above. The following interpretation of contaminant transport pathways provide a framework for understanding the distribution of PFAS the environment at YTC. Multi-media sample sets collected to date provide a basis for adaptive characterization activities to be completed as part of the PFAS RI.

Contaminant transport pathways are heavily influenced by the complex geologic environment described in **Section 3.1**. Primary migration pathways identified at YTC include:

- Leaching to groundwater from PFAS impacted soils at the source areas based on PFAS concentrations identified in soil samples.
- Storm and surface water drainages that receive direct runoff from several of the AOIs, including the Refractometer Solutions Test Area, Fire Station 29 (Building 346), AFFF Storage Area (Building 321), and AFFF Storage Area (Building 821). PFAS detections in surface water and sediment suggest that drainage ditches within the cantonment area have historically received and transported runoff containing AFFF. Additional surface water drainage channels located near Mettie Airstrip contained sediment impacted with PFOS and may receive intermittent seepage of PFAS impacted groundwater from the airstrip.
- Lateral groundwater migration occurs within vesiculated and/or fractured upper and lower contacts of the Pomona Member. Based on the massive nature of the basalt units observed during drilling, vertical migration within the Pomona Member is likely limited to areas of faulting or, to a limited extent, fractures. Groundwater that occurs along the upper surface of basalt flows may be limited to areas of higher elevation.
- The sandstones encountered within of the Ellensburg Fm (anomaly A5 on **Figure 5** and anomaly B1 on **Figure 6**) likely serve as preferential pathways for lateral migration, as well as a vertical pathway to the permeable sediments and vesicular basalt observed at the surface of the underlying basalt. Elevated PFAS concentrations were observed in off-post wells screened in the sandstone units. Additionally, these sandstones produced the highest yields observed during boundary well drilling.
- The contact between the Ellensburg Fm and underlying basalt consistently exhibits a thin volcanic ash lens, followed by a thin layer of coarse material (i.e., basal deposits). These basal deposits likely serve as a generally continuous zone of relatively higher permeability which could facilitate lateral migration of impacted groundwater. This migration pathway may be interrupted where the permeable strata are offset by faults.

3.4 Data Needs

The following data gaps were identified while developing the CSM and will be addressed as part of the ongoing PFAS RI at YTC:

- The lateral and vertical extents of PFAS in soil and groundwater at each AOI are currently undefined and relative PFAS contributions from individual AOIs to the entire PFAS plume are unknown. Contributions attributable to an individual source can be influenced by source mass, connections to preferential pathways, the degree of surface infiltration, and the age of each source. Further source characterization and evaluation of preferential contaminant migration pathways will be undertaken in the RI.
- Perched groundwater at the Former Fire Training Pit and Bird Bath Wash Rack contains substantial PFAS mass; however, the hydraulic connection between water-bearing zone(s)

within the up-slope basalts and the downgradient deeper water-bearing zone identified at the Installation boundary has not been determined. Migration pathways at and downgradient of the Mettie Airstrip are unknown due to a lack of subsurface data and distance from the other AOIs.

- The mechanism for vertical migration of perched groundwater to the underlying sand-rich units of the Ellensburg Fm is not completely understood. Some vertical groundwater transport may occur through fractured zones within the Pomona Member. However, the more massive sections of the Pomona Member likely enhance lateral migration along the surface of the basaltuntil it encounters the edge of the Pomona Member and infiltrates into the more permeable Ellenburg Fm. If lateral groundwater migration occurs along the surface of the Pomona Member, a refined understanding of the extent of the Pomona Member will be critical to defining the migration pathway.
- Current groundwater data sets are insufficient to adequately delineate the lateral and vertical extent of PFAS exceeding the RSLs. PFAS extent in the downgradient direction is currently based on analtyical results generated from private water supply wells. However, the absence of well construction details for the majority of off-post private wells inhibits accurate correlation between wells.
- Soil quality has not been delineated at the Refractometer Solutions Test Area, Building 321, or Selah Airstrip. Addtionally, despite the significant soil reworking that occurred at the Former Fire Training Pit and Bird Bath Wash Rack, soil sampling will be required to confirm that PFAS is not present in soils above applicable RSLs.
- The irrigation canal was dry at the time of sampling; however, sediment samples collected at locations SED-01 and SED-02 were reported as non-detect for PFAS compounds (**Figure 8**). The irrigation canal is unlined and is anticipated to be a losing stream when flowing (Margaret Taaffe, pers. com., 2022). The potential for PFAS transport in the irrigation canal should be evaluated.

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4 REFERENCES

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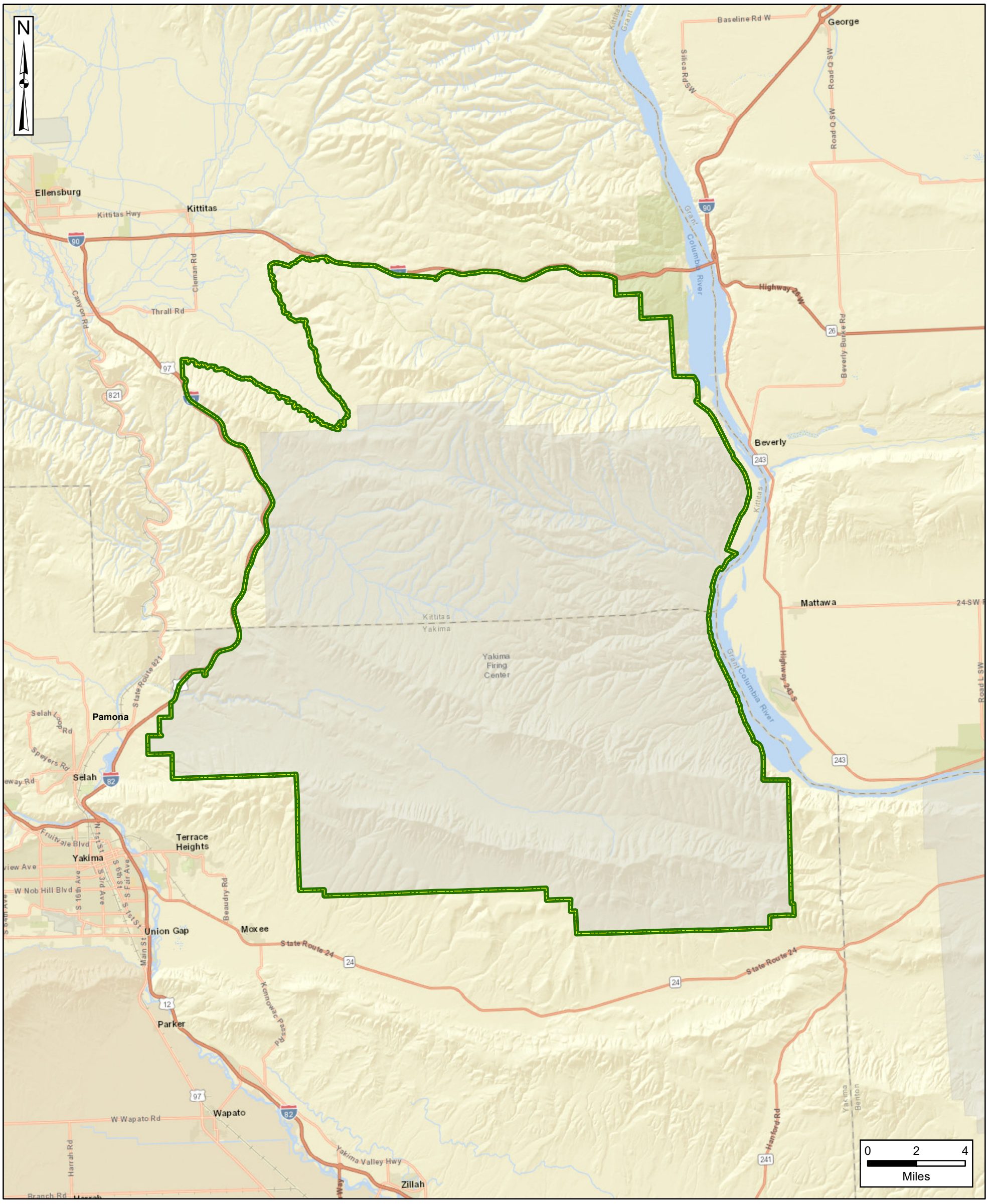
FIGURES

Conceptual Site Model Technical Memorandum
USAEC PFAS Remedial Investigation
Yakima Training Center, WA

Figure 1
Site Location



Installation Boundary

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Street Map Data

Coordinate System:
WGS 1984, UTM Zone 10 North

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USAEC PFAS Remedial Investigation
Yakima Training Center, WA

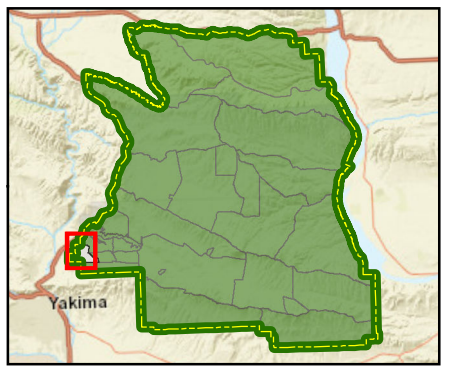
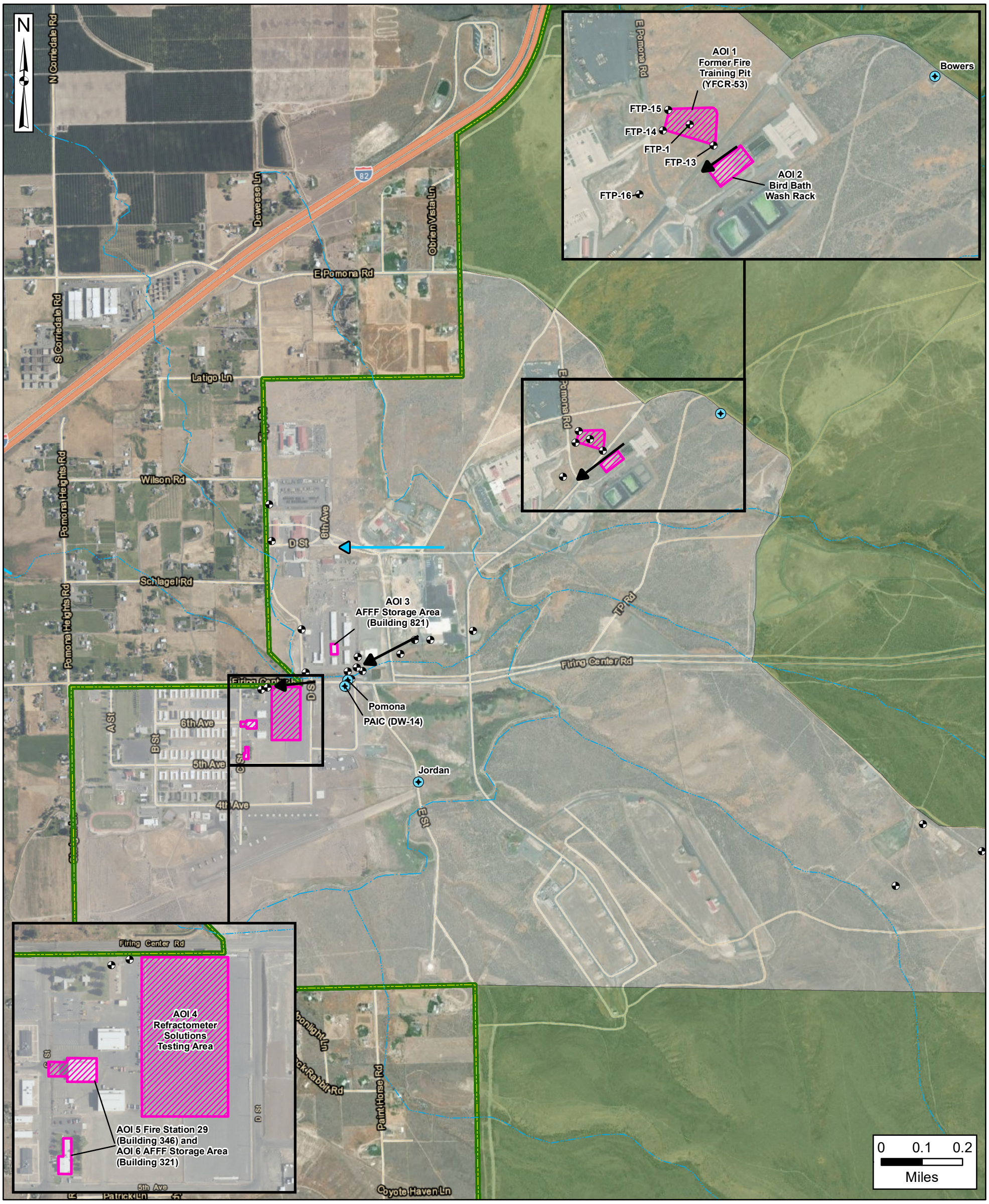


Figure 2
Site Features and AOI Locations



- Installation Boundary
- Cantonment Area
- Range/Training Area
- AOI
- AFFF Use Area
- Monitoring Well
- Potable Water Well (On-Installation)
- River/Stream (Perennial)
- River/Stream (Intermittent)
- Canal/Ditch
- Deep Groundwater (i.e., Used for Installation Potable Supply) Flow Direction
- Perched Groundwater Flow Direction

AFFF = Aqueous Film-Forming Foam
AOI = Area of Interest

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

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USAEC PFAS Remedial Investigation
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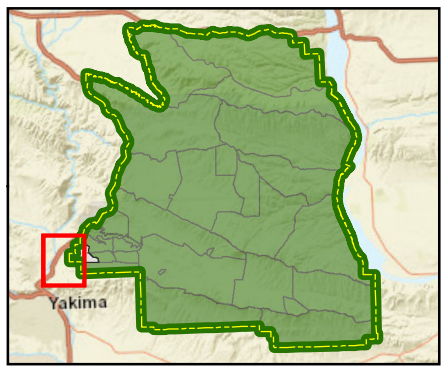
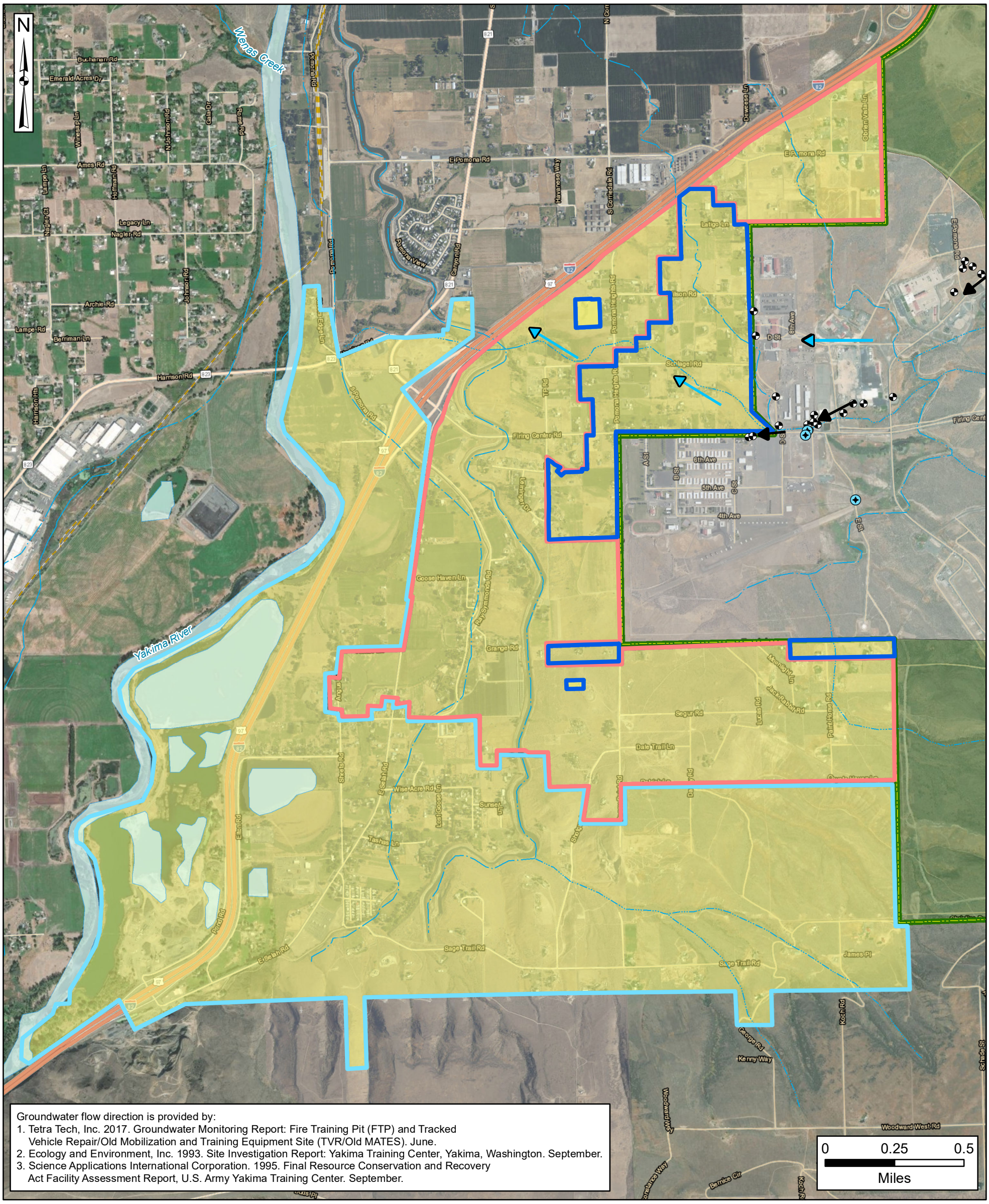


Figure 3
Off-Post Evaluation Area



Groundwater flow direction is provided by:
1. Tetra Tech, Inc. 2017. Groundwater Monitoring Report: Fire Training Pit (FTP) and Tracked Vehicle Repair/Old Mobilization and Training Equipment Site (TVR/Old MATES). June.
2. Ecology and Environment, Inc. 1993. Site Investigation Report: Yakima Training Center, Yakima, Washington. September.
3. Science Applications International Corporation. 1995. Final Resource Conservation and Recovery Act Facility Assessment Report, U.S. Army Yakima Training Center. September.

- Installation Boundary
- Cantonment Area
- Range/Training Area
- Monitoring Well
- Potable Water Well (On-Installation)
- Water Body
- River/Stream (Perennial)
- River/Stream (Intermittent)
- Canal/Ditch
- Deep Groundwater (i.e., Used for Installation Potable Supply) Flow Direction
- Perched Groundwater Flow Direction
- Phase 1 Outreach Area (September 2021)*
- Phase 2 Outreach Area (January 2022)*
- Phase 3 Outreach Area (July/August 2022)*

*Undeveloped parcels and connections to Class A/B systems included.

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

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USAEC PFAS Remedial Investigation
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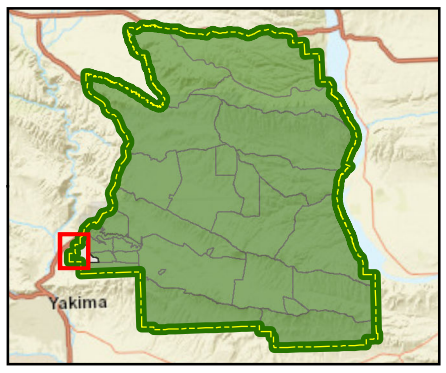
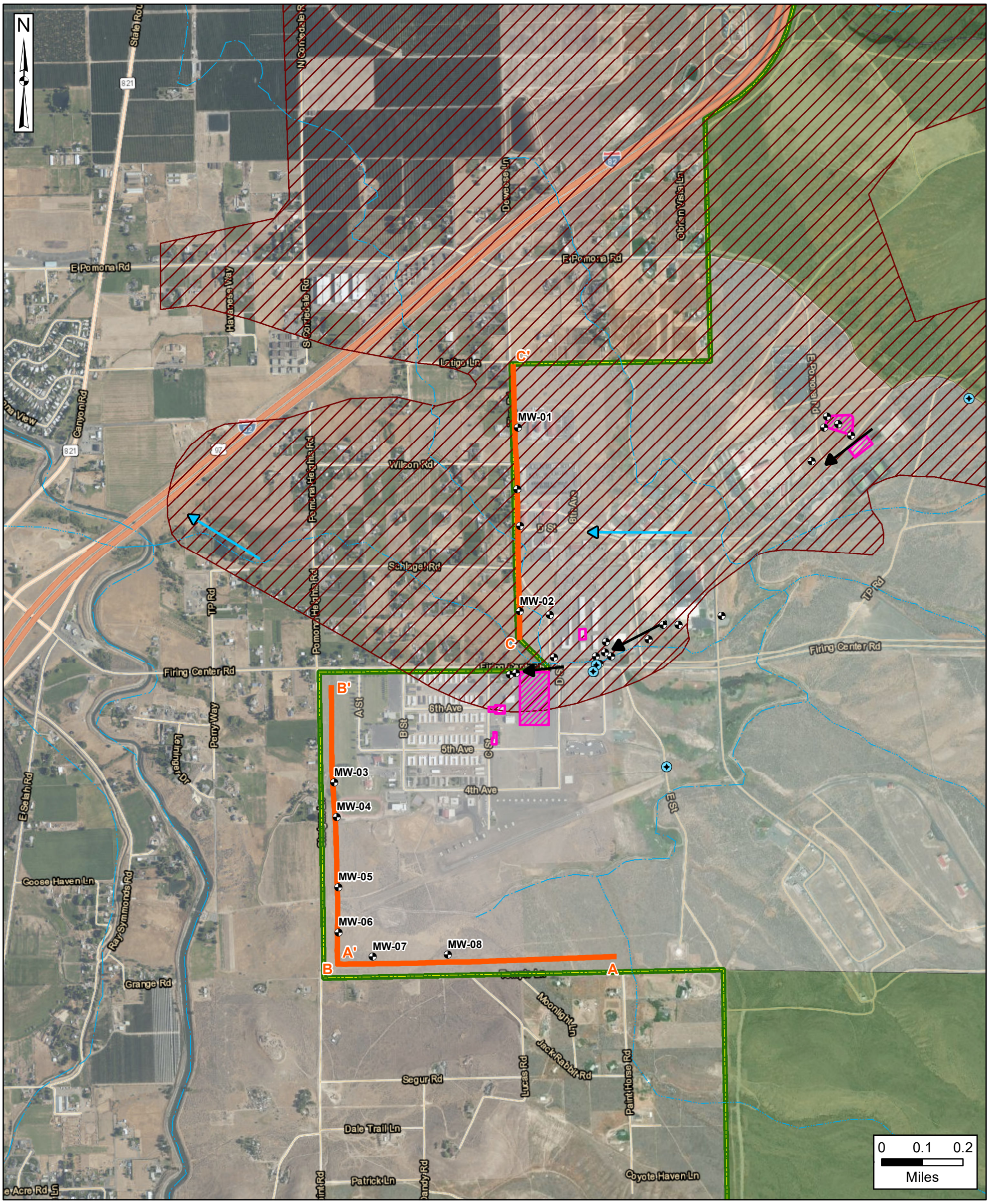


Figure 4
Surface Geophysics Transect Locations



- Installation Boundary
- Cantonment Area
- Range/Training Area
- AOI
- AFFF Use Area
- Approximate Limits of Pomona Basalt
- Monitoring Well
- Potable Water Well (On-Installation)
- River/Stream (Perennial)
- River/Stream (Intermittent)
- Canal/Ditch
- Deep Groundwater (i.e., Used for Installation Potable Supply) Flow Direction
- Perched Groundwater Flow Direction
- Surface Geophysics Transect

AFFF = Aqueous Film-Forming Foam
AOI = Area of Interest

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

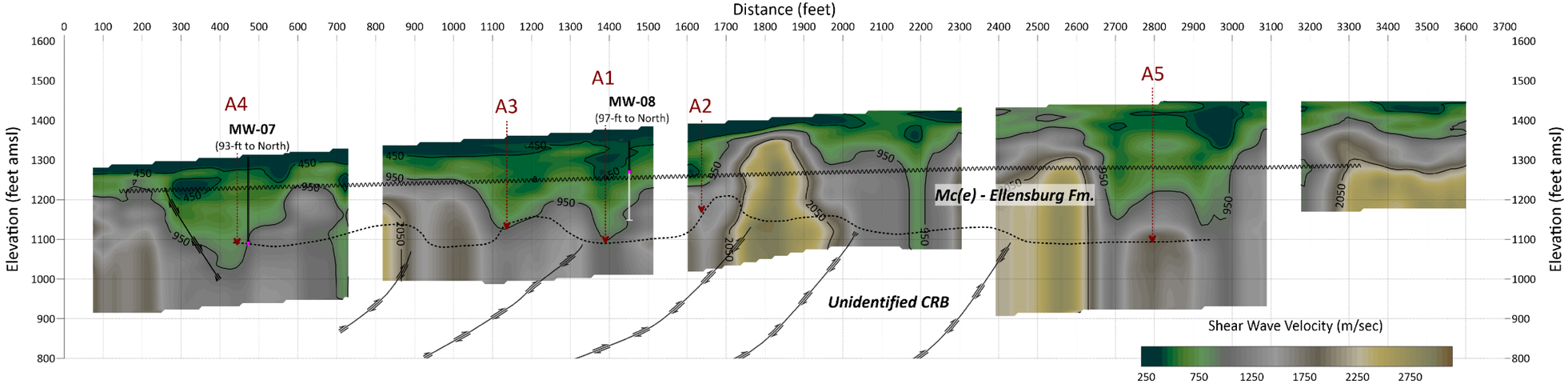
Coordinate System:
WGS 1984, UTM Zone 10 North

WEST

EAST

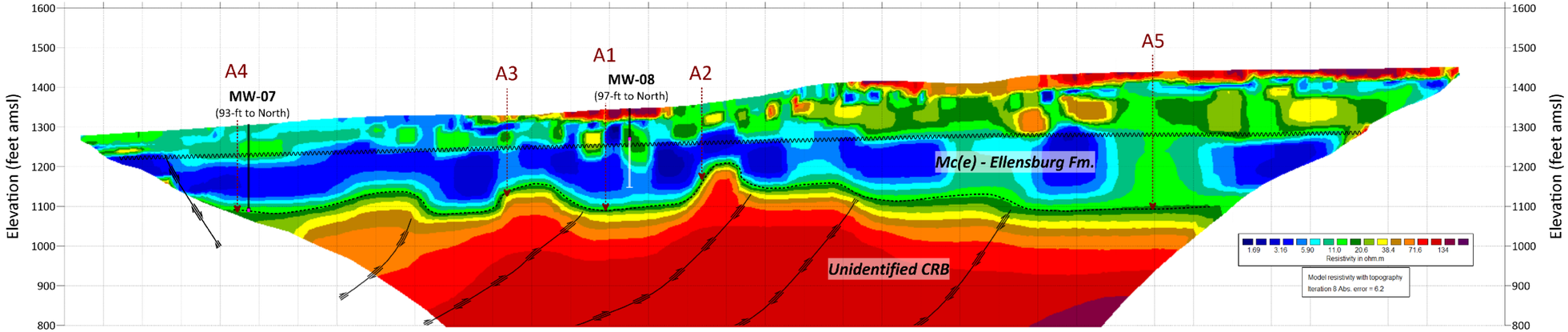
LINE A - SEISMIC SHEAR WAVE MODEL

Distance (feet)



LINE A - ELECTRICAL RESISTIVITY MODEL

Distance (feet)



Legend

MW-08 (97-ft to North) - Monitoring Well (Offset Distance From Transect Shown in Parenthesis)

Screen Interval

A2 - Anomaly

- Interpreted Water Table

- Interpreted Contact

- Reverse/Thrust Fault

- Normal Fault

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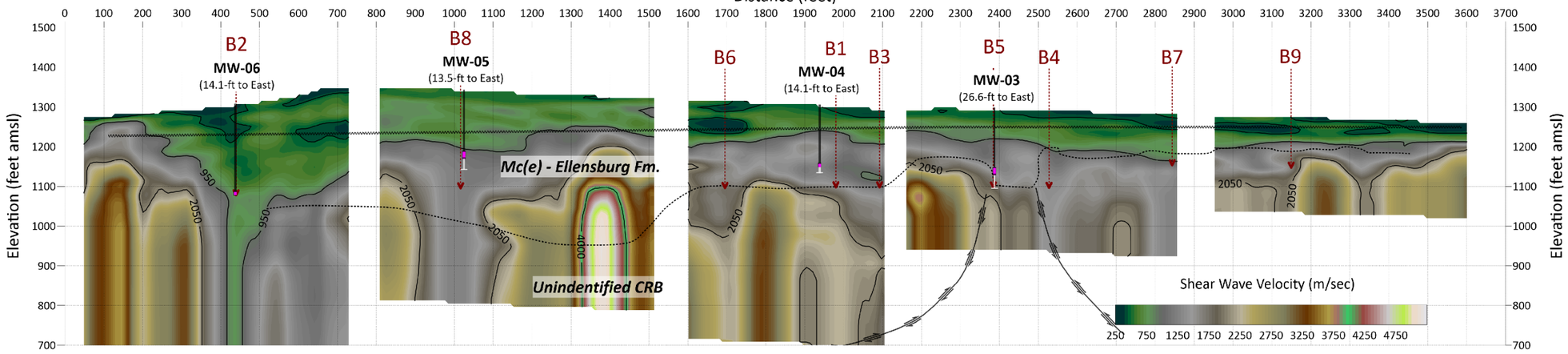
Figure 5
Surface Geophysics Results A-A'

SOUTH

NORTH

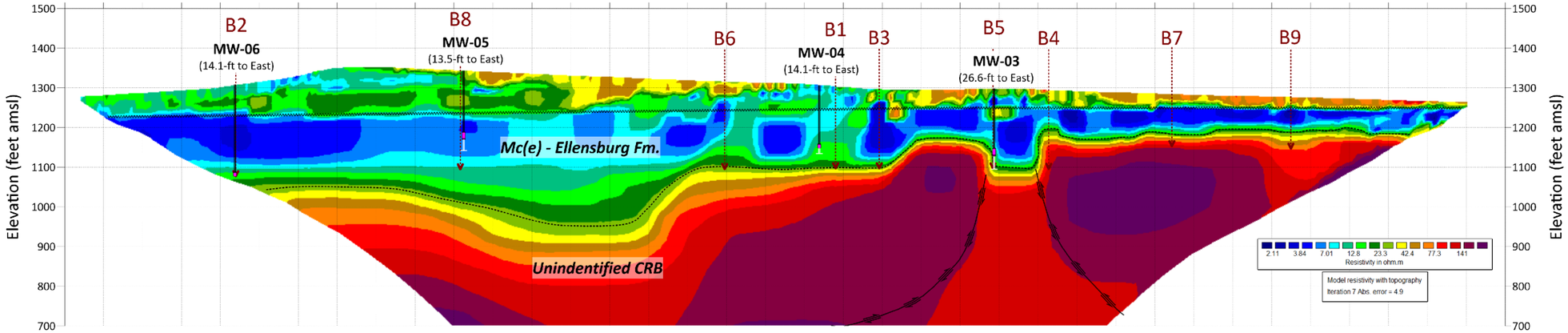
LINE B - SEISMIC SHEAR WAVE MODEL

Distance (feet)



LINE B - ELECTRICAL RESISTIVITY MODEL

Distance (feet)



Legend

MW-08 (97-ft to North) - Monitoring Well (Offset Distance From Transect Shown in Parenthesis)

Screen Interval

A2 - Anomaly

- Interpreted Water Table

- Interpreted Contact

- Reverse/Thrust Fault

- Normal Fault

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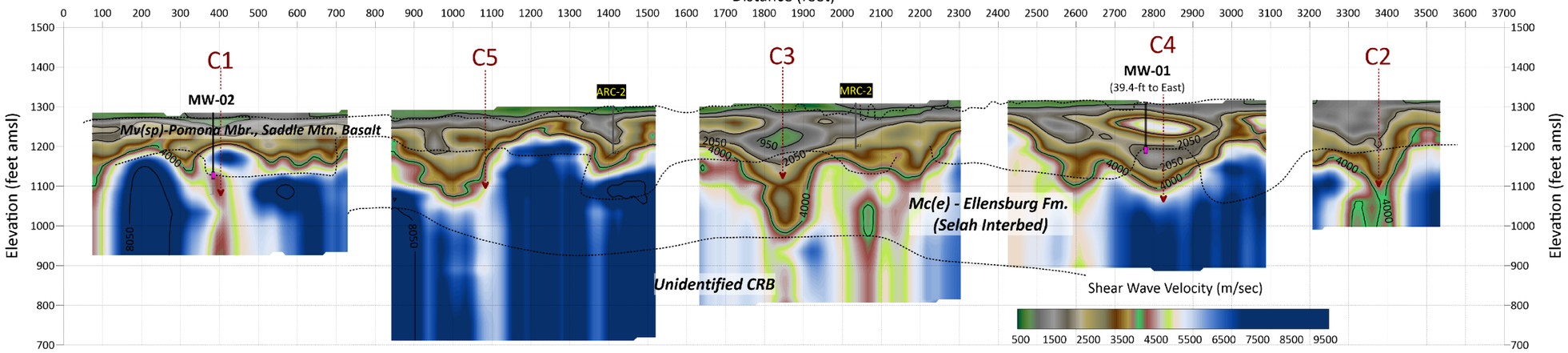
Figure 6
Surface Geophysics Results B-B'

SOUTH

NORTH

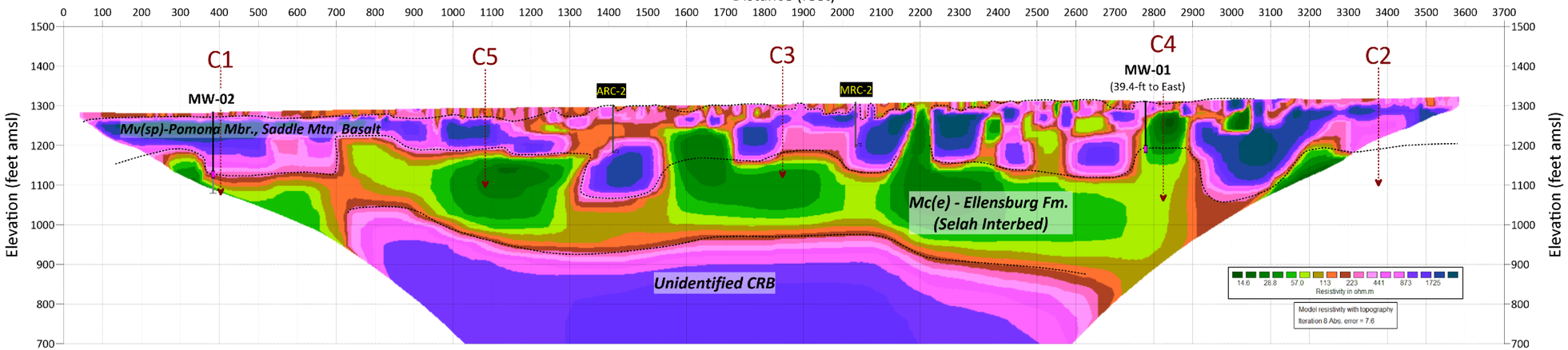
LINE C - SEISMIC SHEAR WAVE MODEL

Distance (feet)



LINE C - ELECTRICAL RESISTIVITY MODEL

Distance (feet)



Legend

MW-08 (97-ft to North) - Monitoring Well (Offset Distance From Transect Shown in Parenthesis)

Screen Interval

A2 - Anomaly

- Interpreted Water Table

- Interpreted Contact

- Reverse/Thrust Fault

- Normal Fault

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Figure 7
Surface Geophysics Results C-C'

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USAEC PFAS Remedial Investigation
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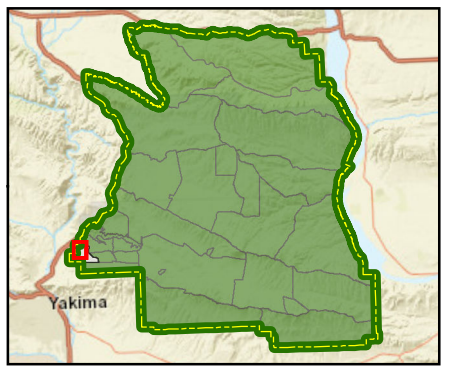
Figure 8
Former Fire Training Pit (YFCR-53) and Bird Bath Wash Rack AOI Baseline Sampling Results



Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

YTC-MRC-2-GW	
Date	2/8/2023
PFOS	**1100**
PFOA	**51**
PFBS	**130**
PFNA	**2.7**
PFHxS	**860**

YTC-SED-01	
Date	2/7/2023
PFOS	0.00073 U
PFOA	0.00073 U
PFBS	0.0024 U
PFNA	0.00073 U
PFHxS	0.00073 U

YTC-SED-02	
Date	2/7/2023
PFOS	0.00087 U
PFOA	0.00087 U
PFBS	0.0029 U
PFNA	0.00087 U
PFHxS	0.00087 U

YTC-MTS-2-GW	
Date	2/8/2023
PFOS	**33 [30]**
PFOA	**5.9 [5.9]**
PFBS	**8.2 [8.3]**
PFNA	**0.82 J [0.90 J]**
PFHxS	**28 [28]**

YTC-MTS-3-GW	
Date	2/6/2023
PFOS	**3.4**
PFOA	**1.3 J**
PFBS	**2.5**
PFNA	1.6 U
PFHxS	**14**

YTC-MTS-4-GW	
Date	2/8/2023
PFOS	**30**
PFOA	**6.0**
PFBS	**18**
PFNA	1.6 U
PFHxS	**75**

AOI 1 Former Fire Training Pit (YFCR-53)
AOI 2 Bird Bath Wash Rack
AOI 3 AFFF Storage Area (Building 821)
AOI 4 Refractormeter Solutions Testing Area
AOI 5 Fire Station 29 (Building 346) and AOI 6 AFFF Storage Area (Building 321)
Pomona
PAIC (DW-14)
Jordan
Tipp Rd
8th Ave
D St
E Pomona Rd
TP Rd
Firing Center Rd
E St
C St

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L).
2. Sediment results are reported in milligrams per kilogram (mg/kg).
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 250 500
Feet

Installation Boundary
Cantonment Area
Range/Training Area
AOI
AFFF Use Area
Monitoring Well
Potable Water Well (On-Installation)
River/Stream (Intermittent)
Canal/Ditch
Perched Groundwater Flow Direction

Sampling Locations
Existing Monitoring Well
Sediment

AFFF = Aqueous Film-Forming Foam
AOI = Area of Interest
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluoroctanoic acid
PFOS = perfluoroctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

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USAEC PFAS Remedial Investigation
Yakima Training Center, WA

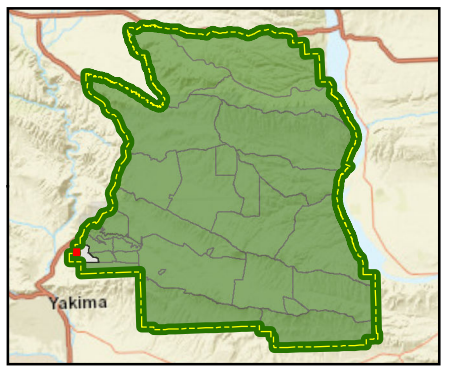


Figure 9
AFFF Storage Area (Building 821) AOI
Baseline Sampling Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

YTC-SW-04	
Date	2/7/2023
PFOS	**2900 [2900]**
PFOA	**78 [83]**
PFBS	**26 [29]**
PFNA	**12 [12]**
PFHxS	**360 [360]**

YTC-SED-04	
Date	2/7/2023
PFOS	**0.0052 J [0.0094 J]**
PFOA	0.00077 U **[0.00025 J]**
PFBS	0.0026 U [0.0022 U]
PFNA	0.00077 U [0.00066 U]
PFHxS	**0.00037 J [0.00068]**

YTC-TVR-2-GW	
Date	2/8/2023
PFOS	**370**
PFOA	**13**
PFBS	**27**
PFNA	**0.73 J**
PFHxS	**310**

YTC-TVR-2-GW	
Date	2/8/2023
PFOS	**65**
PFOA	**5.3**
PFBS	**5.9**
PFNA	**0.76 J**
PFHxS	**43**

YTC-SED-03	
Date	2/7/2023
PFOS	**0.001**
PFOA	0.00069 U
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	0.00069 U

YTC-TVR-6-GW	
Date	2/6/2023
PFOS	**100**
PFOA	**3.6**
PFBS	**4.1**
PFNA	**1.8**
PFHxS	**45**

AOI 3
AFFF Storage Area
(Building 821)

AOI 4
Refractometer
Solutions
Testing Area

YTC-815-2-GW
YTC-TVR-5-GW
TVR-4
TVR-1
TVR-7
Pomona
PAIC (DW-14)

D St
Firing Center Rd
1044
1100
1168

0 100 200
Feet

Notes:
1. Groundwater and surface water results are reported in nanograms/liter (ng/L).
2. Sediment results are reported in milligrams per kilogram (mg/kg).
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
Cantonment Area
Range/Training Area
AOI
AFFF Use Area
Monitoring Well
Abandoned Monitoring Well
Potable Water Well (On-Installation)
River/Stream (Intermittent)
Canal/Ditch
Perched Groundwater Flow Direction

Sampling Locations
Existing Monitoring Well
Sediment

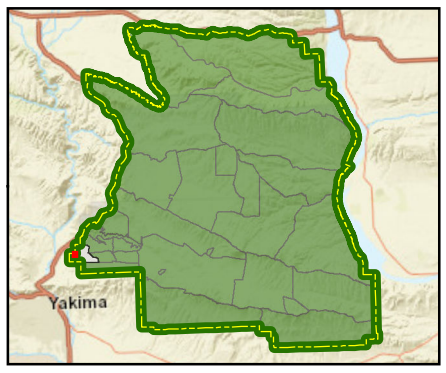
AFFF = Aqueous Film-Forming Foam
AOI = Area of Interest
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

Conceptual Site Model Technical Memorandum
USAEC PFAS Remedial Investigation
Yakima Training Center, WA

Figure 10
Refractometer Solutions Testing Area and Fire Station 29 (Building 346) and AFFF Storage Area (Building 321) AOI Baseline Sampling Results



N

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

YTC-SED-05	
Date	2/7/2023
PFOS	**0.0014**
PFOA	0.00067 U
PFBS	0.0022 U
PFNA	0.00067 U
PFHxS	**0.00029 J**

YTC-MMP-2-GW	
Date	2/8/2023
PFOS	**2300**
PFOA	**230**
PFBS	**190**
PFNA	**6.6**
PFHxS	**1400**

YTC-MMP-1-GW	
Date	2/8/2023
PFOS	**5600**
PFOA	**340**
PFBS	**120**
PFNA	**30**
PFHxS	**2000**

YTC-TVR-5-GW

AOI 4
Refractometer
Solutions
Testing Area

AOI 5 Fire Station 29
(Building 346) and
AOI 6 AFFF Storage Area
(Building 321)

Firing Center Rd
1044
1100
D St
E St
5th Ave

0 100 200
Feet

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L).
2. Sediment results are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

- Installation Boundary
- Cantonment Area
- Range/Training Area
- AOI
- AFFF Use Area
- Monitoring Well
- River/Stream (Intermittent)
- Canal/Ditch
- Perched Groundwater Flow Direction

Sampling Locations

- Existing Monitoring Well
- Surface Water
- Sediment

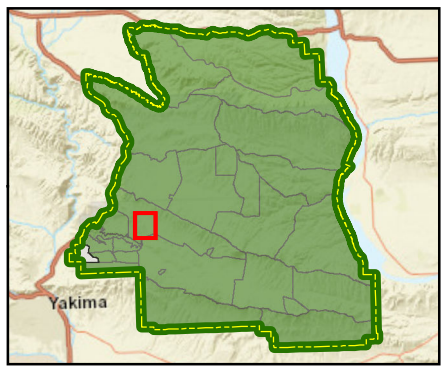
AFFF = Aqueous Film-Forming Foam
AOI = Area of Interest
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

Conceptual Site Model Technical Memorandum
USAEC PFAS Remedial Investigation
Yakima Training Center, WA

Figure 11
Selah Airstrip AOI
Baseline Sampling Results



Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

YTC-SED-06	
Date	2/7/2023
PFOS	**0.00027 J**
PFOA	0.00068 U
PFBS	0.0023 U
PFNA	0.00068 U
PFHxS	0.00068 U

Former Crash Truck Parking Area

AOI 7
Selah Airstrip

Selah Airstrip Well House

Water Stand

YTC-SED-07	
Date	2/7/2023
PFOS	**0.004**
PFOA	0.00083 U
PFBS	0.0028 U
PFNA	0.00083 U
PFHxS	0.00083 U

YTC-SW-08	
Date	2/7/2023
PFOS	1.9 U
PFOA	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHxS	1.8 U

YTC-SED-08	
Date	2/7/2023
PFOS	0.00095 U
PFOA	0.00095 U
PFBS	0.0032 U
PFNA	0.00095 U
PFHxS	0.00095 U

Selah Spring

Selah Creek

0 500 1,000
Feet

Notes:
1. Surface water results are reported in nanograms/liter (ng/L).
2. Sediment results are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Groundwater flow direction is provided by:
1. U.S. Army Public Health Command. 2010. Environmental Baseline Survey No. 38-EH-0DEC-10, Proposed Tactical Unmanned Aircraft System Facility, Yakima Training Center, Selah Airstrip, Yakima, Washington. September.

- Installation Boundary
- Cantonment Area
- Range/Training Area
- AOPI
- Former Building
- River/Stream (Intermittent)
- Canal/Ditch
- Perched Groundwater Flow Direction
- Surface Water Flow Direction
- Potable Water Well (On-Installation)
- Spring

Sampling Locations
- Surface Water
- Sediment

AOI = Area of Interest
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate

Data Sources:
Yakima Training Center, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

TABLES

Table 1 - Groundwater Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

			Location	YTC-MMP-1-GW		YTC-MMP-2-GW		YTC-MRC-2-GW		YTC-MTS-2-GW			
			Sample/Duplicate ID	YTC-MMP-1-GW-020823		YTC-MMP-2-GW-020823		YTC-MRC-2-GW-020823		YTC-MTS-2-GW-020823		YTC-FD-01-GW-020823	
			Sample Date	02/08/2023		02/08/2023		02/08/2023		02/08/2023		02/08/2023	
			Sample Type	N		N		N		N		FD	
			Matrix	Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS													
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	ng/L	**2.4**		**0.74**	J	1.6	U	1.6	U	1.6	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	ng/L	**1300**	J	**630**		**3.7**		2.4	U	2.4	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	ng/L	**300**		**110**		**5.4**		2.4	U	2.4	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	ng/L	2.5	U	2.6	U	2.4	U	2.4	U	2.4	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	ng/L	1.7	U	1.7	U	1.6	U	1.6	U	1.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	601	ng/L	**120**		**190**		**130**		**8.2**		**8.3**	
Perfluorobutanoic acid (PFBA)	375-22-4	--	ng/L	**140**		**110**		**53**		**7.5**		**7.4**	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	ng/L	**0.91**	J	1.7	U	1.6	U	1.6	U	1.6	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	ng/L	**4.6**		**1.3**	J	**0.55**	J	1.6	U	1.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	ng/L	1.7	U	1.7	U	1.6	U	1.6	U	1.6	U
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	ng/L	**120**		**56**		**25**		**0.76**	J	**0.67**	J
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	ng/L	**360**		**180**		**39**		**5.6**		**5.5**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	39	ng/L	**2000**		**1400**		**860**		**28**		**28**	
Perfluorohexanoic acid (PFHxA)	307-24-4	--	ng/L	**520**		**530**		**220**		**15**		**15**	
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	ng/L	1.7	U	1.7	U	**2.4**		1.6	U	1.6	U
Perfluorononanoic acid (PFNA)	375-95-1	6	ng/L	**30**		**6.6**		**2.7**		**0.82**	J	**0.90**	J
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	ng/L	**18**		**11**		**2.9**		1.6	U	1.6	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	4	ng/L	**5600**		**2300**		**1100**		**33**		**30**	
Perfluorooctanoic acid (PFOA)	335-67-1	6	ng/L	**340**		**230**		**51**		**5.9**		**5.9**	
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	ng/L	**180**		**210**		**150**		**6.5**		**6.5**	
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	ng/L	**450**		**360**		**120**		**13**		**13**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	ng/L	1.7	U	1.7	U	1.6	U	1.6	U	1.6	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	ng/L	1.7	U	1.7	U	1.6	U	1.6	U	1.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	ng/L	1.7	U	1.7	U	1.6	U	1.6	U	1.6	U

Table 1 - Groundwater Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

			Location	YTC-MTS-3-GW		YTC-MTS-4-GW		YTC-SOURCE-1		YTC-TVR-2-GW		YTC-TVR-3-GW	
			Sample/Duplicate ID	YTC-MTS-3-GW-020623		YTC-MTS-4-GW-020823		YTC-SOURCE-1-020723		YTC-TVR-2-GW-020823		YTC-TVR-3-GW-020723	
			Sample Date	02/06/2023		02/08/2023		02/07/2023		02/08/2023		02/07/2023	
			Sample Type	N		N		N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS													
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	ng/L	1.6	U	1.6	U	1.7	U	1.6	U	1.6	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	ng/L	2.5	U	2.4	U	2.5	U	2.4	U	2.5	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	ng/L	2.5	U	2.4	U	2.5	U	2.4	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	ng/L	2.5	U	2.4	U	2.5	U	2.4	U	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	601	ng/L	**2.5**		**18**		1.6	U	**5.9**		**27**	
Perfluorobutanoic acid (PFBA)	375-22-4	--	ng/L	4.1	U	**7.5**		4.1	U	**9.5**		**11**	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	**1.1**	J
Perfluorodecanoic acid (PFDA)	335-76-2	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	ng/L	1.6	U	**1.7**		1.6	U	**1.4**	J	**11**	J+
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	ng/L	**0.50**	J	**5.6**		1.6	U	**4.9**		**8.8**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	39	ng/L	**14**		**75**		1.6	U	**43**		**310**	
Perfluorohexanoic acid (PFHxA)	307-24-4	--	ng/L	**1.5**	J	**27**		1.6	U	**12**		**46**	
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	**0.52**	J
Perfluorononanoic acid (PFNA)	375-95-1	6	ng/L	1.6	U	1.6	U	1.6	U	**0.76**	J	**0.73**	J
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	**0.80**	J
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	4	ng/L	**3.4**		**30**		1.7	U	**65**		**370**	
Perfluorooctanoic acid (PFOA)	335-67-1	6	ng/L	**1.3**	J	**6.0**		1.6	U	**5.3**		**13**	
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	ng/L	**2.0**		**17**		1.6	U	**7.1**		**49**	
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	ng/L	**0.99**	J	**12**		1.6	U	**10**		**21**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	ng/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U

Table 1 - Groundwater Analytical Results
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Yakima Training Center
Yakima, Washington

			Location	YTC-TVR-6-GW	
			Sample/Duplicate ID	YTC-TVR-6-GW-020623	
			Sample Date	02/06/2023	
			Sample Type	N	
			Matrix	Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual
PFAS					
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	ng/L	1.7	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	ng/L	2.6	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	ng/L	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	ng/L	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	ng/L	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	601	ng/L	**4.1**	
Perfluorobutanoic acid (PFBA)	375-22-4	--	ng/L	**4.0**	J
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	ng/L	1.7	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	ng/L	**2.8**	
Perfluorododecanoic acid (PFDoA)	307-55-1	--	ng/L	1.7	U
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	ng/L	**1.4**	J
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	ng/L	**3.2**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	39	ng/L	**45**	
Perfluorohexanoic acid (PFHxA)	307-24-4	--	ng/L	**8.5**	
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	ng/L	1.7	U
Perfluorononanoic acid (PFNA)	375-95-1	6	ng/L	**1.8**	
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	ng/L	1.7	UJ
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	4	ng/L	**100**	
Perfluorooctanoic acid (PFOA)	335-67-1	6	ng/L	**3.6**	
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	ng/L	**7.2**	
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	ng/L	**7.0**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	ng/L	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	ng/L	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	ng/L	1.7	U

Table 1 - Groundwater Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Grey shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:
-- = not applicable
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only.
J+	The result is an estimated quantity; the result may be biased high.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

Table 2 - Surface Water Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

			Location	YTC-SW-04				YTC-SW-08	
			Sample/Duplicate ID	YTC-SW-04-020723		YTC-FD-01-SW-020723		YTC-SW-08-020723	
			Sample Date	02/07/2023		02/07/2023		02/07/2023	
			Sample Type	N		FD		N	
			Matrix	Surface Water		Surface Water		Surface Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	ng/L	**0.60**	J	**0.61**	J	1.8	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	ng/L	**180**		**200**		2.7	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	ng/L	**81**		**80**		2.7	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	ng/L	2.7	U	2.6	U	2.7	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	ng/L	1.8	U	1.7	U	1.8	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	601	ng/L	**26**		**29**		1.8	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	ng/L	**22**		**21**		4.5	U
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	ng/L	**2.5**		**2.4**		1.8	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	ng/L	**11**		**11**		1.8	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	ng/L	**1.9**	J	**1.9**		1.8	UX
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	ng/L	**41**		**43**		1.8	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	ng/L	**59**		**59**		1.8	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	39	ng/L	**360**		**360**		1.8	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	ng/L	**160**		**170**		1.8	U
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	ng/L	**3.8**		**3.4**		1.8	U
Perfluorononanoic acid (PFNA)	375-95-1	6	ng/L	**12**		**12**		1.8	U
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	ng/L	**11**	J+	**12**	J+	1.8	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	4	ng/L	**2900**		**2900**		1.9	U
Perfluorooctanoic acid (PFOA)	335-67-1	6	ng/L	**78**		**83**		1.8	U
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	ng/L	**39**		**41**		1.8	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	ng/L	**79**		**78**		1.8	U
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	ng/L	1.8	U	1.7	U	1.8	UX
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	ng/L	1.8	U	1.7	U	1.8	UX
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	ng/L	**2.3**		**2.4**		1.8	U

Table 2 - Surface Water Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Grey shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:
-- = not applicable
% = percent
CAS = Chemical Abstracts Service number
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only.
J+	The result is an estimated quantity; the result may be biased high.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).
UX	Non-detect sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.

Table 3 - Sediment Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

			Location	YTC-SED-01		YTC-SED-02		YTC-SED-03		YTC-SED-04			
			Sample/Duplicate ID	YTC-SED-01-020723		YTC-SED-02-020723		YTC-SED-03-020723		YTC-SED-04-020723		YTC-FD-01-SED-020723	
			Sample Date	02/07/2023		02/07/2023		02/07/2023		02/07/2023		02/07/2023	
			Sample Type	N		N		N		N		FD	
			Matrix	Sediment		Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS													
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0036	U	0.0044	U	0.0034	U	0.0038	U	0.0033	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0024	U	0.0029	U	0.0023	U	0.0026	U	0.0022	U
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00073	U	0.00087	U	**0.00024**	J	0.00077	U	**0.00025**	J
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	**0.00039**	J
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.13 (R) 1.6 (I/C)	mg/kg	0.00073	U	0.00087	U	0.00069	U	**0.00037**	J	**0.00068**	
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	**0.00026**	J	**0.00047**	J
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorononanoic acid (PFNA)	375-95-1	0.019 (R) 0.25 (I/C)	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.013 (R) 0.16 (I/C)	mg/kg	0.00073	U	0.00087	U	**0.001**		**0.0052**	J	**0.0094**	J
Perfluorooctanoic acid (PFOA)	335-67-1	0.019 (R) 0.25 (I/C)	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	**0.00025**	J
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	mg/kg	0.0036	U	0.0044	U	0.0034	U	0.0038	U	0.0033	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	**0.00059**	J	**0.0011**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00073	U	0.00087	U	0.00069	U	0.00077	U	0.00066	U

Table 3 - Sediment Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

			Location	YTC-SED-05		YTC-SED-06		YTC-SED-07		YTC-SED-08	
			Sample/Duplicate ID	YTC-SED-05-020723		YTC-SED-06-020723		YTC-SED-07-020723		YTC-SED-08-020723	
			Sample Date	02/07/2023		02/07/2023		02/07/2023		02/07/2023	
			Sample Type	N		N		N		N	
			Matrix	Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS											
4:2 Fluorotelomer sulfonate (4:2 FTS)	757124-72-4	--	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0033	U	0.0034	U	0.0041	U	0.0047	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0022	U	0.0023	U	0.0028	U	0.0032	U
Perfluorodecane sulfonic acid (PFDS)	335-77-3	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	**0.0003**	J	0.00068	U	0.00083	U	0.00095	U
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.13 (R) 1.6 (I/C)	mg/kg	**0.00029**	J	0.00068	U	0.00083	U	0.00095	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorononane sulfonic acid (PFNS)	68259-12-1	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorononanoic acid (PFNA)	375-95-1	0.019 (R) 0.25 (I/C)	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorooctane sulfonamide (PFOSA)	754-91-6	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.013 (R) 0.16 (I/C)	mg/kg	**0.0014**		**0.00027**	J	**0.004**		0.00095	U
Perfluorooctanoic acid (PFOA)	335-67-1	0.019 (R) 0.25 (I/C)	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluoropentane sulfonic acid (PFPeSA)	2706-91-4	--	mg/kg	0.0033	U	0.0034	U	0.0041	U	0.0047	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00067	U	0.00068	U	0.00083	U	0.00095	U

Table 3 - Sediment Analytical Results
Conceptual Site Model Technical Memorandum
Yakima Training Center
Yakima, Washington

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. All laboratory reported results in nanograms per gram (ng/g) were converted to milligrams per kilogram (mg/kg).
3. Data are compared to the 2022 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:
-- = not applicable/not analyzed
% = percent
CAS = Chemical Abstracts Service number
FD = field duplicate sample
I/C = industrial/commercial receptor scenario
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
R = residential receptor scenario

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

ATTACHMENTS

Attachment 1

Boundary Well Boring Logs

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-01

CLIENT: Army Environmental Command

Project #: 30124009

LOCATION: Yakima Training Center, WA

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/12/2023

DATE DRILLING FINISHED: 4/12/2023

DATE WELL COMPLETE: 4/13/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Larissa Sleeper

NORTHING: 492518.30 **EASTING:** 1651519.53

TOC ELEVATION: 1322.95 ft

GROUND SURFACE ELEVATION: 1320.60 ft

TOTAL BOREHOLE DEPTH: 142 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

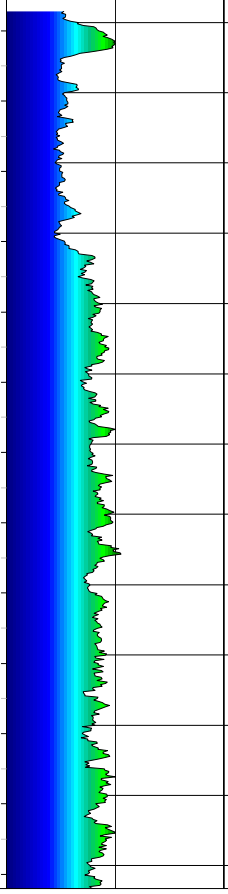
GROUT: Neat Portland Cement

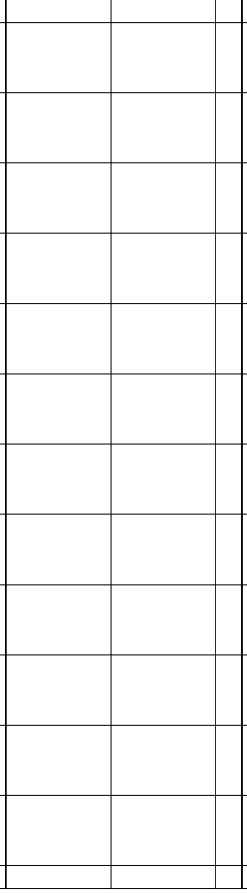
COMPLETION TYPE Stick Up

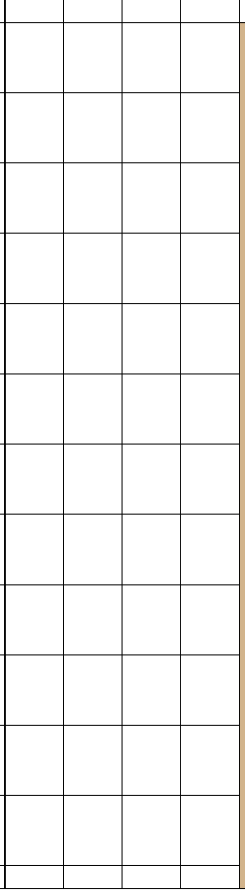
Logging Probes Used

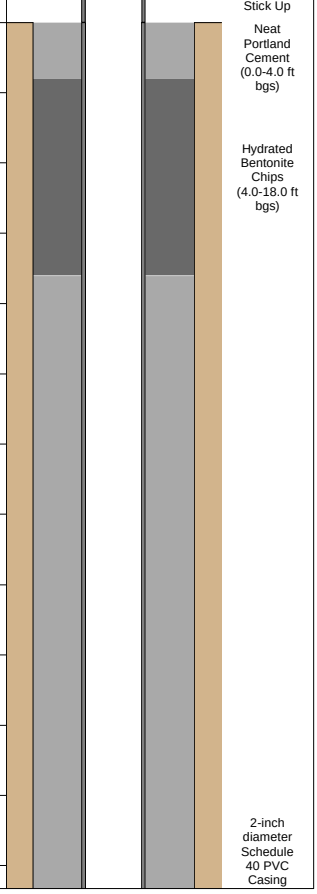
- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [ ] 3-Arm Caliper
- [ ] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [ ] SPR/SP
- [ ] Other:

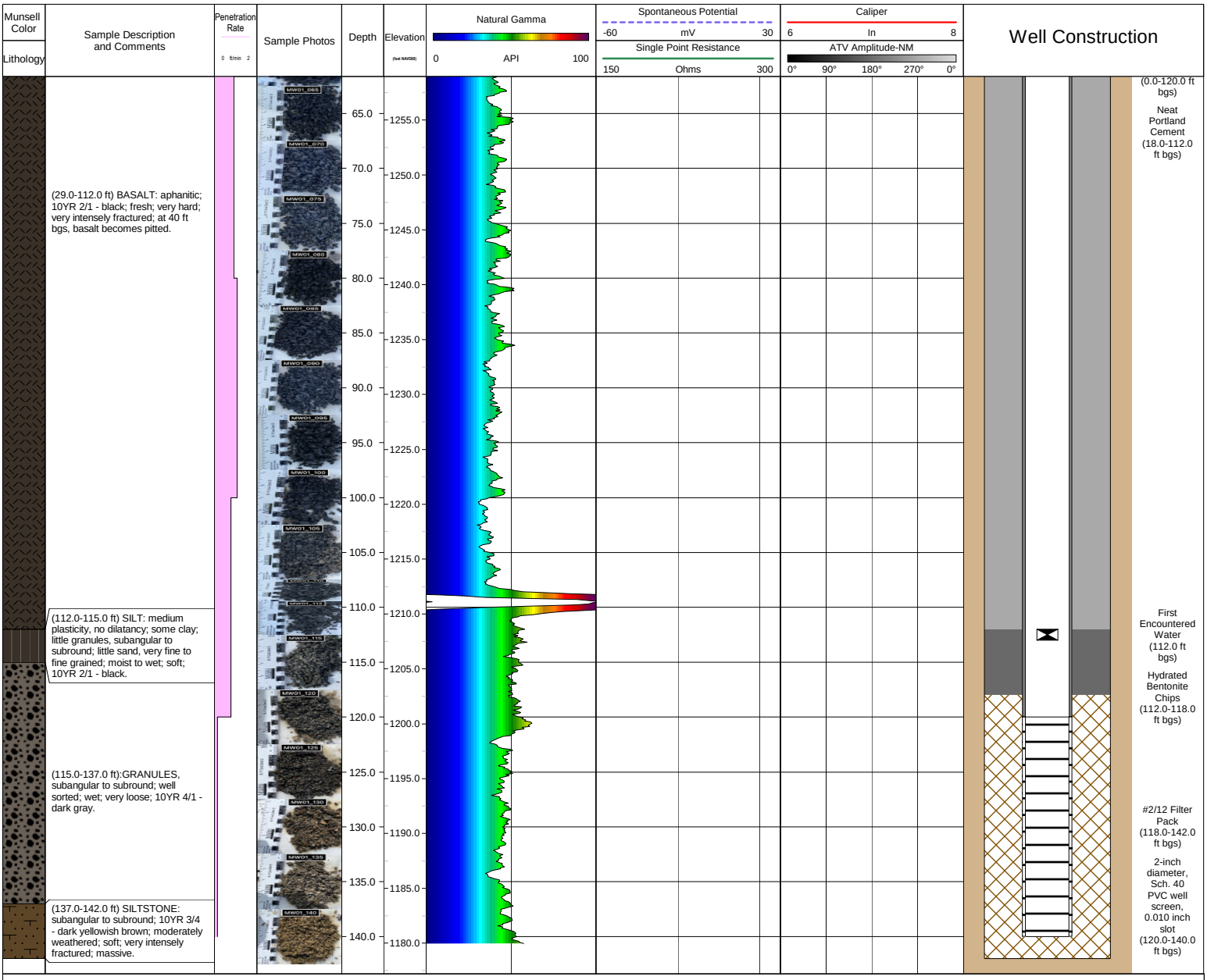
Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 2)	Sample Photos	Depth	Elevation (feet NAVD88)
	(0.0-1.0 ft) SILT: medium plasticity, no dilatancy; little sand, very fine grained; moist; medium stiff; 7.5YR 6/3 - light brown; organic odor; presence of roots.			0.0	1320.0
	(1.0-2.0 ft) SILT: medium plasticity, no dilatancy; little sand, evry fine grained; little pebbles, medium to large, subangular to subround; moist; medium stiff; 7.5YR 6/3 - light brown; pebbles of 2 to 3 inch diameter.			5.0	1315.0
	(2.0-7.0 ft) GRAVEL: small to medium pebbles, angular to subangular; little sand, fine to medium grained; well sorted; dry; very loose; 10YR 3/3 - dark brown.			10.0	1310.0
	(7.0-10.0 ft) SILT: some granules, subangular to subround; some very fine to fine sand; no plasticity; no dilatancy; dry; very soft; 2.5YR 2.5/3 - dark reddish brown.			15.0	1305.0
	(10.0 - 20.0 ft) BASALT: aphanitic; 10YR 2/1 - black; moderately weathered; very hard; very intensely fractured; vesicular.			20.0	1300.0
	(20.0-25.0 ft) BASALT: aphanitic, 10YR 2/2 - very dark brown; slightly weathered; very hard; very intensly fractured.			25.0	1295.0
	(25.0-29.0 ft) SAND: very fine to fine grained; some silt, low plasticity, no dilatancy; dry to moist; very soft; 10YR 3/1 - very dark gray.			30.0	1290.0
				35.0	1285.0
				40.0	1280.0
				45.0	1275.0
				50.0	1270.0
				55.0	1265.0
				60.0	1260.0











ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-02

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/3/2023

DATE DRILLING FINISHED: 4/3/2023

DATE WELL COMPLETE: 4/4/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Roberto Piemontese

NORTHING: 490133.45 **EASTING:** 1651470.97

TOC ELEVATION: 1292.26 ft

GROUND SURFACE ELEVATION: 1289.70 ft

TOTAL BOREHOLE DEPTH: 210.0 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

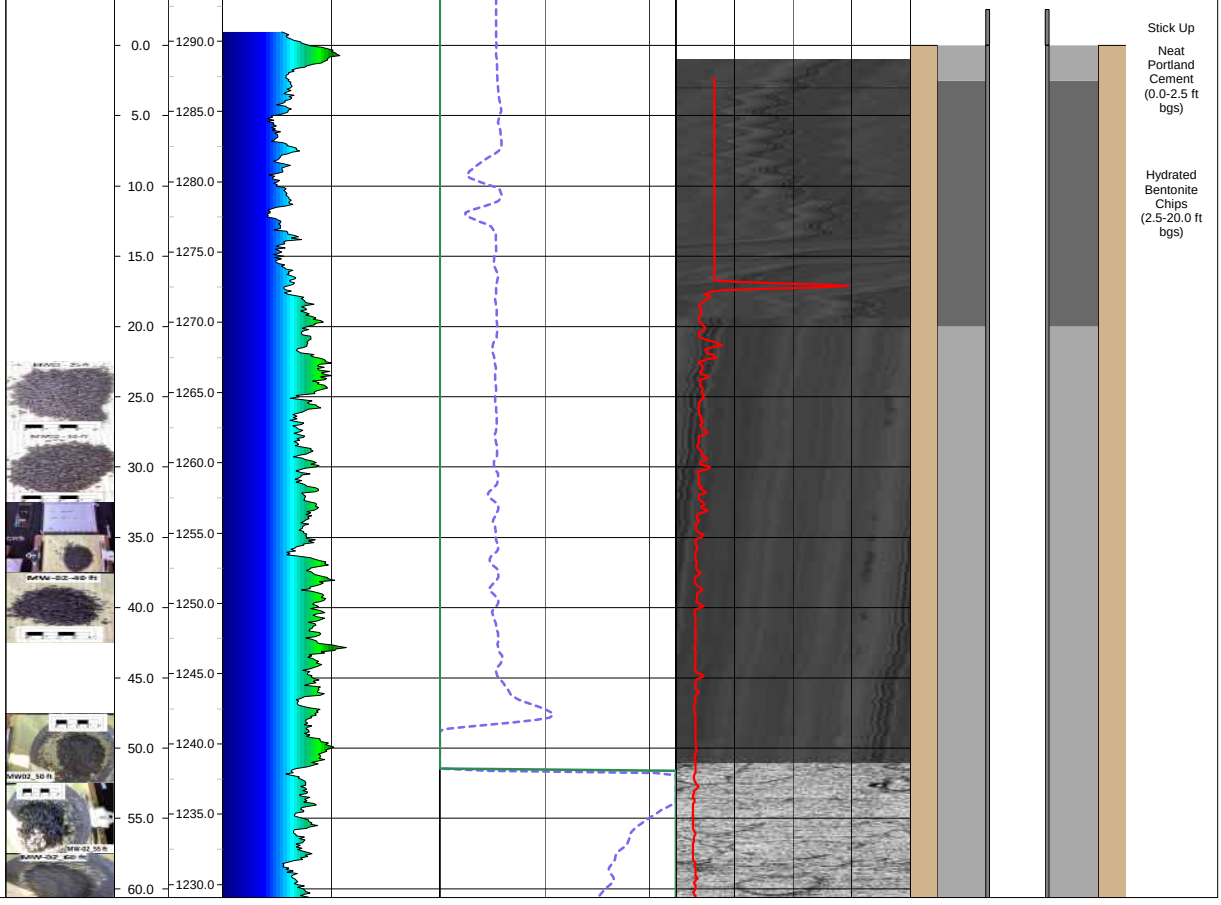
GROUT: Neat Portland Cement

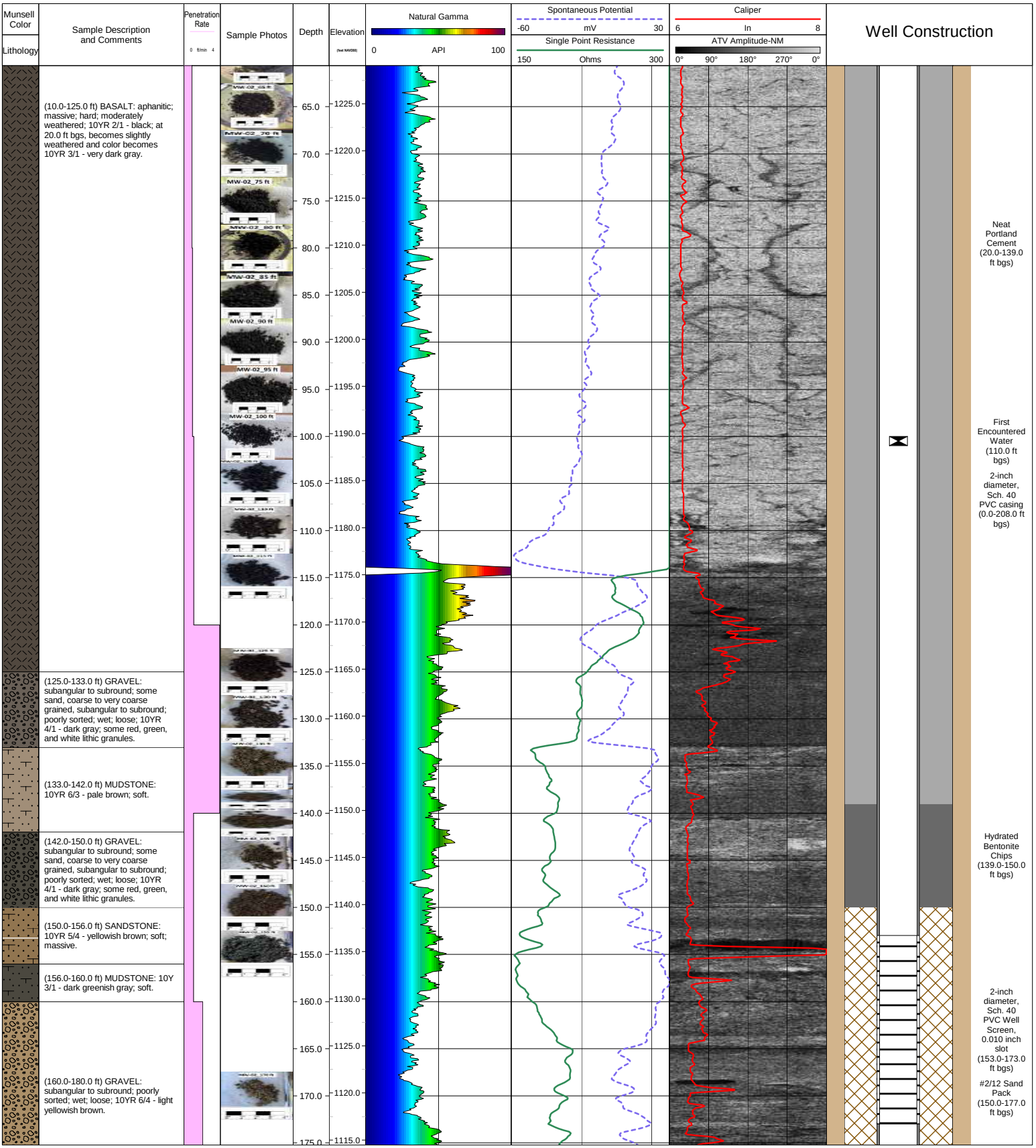
COMPLETION TYPE Stick Up

Logging Probes Used

- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [x] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 4)	Sample Photos	Depth	Elevation (feet NAVD88)
	(0.0-2.0 ft) SILT: low to medium plasticity, no dilatancy; little sand, very fine grained; dry to moist; medium stiff; 7.5YR 6/3 - light brown; presence of roots.			0.0	1290.0
	(2.0-10.0 ft) BASALT: vesicular cobbles; sand; 10YR 2/1 - black, with brownish/reddish sand; 1 to 3mm voids.			5.0	1285.0
				10.0	1280.0
				15.0	1275.0
				20.0	1270.0
				25.0	1265.0
				30.0	1260.0
				35.0	1255.0
				40.0	1250.0
				45.0	1245.0
				50.0	1240.0
				55.0	1235.0
				60.0	1230.0




Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 4
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(10.0-125.0 ft) BASALT: aphanitic; massive; hard; moderately weathered; 10YR 2/1 - black; at 20.0 ft bgs, becomes slightly weathered and color becomes 10YR 3/1 - very dark gray.
(125.0-133.0 ft) GRAVEL: subangular to subround; some sand, coarse to very coarse grained, subangular to subround; poorly sorted; wet; loose; 10YR 4/1 - dark gray; some red, green, and white lithic granules.
(133.0-142.0 ft) MUDSTONE: 10YR 6/3 - pale brown; soft.
(142.0-150.0 ft) GRAVEL: subangular to subround; some sand, coarse to very coarse grained, subangular to subround; poorly sorted; wet; loose; 10YR 4/1 - dark gray; some red, green, and white lithic granules.
(150.0-156.0 ft) SANDSTONE: 10YR 5/4 - yellowish brown; soft; massive.
(156.0-160.0 ft) MUDSTONE: 10Y 3/1 - dark greenish gray; soft.
(160.0-180.0 ft) GRAVEL: subangular to subround; poorly sorted; wet; loose; 10YR 6/4 - light yellowish brown.
MW-02_65 ft
MW-02_70 ft
MW-02_75 ft
MW-02_80 ft
MW-02_85 ft
MW-02_90 ft
MW-02_95 ft
MW-02_100 ft
MW-02_105 ft
MW-02_110 ft
MW-02_115 ft
MW-02_120 ft
MW-02_125 ft
MW-02_130 ft
MW-02_135 ft
MW-02_140 ft
MW-02_145 ft
MW-02_150 ft
MW-02_155 ft
MW-02_160 ft
MW-02_165 ft
MW-02_170 ft
MW-02_175 ft
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165.0
170.0
175.0
Elevation
1225.0
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1210.0
1205.0
1200.0
1195.0
1190.0
1185.0
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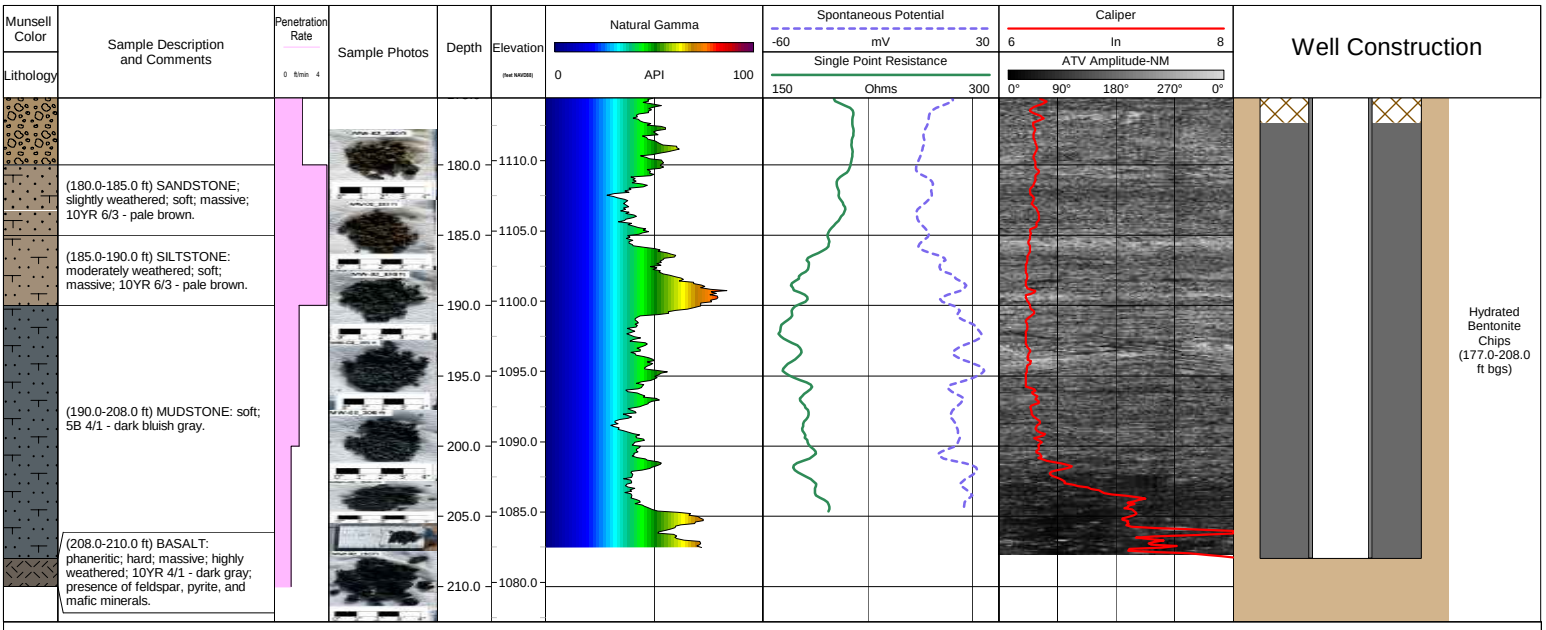
1175.0
1170.0
1165.0
1160.0
1155.0
1150.0
1145.0
1140.0
1135.0
1130.0
1125.0
1120.0
1115.0
Neat Portland Cement (20.0-139.0 ft bgs)
First Encountered Water (110.0 ft bgs)
2-inch diameter, Sch. 40 PVC casing (0.0-208.0 ft bgs)
Hydrated Bentonite Chips (139.0-150.0 ft bgs)
2-inch diameter, Sch. 40 PVC Well Screen, 0.010 inch slot (153.0-173.0 ft bgs)
#2/12 Sand Pack (150.0-177.0 ft bgs)



ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-03

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/5/2023

DATE DRILLING FINISHED: 4/5/2023

DATE WELL COMPLETE: 4/6/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Roberto Piemontese

NORTHING: 487990.45 **EASTING:** 1648992.98

TOC ELEVATION: 1307.66 ft

GROUND SURFACE ELEVATION: 1305.00 ft

TOTAL BOREHOLE DEPTH: 210.0 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

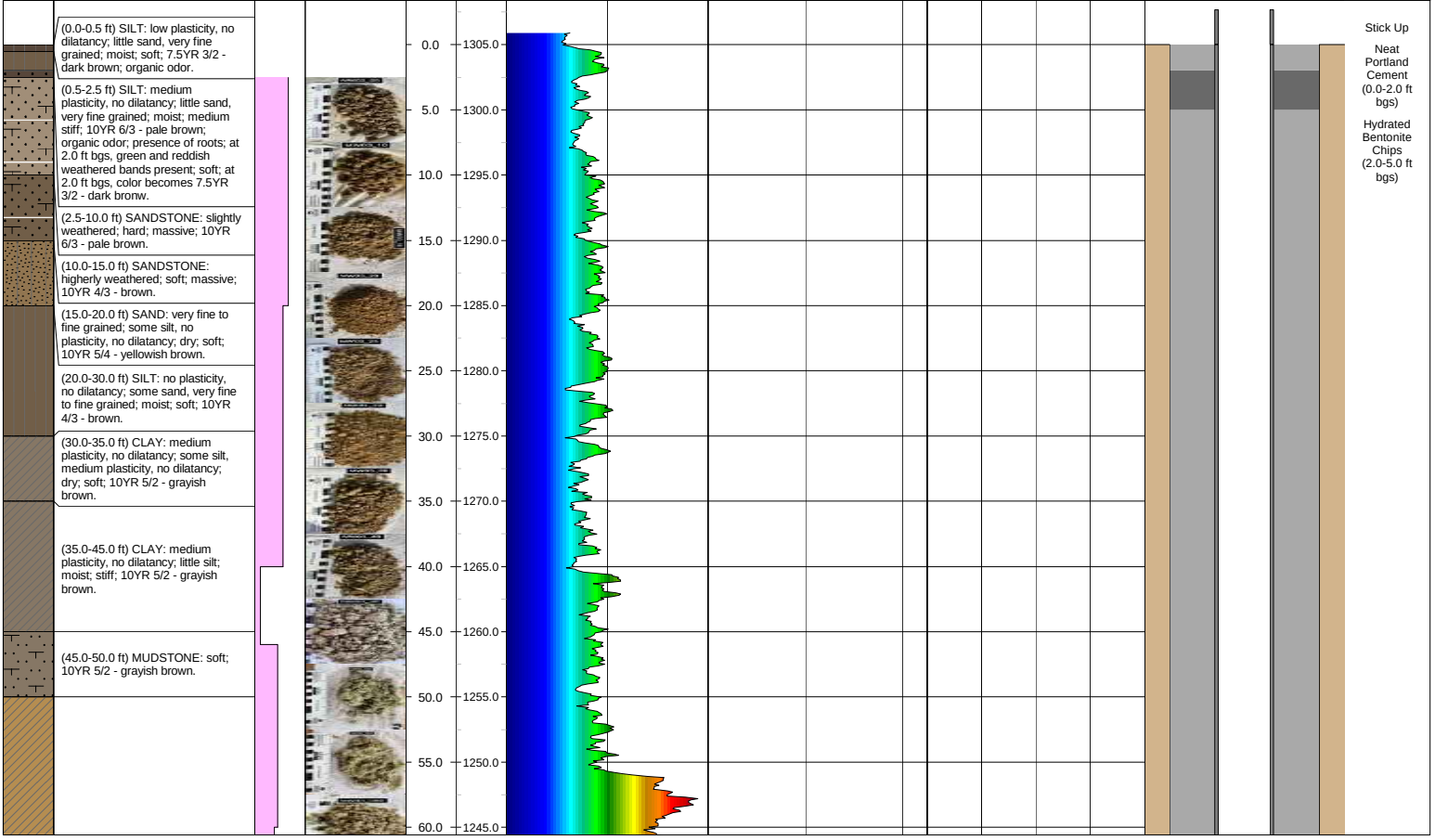
GROUT: Neat Portland Cement

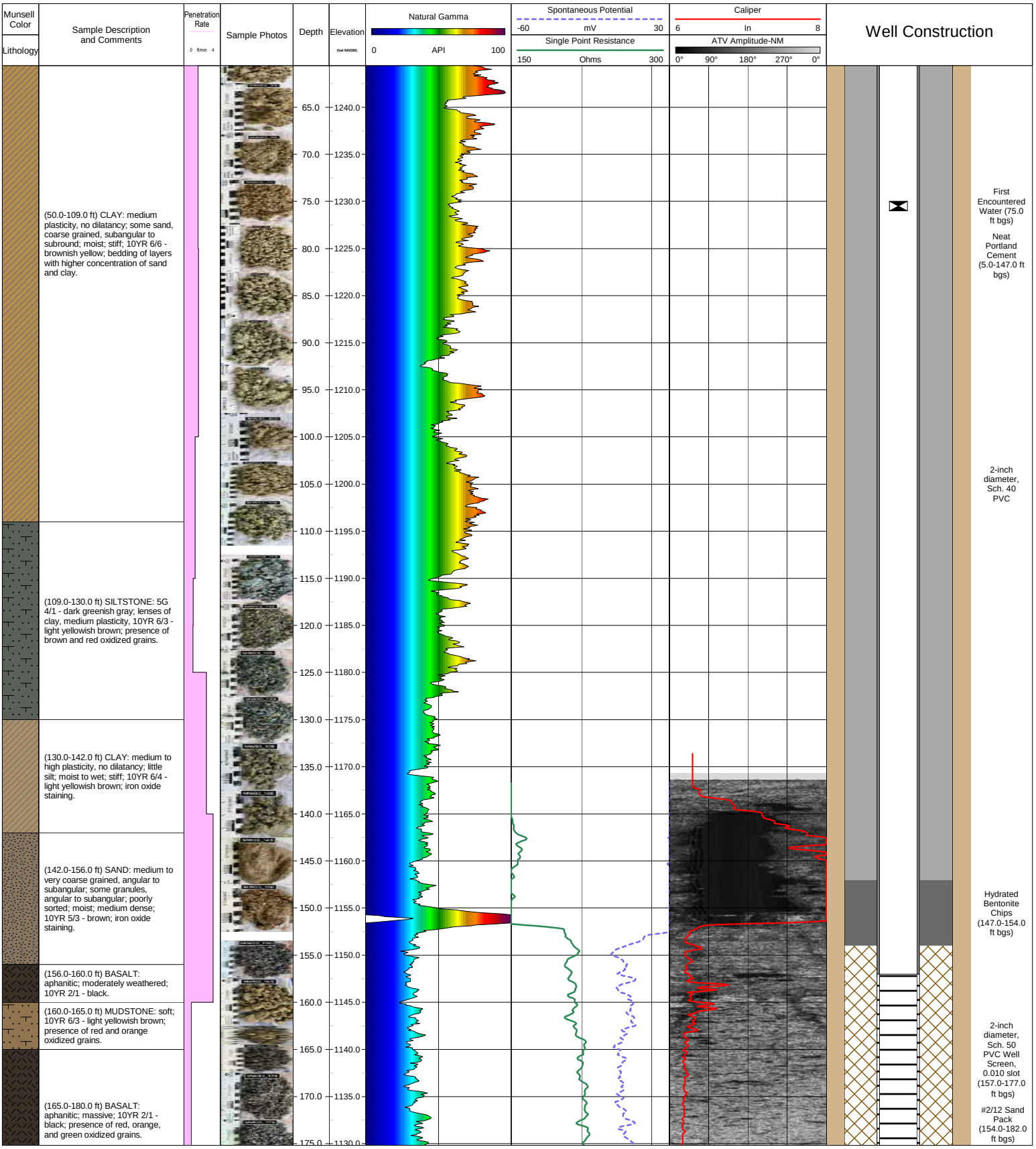
COMPLETION TYPE Stick Up

Logging Probes Used

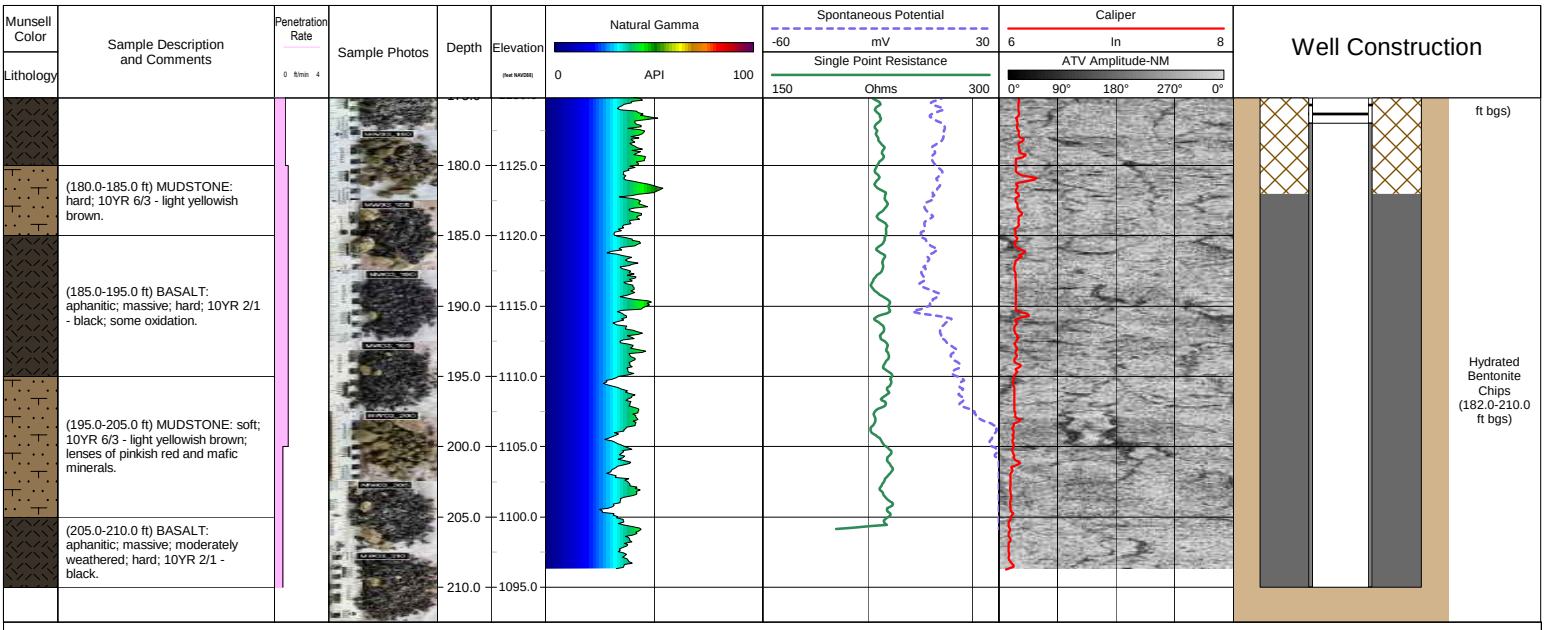
- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [x] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

Munsell Color / Lithology	Sample Description and Comments
	(0.0-0.5 ft) SILT: low plasticity, no dilatancy; little sand, very fine grained; moist; soft; 7.5YR 3/2 - dark brown; organic odor.
	(0.5-2.5 ft) SILT: medium plasticity, no dilatancy; little sand, very fine grained; moist; medium stiff; 10YR 6/3 - pale brown; organic odor; presence of roots; at 2.0 ft bgs, green and reddish weathered bands present; soft; at 2.0 ft bgs, color becomes 7.5YR 3/2 - dark bronw.
	(2.5-10.0 ft) SANDSTONE: slightly weathered; hard; massive; 10YR 6/3 - pale brown.
	(10.0-15.0 ft) SANDSTONE: higherly weathered; soft; massive; 10YR 4/3 - brown.
	(15.0-20.0 ft) SAND: very fine to fine grained; some silt, no plasticity, no dilatancy; dry; soft; 10YR 5/4 - yellowish brown.
	(20.0-30.0 ft) SILT: no plasticity, no dilatancy; some sand, very fine to fine grained; moist; soft; 10YR 4/3 - brown.
	(30.0-35.0 ft) CLAY: medium plasticity, no dilatancy; some silt, medium plasticity, no dilatancy; dry; soft; 10YR 5/2 - grayish brown.
	(35.0-45.0 ft) CLAY: medium plasticity, no dilatancy; little silt; moist; stiff; 10YR 5/2 - grayish brown.
	(45.0-50.0 ft) MUDSTONE: soft; 10YR 5/2 - grayish brown.




Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 4
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(50.0-109.0 ft) CLAY: medium plasticity, no dilatancy; some sand, coarse grained, subangular to subround; moist; stiff; 10YR 6/6 - brownish yellow; bedding of layers with higher concentration of sand and clay.
(109.0-130.0 ft) SILTSTONE: 5G 4/1 - dark greenish gray; lenses of clay, medium plasticity, 10YR 6/3 - light yellowish brown; presence of brown and red oxidized grains.
(130.0-142.0 ft) CLAY: medium to high plasticity, no dilatancy; little silt; moist to wet; stiff; 10YR 6/4 - light yellowish brown; iron oxide staining.
(142.0-156.0 ft) SAND: medium to very coarse grained, angular to subangular; some granules, angular to subangular; poorly sorted; moist; medium dense; 10YR 5/3 - brown; iron oxide staining.
(156.0-160.0 ft) BASALT: aphanitic; moderately weathered; 10YR 2/1 - black.
(160.0-165.0 ft) MUDSTONE: soft; 10YR 6/3 - light yellowish brown; presence of red and orange oxidized grains.
(165.0-180.0 ft) BASALT: aphanitic; massive; 10YR 2/1 - black; presence of red, orange, and green oxidized grains.
65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0 155.0 160.0 165.0 170.0 175.0
1240.0 1235.0 1230.0 1225.0 1220.0 1215.0 1210.0 1205.0 1200.0 1195.0 1190.0 1185.0 1180.0 1175.0 1170.0 1165.0 1160.0 1155.0 1150.0 1145.0 1140.0 1135.0 1130.0
First Encountered Water (75.0 ft bgs)
Neat Portland Cement (5.0-147.0 ft bgs)
2-inch diameter, Sch. 40 PVC
Hydrated Bentonite Chips (147.0-154.0 ft bgs)
2-inch diameter, Sch. 50 PVC Well Screen, 0.010 slot (157.0-177.0 ft bgs)
#2/12 Sand Pack (154.0-182.0 ft bgs)

MW-03



ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-04

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/17/2023

DATE DRILLING FINISHED: 4/17/2023

DATE WELL COMPLETE: 4/18/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Larissa Sleeper

NORTHING: 487542.02 **EASTING:** 1649009.88

TOC ELEVATION: 1315.69 ft

GROUND SURFACE ELEVATION: 1314.30 ft

TOTAL BOREHOLE DEPTH: 180 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

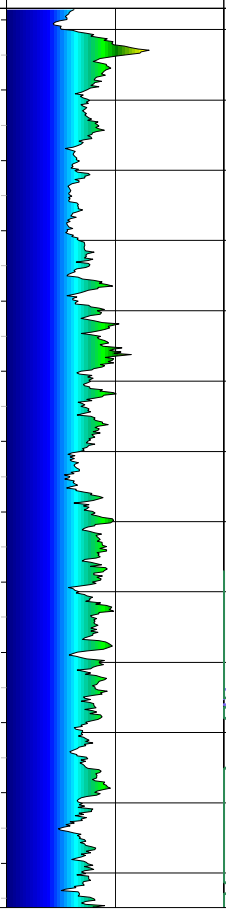
GROUT: Neat Portland Cement

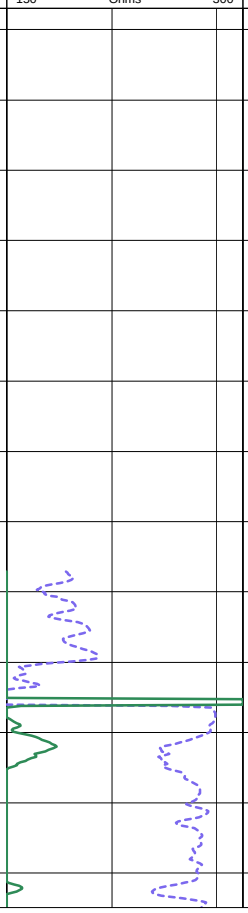
COMPLETION TYPE Stick Up

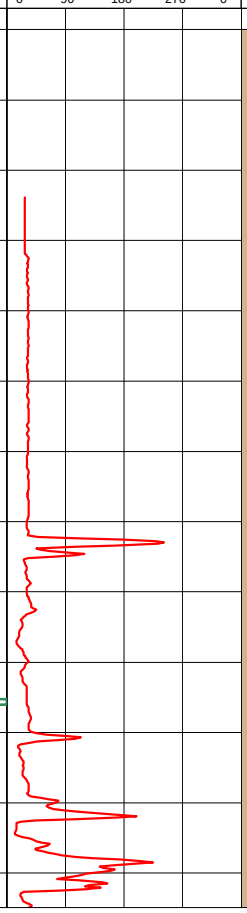
Logging Probes Used

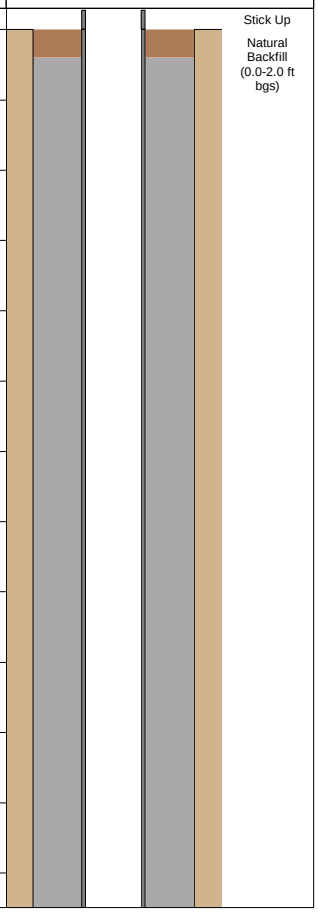
- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [ ] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

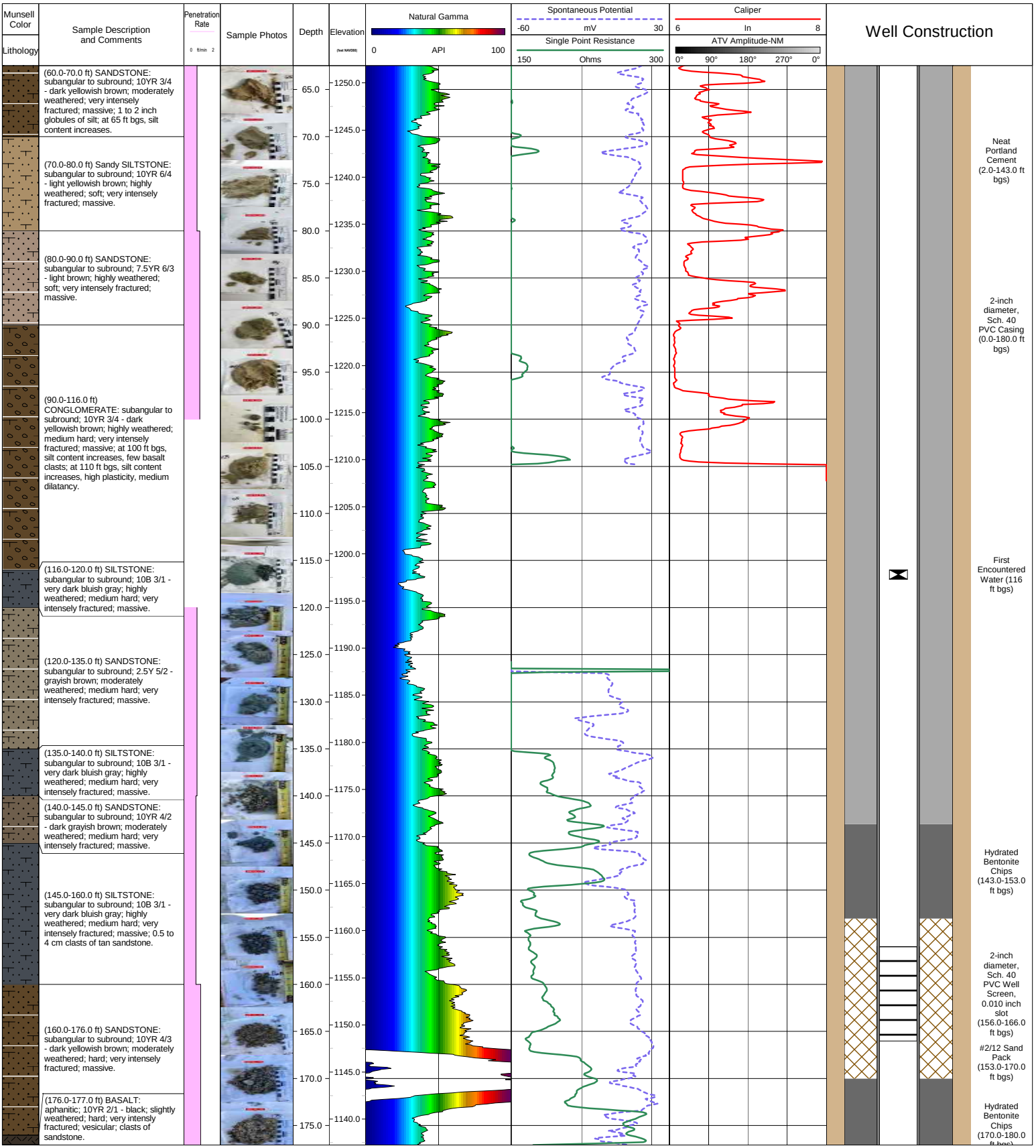
Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 2)	Sample Photos	Depth	Elevation (feet NAVD88)
	(0.0-10.0 ft) SAND: very fine to medium grained; little granules, subangular to aubrouns; little silt, no plasticity, no dilatancy; dry; very soft; 10YR 6/4 - light yellowish brown.			0.0	1315.0
	(10.0-45.0 ft) SILT: low plasticity, no dilatancy; some sand, very fine to fine grained; dry; very soft; 10YR 6/4 - light yellowish brown; at 15 ft bgs, silt content increases to 80%; at 20ft bgs, color becomes light brown; at 30 ft bgs, silt content decreases to 50%; at 35 ft bgs, silt content increases to 80%; at 40 ft bgs, silt content decreases to 50%.			5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0	1310.0 1305.0 1300.0 1295.0 1290.0 1285.0 1280.0 1275.0
	(45.0-60.0 ft bgs) SANAD: very fine to medium grained; some silt, low plasticity, no dilatanncy; dry; soft; 10YR 3/4 - dark yellowish brown.			45.0 50.0 55.0 60.0	1270.0 1265.0 1260.0 1255.0










Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 2
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(60.0-70.0 ft) SANDSTONE: subangular to subround; 10YR 3/4 - dark yellowish brown; moderately weathered; very intensely fractured; massive; 1 to 2 inch globules of silt; at 65 ft bgs, silt content increases.
(70.0-80.0 ft) Sandy SILTSTONE: subangular to subround; 10YR 6/4 - light yellowish brown; highly weathered; soft; very intensely fractured; massive.
(80.0-90.0 ft) SANDSTONE: subangular to subround; 7.5YR 6/3 - light brown; highly weathered; soft; very intensely fractured; massive.
(90.0-116.0 ft) CONGLOMERATE: subangular to subround; 10YR 3/4 - dark yellowish brown; highly weathered; medium hard; very intensely fractured; massive; at 100 ft bgs, silt content increases, few basalt clasts; at 110 ft bgs, silt content increases, high plasticity, medium dilatancy.
(116.0-120.0 ft) SILTSTONE: subangular to subround; 10B 3/1 - very dark bluish gray; highly weathered; medium hard; very intensely fractured; massive.
(120.0-135.0 ft) SANDSTONE: subangular to subround; 2.5Y 5/2 - grayish brown; moderately weathered; medium hard; very intensely fractured; massive.
(135.0-140.0 ft) SILTSTONE: subangular to subround; 10B 3/1 - very dark bluish gray; highly weathered; medium hard; very intensely fractured; massive.
(140.0-145.0 ft) SANDSTONE: subangular to subround; 10YR 4/2 - dark grayish brown; moderately weathered; medium hard; very intensely fractured; massive.
(145.0-160.0 ft) SILTSTONE: subangular to subround; 10B 3/1 - very dark bluish gray; highly weathered; medium hard; very intensely fractured; massive; 0.5 to 4 cm clasts of tan sandstone.
(160.0-176.0 ft) SANDSTONE: subangular to subround; 10YR 4/3 - dark yellowish brown; moderately weathered; hard; very intensely fractured; massive.
(176.0-177.0 ft) BASALT: aphanitic; 10YR 2/1 - black; slightly weathered; hard; very intensely fractured; vesicular; clasts of sandstone.
65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0 155.0 160.0 165.0 170.0 175.0
1250.0 1245.0 1240.0 1235.0 1230.0 1225.0 1220.0 1215.0 1210.0 1205.0 1200.0 1195.0 1190.0 1185.0 1180.0 1175.0 1170.0 1165.0 1160.0 1155.0 1150.0 1145.0 1140.0
Neat Portland Cement (2.0-143.0 ft bgs)
2-inch diameter, Sch. 40 PVC Casing (0.0-180.0 ft bgs)
First Encountered Water (116 ft bgs)
Hydrated Bentonite Chips (143.0-153.0 ft bgs)
2-inch diameter, Sch. 40 PVC Well Screen, 0.010 inch slot (156.0-166.0 ft bgs)
#2/12 Sand Pack (153.0-170.0 ft bgs)
Hydrated Bentonite Chips (170.0-180.0

Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 2)	Sample Photos	Depth	Elevation (feet NAVD88)	Natural Gamma (0 API 100)	Spontaneous Potential (-60 mV 30) / Single Point Resistance (150 Ohms 300)	Caliper (6 In 8) / ATV Amplitude-NM (0° 90° 180° 270° 0°)	Well Construction (ft bgs)
	(177.0-180.0 ft) SANDSTONE: subangular; 10YR 3/4 - dark yellowish brown; moderately weathered; hard; very intensely fractured; massive.			180.0 185.0	1135.0 1130.0				

ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-05

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/12/2023

DATE DRILLING FINISHED: 4/12/2023

DATE WELL COMPLETE: 4/13/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Larissa Sleeper

NORTHING: 486631.14 **EASTING:** 1649002.06

TOC ELEVATION: 1354.49 ft

GROUND SURFACE ELEVATION: 1351.80 ft

TOTAL BOREHOLE DEPTH: 210 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

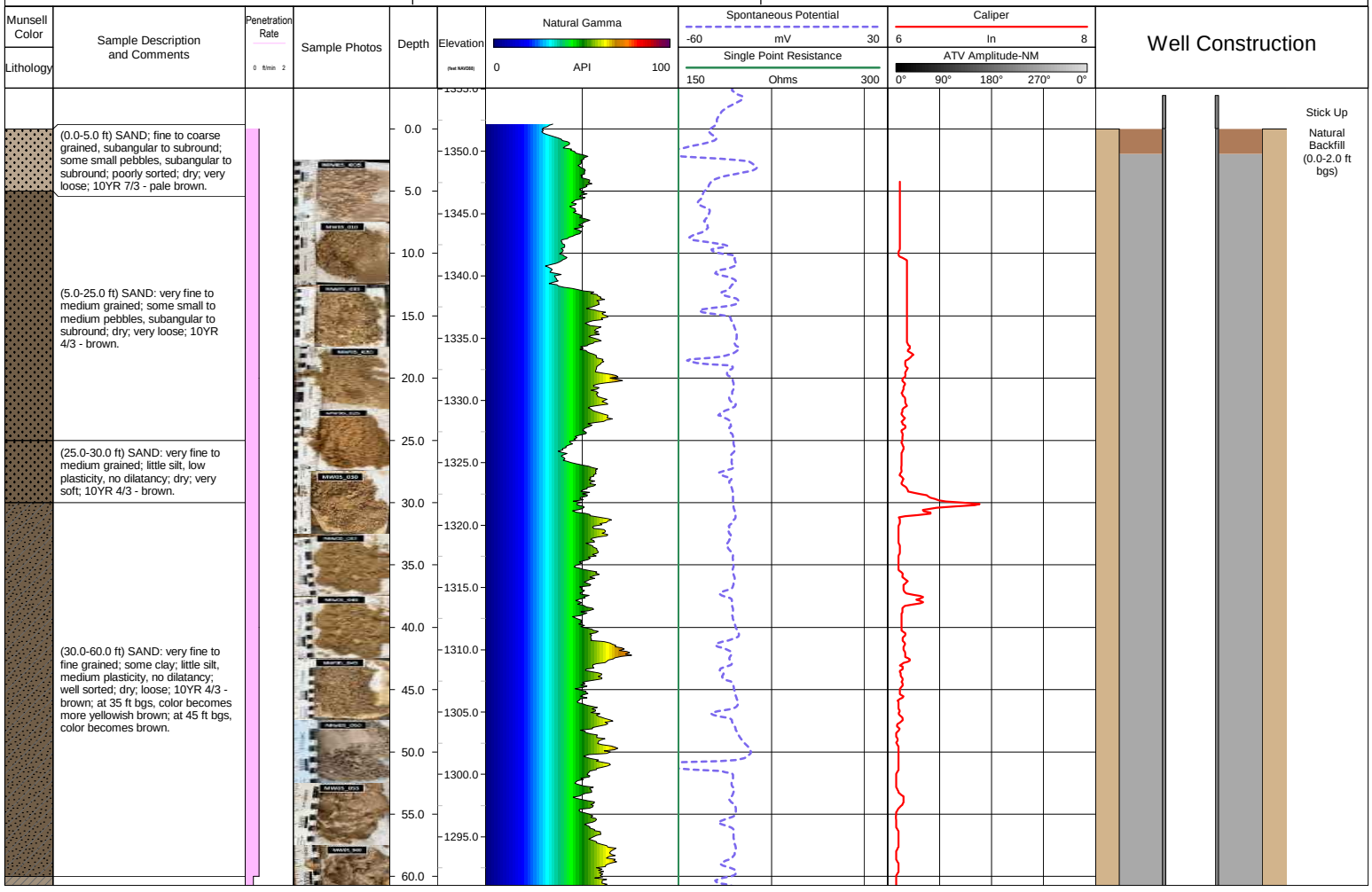
GROUT: Neat Portland Cement

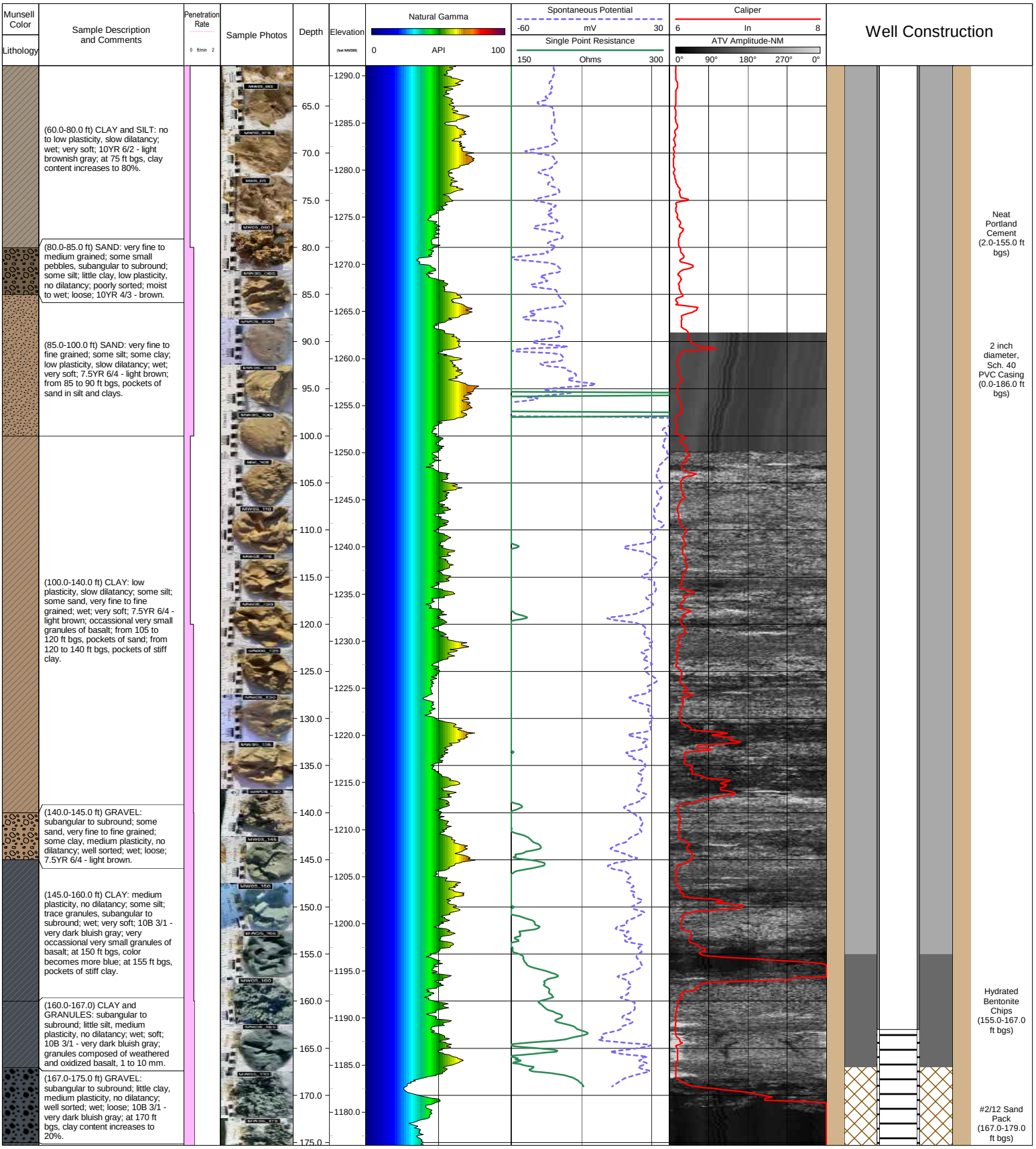
COMPLETION TYPE Stick Up

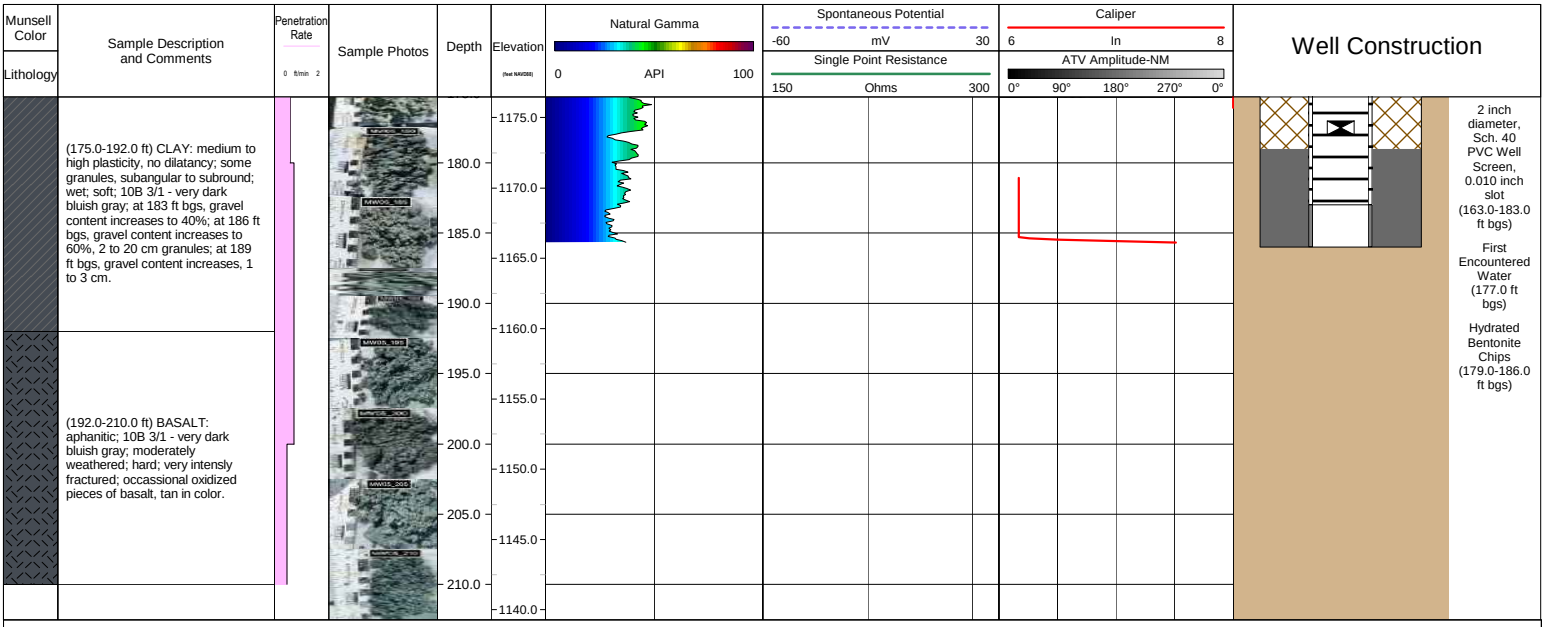
Logging Probes Used

- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [x] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

Munsell Color / Lithology	Sample Description and Comments
	(0.0-5.0 ft) SAND; fine to coarse grained, subangular to subround; some small pebbles, subangular to subround; poorly sorted; dry; very loose; 10YR 7/3 - pale brown.
	(5.0-25.0 ft) SAND: very fine to medium grained; some small to medium pebbles, subangular to subround; dry; very loose; 10YR 4/3 - brown.
	(25.0-30.0 ft) SAND: very fine to medium grained; little silt, low plasticity, no dilatancy; dry; very soft; 10YR 4/3 - brown.
	(30.0-60.0 ft) SAND: very fine to fine grained; some clay; little silt, medium plasticity, no dilatancy; well sorted; dry; loose; 10YR 4/3 - brown; at 35 ft bgs, color becomes more yellowish brown; at 45 ft bgs, color becomes brown.




Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 2
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(60.0-80.0 ft) CLAY and SILT: no to low plasticity, slow dilatancy; wet; very soft; 10YR 6/2 - light brownish gray; at 75 ft bgs, clay content increases to 80%.
(80.0-85.0 ft) SAND: very fine to medium grained; some small pebbles, subangular to subround; some silt; little clay, low plasticity, no dilatancy; poorly sorted; moist to wet; loose; 10YR 4/3 - brown.
(85.0-100.0 ft) SAND: very fine to fine grained; some silt; some clay; low plasticity, slow dilatancy; wet; very soft; 7.5YR 6/4 - light brown; from 85 to 90 ft bgs, pockets of sand in silt and clays.
(100.0-140.0 ft) CLAY: low plasticity, slow dilatancy; some silt; some sand, very fine to fine grained; wet; very soft; 7.5YR 6/4 - light brown; occassional very small granules of basalt; from 105 to 120 ft bgs, pockets of sand; from 120 to 140 ft bgs, pockets of stiff clay.
(140.0-145.0 ft) GRAVEL: subangular to subround; some sand, very fine to fine grained; some clay, medium plasticity, no dilatancy; well sorted; wet; loose; 7.5YR 6/4 - light brown.
(145.0-160.0 ft) CLAY: medium plasticity, no dilatancy; some silt; trace granules, subangular to subround; wet; very soft; 10B 3/1 - very dark bluish gray; very occassional very small granules of basalt; at 150 ft bgs, color becomes more blue; at 155 ft bgs, pockets of stiff clay.
(160.0-167.0) CLAY and GRANULES: subangular to subround; little silt, medium plasticity, no dilatancy; wet; soft; 10B 3/1 - very dark bluish gray; granules composed of weathered and oxidized basalt, 1 to 10 mm.
(167.0-175.0 ft) GRAVEL: subangular to subround; little clay, medium plasticity, no dilatancy; well sorted; wet; loose; 10B 3/1 - very dark bluish gray; at 170 ft bgs, clay content increases to 20%.
65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0 155.0 160.0 165.0 170.0 175.0
1290.0 1285.0 1280.0 1275.0 1270.0 1265.0 1260.0 1255.0 1250.0 1245.0 1240.0 1235.0 1230.0 1225.0 1220.0 1215.0 1210.0 1205.0 1200.0 1195.0 1190.0 1185.0 1180.0
Neat Portland Cement (2.0-155.0 ft bgs)
2 inch diameter, Sch. 40 PVC Casing (0.0-186.0 ft bgs)
Hydrated Bentonite Chips (155.0-167.0 ft bgs)
#2/12 Sand Pack (167.0-179.0 ft bgs)



ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-06

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/23/2023

DATE DRILLING FINISHED: 4/23/2023

DATE WELL COMPLETE: 4/24/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Chris Gregory

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Roberto Piemontese

NORTHING: 486049.10 **EASTING:** 1648988.98

TOC ELEVATION: 1315.81 ft

GROUND SURFACE ELEVATION: 1313.40 ft

TOTAL BOREHOLE DEPTH: 236 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

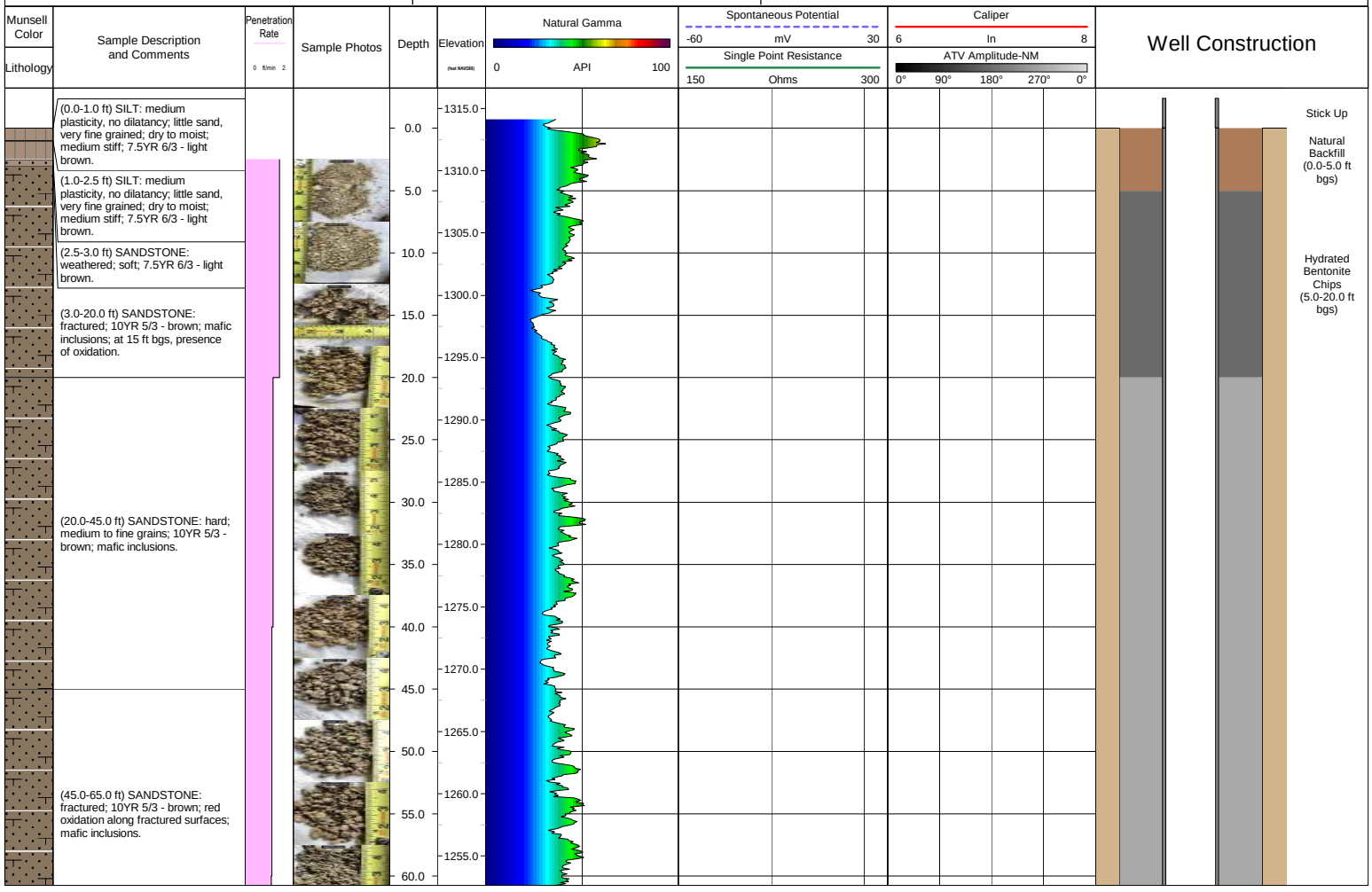
GROUT: Neat Portland Cement

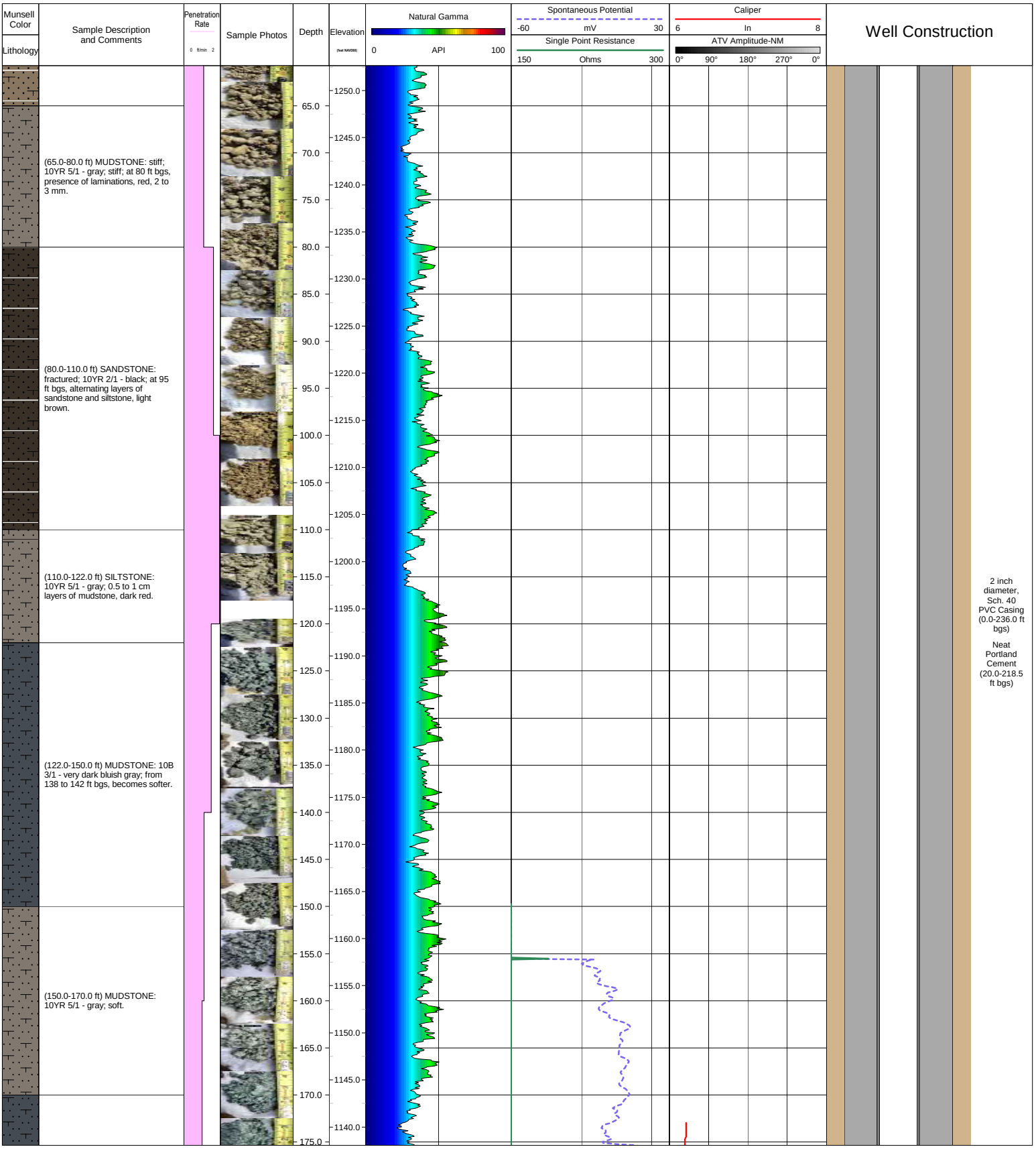
COMPLETION TYPE Stick Up

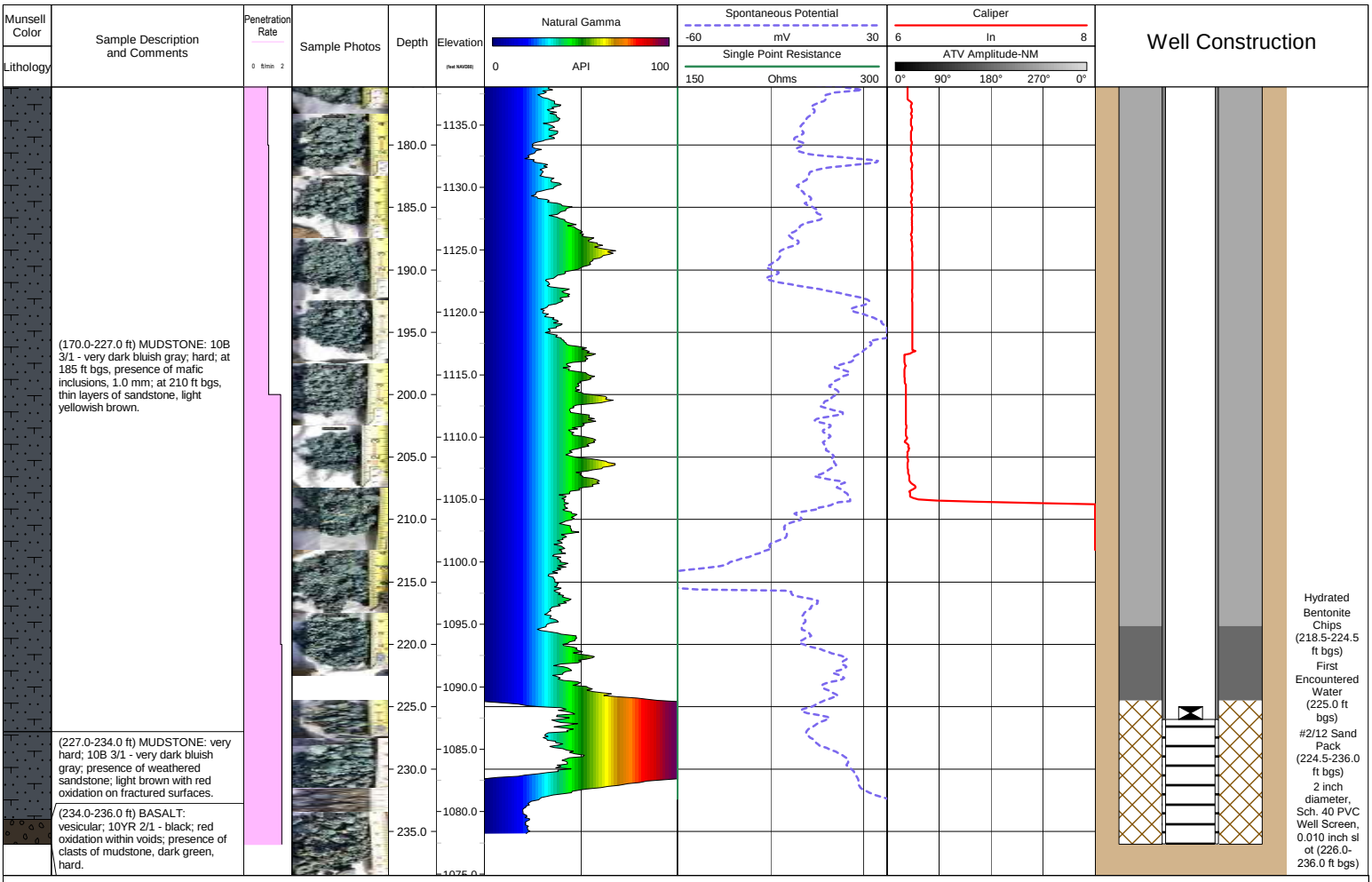
Logging Probes Used

- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [ ] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

Munsell Color / Lithology	Sample Description and Comments
	(0.0-1.0 ft) SILT: medium plasticity, no dilatancy; little sand, very fine grained; dry to moist; medium stiff; 7.5YR 6/3 - light brown.
	(1.0-2.5 ft) SILT: medium plasticity, no dilatancy; little sand, very fine grained; dry to moist; medium stiff; 7.5YR 6/3 - light brown.
	(2.5-3.0 ft) SANDSTONE: weathered; soft; 7.5YR 6/3 - light brown.
	(3.0-20.0 ft) SANDSTONE: fractured; 10YR 5/3 - brown; mafic inclusions; at 15 ft bgs, presence of oxidation.
	(20.0-45.0 ft) SANDSTONE: hard; medium to fine grains; 10YR 5/3 - brown; mafic inclusions.
	(45.0-65.0 ft) SANDSTONE: fractured; 10YR 5/3 - brown; red oxidation along fractured surfaces; mafic inclusions.




Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 2
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(65.0-80.0 ft) MUDSTONE: stiff; 10YR 5/1 - gray; stiff; at 80 ft bgs, presence of laminations, red, 2 to 3 mm.
(80.0-110.0 ft) SANDSTONE: fractured; 10YR 2/1 - black; at 95 ft bgs, alternating layers of sandstone and siltstone, light brown.
(110.0-122.0 ft) SILTSTONE: 10YR 5/1 - gray; 0.5 to 1 cm layers of mudstone, dark red.
(122.0-150.0 ft) MUDSTONE: 10B 3/1 - very dark bluish gray; from 138 to 142 ft bgs, becomes softer.
(150.0-170.0 ft) MUDSTONE: 10YR 5/1 - gray; soft.
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0
120.0
125.0
130.0
135.0
140.0
145.0
150.0
155.0
160.0
165.0
170.0
175.0
1250.0
1245.0
1240.0
1235.0
1230.0
1225.0
1220.0
1215.0
1210.0
1205.0
1200.0
1195.0
1190.0
1185.0
1180.0
1175.0
1170.0
1165.0
1160.0
1155.0
1150.0
1145.0
1140.0
2 inch diameter, Sch. 40 PVC Casing (0.0-236.0 ft bgs)
Neat Portland Cement (20.0-218.5 ft bgs)



ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-07

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/23/2023

DATE DRILLING FINISHED: 4/23/2023

DATE WELL COMPLETE: 4/24/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Nicholas Pilar

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Roberto Piemontese

NORTHING: 485716.90 **EASTING:** 1649418.98

TOC ELEVATION: 1323.93 ft

GROUND SURFACE ELEVATION: 1321.20 ft

TOTAL BOREHOLE DEPTH: 236 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

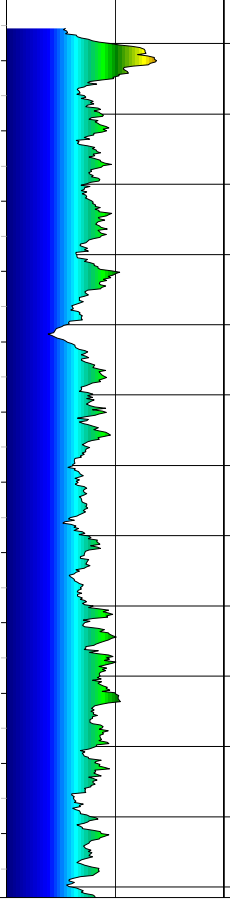
GROUT: Neat Portland Cement

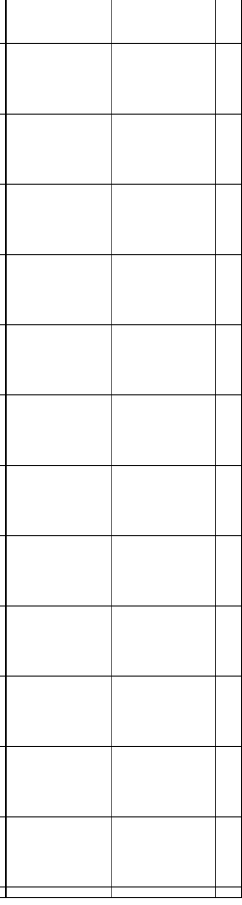
COMPLETION TYPE Stick Up

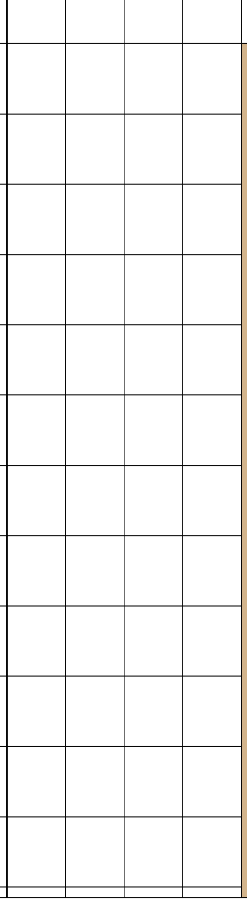
Logging Probes Used

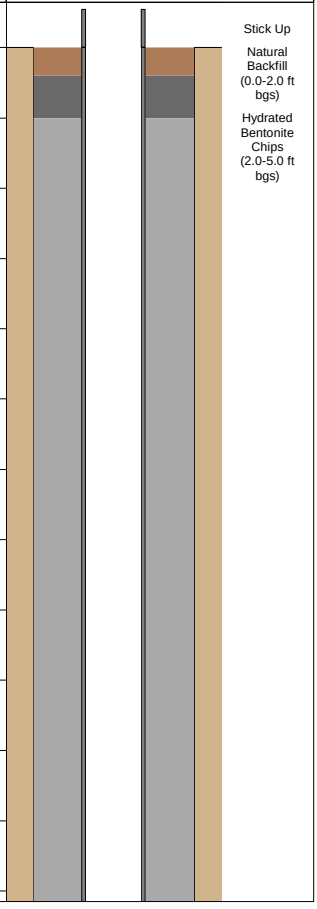
- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [ ] 3-Arm Caliper
- [ ] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [ ] SPR/SP
- [ ] Other:

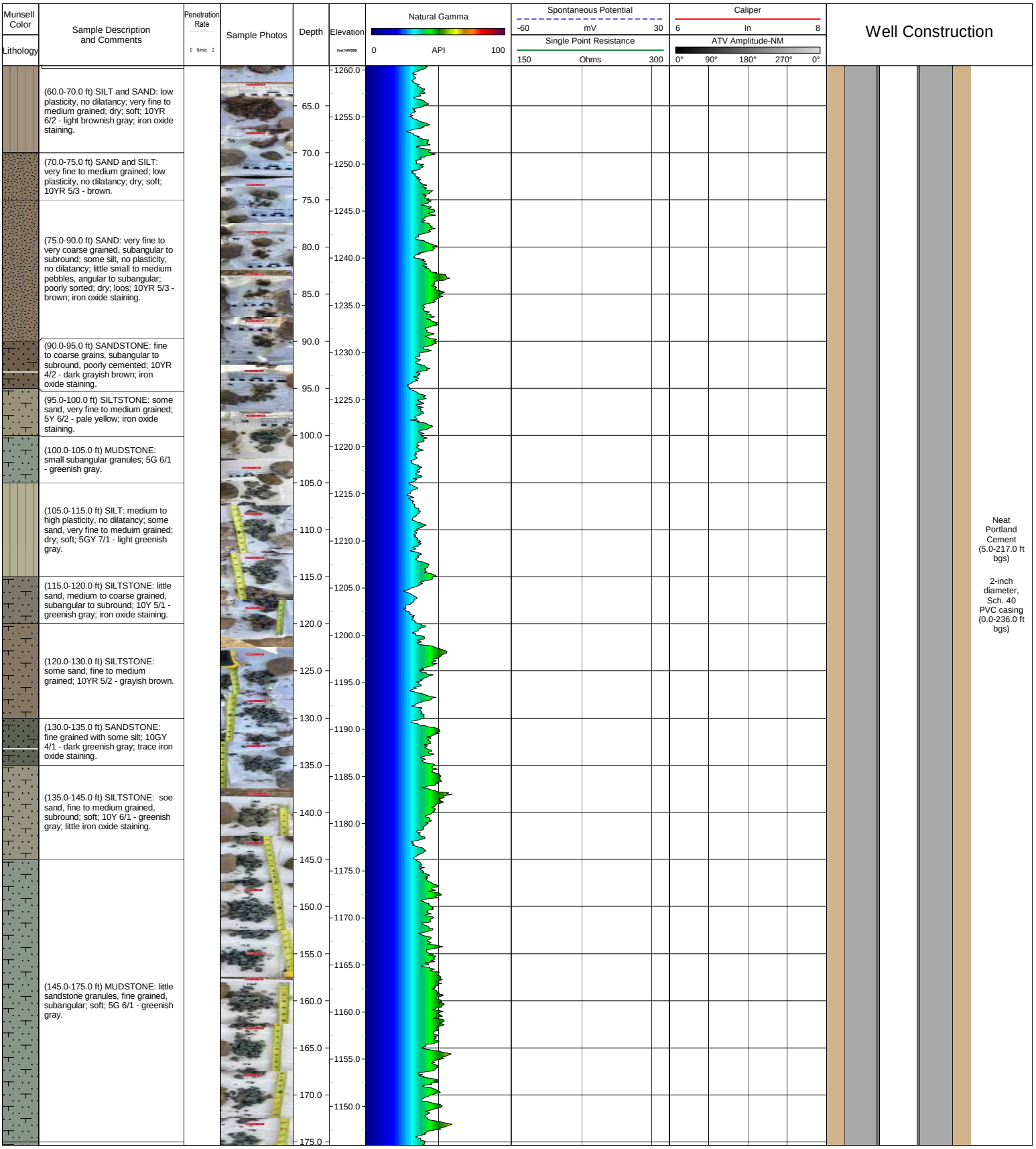
Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 2)	Sample Photos	Depth	Elevation (feet NAVD88)
				0.0	1320.0
	(5.0-10.0 ft) SAND: very fine to coarse grained, angular to subround; some granules to small pebbles, angular to subangular; some silt, no plasticity, no dilatancy; poorly sorted; dry; loose; 10YR 5/2 - grayish brown.			5.0	1315.0
	(10.0-15.0 ft) SILT: medium plasticity, no dilatancy; some sand, very fine to fine grained; dry; soft; 10YR 5/3 - brown.			10.0	1310.0
	(15.0-20.0 ft) SILT: medium plasticity, no dilatancy; trace sand, very fine to fine grained; dry; soft; 10YR 5/3 - brown.			15.0	1305.0
	(20.0-25.0 ft) SILT: medium plasticity, no dilatancy; some sand, very fine to fine grained; little clay; dry; soft; 10YR 6/6 - brownish yellow; iron oxide staining.			20.0	1300.0
	(25.0-40.0 ft) SILT: medium plasticity, no dilatancy; trace sand, very fine to fine grained; dry; doft; 10YR 6/2 - light brownish gray.			25.0	1295.0
				30.0	1290.0
				35.0	1285.0
	(40.0-45.0 ft) SILT: medium plasticity, no dilatancy; trace granules, subangular to subround; trace sand, very fine to fine grained; dry; soft; 10YR 6/2 - light brownish gray.			40.0	1280.0
	(45.0-50.0 ft) SILT: medium plasticity, no dilatancy; trace sand, very fine to fine grained; dry; soft; 10YR 6/2 - light brownish gray.			45.0	1275.0
	(50.0-55.0 ft) SILT: medium plasticity, no dilatancy; some sand, very fine to fine grained; dry; soft; 10YR 6/2 - light brownish gray.			50.0	1270.0
	(55.0-60.0 ft) SILT: medium plasticity, no dilatancy; some sand, very fine to fine grained; dry; very soft; 10YR 6/2 - light brownish gray; iron oxide staining.			55.0	1265.0
				60.0	

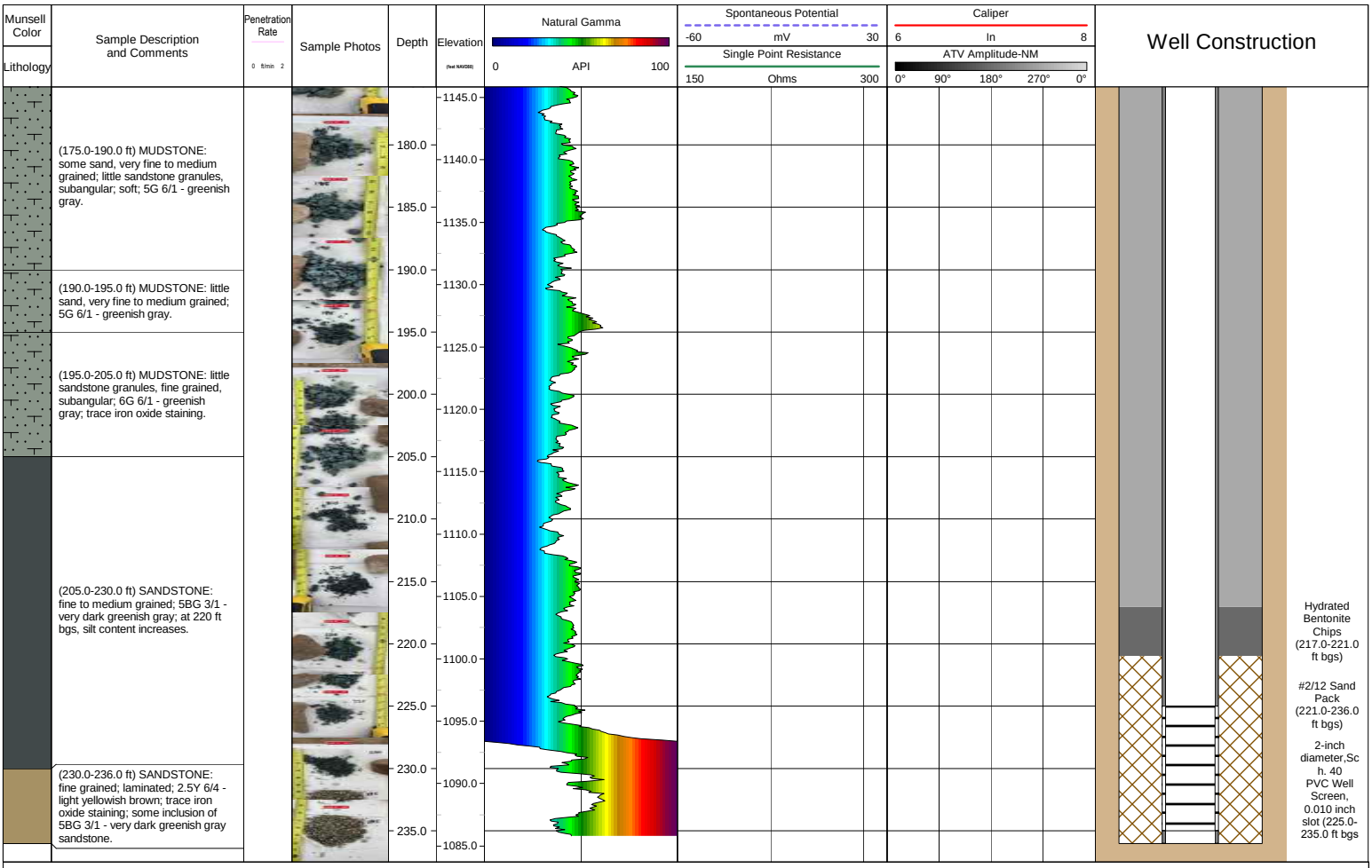









Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 2
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(60.0-70.0 ft) SILT and SAND: low plasticity, no dilatancy; very fine to medium grained; dry; soft; 10YR 6/2 - light brownish gray; iron oxide staining.
(70.0-75.0 ft) SAND and SILT: very fine to medium grained; low plasticity, no dilatancy; dry; soft; 10YR 5/3 - brown.
(75.0-90.0 ft) SAND: very fine to very coarse grained, subangular to subround; some silt, no plasticity, no dilatancy; little small to medium pebbles, angular to subangular; poorly sorted; dry; loos; 10YR 5/3 - brown; iron oxide staining.
(90.0-95.0 ft) SANDSTONE: fine to coarse grains, subangular to subround, poorly cemented; 10YR 4/2 - dark grayish brown; iron oxide staining.
(95.0-100.0 ft) SILTSTONE: some sand, very fine to medium grained; 5Y 6/2 - pale yellow; iron oxide staining.
(100.0-105.0 ft) MUDSTONE: small subangular granules; 5G 6/1 - greenish gray.
(105.0-115.0 ft) SILT: medium to high plasticity, no dilatancy; some sand, very fine to meduim grained; dry; soft; 5GY 7/1 - light greenish gray.
(115.0-120.0 ft) SILTSTONE: little sand, medium to coarse grained, subangular to subround; 10Y 5/1 - greenish gray; iron oxide staining.
(120.0-130.0 ft) SILTSTONE: some sand, fine to medium grained; 10YR 5/2 - grayish brown.
(130.0-135.0 ft) SANDSTONE: fine grained with some silt; 10GY 4/1 - dark greenish gray; trace iron oxide staining.
(135.0-145.0 ft) SILTSTONE: soe sand, fine to medium grained, subround; soft; 10Y 6/1 - greenish gray; little iron oxide staining.
(145.0-175.0 ft) MUDSTONE: little sandstone granules, fine grained, subangular; soft; 5G 6/1 - greenish gray.
65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0 155.0 160.0 165.0 170.0 175.0
1260.0 1255.0 1250.0 1245.0 1240.0 1235.0 1230.0 1225.0 1220.0 1215.0 1210.0 1205.0 1200.0 1195.0 1190.0 1185.0 1180.0 1175.0 1170.0 1165.0 1160.0 1155.0 1150.0
Neat Portland Cement (5.0-217.0 ft bgs)
2-inch diameter, Sch. 40 PVC casing (0.0-236.0 ft bgs)



ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

ARCADIS Design & Consultancy for natural and built assets

Boring, Well Construction, & Geophysical Log

Arcadis U.S., Inc.
830 NE Holladay Street, Suite #109
Portland, OR 97232

WELL ID: MW-08

CLIENT: Army Environmental Command

LOCATION: Yakima Training Center, WA

Project #: 30124009

Reviewed by: Jesse Hemmen, PG#2958

DATE DRILLING STARTED: 4/23/2023

DATE DRILLING FINISHED: 4/23/2023

DATE WELL COMPLETE: 4/24/2023

DRILLING COMPANY: Gregory Drilling

DRILLING RIG: Foremost DR-12

DRILLER'S NAME: Nicholas Pilar

DRILLER'S ASSISTANT(S): M. Grauberer, J. Davis

LOGGED BY: Larissa Sleeper

NORTHING: 485710.84 **EASTING:** 1650395.35

TOC ELEVATION: 1360.67 ft

GROUND SURFACE ELEVATION: 1358.00 ft

TOTAL BOREHOLE DEPTH: 210 feet bgs

BOREHOLE DIAMETER: 6.0 inches

DRILLING METHOD: Air Rotary

SAMPLING INTERVAL: Continuous

SAMPLING DEVICE: Cyclone

DRILLING FLUID USED: Water as Needed

WELL CONSTRUCTION

WELL CASING: Schedule 40 PVC

WELL DIAMETER: 2.0 inches

WELL SCREEN: Schedule 40 PVC

SCREEN DIAMETER: 2.0 inches

SLOT SIZE: 0.010 inches

SAND PACK: #2/12 Sand Pack

ANNULUS SEAL: Hydrated Bentonite Chips

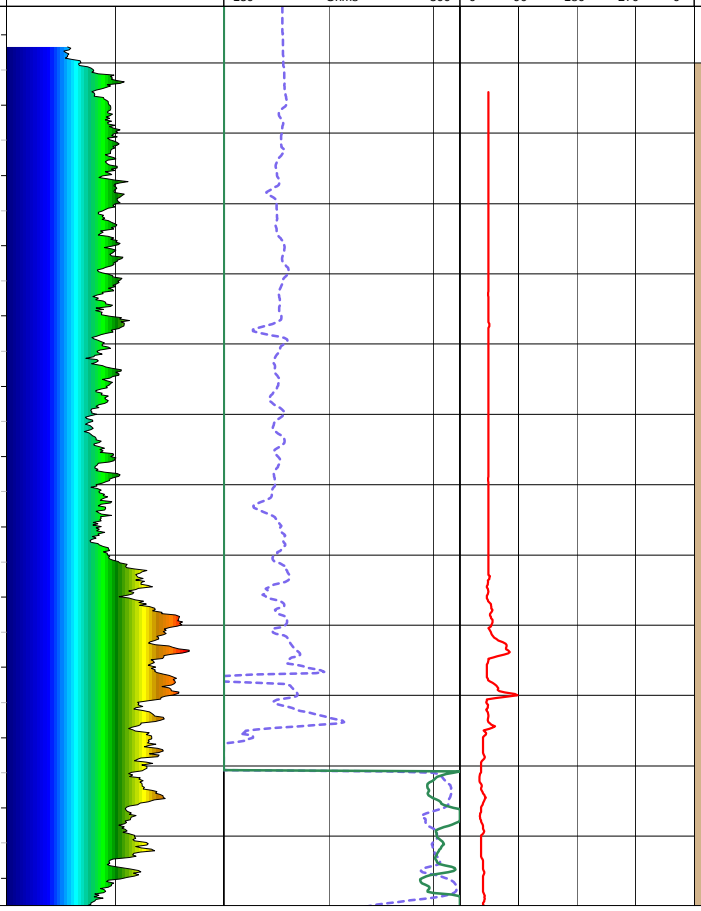
GROUT: Neat Portland Cement

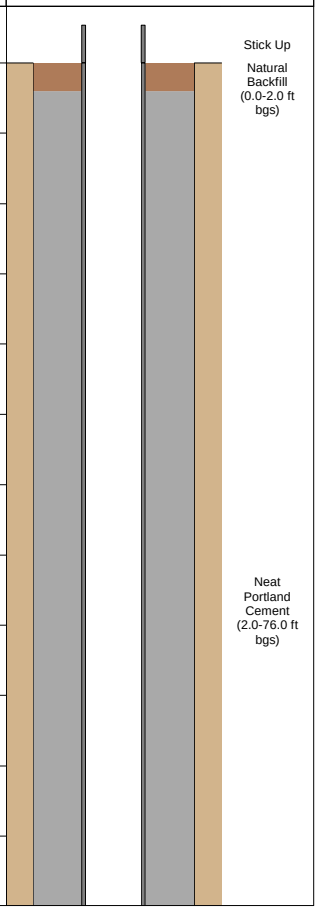
COMPLETION TYPE Stick Up

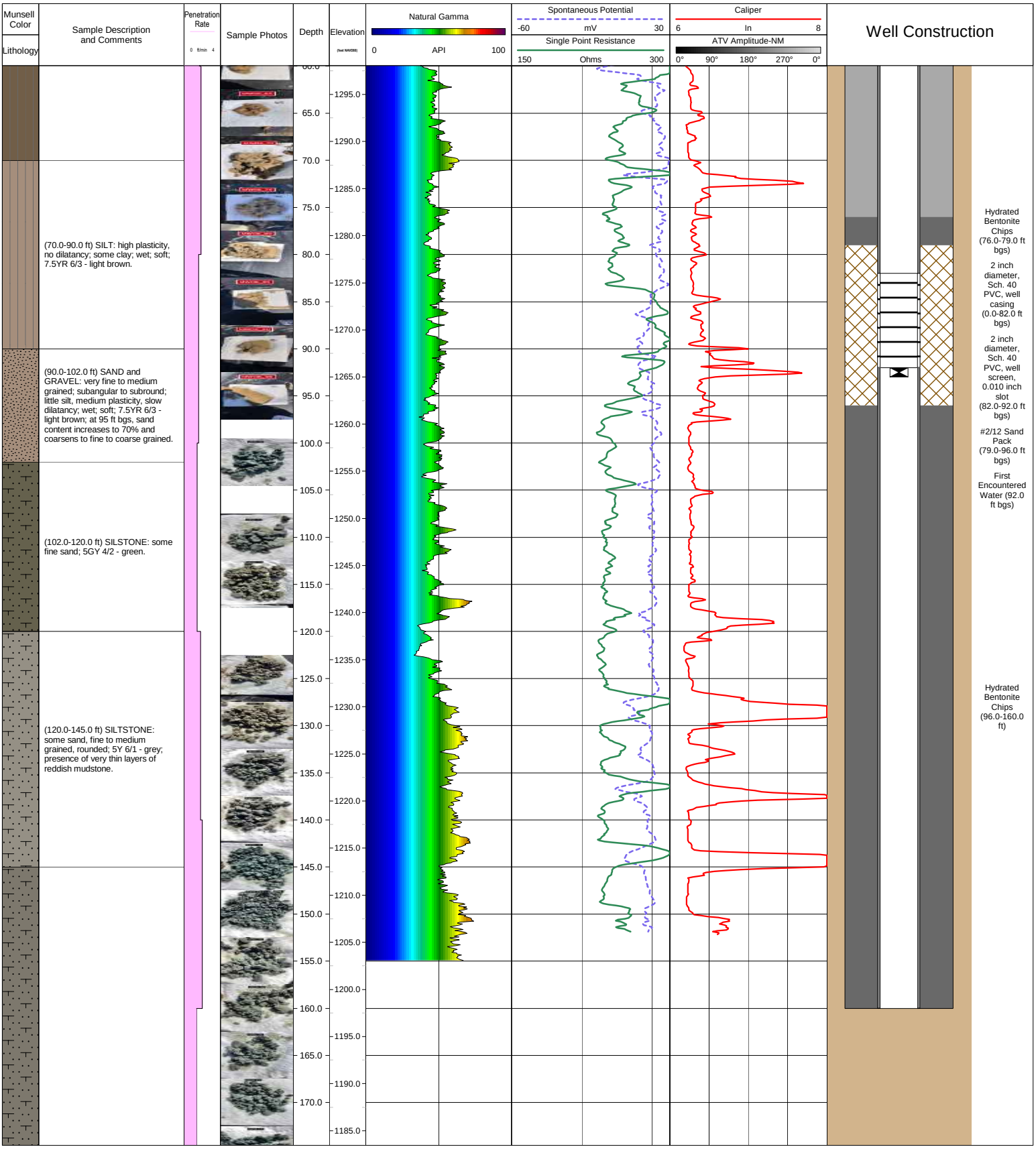
Logging Probes Used

- [x] Natural Gamma
- [ ] Fluid Temperature/Resistivity
- [ ] Induction Conductivity
- [ ] Normal Resistivity
- [x] 3-Arm Caliper
- [ ] Acoustic Televiewer
- [ ] Optical Televiewer
- [ ] Heat Pulse Flow Meter
- [ ] Spinner Flow Meter
- [ ] Spectral Gamma
- [ ] Full Waveform Sonic
- [ ] Nuclear Magnetic Resonance
- [ ] CDFM Flow Meter
- [x] SPR/SP
- [ ] Other:

Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 4)	Sample Photos	Depth	Elevation (feet NAVD88)
	(0.0-1.0 ft) SILT: medium plasticity, no dilatancy; some small cobbles, subangular to subround; little sand, very fine grained; moist; stiff; 7.5YR 3/2 - dark brown; oragnic odor; cobbles of 2 to 8 inches of diameter; presence of roots.			0.0	1360.0
	(1.0-2.0 ft) SILT: medium plasticity, no dilatancy; cobbles, small to large, subangular to subround; little clay; moist; very stiff; 7.5YR 3/2 - dark brown; organic odor; cobbles of 2 to 8 inches diameter.			5.0	1355.0
	(2.0-3.0 ft) COBBLES and SILT: small to large, subangular to subround; medium plasticity, no dilatancy; poorly sorted; dry; stiff; 10YR 4/3 - brown; cobbles of 2 to 10 inch diameter.			10.0	1350.0
	(3.0-10.0 ft) GRAVEL: granules to medium pebbles, angular to subround; well sorted; dry; loose; 10YR 2/2 - very dark brown.			15.0	1345.0
	(10.0-20.0 ft) SAND: medium to coarse grained, subangular to subround; small to medium pebbles, subangular to subround; little silt, no plasticity, no dilatancy; poorly sorted; dry; very loose; 10YR 3/3 - dark brown; at 15 ft bgs, sand content increases to 75%.			20.0	1340.0
	(20.0-30.0 ft) GRAVEL: granules to large pebbles, angular to subround; poorly sorted; wet; very loose; 10YR 2/1 - black.			25.0	1335.0
	(30.0-40.0 ft) SAND: very fine to medium grained; little granules, subangular to subround; dry; very soft; 10YR 4/3 - brown.			30.0	1330.0
	(40.0-45.0 ft) SAND and SILT: very fine to fine grained; medium plasticity, no dilatancy; dry; very soft; 10YR 4/3 - brown.			35.0	1325.0
	(45.0-70.0 ft) SILT and GRAVEL: medium plasticity, no dilatancy; subangular to subround; little sand, very fine to fine grained;wet; soft 10YR 4/3 - brown.			40.0	1320.0
				45.0	1315.0
				50.0	1310.0
				55.0	1305.0
					1300.0






Munsell Color
Lithology
Sample Description and Comments
Penetration Rate
0 ft/min 4
Sample Photos
Depth
Elevation
(feet NAVD88)
Natural Gamma
0 API 100
Spontaneous Potential
-60 mV 30
Single Point Resistance
150 Ohms 300
Caliper
6 In 8
ATV Amplitude-NM
0° 90° 180° 270° 0°
Well Construction
(70.0-90.0 ft) SILT: high plasticity, no dilatancy; some clay; wet; soft; 7.5YR 6/3 - light brown.
(90.0-102.0 ft) SAND and GRAVEL: very fine to medium grained; subangular to subround; little silt, medium plasticity, slow dilatancy; wet; soft; 7.5YR 6/3 - light brown; at 95 ft bgs, sand content increases to 70% and coarsens to fine to coarse grained.
(102.0-120.0 ft) SILTSTONE: some fine sand; 5GY 4/2 - green.
(120.0-145.0 ft) SILTSTONE: some sand, fine to medium grained, rounded; 5Y 6/1 - grey; presence of very thin layers of reddish mudstone.
Hydrated Bentonite Chips (76.0-79.0 ft bgs)
2 inch diameter, Sch. 40 PVC, well casing (0.0-82.0 ft bgs)
2 inch diameter, Sch. 40 PVC, well screen, 0.010 inch slot (82.0-92.0 ft bgs)
#2/12 Sand Pack (79.0-96.0 ft bgs)
First Encountered Water (92.0 ft bgs)
Hydrated Bentonite Chips (96.0-160.0 ft)

Munsell Color / Lithology	Sample Description and Comments	Penetration Rate (0 ft/min 4)	Sample Photos	Depth	Elevation (feet NAVD88)	Natural Gamma (0 API 100)	Spontaneous Potential (-60 mV 30) / Single Point Resistance (150 Ohms 300)	Caliper (6 In 8) / ATV Amplitude-NM (0° 90° 180° 270° 0°)	Well Construction
	(145.0-210.0 ft) SILTSTONE: some sand, fine to medium grained, round; 5GY 4/2 - green; at 160 ft bgs, presence of thin layers of mudstone, 2.5Y 5/1 - grey; occassional traces of sandstone, 10YR 7/6 - orangish brown.			175.0 180.0 185.0 190.0 195.0 200.0 205.0 210.0 215.0 220.0 225.0 230.0 235.0	1180.0 1175.0 1170.0 1165.0 1160.0 1155.0 1150.0 1145.0 1140.0 1135.0 1130.0 1125.0				

ABBREVIATIONS: bgs = beneath ground surface, NA = not available, ft = feet, PVC = polyvinyl chloride, USCS = Unified Soil Classification System, in = inches, mm = millimeters, < = less than, % = percent, NAVD88 = North American Vertical Datum of1988, NAD83 = North American Datum of 1983

NOTES: Horizontal coordinate projection: SPCS, Washington South, NAD83 Datum, U.S. Survey Feet. Elevation is reported in the NAVD88 (Geoid 18) system. Hand augered to 5.0 ft bgs or to refusal.

Attachment 2

Baseline Data Validation Reports

ARCADIS

Yakima Training Center PFAS RI

DATA REVIEW

Yakima, Washington

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG #410-115153-1

Analyses Performed By:
Eurofins Lancaster Laboratories Environmental
Lancaster, Pennsylvania

Report #48944R
Review Level: Stage 2b/4
Project: 30124009.04

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 410-115153-1 for samples collected in association with the Yakima Training Center (YTC) site. The review was conducted as 100 percent Stage 2B and 10% Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					PFAS
YTC-MTS-2-GW-020823	410-115153-1	Water	02/08/2023		X
YTC-FD-01-GW-020823	410-115153-2	Water	02/08/2023	YTC-MTS-2-GW-020823	X
YTC-MTS-4-GW-020823	410-115153-3	Water	02/08/2023		X
YTC-TVR-2-GW-020823	410-115153-4	Water	02/08/2023		X
YTC-MRC-2-GW-020823	410-115153-5	Water	02/08/2023		X
YTC-MMP-2-GW-020823	410-115153-6	Water	02/08/2023		X
YTC-MMP-1-GW-020823	410-115153-7	Water	02/08/2023		X
YTC-EB-3-020823	410-115153-8	Water	02/08/2023		X
YTC-FB-3-020823	410-115153-9	Water	02/08/2023		X

Notes:

1. Stage 4 validation was performed on sample location YTC-MMP-1-GW-020823.
2. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample locations associated with this SDG.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to Department of Defense/Department of Energy Consolidated Quality Systems Manual for Environmental Laboratories (QSM) conducted using Liquid Chromatography Tandem Mass Spectrometry compliant with Table B-15 of QSM 5.4. Data were reviewed in accordance with Eurofins Lancaster Laboratories Environmental (ELLE) SOP T-PFAS-WI36458 Polyfluorinated Alkyl Substances (PFAS) in Aqueous Samples by Method 537 Revision 1.1 Modified QSM 5.4 Table B-15 Using /LC/MS/MS, Version 3 (2022), SOP T-PFAS-WI36459 Polyfluorinated Alkyl Substances (PFASs) in Solids by Method 537 Version 1.1 Modified QSM 5.4 Table B-15 Using LC/MS/MS, Version 2 (2022), Department of Defense (DoD) Quality Systems Manual (QSM) 5.4, DoD General Data Validation Guidelines, November 2019, DoD Final Data Validation Guidelines Module 3: PFAS, May 2020, and Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, October 2019 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified, and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Per DoD General Data Validation Guidelines November 2019 Revision 1 Section 4.8 states; “The following provides a brief explanation of the DoD data validation qualifiers assigned to results during the data review process by a data validator. The reviewer should use these qualifiers, as applicable, unless other data qualifiers are specified in a project related document, such as a QAPP. If other qualifiers are used, a complete explanation of those qualifiers should accompany the data validation report.” Below are the qualifier codes that may be applied in this validation report:

- Concentration (C) Qualifiers
  - U The analyte was not detected and was reported as less than the LOD. The LOD has been adjusted for any dilution or concentration of the sample.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The reported result was an estimated value with an unknown bias.
  - J+ The result was an estimated quantity, but the result may be biased high.
  - J- The result was an estimated quantity, but the result may be biased low.
  - UJ The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.

X The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

A fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
DoD QSM 5.4 Table B-15	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Soil	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

The holding time has been changed from the original holding time documented in EPA 537 of 14 days for extraction to 28 days. This was documented in EPA Technical Brief EPA/600/F-17/022h Updated January 2020. Utilizing the new guidance of 28 days all samples were analyzed within the specified holding time criteria.

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

The compound perfluorooctanesulfonic acid was detected in the associated equipment blank- YTC-EB-3-020823; however, the associated sample results were greater than the BAL and/or were non-detect. No qualification of the sample results was required. All other criteria were met.

3. Mass Calibration

Mass calibration and system performance were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration, $r^2 \geq 0.99$. Analytes must be within 70-130% recovery of their true value for each calibration standard. The initial calibration verification (ICV) standard recoveries must be within 70-130% recovery of their true value.

The initial calibration, calibration standards and ICV recoveries were within acceptable limits.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration verification (CCV) standards must exhibit a percent recovery (%R) within 70% to 130%.

All compounds associated with the CCVs were within the specified control limits.

4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

All compounds associated with ISC recoveries were within control limits.

4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.4 Table B-15.

The ion transitions were as specified in DoD QSM 5.4.

5. Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within 50% to 150% of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compounds	EIS %R	RE EIS %R
YTC-MTS-2-GW-020823	M2-4:2 FTS	4:2 FTS	>150%	**AC**
YTC-FD-01-GW-020823	M2-4:2 FTS	4:2 FTS	>150%	**AC**
YTC-MTS-4-GW-020823	M2-4:2 FTS	4:2 FTS	>150%	**AC**
	M2-6:2 FTS	6:2 FTS	>150%	**AC**
YTC-TVR-2-GW-020823	M2-4:2 FTS	4:2 FTS	>150%	**AC**
	M2-6:2 FTS	6:2 FTS	>150%	**AC**
YTC-MRC-2-GW-020823	13C4 PFHpA	Perfluoroheptanoic acid (PFHpA)	< 50 but >20%	**AC**
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 50 but >20%	**AC**
YTC-MMP-2-GW-020823	13C3 PFHxS	Perfluorohexanesulfonic acid (PFHxS)	< 20% (DL)	**AC**
YTC-MMP-1-GW-020823	13C4 PFHpA	Perfluoroheptanoic acid (PFHpA)	< 20% (DL)	**AC**
	13C9 PFNA	Perfluorononanoic acid (PFNA)	< 50 but >20%	**AC**
	13C3 PFHxS	Perfluorohexanesulfonic acid (PFHxS)	< 20% (DL)	**AC**

Sample Locations	EIS	Associated Compounds	EIS %R	RE EIS %R
	13C8 PFOS	Perfluorooctanesulfonic acid (PFOS)	< 20% (DL)	**AC**
YTC-FB-3-020823	M2-4:2 FTS	4:2 FTS	>150%	**AC**
	13C5 PFHxA	Perfluorohexanoic acid (PFHxA)	>150%	**AC**
	13C3 PFBS	Perfluorobutanesulfonic acid (PFBS)	>150%	**AC**
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	>150%	**AC**
	13C5 PFPeA	Perfluoropentanoic acid (PFPeA)	>150%	**AC**

Notes:
AC Acceptable
DL Dilution

Where a re-extracted analysis was performed, results are reported from the analysis in bold above.

The analytical report lists the EIS recoveries based on true value. Form VIII was reviewed for area counts between the sample location and the initial CCV for EIS recovery exceedances. The recoveries reported on the analytical result pages can be slightly different when calculated using area.

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	J-
< 50% but > 20%	Non-detect	UJ
	Detect	J+
< 20%	Non-detect	UX
	Detect	X

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the DoD QSM 5.4 acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be ≤ 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD analysis was not performed on sample locations associated with this SDG.

7. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery and RPD within the DoD QSM 5.4 acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries and RPDs within the control limits.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. For sample results greater than five times the LOQ, control limits of 30% for water matrices and 50% for soils are applied to the RPD between the parent sample and the field duplicate sample results. For sample results less than five times the LOQ, a control limit of two times the LOQ is applied for water matrices and a control limit of three times the LOQ is applied for soil matrices. The table below presents analytical results for each parent/duplicate sample pair, either an RPD value or an absolute difference value (as applicable), the applicable control limit (as either a percentage or a multiplier of the LOQ), and determination of whether the parent/duplicate sample results differences meet the applicable control limits.

Sample ID / Duplicate ID	Compounds	Sample Result	Duplicate Result	RPD/ Absolute Difference	LOQ CL/ RPD CL	AC/ NC
YTC-MTS-2-GW-020823 / YTC-FD-01-GW-020823	Perfluorohexanoic acid	15	15	0.0%	30%	AC
	Perfluoroheptanoic acid	5.6	5.5	0.1	3.2	AC
	Perfluorooctanoic acid	5.9	5.9	0.0	3.2	AC
	Perfluorononanoic acid	0.82 J	0.90 J	0.08	3.2	AC
	Perfluorobutanesulfonic acid	8.2	8.3	0.1	3.2	AC
	Perfluorohexanesulfonic acid	28	28	0.0%	30%	AC
	Perfluorooctanesulfonic acid	33	30	9.5%	30%	AC
	Perfluoropentanesulfonic acid	6.5	6.5	0.0	3.2	AC
	Perfluoroheptanesulfonic acid	0.76 J	0.67 J	0.09	3.2	AC
	Perfluorobutanoic acid	7.5	7.4	0.1	8	AC
	Perfluoropentanoic acid	13	13	0.0%	30%	AC

Notes:
AC Acceptable
CL Control limit

The calculated RPDs for results greater than five times the LOQ and the absolute differences for results less than five times the LOQ were acceptable between the parent sample and field duplicate.

9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

Sample locations associated with ion ratios outside of the control limits of 50% to 150% recovery (%R) are presented in the following table.

Sample Location	Compound	Ion Ratio %R
YTC-MMP-1-GW-020823	Perfluorodecanesulfonic acid	39%

In the case of an ion ratio deviation, the sample results are qualified as documented in the table below.

Control limit	Sample Result	Qualification
< 50% or > 150% R	Detect	J

Note a number of results were manually integrated which were spot checked. The manual quantitation (M) laboratory qualifier has been preserved with the data as informational data for the end user; there was no impact on the data usability. The manual quantitation (M) laboratory qualifier associated with data reported as non-detect have been removed.

Sample results associated with compounds that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compounds	Original Analysis	Diluted Analysis	Reported Analysis
YTC-MTS-4-GW-020823	Perfluorohexanesulfonic acid	74 E	75	75 D
YTC-MRC-2-GW-020823	Perfluorooctanesulfonic acid	1324 E	1100	1100 D
	Perfluorohexanesulfonic acid	901 E	860	860 D
YTC-MMP-2-GW-020823	Perfluorohexanoic acid	597 E	530	530 D
	Perfluoroheptanoic acid	209 E	180	180 D
	Perfluorooctanesulfonic acid	2727 E	2300	2300 D
	Perfluoroheptanesulfonic acid	84 E	56	56 D
	Perfluoropentanoic acid	391 E	360	360 D
	6:2 Fluorotelomer sulfonic acid	614 E	630	630 D
	8:2 Fluorotelomer sulfonic acid	115 E	110	110 D
YTC-MMP-1-GW-020823	Perfluorohexanoic acid	633 E	520	520 D
	Perfluorooctanoic acid	417 E	340	340 D
	Perfluoroheptanesulfonic acid	156 E	120	120 D
	Perfluoropentanoic acid	501 E	450	450 D
	6:2 Fluorotelomer sulfonic acid	1244 E	1300	1300 D
	8:2 Fluorotelomer sulfonic acid	369 E	300	300 D
	Perfluorooctanesulfonic acid	9790 E	5600	5600 D

Sample results associated with compounds exhibiting concentrations greater than the linear range are qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within calibration range.	D

10. System Performance and Overall Assessment

Some of the compound results were qualified ‘cn’ that is defined as Refer to Case Narrative for further detail. The case narrative was reviewed, and associated data qualified if appropriate. The case narrative noted the EIS recoveries outside control limits as listed in Section 5, and the data was qualified. The “cn” qualifier has been removed from the database.

Some of the compound results were qualified ‘J1’ that is defined as the quantitation is an estimation due to discrepancies in the meeting certain analyte-specific quality control criteria. The “J1” qualifier has been removed and qualified as estimated ‘J’.

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAS

PFAS: DoD QSM 5.4	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Stage 2B Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X	X		
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)		X		X	
Extracted Internal Standard %R		X	X		
Dilution Factor		X		X	
Moisture Content	X				X
Stage 3/4 Validation					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Rs		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Ion Ratio %R		X	X		

PFAS: DoD QSM 5.4	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
E. Transcription/calculations acceptable		X		X	
F. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Pruthvi Kumar C, Arcadis

SIGNATURE: 

DATE: March 20, 2023

PEER REVIEW: Dennis Capria, Arcadis

DATE: March 28, 2023

Stage 3 / 4
PFAS Calibration Standards %D

SDG #: 410-115153-1
Lab: Eurofins Lancaster
Project: Yakima Training Center PFAS RI

Date: 03/17/2023
Page: 1
Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

PFPeA 02/18/2023 Calibration Instrument: 30728 Page 1709-1725 of SDG 410-115153-1

Cal Conc ng/ml	Std Area	EIS Area	EIS Conc	Area Ratio	Calculated RF	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
0.2	51988	2324466	10	0.022366	1.1182783	1.0293	0.217289	0.2	8.645	8.6	MATCH
0.5	125673	2482712	10	0.050619	1.0123848	1.0293	0.491783	0.5	-1.643	-1.6	MATCH
2	504339	2446209	10	0.206172	1.0308584	1.0293	2.003028	2	0.151	0.1	MATCH
8	1778826	2189878	10	0.812295	1.0153682	1.0293	7.891718	8	-1.354	-1.4	MATCH
20	4310218	2080370	10	2.071852	1.0359258	1.0293	20.12874	20	0.644	0.6	MATCH
50	8733678	1754931	10	4.97665	0.9953301	1.0293	48.34985	50	-3.300	-3.3	MATCH
100	16607702	1665472	10	9.971769	0.9971769	1.0293	96.87913	100	-3.121	-3.1	MATCH
				Avg RF	1.0293318	MATCH					

Concentration ng/ml = (Peak area ratio/Avg RF) x EIS concentration

Stage 3 / 4
PFAS ICV CCV Standards %D

SDG #: 410-115153-1 Date: 03/17/2023
Lab: Eurofins Lancaster Page: 2
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.3

Instrument: 30728 File ID: 23FEB18DCAL-09.d
ICV 410-345861/9 02/18/2023 13:09 Page 2444 of SDG 410-115153-1

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFPeA	480254	2295291	10.00	0.2092345	1.0293	2.0328	2.00	1.639	1.6	Match
PFHxS	394929	1794566	9.46	0.2200694	1.0806	1.9266	1.82	5.856	5.6	Match
PFHpA	656668	2988309	10.00	0.2197457	1.0328	2.1277	2.00	6.383	6.4	Match

Instrument: 30728 File ID: 23FEB22DOD-05.d
CCVIS 410-346984/1 02/22/2023 16:35 Page 2462 of SDG 410-115153-1
This CCVIS is applicable for the sample YTC-MMP-1-GW-020823 (410-115153-7)

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFPeA	111755	2148151	10.00	0.0520238	1.0293	0.5054	0.500	1.086	1.1	Match
PFHxS	86521	1732589	9.46	0.0499374	1.0806	0.4372	0.456	-4.129	-4.1	Match
PFHpA	150073	2863851	10.00	0.0524025	1.0328	0.5074	0.500	1.477	1.5	Match

Instrument: 30728 File ID: 23FEB22DOD-83.d
CCV 410-346984/79 410-346984/79 Page 2501 of SDG 410-115153-1
This CCV is applicable for the sample YTC-MMP-1-GW-020823 (410-115153-7)

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFPeA	443858	2180417	10.00	0.2035656	1.0293	1.9777	2.00	-1.115	-1.1	Match
PFBS	356311	1602592	9.3	0.2223342	1.0933	1.8913	1.77	6.851	6.9	Match
PFHpA	600861	2735199	10.00	0.2196773	1.0328	2.1270	2.00	6.350	6.4	Match

Concentration ng/ml = (Peak area ratio/Avg RF) x EIS concentration

Stage 3 / 4
PFAS LCS

SDG #: 410-115153-1 Date: 03/17/2023
Lab: Eurofins Lancaster Page: 3
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

LCS ID 410-345997/3-A

ANALYTE Perfluorobutanesulfonic acid
REPORTED LCS %R 94
REPORTED LCSD %R NA
REPORTED RPD NA

$$\%R = \frac{100 * \text{LCS Concentration}}{\text{LCS TV}} \qquad RPD = \frac{100 * | \text{LCS \%R} - \text{LCSD \%R} |}{\text{Average of LCS LCSD \%R}}$$

LCS Concentration	21.3	LCS %R	93.8326	MATCH
LCSD Concentration	NA	LCSD %R	NA	MATCH
LCS TV	22.7	RPD	NA	MATCH
LCSD TV	NA			

Differences in %R may be due to rounding of the true value

This LCS is applicable for the sample YTC-MMP-1-GW-020823 (410-115153-7)

Stage 3 / 4
PFAS Sample Concentration

SDG #: 410-115153-1 Date: 03/17/2023
Lab: Eurofins Lancaster Page: 4
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

YTC-MMP-1-GW-020823 Lab ID: 410-115153-7 Page 1287 of SDG 410-115153-1
Instrument: 30728 FV= 1ml

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calculated Amount ng/ml	Sample Volume mls	Calculated ng/L	Reported Value ng/L	
PFNA	665218	793449	10.00	0.838388	0.9466	8.86	295.1	30.01	30	Match
PFDA	278308	2318134	10	0.120057	0.8872	1.35	295.1	4.59	4.6	Match
PFBS	5113584	1239418	9.30	4.125795	1.0933	35.10	295.1	118.93	120	Match

Concentration ng/ml = (Peak area ratio/Avg RF) x DF x EIS concentration
Concentration ng/L = concentration ng/ml / (sample volume/1000)

Stage 3 / 4
PFAS EIS

SDG #: 410-115153-1 Date: 03/17/2023
Lab: Eurofins Lancaster Page: 5
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.3

YTC-MMP-1-GW-020823 Lab ID: 410-115153-7
EIS 13C3 PFBS
REPORTED EIS %R 71

$$\%R = \frac{100 * \text{EIS Concentration}}{\text{EIS TV}}$$

EIS Concentration 6.65 Page 1289 of SDG 410-115153-1
EIS TV 9.3 Lab Reports EIS %R based on true value
%R 71.5 MATCH

$$\%R = \frac{100 * \text{EIS Area}}{\text{CCVIS EIS Area}}$$

EIS Area 1239418 Page 1026 and 1289 of SDG 410-115153-1
CCVIS EIS Area 1688135 Page 1018 and 2464 of SDG 410-115153-1
%R 73.4

DoD QSM 5.3 specifies EIS %R calculated from area compared to initial CCV.
Lab supplies area counts on Form VIII in Stage 4 data package.
Form VIII is reviewed for EIS %R exceedances.

CHAIN OF CUSTODY
SAMPLE ANALYSIS DATA SHEETS

410-115153 Chain of Custody

Chain of Custody Record

eurofins | Environment Testing

Courtney Bigelow	Sampler: A. Balser / B. Pollard	Lab PM: Martin, Elizabeth	Carrier Tracking No(s):	COC No: 410-80232-22040.5
	Phone: 415.404.5375	E-Mail: Elizabeth.Martin@et.eurofinsus.com	State of Origin:	Page: Page 5 of 5 → 1 of 1

Company: Environmental Chemical Corp.	PWSID:	Analysis Requested	Job #:
Address: 1304 Governors Court Suites 101 & 102	Due Date Requested:		Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
City: Abingdon	TAT Requested (days): 15 day TAT		
State, Zip: MD, 21009	Compliance Project: Δ Yes Δ No		
Phone: 410-671-2970(Tel)	PO #: PO Pending		
Email: cbigelow@ecc.net	WO #:		Other:
Project Name: Yakima PFAS	Project #: 41013850		
Site:	SSOW#:		

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA_D5.3 - PFC_IDA_D5.3 (List of 24 Compounds)	Moisture - Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N		
YTC-MTS-2-GW-020823	2-8-23	0856	G	GW	N	N	2	-		*High PFAS Expected
YTC-FD-01-GW-020823	2-8-23	0000	G	GW	N	N	2	-		*High PFAS Expected
YTC-MTS-4-GW-020823	2-8-23	1041	G	GW	N	N	2	-		*High PFAS Expected
YTC-TVR-2-GW-020823	2-8-23	1152	G	GW	N	N	2	-		*High PFAS Expected
YTC-MRC-2-GW-020823	2-8-23	1336	G	GW	N	N	2	-		*High PFAS Expected
YTC-MMP-2-GW-020823	2-8-23	1516	G	GW	N	N	2	-		*High PFAS Expected
YTC-MMP-1-GW-020823	2-8-23	1636	G	GW	N	N	2	-		*High PFAS Expected
YTC-EB-3-020823	2-8-23	1715	G	W	N	N	2	-		
YTC-FB-3-020823	2-8-23	1720	G	W	N	N	2	-		

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by:		Date/Time: 2/9/23 1530	Company: ECC	Received by: Fed Ex	Date/Time: 2/9/23 1530	Company: —	
Relinquished by:		Date/Time:	Company:	Received by:	Date/Time:	Company:	
Relinquished by:		Date/Time:	Company:	Received by:	Date/Time: 2/10/23 9:54	Company: ECC-J	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 3.6

Ver: 06/08/2021

Definitions/Glossary

Client: Environmental Chemical Corp. Job ID: 410-115153-1
Project/Site: Yakima PFAS

Qualifiers

LCMS

Qualifier	Qualifier Description
cn	Refer to Case Narrative for further detail
D	The reported value is from a dilution.
H	Sample was prepped or analyzed beyond the specified holding time
I	Value is EMPC (estimated maximum possible concentration).
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M	Manual integrated compound.
Q	One or more quality control criteria failed.
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample ID: YTC-MTS-2-GW-020823

Date Collected: 02/08/23 08:56
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-1

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**15**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluoroheptanoic acid	**5.6**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorooctanoic acid	**5.9**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorononanoic acid	**0.82**	**J**	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorodecanoic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorotridecanoic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorotetradecanoic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorobutanesulfonic acid	**8.2**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorohexanesulfonic acid	**28**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorooctanesulfonic acid	**33**		1.7	1.6	0.81	ng/L		02/25/23 02:21	1
NEtFOSAA	0.81	U	2.4	0.81	0.40	ng/L		02/25/23 02:21	1
NMeFOSAA	0.97	U	1.6	0.97	0.48	ng/L		02/25/23 02:21	1
Perfluoropentanesulfonic acid	**6.5**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluoroheptanesulfonic acid	**0.76**	**J**	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorononanesulfonic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorodecanesulfonic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorooctanesulfonamide	1.1	U M	1.6	1.1	0.56	ng/L		02/25/23 02:21	1
Perfluorobutanoic acid	**7.5**		4.0	3.2	1.6	ng/L		02/25/23 02:21	1
Perfluoropentanoic acid	**13**		1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluoroundecanoic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
Perfluorododecanoic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:21	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:21	1
4:2 Fluorotelomer sulfonic acid	0.81	U	1.6	0.81	0.40	ng/L		02/25/23 02:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*168*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
M2-8:2 FTS	*127*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
M2-6:2 FTS	*153*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C5 PFHxA	*132*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C4 PFHpA	*121*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C8 PFOA	*141*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C9 PFNA	*130*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C6 PFDA	*129*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C7 PFUnA	*141*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C2-PFDoDA	*131*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C2 PFTeDA	*130*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C3 PFBS	*128*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C3 PFHxS	*130*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C8 PFOS	*127*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
d3-NMeFOSAA	*124*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
d5-NEtFOSAA	*132*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C8 FOSA	*118*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C4 PFBA	*101*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*
13C5 PFPeA	*116*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:21*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**14**	**H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluoroheptanoic acid	**5.4**	**H M**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1

Client Sample ID: YTC-MTS-2-GW-020823

Lab Sample ID: 410-115153-1

Date Collected: 02/08/23 08:56
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	**5.4**	**H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorononanoic acid	**0.76**	**J H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorodecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorotridecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorotetradecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorobutanesulfonic acid	**8.0**	**H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorohexanesulfonic acid	**28**	**H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorooctanesulfonic acid	**29**	**H**	2.0	1.9	0.96	ng/L		03/03/23 13:12	1
NEtFOSAA	0.96	U H	2.9	0.96	0.48	ng/L		03/03/23 13:12	1
NMeFOSAA	1.1	U H	1.9	1.1	0.57	ng/L		03/03/23 13:12	1
Perfluoropentanesulfonic acid	**6.3**	**H M**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluoroheptanesulfonic acid	**0.65**	**J H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorononanesulfonic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorodecanesulfonic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorooctanesulfonamide	**0.96**	**J H**	1.9	1.3	0.67	ng/L		03/03/23 13:12	1
Perfluorobutanoic acid	**7.1**	**H**	4.8	3.8	1.9	ng/L		03/03/23 13:12	1
Perfluoropentanoic acid	**13**	**H**	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluoroundecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
Perfluorododecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1
6:2 Fluorotelomer sulfonic acid	1.9	U H	2.9	1.9	0.96	ng/L		03/03/23 13:12	1
8:2 Fluorotelomer sulfonic acid	1.9	U H	2.9	1.9	0.96	ng/L		03/03/23 13:12	1
4:2 Fluorotelomer sulfonic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*104*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
M2-8:2 FTS	*134*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
M2-6:2 FTS	*126*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C5 PFHxA	*113*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C4 PFHpA	*116*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C8 PFOA	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C9 PFNA	*121*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C6 PFDA	*122*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C7 PFUnA	*122*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C2-PFDoDA	*122*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C2 PFTeDA	*110*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C3 PFBS	*116*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C3 PFHxS	*128*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C8 PFOS	*117*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
d3-NMeFOSAA	*121*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
d5-NEtFOSAA	*118*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C8 FOSA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C4 PFBA	*90*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*
13C5 PFPeA	*100*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:12*	*1*

Client Sample ID: YTC-FD-01-GW-020823

Lab Sample ID: 410-115153-2

Date Collected: 02/08/23 00:00
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**15**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1

Client Sample ID: YTC-FD-01-GW-020823

Date Collected: 02/08/23 00:00
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-2

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanoic acid	**5.5**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorooctanoic acid	**5.9**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorononanoic acid	**0.90**	**J M**	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorodecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorotridecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorotetradecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorobutanesulfonic acid	**8.3**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorohexanesulfonic acid	**28**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorooctanesulfonic acid	**30**		1.7	1.6	0.81	ng/L		02/25/23 02:32	1
NEtFOSAA	0.81	U	2.4	0.81	0.41	ng/L		02/25/23 02:32	1
NMeFOSAA	0.98	U	1.6	0.98	0.49	ng/L		02/25/23 02:32	1
Perfluoropentanesulfonic acid	**6.5**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluoroheptanesulfonic acid	**0.67**	**J**	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorononanesulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorodecanesulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorooctanesulfonamide	1.1	U M	1.6	1.1	0.57	ng/L		02/25/23 02:32	1
Perfluorobutanoic acid	**7.4**		4.1	3.3	1.6	ng/L		02/25/23 02:32	1
Perfluoropentanoic acid	**13**		1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluoroundecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
Perfluorododecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:32	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:32	1
4:2 Fluorotelomer sulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*162*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
M2-8:2 FTS	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
M2-6:2 FTS	*142*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C5 PFHxA	*135*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C4 PFHpA	*122*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C8 PFOA	*143*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C9 PFNA	*130*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C6 PFDA	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C7 PFUnA	*143*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C2-PFDoDA	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C2 PFTeDA	*120*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C3 PFBS	*127*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C3 PFHxS	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C8 PFOS	*134*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
d3-NMeFOSAA	*118*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
d5-NEtFOSAA	*128*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C8 FOSA	*115*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C4 PFBA	*102*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*
13C5 PFPeA	*116*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:32*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**15**	**H**	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluoroheptanoic acid	**5.5**	**H M**	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorooctanoic acid	**5.5**	**H**	2.0	0.99	0.49	ng/L		03/03/23 13:23	1

Client Sample ID: YTC-FD-01-GW-020823

Date Collected: 02/08/23 00:00
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-2

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorononanoic acid	0.78	J H M	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorodecanoic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorotridecanoic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorotetradecanoic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorobutanesulfonic acid	7.9	H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorohexanesulfonic acid	29	H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorooctanesulfonic acid	29	H	2.1	2.0	0.99	ng/L		03/03/23 13:23	1
NEtFOSAA	0.99	U H	3.0	0.99	0.49	ng/L		03/03/23 13:23	1
NMeFOSAA	1.2	U H	2.0	1.2	0.59	ng/L		03/03/23 13:23	1
Perfluoropentanesulfonic acid	6.7	H M	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluoroheptanesulfonic acid	0.67	J H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorononanesulfonic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorodecanesulfonic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorooctanesulfonamide	0.96	J H	2.0	1.4	0.69	ng/L		03/03/23 13:23	1
Perfluorobutanoic acid	7.1	H	4.9	4.0	2.0	ng/L		03/03/23 13:23	1
Perfluoropentanoic acid	13	H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluoroundecanoic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
Perfluorododecanoic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1
6:2 Fluorotelomer sulfonic acid	2.0	U H	3.0	2.0	0.99	ng/L		03/03/23 13:23	1
8:2 Fluorotelomer sulfonic acid	2.0	U H	3.0	2.0	0.99	ng/L		03/03/23 13:23	1
4:2 Fluorotelomer sulfonic acid	0.99	U H	2.0	0.99	0.49	ng/L		03/03/23 13:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*109*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
M2-8:2 FTS	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
M2-6:2 FTS	*140*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C5 PFHxA	*117*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C4 PFHpA	*116*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C8 PFOA	*129*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C9 PFNA	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C6 PFDA	*119*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C7 PFUnA	*123*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C2-PFDoDA	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C2 PFTeDA	*115*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C3 PFBS	*115*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C3 PFHxS	*133*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C8 PFOS	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
d3-NMeFOSAA	*118*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
d5-NEtFOSAA	*120*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C8 FOSA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C4 PFBA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*
13C5 PFPeA	*105*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:23*	*1*

Client Sample ID: YTC-MTS-4-GW-020823

Date Collected: 02/08/23 10:41
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-3

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	27		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluoroheptanoic acid	5.6		1.6	0.81	0.41	ng/L		02/25/23 02:43	1

Client Sample ID: YTC-MTS-4-GW-020823

Date Collected: 02/08/23 10:41
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-3

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	**6.0**		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorononanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorodecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorotridecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorotetradecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorobutanesulfonic acid	**18**		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorooctanesulfonic acid	**30**		1.7	1.6	0.81	ng/L		02/25/23 02:43	1
NEtFOSAA	0.81	U	2.4	0.81	0.41	ng/L		02/25/23 02:43	1
NMeFOSAA	0.98	U	1.6	0.98	0.49	ng/L		02/25/23 02:43	1
Perfluoropentanesulfonic acid	**17**		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluoroheptanesulfonic acid	**1.7**		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorononanesulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorodecanesulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorooctanesulfonamide	1.1	U	1.6	1.1	0.57	ng/L		02/25/23 02:43	1
Perfluorobutanoic acid	**7.5**		4.1	3.3	1.6	ng/L		02/25/23 02:43	1
Perfluoropentanoic acid	**12**		1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluoroundecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
Perfluorododecanoic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:43	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.81	ng/L		02/25/23 02:43	1
4:2 Fluorotelomer sulfonic acid	0.81	U	1.6	0.81	0.41	ng/L		02/25/23 02:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*172*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
M2-8:2 FTS	*125*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
M2-6:2 FTS	*156*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C5 PFHxA	*136*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C4 PFHpA	*122*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C8 PFOA	*150*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C9 PFNA	*136*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C6 PFDA	*136*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C7 PFUnA	*147*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C2-PFDoDA	*126*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C2 PFTeDA	*119*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C3 PFBS	*128*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C3 PFHxS	*129*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C8 PFOS	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
d3-NMeFOSAA	*128*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
d5-NEtFOSAA	*133*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C8 FOSA	*114*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C4 PFBA	*108*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*
13C5 PFPeA	*123*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:43*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	**75**	**D**	16	8.1	4.1	ng/L		02/25/23 02:54	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFHxS	*146*		*50 - 150*	*02/20/23 07:09*	*02/25/23 02:54*	*10*

Client Sample ID: YTC-MTS-4-GW-020823

Date Collected: 02/08/23 10:41
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-3

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	26	H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluoroheptanoic acid	5.1	H M	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorooctanoic acid	6.0	H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorononanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorodecanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorotridecanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorotetradecanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorobutanesulfonic acid	19	H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorohexanesulfonic acid	75	H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorooctanesulfonic acid	32	H	2.0	1.9	0.97	ng/L		03/03/23 13:33	1
NEtFOSAA	0.97	U H	2.9	0.97	0.49	ng/L		03/03/23 13:33	1
NMeFOSAA	1.2	U H	1.9	1.2	0.58	ng/L		03/03/23 13:33	1
Perfluoropentanesulfonic acid	17	H M	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluoroheptanesulfonic acid	1.6	J H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorononanesulfonic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorodecanesulfonic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorooctanesulfonamide	1.4	U H	1.9	1.4	0.68	ng/L		03/03/23 13:33	1
Perfluorobutanoic acid	7.4	H	4.9	3.9	1.9	ng/L		03/03/23 13:33	1
Perfluoropentanoic acid	13	H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluoroundecanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
Perfluorododecanoic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1
6:2 Fluorotelomer sulfonic acid	1.9	U H	2.9	1.9	0.97	ng/L		03/03/23 13:33	1
8:2 Fluorotelomer sulfonic acid	1.9	U H	2.9	1.9	0.97	ng/L		03/03/23 13:33	1
4:2 Fluorotelomer sulfonic acid	0.97	U H	1.9	0.97	0.49	ng/L		03/03/23 13:33	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*108*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
M2-8:2 FTS	*126*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
M2-6:2 FTS	*126*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C5 PFHxA	*114*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C4 PFHpA	*118*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C8 PFOA	*129*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C9 PFNA	*119*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C6 PFDA	*116*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C7 PFUnA	*120*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C2-PFDoDA	*117*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C2 PFTeDA	*111*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C3 PFBS	*115*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C3 PFHxS	*128*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C8 PFOS	*113*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
d3-NMeFOSAA	*111*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
d5-NEtFOSAA	*118*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C8 FOSA	*106*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C4 PFBA	*102*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*
13C5 PFPeA	*103*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:33*	*1*

Client Sample ID: YTC-TVR-2-GW-020823

Date Collected: 02/08/23 11:52
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-4

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**12**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluoroheptanoic acid	**4.9**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorooctanoic acid	**5.3**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorononanoic acid	**0.76**	**J**	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorodecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorotridecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorotetradecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorobutanesulfonic acid	**5.9**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorohexanesulfonic acid	**43**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorooctanesulfonic acid	**65**		1.7	1.6	0.80	ng/L		02/25/23 03:05	1
NEtFOSAA	0.80	U	2.4	0.80	0.40	ng/L		02/25/23 03:05	1
NMeFOSAA	0.96	U	1.6	0.96	0.48	ng/L		02/25/23 03:05	1
Perfluoropentanesulfonic acid	**7.1**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluoroheptanesulfonic acid	**1.4**	**J**	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorononanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorodecanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorooctanesulfonamide	1.1	U	1.6	1.1	0.56	ng/L		02/25/23 03:05	1
Perfluorobutanoic acid	**9.5**		4.0	3.2	1.6	ng/L		02/25/23 03:05	1
Perfluoropentanoic acid	**10**		1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluoroundecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
Perfluorododecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.80	ng/L		02/25/23 03:05	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.80	ng/L		02/25/23 03:05	1
4:2 Fluorotelomer sulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/25/23 03:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*168*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
M2-8:2 FTS	*129*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
M2-6:2 FTS	*161*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C5 PFHxA	*125*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C4 PFHpA	*117*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C8 PFOA	*144*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C9 PFNA	*134*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C6 PFDA	*134*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C7 PFUnA	*138*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C2-PFDoDA	*136*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C2 PFTeDA	*108*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C3 PFBS	*117*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C3 PFHxS	*127*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C8 PFOS	*126*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
d3-NMeFOSAA	*120*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
d5-NEtFOSAA	*122*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C8 FOSA	*116*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C4 PFBA	*76*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*
13C5 PFPeA	*103*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:05*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**13**	**H**	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluoroheptanoic acid	**3.9**	**H M**	2.0	0.98	0.49	ng/L		03/03/23 13:44	1

Client Sample ID: YTC-TVR-2-GW-020823

Lab Sample ID: 410-115153-4

Date Collected: 02/08/23 11:52
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	4.9	H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorononanoic acid	0.74	J H M	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorodecanoic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorotridecanoic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorotetradecanoic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorobutanesulfonic acid	6.4	H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorohexanesulfonic acid	42	H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorooctanesulfonic acid	63	H	2.0	2.0	0.98	ng/L		03/03/23 13:44	1
NEtFOSAA	0.98	U H	2.9	0.98	0.49	ng/L		03/03/23 13:44	1
NMeFOSAA	1.2	U H	2.0	1.2	0.59	ng/L		03/03/23 13:44	1
Perfluoropentanesulfonic acid	6.6	H M	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluoroheptanesulfonic acid	1.3	J H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorononanesulfonic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorodecanesulfonic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorooctanesulfonamide	0.68	J H	2.0	1.4	0.68	ng/L		03/03/23 13:44	1
Perfluorobutanoic acid	8.1	H	4.9	3.9	2.0	ng/L		03/03/23 13:44	1
Perfluoropentanoic acid	10	H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluoroundecanoic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
Perfluorododecanoic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1
6:2 Fluorotelomer sulfonic acid	2.0	U H	2.9	2.0	0.98	ng/L		03/03/23 13:44	1
8:2 Fluorotelomer sulfonic acid	2.0	U H	2.9	2.0	0.98	ng/L		03/03/23 13:44	1
4:2 Fluorotelomer sulfonic acid	0.98	U H	2.0	0.98	0.49	ng/L		03/03/23 13:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*101*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
M2-8:2 FTS	*135*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
M2-6:2 FTS	*122*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C5 PFHxA	*109*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C4 PFHpA	*111*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C8 PFOA	*130*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C9 PFNA	*121*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C6 PFDA	*115*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C7 PFUnA	*129*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C2-PFDoDA	*127*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C2 PFTeDA	*120*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C3 PFBS	*109*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C3 PFHxS	*128*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C8 PFOS	*120*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
d3-NMeFOSAA	*121*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
d5-NEtFOSAA	*130*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C8 FOSA	*114*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C4 PFBA	*100*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*
13C5 PFPeA	*93*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:44*	*1*

Client Sample ID: YTC-MRC-2-GW-020823

Lab Sample ID: 410-115153-5

Date Collected: 02/08/23 13:36
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	220		1.6	0.80	0.40	ng/L		02/23/23 07:23	1

Client Sample ID: YTC-MRC-2-GW-020823

Date Collected: 02/08/23 13:36
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-5

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanoic acid	39		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorooctanoic acid	51		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorononanoic acid	2.7		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorodecanoic acid	0.55	J M	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorotridecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorotetradecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorobutanesulfonic acid	130		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
NEtFOSAA	0.80	U	2.4	0.80	0.40	ng/L		02/23/23 07:23	1
NMeFOSAA	0.96	U	1.6	0.96	0.48	ng/L		02/23/23 07:23	1
Perfluoropentanesulfonic acid	150		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluoroheptanesulfonic acid	25	M	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorononanesulfonic acid	2.4	M	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorodecanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorooctanesulfonamide	2.9	M	1.6	1.1	0.56	ng/L		02/23/23 07:23	1
Perfluorobutanoic acid	53		4.0	3.2	1.6	ng/L		02/23/23 07:23	1
Perfluoropentanoic acid	120		1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluoroundecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
Perfluorododecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1
6:2 Fluorotelomer sulfonic acid	3.7		2.4	1.6	0.80	ng/L		02/23/23 07:23	1
8:2 Fluorotelomer sulfonic acid	5.4		2.4	1.6	0.80	ng/L		02/23/23 07:23	1
4:2 Fluorotelomer sulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/23/23 07:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*70*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
M2-8:2 FTS	*73*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
M2-6:2 FTS	*72*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C5 PFHxA	*55*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C4 PFHpA	*48*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C8 PFOA	*70*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C9 PFNA	*54*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C6 PFDA	*69*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C7 PFUnA	*76*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C2-PFDoDA	*68*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C2 PFTeDA	*53*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C3 PFBS	*57*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C3 PFHxS	*49*	*Q*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C8 PFOS	*48*	*Q*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
d3-NMeFOSAA	*96*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
d5-NEtFOSAA	*87*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C8 FOSA	*71*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C4 PFBA	*43*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*
13C5 PFPeA	*53*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:23*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanesulfonic acid	1100	D	17	16	8.0	ng/L		02/25/23 03:27	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 PFOS	*108*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:27*	*10*

Client Sample ID: YTC-MRC-2-GW-020823

Date Collected: 02/08/23 13:36
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-5

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	860	D	160	80	40	ng/L		02/25/23 03:38	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFHxS	*114*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:38*	*100*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	260	H J1	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluoroheptanoic acid	41	H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorooctanoic acid	52	H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorononanoic acid	2.8	H M	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorodecanoic acid	0.53	J H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorotridecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorotetradecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorobutanesulfonic acid	150	H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorohexanesulfonic acid	630	H J1	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorooctanesulfonic acid	1000	H J1	2.0	1.9	0.96	ng/L		03/03/23 13:54	1
NEtFOSAA	0.96	U H	2.9	0.96	0.48	ng/L		03/03/23 13:54	1
NMeFOSAA	1.1	U H	1.9	1.1	0.57	ng/L		03/03/23 13:54	1
Perfluoropentanesulfonic acid	140	H M	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluoroheptanesulfonic acid	26	H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorononanesulfonic acid	2.0	H M	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorodecanesulfonic acid	0.96	U H M	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorooctanesulfonamide	4.3	H	1.9	1.3	0.67	ng/L		03/03/23 13:54	1
Perfluorobutanoic acid	57	H	4.8	3.8	1.9	ng/L		03/03/23 13:54	1
Perfluoropentanoic acid	140	H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluoroundecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
Perfluorododecanoic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1
6:2 Fluorotelomer sulfonic acid	3.6	H	2.9	1.9	0.96	ng/L		03/03/23 13:54	1
8:2 Fluorotelomer sulfonic acid	5.9	H	2.9	1.9	0.96	ng/L		03/03/23 13:54	1
4:2 Fluorotelomer sulfonic acid	0.96	U H	1.9	0.96	0.48	ng/L		03/03/23 13:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*80*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
M2-8:2 FTS	*111*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
M2-6:2 FTS	*105*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C5 PFHxA	*67*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C4 PFHpA	*75*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C8 PFOA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C9 PFNA	*87*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C6 PFDA	*98*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C7 PFUnA	*93*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C2-PFDoDA	*67*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C2 PFTeDA	*31*	*Q*	*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C3 PFBS	*91*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C3 PFHxS	*86*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C8 PFOS	*80*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
d3-NMeFOSAA	*88*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
d5-NEtFOSAA	*92*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C8 FOSA	*71*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*
13C4 PFBA	*82*		*50 - 150*	*03/01/23 08:26*	*03/03/23 13:54*	*1*

Client Sample ID: YTC-MRC-2-GW-020823

Lab Sample ID: 410-115153-5

Date Collected: 02/08/23 13:36
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFPeA	81		50 - 150	03/01/23 08:26	03/03/23 13:54	1

Client Sample ID: YTC-MMP-2-GW-020823

Lab Sample ID: 410-115153-6

Date Collected: 02/08/23 15:16
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	**230**		1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorononanoic acid	**6.6**		1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorodecanoic acid	**1.3**	**J**	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorotridecanoic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorotetradecanoic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorobutanesulfonic acid	**190**		1.7	0.85	0.43	ng/L		02/23/23 07:34	1
NEtFOSAA	0.85	U	2.6	0.85	0.43	ng/L		02/23/23 07:34	1
NMeFOSAA	1.0	U	1.7	1.0	0.51	ng/L		02/23/23 07:34	1
Perfluoropentanesulfonic acid	**210**		1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorononanesulfonic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorodecanesulfonic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorooctanesulfonamide	**11**		1.7	1.2	0.60	ng/L		02/23/23 07:34	1
Perfluorobutanoic acid	**110**		4.3	3.4	1.7	ng/L		02/23/23 07:34	1
Perfluoroundecanoic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
Perfluorododecanoic acid	0.85	U	1.7	0.85	0.43	ng/L		02/23/23 07:34	1
4:2 Fluorotelomer sulfonic acid	**0.74**	**J**	1.7	0.85	0.43	ng/L		02/23/23 07:34	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	66		50 - 150	02/20/23 07:09	02/23/23 07:34	1
M2-8:2 FTS	74		50 - 150	02/20/23 07:09	02/23/23 07:34	1
M2-6:2 FTS	58		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C5 PFHxA	62		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C4 PFHpA	45	Q	50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C8 PFOA	68		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C9 PFNA	53		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C6 PFDA	84		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C7 PFUnA	87		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C2-PFDoDA	72		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C2 PFTeDA	54		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C3 PFBS	69		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C3 PFHxS	44	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C8 PFOS	45	Q	50 - 150	02/20/23 07:09	02/23/23 07:34	1
d3-NMeFOSAA	103	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:34	1
d5-NEtFOSAA	92		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C8 FOSA	74		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C4 PFBA	65		50 - 150	02/20/23 07:09	02/23/23 07:34	1
13C5 PFPeA	62		50 - 150	02/20/23 07:09	02/23/23 07:34	1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**530**	**D**	17	8.5	4.3	ng/L		02/25/23 03:50	10
Perfluoroheptanoic acid	**180**	**D**	17	8.5	4.3	ng/L		02/25/23 03:50	10
Perfluorooctanesulfonic acid	**2300**	**D**	18	17	8.5	ng/L		02/25/23 03:50	10

Client Sample ID: YTC-MMP-2-GW-020823

Date Collected: 02/08/23 15:16
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-6

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanesulfonic acid	56	D	17	8.5	4.3	ng/L		02/25/23 03:50	10
Perfluoropentanoic acid	360	D	17	8.5	4.3	ng/L		02/25/23 03:50	10
6:2 Fluorotelomer sulfonic acid	630	D	26	17	8.5	ng/L		02/25/23 03:50	10
8:2 Fluorotelomer sulfonic acid	110	D	26	17	8.5	ng/L		02/25/23 03:50	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-8:2 FTS	*127*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
M2-6:2 FTS	*130*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
13C5 PFHxA	*137*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
13C4 PFHpA	*118*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
13C3 PFHxS	*128*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
13C8 PFOS	*115*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*
13C5 PFPeA	*143*		*50 - 150*	*02/20/23 07:09*	*02/25/23 03:50*	*10*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	1400	D	170	85	43	ng/L		02/25/23 04:01	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFHxS	*160*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 04:01*	*100*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	530	H J1	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluoroheptanoic acid	180	H J1 M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorooctanoic acid	190	H J1	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorononanoic acid	6.2	H M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorodecanoic acid	1.3	J H M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorotridecanoic acid	0.95	U H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorotetradecanoic acid	0.95	U H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorobutanesulfonic acid	170	H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorohexanesulfonic acid	860	H J1	J 1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorooctanesulfonic acid	1500	H J1	2.0	1.9	0.95	ng/L		03/03/23 14:05	1
NEtFOSAA	0.95	U H	2.9	0.95	0.48	ng/L		03/03/23 14:05	1
NMeFOSAA	1.1	U H	1.9	1.1	0.57	ng/L		03/03/23 14:05	1
Perfluoropentanesulfonic acid	180	H M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluoroheptanesulfonic acid	78	H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorononanesulfonic acid	0.62	J H M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorodecanesulfonic acid	0.95	U H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorooctanesulfonamide	11	H	1.9	1.3	0.67	ng/L		03/03/23 14:05	1
Perfluorobutanoic acid	110	H	4.8	3.8	1.9	ng/L		03/03/23 14:05	1
Perfluoropentanoic acid	380	H J1	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluoroundecanoic acid	0.95	U H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
Perfluorododecanoic acid	0.95	U H	1.9	0.95	0.48	ng/L		03/03/23 14:05	1
6:2 Fluorotelomer sulfonic acid	540	H J1	2.9	1.9	0.95	ng/L		03/03/23 14:05	1
8:2 Fluorotelomer sulfonic acid	100	H	2.9	1.9	0.95	ng/L		03/03/23 14:05	1
4:2 Fluorotelomer sulfonic acid	0.74	J H M	1.9	0.95	0.48	ng/L		03/03/23 14:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*86*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:05*	*1*
M2-8:2 FTS	*123*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:05*	*1*
M2-6:2 FTS	*82*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:05*	*1*

Client Sample ID: YTC-MMP-2-GW-020823

Lab Sample ID: 410-115153-6

Date Collected: 02/08/23 15:16
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFHxA	77		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C4 PFHpA	66		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C8 PFOA	97		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C9 PFNA	86		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C6 PFDA	114		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C7 PFUnA	126		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C2-PFDoDA	129		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C2 PFTeDA	122		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C3 PFBS	103		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C3 PFHxS	77		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C8 PFOS	77		50 - 150	03/01/23 08:26	03/03/23 14:05	1
d3-NMeFOSAA	125		50 - 150	03/01/23 08:26	03/03/23 14:05	1
d5-NEtFOSAA	120		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C8 FOSA	105		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C4 PFBA	99		50 - 150	03/01/23 08:26	03/03/23 14:05	1
13C5 PFPeA	81		50 - 150	03/01/23 08:26	03/03/23 14:05	1

Client Sample ID: YTC-MMP-1-GW-020823

Lab Sample ID: 410-115153-7

Date Collected: 02/08/23 16:36
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
~~Perfluorononanoic acid~~	~~30~~		1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorodecanoic acid	**4.6**	**M**	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorotridecanoic acid	0.85	U	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorotetradecanoic acid	0.85	U	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorobutanesulfonic acid	**120**		1.7	0.85	0.42	ng/L		02/23/23 07:45	1
NEtFOSAA	0.85	U	2.5	0.85	0.42	ng/L		02/23/23 07:45	1
NMeFOSAA	1.0	U	1.7	1.0	0.51	ng/L		02/23/23 07:45	1
Perfluoropentanesulfonic acid	**180**		1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorononanesulfonic acid	0.85	U	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorodecanesulfonic acid	**0.91**	~~J H M~~ MJ	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorooctanesulfonamide	**18**		1.7	1.2	0.59	ng/L		02/23/23 07:45	1
Perfluorobutanoic acid	**140**		4.2	3.4	1.7	ng/L		02/23/23 07:45	1
Perfluoroundecanoic acid	0.85	U	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
Perfluorododecanoic acid	0.85	U	1.7	0.85	0.42	ng/L		02/23/23 07:45	1
4:2 Fluorotelomer sulfonic acid	**2.4**		1.7	0.85	0.42	ng/L		02/23/23 07:45	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	79		50 - 150	02/20/23 07:09	02/23/23 07:45	1
M2-8:2 FTS	76		50 - 150	02/20/23 07:09	02/23/23 07:45	1
M2-6:2 FTS	52		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C5 PFHxA	65		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C4 PFHpA	40	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C8 PFOA	56		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C9 PFNA	38	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C6 PFDA	86		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C7 PFUnA	100		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C2-PFDoDA	94		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C2 PFTeDA	86		50 - 150	02/20/23 07:09	02/23/23 07:45	1

Client Sample ID: YTC-MMP-1-GW-020823

Date Collected: 02/08/23 16:36
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-7

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 PFBS	71		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C3 PFHxS	38	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C8 PFOS	30	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:45	1
d3-NMeFOSAA	120	Q cn	50 - 150	02/20/23 07:09	02/23/23 07:45	1
d5-NEtFOSAA	113		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C8 FOSA	86		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C4 PFBA	65		50 - 150	02/20/23 07:09	02/23/23 07:45	1
13C5 PFPeA	60		50 - 150	02/20/23 07:09	02/23/23 07:45	1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	520	D	17	8.5	4.2	ng/L		02/25/23 04:12	10
Perfluoroheptanoic acid	360	D	17	8.5	4.2	ng/L		02/25/23 04:12	10
Perfluorooctanoic acid	340	D	17	8.5	4.2	ng/L		02/25/23 04:12	10
Perfluoroheptanesulfonic acid	120	D	17	8.5	4.2	ng/L		02/25/23 04:12	10
Perfluoropentanoic acid	450	D	17	8.5	4.2	ng/L		02/25/23 04:12	10
6:2 Fluorotelomer sulfonic acid	1300	J1 D J	25	17	8.5	ng/L		02/25/23 04:12	10
8:2 Fluorotelomer sulfonic acid	300	D	25	17	8.5	ng/L		02/25/23 04:12	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-8:2 FTS	149		50 - 150	02/20/23 07:09	02/25/23 04:12	10
M2-6:2 FTS	124		50 - 150	02/20/23 07:09	02/25/23 04:12	10
13C5 PFHxA	146		50 - 150	02/20/23 07:09	02/25/23 04:12	10
13C4 PFHpA	106	cn	50 - 150	02/20/23 07:09	02/25/23 04:12	10
13C8 PFOA	136		50 - 150	02/20/23 07:09	02/25/23 04:12	10
13C3 PFHxS	117	cn	50 - 150	02/20/23 07:09	02/25/23 04:12	10
13C5 PFPeA	141		50 - 150	02/20/23 07:09	02/25/23 04:12	10

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	2000	D	170	85	42	ng/L		02/25/23 04:23	100
Perfluorooctanesulfonic acid	5600	D	180	170	85	ng/L		02/25/23 04:23	100

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 PFHxS	151	Q cn	50 - 150	02/20/23 07:09	02/25/23 04:23	100
13C8 PFOS	168	Q cn	50 - 150	02/20/23 07:09	02/25/23 04:23	100

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	580	H J1	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluoroheptanoic acid	320	H J1 M	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorooctanoic acid	320	H J1	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorononanoic acid	29	H M	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorodecanoic acid	4.7	H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorotridecanoic acid	0.95	U H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorotetradecanoic acid	0.95	U H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorobutanesulfonic acid	110	H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorohexanesulfonic acid	1100	H J1	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorooctanesulfonic acid	2700	H J1	2.0	1.9	0.95	ng/L		03/03/23 14:16	1
NEtFOSAA	0.95	U H	2.8	0.95	0.47	ng/L		03/03/23 14:16	1
NMeFOSAA	1.1	U H	1.9	1.1	0.57	ng/L		03/03/23 14:16	1
Perfluoropentanesulfonic acid	160	H M	1.9	0.95	0.47	ng/L		03/03/23 14:16	1

Client Sample ID: YTC-MMP-1-GW-020823

Lab Sample ID: 410-115153-7

Date Collected: 02/08/23 16:36
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanesulfonic acid	150	H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorononanesulfonic acid	2.0	H M	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorodecanesulfonic acid	0.80	J H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorooctanesulfonamide	17	H	1.9	1.3	0.66	ng/L		03/03/23 14:16	1
Perfluorobutanoic acid	130	H	4.7	3.8	1.9	ng/L		03/03/23 14:16	1
Perfluoropentanoic acid	460	H J1	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluoroundecanoic acid	0.95	U H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
Perfluorododecanoic acid	0.95	U H	1.9	0.95	0.47	ng/L		03/03/23 14:16	1
6:2 Fluorotelomer sulfonic acid	990	H J1	2.8	1.9	0.95	ng/L		03/03/23 14:16	1
8:2 Fluorotelomer sulfonic acid	300	H J1	2.8	1.9	0.95	ng/L		03/03/23 14:16	1
4:2 Fluorotelomer sulfonic acid	2.5	H M	1.9	0.95	0.47	ng/L		03/03/23 14:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*86*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
M2-8:2 FTS	*109*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
M2-6:2 FTS	*66*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C5 PFHxA	*74*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C4 PFHpA	*57*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C8 PFOA	*81*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C9 PFNA	*63*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C6 PFDA	*104*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C7 PFUnA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C2-PFDoDA	*115*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C2 PFTeDA	*107*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C3 PFBS	*101*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C3 PFHxS	*64*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C8 PFOS	*53*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
d3-NMeFOSAA	*109*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C8 FOSA	*105*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C4 PFBA	*98*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*
13C5 PFPeA	*78*		*50 - 150*	*03/01/23 08:26*	*03/03/23 14:16*	*1*

Client Sample ID: YTC-EB-3-020823

Lab Sample ID: 410-115153-8

Date Collected: 02/08/23 17:15
Matrix: Water
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluoroheptanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorooctanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorononanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorodecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorotridecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorotetradecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorobutanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorohexanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorooctanesulfonic acid	2.7		1.8	1.7	0.84	ng/L		02/23/23 07:56	1
NEtFOSAA	0.84	U	2.5	0.84	0.42	ng/L		02/23/23 07:56	1
NMeFOSAA	1.0	U	1.7	1.0	0.51	ng/L		02/23/23 07:56	1

Client Sample ID: YTC-EB-3-020823 — Lab Sample ID: 410-115153-8

Date Collected: 02/08/23 17:15 **Matrix: Water**
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoropentanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluoroheptanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorononanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorodecanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorooctanesulfonamide	1.2	U	1.7	1.2	0.59	ng/L		02/23/23 07:56	1
Perfluorobutanoic acid	3.4	U	4.2	3.4	1.7	ng/L		02/23/23 07:56	1
Perfluoropentanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluoroundecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
Perfluorododecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1
6:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.84	ng/L		02/23/23 07:56	1
8:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.84	ng/L		02/23/23 07:56	1
4:2 Fluorotelomer sulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/23/23 07:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*86*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
M2-8:2 FTS	*87*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
M2-6:2 FTS	*91*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C5 PFHxA	*110*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C4 PFHpA	*97*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C8 PFOA	*109*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C9 PFNA	*99*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C6 PFDA	*100*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C7 PFUnA	*104*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C2-PFDoDA	*101*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C2 PFTeDA	*86*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C3 PFBS	*98*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C3 PFHxS	*95*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C8 PFOS	*98*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
d3-NMeFOSAA	*122*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
d5-NEtFOSAA	*118*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C8 FOSA	*92*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C4 PFBA	*102*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*
13C5 PFPeA	*99*		*50 - 150*	*02/20/23 07:09*	*02/23/23 07:56*	*1*

Client Sample ID: YTC-FB-3-020823 — Lab Sample ID: 410-115153-9

Date Collected: 02/08/23 17:20 **Matrix: Water**
Date Received: 02/10/23 09:54

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluoroheptanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorooctanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorononanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorodecanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorotridecanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorotetradecanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorobutanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorohexanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorooctanesulfonic acid	1.9	U	2.0	1.9	0.93	ng/L		03/04/23 02:21	1
NEtFOSAA	0.93	U	2.8	0.93	0.46	ng/L		03/04/23 02:21	1

Client Sample ID: YTC-FB-3-020823

Date Collected: 02/08/23 17:20
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-9

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
NMeFOSAA	1.1	U	1.9	1.1	0.56	ng/L		03/04/23 02:21	1
Perfluoropentanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluoroheptanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorononanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorodecanesulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorooctanesulfonamide	1.3	U	1.9	1.3	0.65	ng/L		03/04/23 02:21	1
Perfluorobutanoic acid	3.7	U	4.6	3.7	1.9	ng/L		03/04/23 02:21	1
Perfluoropentanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluoroundecanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
Perfluorododecanoic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1
6:2 Fluorotelomer sulfonic acid	1.9	U	2.8	1.9	0.93	ng/L		03/04/23 02:21	1
8:2 Fluorotelomer sulfonic acid	1.9	U	2.8	1.9	0.93	ng/L		03/04/23 02:21	1
4:2 Fluorotelomer sulfonic acid	0.93	U	1.9	0.93	0.46	ng/L		03/04/23 02:21	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*144*	*Q*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
M2-8:2 FTS	*121*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
M2-6:2 FTS	*139*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C5 PFHxA	*147*	*Q cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C4 PFHpA	*136*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C8 PFOA	*143*	*cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C9 PFNA	*142*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C6 PFDA	*123*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C7 PFUnA	*130*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C2-PFDoDA	*134*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C2 PFTeDA	*118*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C3 PFBS	*148*	*Q cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C3 PFHxS	*145*	*cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C8 PFOS	*138*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
d3-NMeFOSAA	*124*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
d5-NEtFOSAA	*130*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C8 FOSA	*109*		*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C4 PFBA	*142*	*Q cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*
13C5 PFPeA	*145*	*Q cn*	*50 - 150*	*02/20/23 08:57*	*03/04/23 02:21*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluoroheptanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorooctanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorononanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorodecanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorotridecanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorotetradecanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorobutanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorohexanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorooctanesulfonic acid	1.9	U H	2.0	1.9	0.93	ng/L		03/09/23 09:37	1
NEtFOSAA	0.93	U H	2.8	0.93	0.47	ng/L		03/09/23 09:37	1
NMeFOSAA	1.1	U H	1.9	1.1	0.56	ng/L		03/09/23 09:37	1
Perfluoropentanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1

Client Sample ID: YTC-FB-3-020823

Date Collected: 02/08/23 17:20
Date Received: 02/10/23 09:54

Lab Sample ID: 410-115153-9

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorononanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorodecanesulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorooctanesulfonamide	1.3	U H	1.9	1.3	0.65	ng/L		03/09/23 09:37	1
Perfluorobutanoic acid	3.7	U H	4.7	3.7	1.9	ng/L		03/09/23 09:37	1
Perfluoropentanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluoroundecanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
Perfluorododecanoic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1
6:2 Fluorotelomer sulfonic acid	1.9	U H	2.8	1.9	0.93	ng/L		03/09/23 09:37	1
8:2 Fluorotelomer sulfonic acid	1.9	U H	2.8	1.9	0.93	ng/L		03/09/23 09:37	1
4:2 Fluorotelomer sulfonic acid	0.93	U H	1.9	0.93	0.47	ng/L		03/09/23 09:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*159*	*Q*	*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
M2-8:2 FTS	*148*	*Q*	*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
M2-6:2 FTS	*163*	*Q*	*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C5 PFHxA	*145*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C4 PFHpA	*133*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C8 PFOA	*140*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C9 PFNA	*130*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C6 PFDA	*135*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C7 PFUnA	*140*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C2-PFDoDA	*127*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C2 PFTeDA	*130*	*Q*	*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C3 PFBS	*130*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C3 PFHxS	*139*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C8 PFOS	*128*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
d3-NMeFOSAA	*129*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
d5-NEtFOSAA	*128*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C8 FOSA	*125*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C4 PFBA	*131*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*
13C5 PFPeA	*126*		*50 - 150*	*03/07/23 08:36*	*03/09/23 09:37*	*1*

Yakima Training Center PFAS RI

DATA REVIEW

Yakima, Washington

Per- and Polyfluoroalkyl Substances (PFAS) Analysis

SDG #410-115009-1

Analyses Performed By:
Eurofins Lancaster Laboratories Environmental
Lancaster, Pennsylvania

Report #48943R
Review Level: Stage 2b/4
Project: 30124009.04

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # 410-115009-1 for samples collected in association with the Yakima Training Center (YTC) site. The review was conducted as 100 percent Stage 2B and 10% Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					PFAS
YTC-MTS-3-GW-020623	410-115009-1	Water	02/06/2023		X
YTC-TVR-6-GW-020623	410-115009-2	Water	02/06/2023		X
YTC-FB-1-020623	410-115009-3	Water	02/06/2023		X
YTC-EB-1-020623	410-115009-4	Water	02/06/2023		X
YTC-SOURCE-1-020723	410-115009-5	Water	02/07/2023		X
YTC-TVR-3-GW-020723	410-115009-6	Water	02/07/2023		X
YTC-FB-2-020723	410-115009-7	Water	02/07/2023		X
YTC-EB-2-020723	410-115009-8	Water	02/07/2023		X
YTC-SW-08-020723	410-115009-9	Water	02/07/2023		X
YTC-SED-01-020723	410-115009-10	Soil	02/07/2023		X
YTC-SED-02-020723	410-115009-11	Soil	02/07/2023		X
YTC-SED-03-020723	410-115009-12	Soil	02/07/2023		X
YTC-SED-04-020723	410-115009-13	Soil	02/07/2023		X
YTC-FD-01-SED-020723	410-115009-14	Soil	02/07/2023	YTC-SED-04-020723	X
YTC-SW-04-020723	410-115009-15	Water	02/07/2023		X
YTC-FD-01-SW-020723	410-115009-16	Water	02/07/2023	YTC-SW-04-020723	X
YTC-SED-05-020723	410-115009-17	Soil	02/07/2023		X
YTC-SED-06-020723	410-115009-18	Soil	02/07/2023		X
YTC-SED-07-020723	410-115009-19	Soil	02/07/2023		X
YTC-SED-08-020723	410-115009-20	Soil	02/07/2023		X

Notes:

1. Stage 4 validation was performed on sample location YTC-SW-04-020723.
2. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample locations YTC-TVR-3-GW-020723, YTC-SW-08-020723, and YTC-SED-03-020723.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to Department of Defense/Department of Energy Consolidated Quality Systems Manual for Environmental Laboratories (QSM) conducted using Liquid Chromatography Tandem Mass Spectrometry compliant with Table B-15 of QSM 5.4. Data were reviewed in accordance with Eurofins Lancaster Laboratories Environmental (ELLE) SOP T-PFAS-WI36458 Polyfluorinated Alkyl Substances (PFAS) in Aqueous Samples by Method 537 Revision 1.1 Modified QSM 5.4 Table B-15 Using /LC/MS/MS, Version 3 (2022), SOP T-PFAS-WI36459 Polyfluorinated Alkyl Substances (PFASs) in Solids by Method 537 Version 1.1 Modified QSM 5.4 Table B-15 Using LC/MS/MS, Version 2 (2022), Department of Defense (DoD) Quality Systems Manual (QSM) 5.4, DoD General Data Validation Guidelines, November 2019, DoD Final Data Validation Guidelines Module 3: PFAS, May 2020, and Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, October 2019 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified, and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Per DoD General Data Validation Guidelines November 2019 Revision 1 Section 4.8 states; “The following provides a brief explanation of the DoD data validation qualifiers assigned to results during the data review process by a data validator. The reviewer should use these qualifiers, as applicable, unless other data qualifiers are specified in a project related document, such as a QAPP. If other qualifiers are used, a complete explanation of those qualifiers should accompany the data validation report.” Below are the qualifier codes that may be applied in this validation report:

- Concentration (C) Qualifiers
  - U The analyte was not detected and was reported as less than the LOD. The LOD has been adjusted for any dilution or concentration of the sample.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The reported result was an estimated value with an unknown bias.
  - J+ The result was an estimated quantity, but the result may be biased high.
  - J- The result was an estimated quantity, but the result may be biased low.
  - UJ The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.

X The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

A fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
DoD QSM 5.4 Table B-15	Water	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Soil	28 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

The holding time has been changed from the original holding time documented in EPA 537 of 14 days for extraction to 28 days. This was documented in EPA Technical Brief EPA/600/F-17/022h Updated January 2020. Utilizing the new guidance of 28 days all samples were analyzed within the specified holding time criteria.

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Mass Calibration

Mass calibration and system performance were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration, $r^2 \geq 0.99$. Analytes must be within 70-130% recovery of their true value for each calibration standard. The initial calibration verification (ICV) standard recoveries must be within 70-130% recovery of their true value.

The initial calibration, calibration standards and ICV recoveries were within acceptable limits.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration verification (CCV) standards must exhibit a percent recovery (%R) within 70% to 130%.

All compounds associated with the CCVs were within the specified control limits.

4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

All compounds associated with ISC recoveries were within control limits.

4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.4 Table B-15.

The ion transitions were as specified in DoD QSM 5.4.

5. Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within 50% to 150% of ICAL midpoint standard area or area measured in the initial CCV on days when ICAL not performed.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compounds	EIS %R	RE EIS %R
YTC-TVR-6-GW-020623	M2-4:2 FTS	4:2 FTS	>150%	**AC**
	M2-6:2 FTS	6:2 FTS	> 150%	**AC**
	13C8-FOSA	Perfluorooctanesulfonamide	**< 50 but >20%**	< 50 but >20%
YTC-SOURCE-1-020723	M2-4:2 FTS	4:2 FTS	>150%	**AC**
YTC-TVR-3-GW-020723	13C3 PFHxS	Perfluorohexanesulfonic acid (PFHxS)	>150% (DL)	**AC**
	13C8 PFOS	Perfluorooctanesulfonic acid (PFOS)	>150% (DL)	**AC**
YTC-SW-08-020723	M2-4:2 FTS	4:2 FTS	**>150%**	Not Analyzed
	13C2-PFDoDA	Perfluorododecanoic acid (PFDoDA)	**< 20%**	
		Perfluorotridecanoic acid (PFTrDA)		
	13C2 PFTeDA	Perfluorotetradecanoic acid (PFTeDA)	**< 20%**	
YTC-SW-04-020723	13C8-FOSA	Perfluorooctanesulfonamide	**< 50 but >20%**	< 50 but >20%
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 50 but >20%	**AC**
YTC-FD-01-SW-020723	13C9 PFNA	Perfluorononanoic acid (PFNA)	< 50 but >20%	**AC**

Sample Locations	EIS	Associated Compounds	EIS %R	RE EIS %R
	13C8-FOSA	Perfluorooctanesulfonamide	**< 50 but >20%**	< 50 but >20%
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 50 but >20%	**AC**

Notes:
AC Acceptable
DL Dilution

Where a re-extracted analysis was performed, results are reported from the analysis in bold above.

The analytical report lists the EIS recoveries based on true value. Form VIII was reviewed for area counts between the sample location and the initial CCV for EIS recovery exceedances. The recoveries reported on the analytical result pages can be slightly different when calculated using area.

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	J-
< 50% but > 20%	Non-detect	UJ
	Detect	J+
< 20%	Non-detect	UX
	Detect	X

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the DoD QSM 5.4 acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be ≤ 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD analysis was performed on sample locations YTC-TVR-3-GW-020723, YTC-SW-08-020723, and YTC-SED-03-020723.

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Location	Compounds	MS Recovery	MSD Recovery
YTC-TVR-3-GW-020723	Perfluorohexanesulfonic acid	SR>4X	SR>4X
	Perfluorooctanesulfonic acid	SR>4X	SR>4X
	Perfluoroheptanesulfonic acid	>UL	AC

Sample Location	Compounds	MS Recovery	MSD Recovery

Notes:
AC Acceptable
UL Upper control limit
SR>4X Sample result greater than 4 times added spike

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J+
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J-
< 10%	Non-detect	UX
	Detect	J-
SR>4X: Parent sample concentration > four times the MS/MSD spiking solution concentration.	Detect	No Action
	Non-detect	

7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the DoD QSM 5.4 acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. For sample results greater than five times the LOQ, control limits of 30% for water matrices and 50% for soils are applied to the RPD between the parent sample and the field duplicate sample results. For sample results less than five times the LOQ, a control limit of two times the LOQ is applied for water matrices and a control limit of three times the LOQ is applied for soil matrices. The table below presents analytical results for each parent/duplicate sample pair, either an RPD value or an absolute difference value (as applicable), the applicable control limit (as either a percentage or a multiplier of the LOQ), and determination of whether the parent/duplicate sample results differences meet the applicable control limits.

Sample ID / Duplicate ID	Compounds	Sample Result	Duplicate Result	RPD/ Absolute Difference	LOQ CL/ RPD CL	AC/ NC
YTC-SED-04-020723 / YTC-FD-01-SED-020723	Perfluorohexanoic acid	0.26 J	0.47 J	0.21	2.31	AC
	Perfluorooctanoic acid	0.77 U	0.25 J	0.25	2.31	AC
	Perfluorodecanoic acid	0.77 U	0.25 J	0.25	2.31	AC

Sample ID / Duplicate ID	Compounds	Sample Result	Duplicate Result	RPD/ Absolute Difference	LOQ CL/ RPD CL	AC/ NC
	Perfluorohexanesulfonic acid	0.37 J	0.68	0.31	2.31	AC
	Perfluorooctanesulfonic acid	5.2	9.4	57.5%	50%	NC
	Perfluoropentanoic acid	0.59 J	1.1	0.51	2.31	AC
	Perfluorododecanoic acid	0.77 U	0.39 J	0.39	2.31	AC
YTC-SW-04-020723 / YTC-FD-01-SW-020723	Perfluorohexanoic acid	160	170	6.1%	30%	AC
	Perfluoroheptanoic acid	59	59	0.0%	30%	AC
	Perfluorooctanoic acid	78	83	6.2%	30%	AC
	Perfluorononanoic acid	12	12	0.0%	30%	AC
	Perfluorodecanoic acid	11	11	0.0%	30%	AC
	Perfluorobutanesulfonic acid	26	29	10.9%	30%	AC
	Perfluoropentanesulfonic acid	39	41	5%	30%	AC
	Perfluoroheptanesulfonic acid	41	43	4.8%	30%	AC
	Perfluorononanesulfonic acid	3.8	3.4	0.4	3.6	AC
	Perfluorodecanesulfonic acid	2.5	2.4	0.1	3.6	AC
	Perfluorooctanesulfonamide	11	12	8.7%	30%	AC
	Perfluorobutanoic acid	22	21	4.7%	30%	AC
	Perfluoropentanoic acid	79	78	1.3%	30%	AC
	Perfluoroundecanoic acid	2.3	2.4	0.1	3.6	AC
	Perfluorododecanoic acid	1.9	1.9	0.0	3.6	AC
	4:2 FTS	0.60 J	0.61 J	0.01	3.6	AC
	Perfluorohexanesulfonic acid	360	360	0.0%	30%	AC
	Perfluorooctanesulfonic acid	2900	2900	0.0%	30%	AC
	6:2 FTS	180	200	10.5%	30%	AC
	8:2 FTS	81	80	1	54	AC

Notes:
AC Acceptable
NC Not compliant
CL Control limit

The compound perfluorooctanesulfonic acid associated with sample locations YTC-SED-04-020723 and YTC-FD-01-SED-020723 exhibited a field duplicate RPD greater than the control limit. The associated sample results from sample locations for the listed analyte were qualified as estimated.

9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

Sample locations associated with ion ratios outside of the control limits of 50% to 150% recovery (%R) are presented in the following table.

Sample Location	Compounds	Ion Ratio %R
YTC-TVR-3-GW-020723	Perfluorodecanesulfonic acid	399.2%
YTC-SW-04-020723	Perfluorododecanoic acid	162.7%

In the case of an ion ratio deviation, the sample results are qualified as documented in the table below.

Control limit	Sample Result	Qualification
< 50% or > 150% R	Detect	J

Note a number of results were manually integrated which were spot checked. The manual quantitation (M) laboratory qualifier has been preserved with the data as informational data for the end user; there was no impact on the data usability. The manual quantitation (M) laboratory qualifier associated with data reported as non-detect have been removed.

Sample results associated with compounds that exhibited a concentration greater than the linear range of the instrument calibration are summarized in the following table.

Sample ID	Compounds	Original Analysis	Diluted Analysis	Reported Analysis
YTC-SW-04-020723	Perfluorohexanesulfonic acid	--	360	360 D
	Perfluorooctanesulfonic acid	--	2900	2900 D
	6:2 FTS	--	180	180 D
	8:2 FTS	--	360	360 D
YTC-FD-01-SW-020723	Perfluorohexanesulfonic acid	--	360	360 D
	Perfluorooctanesulfonic acid	--	2900	2900 D
	6:2 FTS	--	200	200 D
	8:2 FTS	--	80	80 D

Note: The laboratory did not report the original analysis, only the diluted result.

Sample results associated with compounds exhibiting concentrations greater than the linear range are qualified as documented in the table below when reported as the final reported sample result.

Reported Sample Results	Qualification
Diluted sample result within calibration range.	D

10. System Performance and Overall Assessment

The case narrative OR sample preparation log indicated that the sample YTC-SW-08-020723 required centrifugation prior to extraction, due to excessive solids present in the sample. Centrifugation was performed following the PFAS Aqueous Centrifuge Protocol; sample was spiked with Surrogate (SUR; Extracted Internal Standard/EIS) and shaken vigorously before being poured into a conical bottle and centrifuged. The centrifuged aqueous sample was decanted back into the original sample bottle, off of the condensed solids remaining in the centrifuge bottle. Original sample bottle was rinsed as normal and centrifuge bottle was rinsed with 4mL of methanol each. Centrifuge bottle rinsate was added to the elution. Samples concentrated to <10mL and reconstituted to 10mL using methanol by transfer pipet. Hence, the target compounds were not qualified for the sample preparation modification.

Some of the compound results were qualified ‘cn’ which is defined as Refer to the Case Narrative for further detail. The case narrative was reviewed, and associated data qualified if appropriate. The case narrative noted the EIS and MS/MSD recoveries outside control limits as listed in Section 5 and 6, and the data was qualified. The “cn” qualifier has been removed from the database.

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAS

PFAS: DoD QSM 5.4	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
Stage 2B Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate (MSD) %R		X	X		
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)		X	X		
Extracted Internal Standard %R		X	X		
Dilution Factor		X		X	
Moisture Content		X		X	
Stage 3/4 Validation					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Rs		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Ion Ratio %R		X	X		

PFAS: DoD QSM 5.4	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)					
E. Transcription/calculations acceptable		X		X	
F. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

VALIDATION PERFORMED BY: Pruthvi Kumar C, Arcadis

SIGNATURE: 

DATE: March 16, 2023

PEER REVIEW: Dennis Capria, Arcadis

DATE: March 28, 2023

Stage 3 / 4
PFAS Calibration Standards %D

SDG #: 410-115009-1
Lab: Eurofins Lancaster
Project: Yakima Training Center PFAS RI

Date: 03/16/2023
Page: 1
Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

PFHxA 02/18/2023 Calibration Instrument: 30728 Page 2246-2259

Cal Conc ng/ml	Std Area	EIS Area	EIS Conc	Area Ratio	Calculated RF	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
0.2	51463	2837033	10	0.01814	0.9069863	0.8496	0.213509	0.2	6.755	6.8	MATCH
0.5	116600	2968613	10	0.039278	0.785552	0.8496	0.462307	0.5	-7.539	-7.5	MATCH
2	496309	2804367	10	0.176977	0.884886	0.8496	2.083065	2	4.153	4.1	MATCH
8	1623652	2525900	10	0.642801	0.8035017	0.8496	7.56593	8	-5.426	-5.4	MATCH
20	3884118	2312864	10	1.679354	0.8396771	0.8496	19.76641	20	-1.168	-1.2	MATCH
50	7991388	1912448	10	4.178617	0.8357234	0.8496	49.18335	50	-1.633	-1.6	MATCH
100	15244340	1710753	10	8.910895	0.8910895	0.8496	104.8834	100	4.883	4.9	MATCH
				Avg RF	0.8496309	MATCH					

Concentration ng/ml = (Peak area ratio/Avg RF) x EIS concentration

Stage 3 / 4
PFAS ICV CCV Standards %D

SDG #: 410-115009-1 Date: 03/16/2023
Lab: Eurofins Lancaster Page: 2
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.3

Instrument: 30728 File ID: 23FEB18DCAL-09.d
ICV 410-345861/9 02/18/2023 13:09 Page 3113 of SDG 410-115009-1

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFHpA	656668	2988309	10.00	0.219746	1.0328	2.1277	2.00	6.383	6.4	Match
PFHxS	394929	1794566	9.46	0.220069	1.0806	1.9266	1.82	5.856	5.6	Match
PFHxA	462552	2690653	10.00	0.171911	0.8496	2.0234	2.00	1.172	1.2	Match

Instrument: 30728 File ID: 23FEB20-06.d
CCVIS 410-346104/1 02/20/2023 11:57 Page 3188 of SDG 410-115009-1
This CCVIS is applicable for the sample YTC-SW-04-020723 (410-115009-15)

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFHpA	154303	2850612	10.00	0.05413	1.0328	0.5241	0.500	4.821	4.8	Match
PFHxS	80095	1597893	9.46	0.050125	1.0806	0.4388	0.456	-3.768	-3.8	Match
PFHxA	111827	2523882	10.00	0.044308	0.8496	0.5215	0.500	4.302	4.3	Match

Instrument: 30728 File ID: 23FEB20-111.d
CCV 410-346104/106 02/21/2023 07:21 Page 3224 of SDG 410-115009-1
This CCVIS is applicable for the sample YTC-SW-04-020723 (410-115009-15)

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calc Amount	Tvalue	Calculated % D	Reported % D	
PFHpA	156670	2900999	10.00	0.054006	1.0328	0.5229	0.500	4.581	4.6	Match
PFHxS	82581	1655326	9.46	0.049888	1.0806	0.4367	0.456	-4.224	-4.2	Match
PFHxA	107160	2578091	10.00	0.041566	0.8496	0.4892	0.500	-2.152	-2.2	Match

Concentration ng/ml = (Peak area ratio/Avg RF) x EIS concentration

Stage 3 / 4
PFAS LCS

SDG #: 410-115009-1 Date: 03/16/2023
Lab: Eurofins Lancaster Page: 3
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

LCS ID 410-345843/3-A
ANALYTE Perfluorobutanesulfonic acid
REPORTED LCS %R 94
REPORTED LCSD %R NA
REPORTED RPD NA

$$\%R = \frac{100 * \text{LCS Concentration}}{\text{LCS TV}} \qquad RPD = \frac{100 * |\ \text{LCS \%R} - \text{LCSD \%R}\ |}{\text{Average of LCS LCSD \%R}}$$

LCS Concentration	21.3	LCS %R	93.8326	MATCH
LCSD Concentration	NA	LCSD %R	NA	MATCH
LCS TV	22.7	RPD	NA	MATCH
LCSD TV	NA			

Differences in %R may be due to rounding of the true value

This LCS is applicable for the sample YTC-SW-04-020723 (410-115009-15)

Stage 3 / 4
PFAS MS/MSD

SDG #: 410-115009-1 Date: 03/16/2023
Lab: Eurofins Lancaster Page: 4
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

MS/MSD Sample ID YTC-TVR-3-GW-020723 Page 1023 & 1033 of SDG 410-115009-1
ANALYTE Perfluorobutanoic acid
REPORTED MS %R 93
REPORTED MSD %R 92
REPORTED RPD 2

$$\%R = \frac{100 * \text{MS Concentration}}{\text{MS TV}} \qquad RPD = \frac{100 * |\text{MS \%R - MSD \%R}|}{\text{Average of MS MSD \%R}}$$

Sample Concentration	11			
MS Concentration	30.7	MS %R	93.36	MATCH
MSD Concentration	30.2	MSD %R	92.75	MATCH
MS TV	21.1	RPD	1.64	MATCH
MSD TV	20.7			

Differences in %R may be due to rounding of the true value

Stage 3 / 4
PFAS Sample Concentration

SDG #: 410-115009-1 Date: 03/16/2023
Lab: Eurofins Lancaster Page: 5
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.4

YTC-SW-04-020723 Lab ID: 410-115009-15 Page 1427 & 1469 of SDG 410-115009-1
Instrument: 30728 FV= 1ml

Analyte	Analyte Area	EIS Area	EIS Conc	Area Ratio	Avg RF	Calculated Amount ng/ml	Sample Volume mls	Calculated ng/L	Reported Value ng/L	
PFHpA	2900963	1706325	10.00	1.700123	1.0328	16.46	276.7	59.49	59	Match
PFHxS	7495857	662667	9.46	11.31165	1.0806	99.03	276.7	357.88	360	Match
PFHxA	6168712	1614089	10.00	3.821792	0.8496	44.98	276.7	162.57	160	Match

Concentration ng/ml = (Peak area ratio/Avg RF) x DF x EIS concentration
Concentration ng/L = concentration ng/ml / (sample volume/1000)

Stage 3 / 4
PFAS EIS

SDG #: 410-115009-1 Date: 03/16/2023
Lab: Eurofins Lancaster Page: 6
Project: Yakima Training Center PFAS RI Validated by: PK

Method: EPA modified 537 per DoD QSM 5.3

YTC-SW-04-020723 Lab ID: 410-115009-15
EIS 13C3 PFBS
REPORTED EIS %R 62

$$\%R = \frac{100 * \text{EIS Concentration}}{\text{EIS TV}}$$

EIS Concentration 5.75 Page 1429 of SDG 410-115009-1
EIS TV 9.3 Lab Reports EIS %R based on true value
%R 61.8 MATCH

$$\%R = \frac{100 * \text{EIS Area}}{\text{CCVIS EIS Area}}$$

EIS Area 1072177 Page 1147 and 1429 of SDG 410-115009-1
CCVIS EIS Area 1603759 Page 1147 and 3190 of SDG 410-115009-1
%R 66.9

DoD QSM 5.3 specifies EIS %R calculated from area compared to initial CCV.
Lab supplies area counts on Form VIII in Stage 4 data package.
Form VIII is reviewed for EIS %R exceedances.

CHAIN OF CUSTODY
SAMPLE ANALYSIS DATA SHEETS

410-115009 Chain of Custody

ivironme

Chain of Custody Record

eurofins | Environment Testing

	Sampler: A.Balson / B.Pollard	Lab PM: Martin, Elizabeth	Carrier Tracking No(s):	COC No: 410-80232-22040.1
Client Contact: Courtney Bigelow	Phone: 717.940.8808	E-Mail: Elizabeth.Martin@et.eurofinsus.com	State of Origin:	Page: ~~Page 1 of 5~~ Page 1 of 2
Company: Environmental Chemical Corp.	PWSID:	Analysis Requested		Job #:
Address: 1304 Governors Court Suites 101 & 102	Due Date Requested:			Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify); Other:
City: Abingdon	TAT Requested (days): 15 day TAT			
State, Zip: MD, 21009	Compliance Project: Δ Yes Δ No			
Phone: 410-671-2970(Tel)	PO #: PO Pending			
Email: cbigelow@ecc.net	WO #:			
Project Name: Yakima PFAS	Project #: 41013850			
Site: YTC - Baseline	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA_D5.3 - PFC_IDA_D5.3 (List of 24 Compounds)	Moisture - Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N		
YTC-MTS-3-GW-020623	2-6-23	1006	G	GW	N	N	2	-		*High PFAS Expected
YTC-TVR-6-GW-020623	2-6-23	1301	G	GW	N	N	2	-		*High PFAS Expected
YTC-FB-1-020623	2-6-23	1630	G	W	N	N	2	-		
YTC-EB-1-020623	2-6-23	1635	G	W	N	N	2	-		
YTC-SOURCE-1-020723	2-7-23	0835	G	W	N	N	2	-		*High PFAS Expected
YTC-TVR-3-GW-020723	2-7-23	1311	G	GW	N	Y	6	-		*High PFAS Expected ms/msd
YTC-FB-2-020723	2-7-23	1530	G	W	N	N	2	-		
YTC-EB-2-020723	2-7-23	1535	G	W	N	N	2	-		
YTC-SW-08-020723	2-7-23	1505	G	SW	N	Y	6	-		ms/msd

A. Balson 2/7/23

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by: A. Balson	Date/Time: ~~2/7/23 1720~~ AEB	Company: ECC	Received by: FedEx	Date/Time: ~~2/7/23 1720~~ AEB	Company: —		
Relinquished by:	Date/Time: 2/8/23 1600	Company:	Received by:	Date/Time: 2/8/23 1600	Company:		
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 2/9/23 10:25	Company: ECET		

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 5.4, 2.8

Ver: 06/08/2021

Eurofins Lancaster
2425 New Holland Pike
Lancaster, PA 17601
Phone: 717-656-2300 Fax

Chain of Custody Record

eurofins | Environment Testing

Client Information	Sampler: Audra Balson	Lab PM: Martin, Elizabeth	Carrier Tracking No(s):	COC No: 410-80232-22040.4
Client Contact: Courtney Bigelow	Phone: 717.940.8808	E-Mail: Elizabeth.Martin@et.eurofinsus.com	State of Origin:	Page: ~~Page 4 of 5~~ Pg 2 of 2
Company: Environmental Chemical Corp.	PWSID:	Analysis Requested		Job #:
Address: 1304 Governors Court Suites 101 & 102	Due Date Requested:			Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify); Other:
City: Abingdon	TAT Requested (days):			
State, Zip: MD, 21009	Compliance Project: Δ Yes Δ No			
Phone: 410-671-2970(Tel)	PO #: PO Pending			
Email: cbigelow@ecc.net	WO #:			
Project Name: Yakima PFAS	Project #: 41013850			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA_D5.3 - PFC_IDA_D5.3 (List of 24 Compounds)	Moisture - Percent Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N		
YTC-SED-01-020723	2-7-23	0905	G	S	N	N	1	1		
YTC-SED-02-020723	2-7-23	0940	G	S	N	N	1	1		
YTC-SED-03-020723	2-7-23	1000	G	S	N	Y	3	1		MS/MSD
YTC-SED-04-020723	2-7-23	1025	G	S	N	N	1	1		
YTC-FD-01-SED-020723	2-7-23	0000	G	S	N	N	1	1		
YTC-SW-04-020723	2-7-23	1020	G	SW	N	N	1	1		* High PFAS Expected
YTC-FD-01-SW-020723	2-7-23	0000	G	SW	N	N	1	1		
YTC-SED-05-020723	2-7-23	1055	G	S	N	N	1	1		* High PFAS Expected
YTC-SED-06-020723	2-7-23	1430	G	S	N	N	1	1		
YTC-SED-07-020723	2-7-23	1450	G	S	N	N	1	1		
YTC-SED-08-020723	2-7-23	1510	G	S	N	N	1	1		

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month): ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
			AES

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time	Company
1	[signature]	2/7/23 1720 AES	ECC	FedEx	2/7/23 1720	—
2		2/8/23 1600			2/8/23 1600	
3					2/9/23 10:25	ECC T

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 5.4, 2.8

Ver: 06/08/2021

Qualifiers

LCMS

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
cn	Refer to Case Narrative for further detail
D	The reported value is from a dilution.
H	Sample was prepped or analyzed beyond the specified holding time
I	Value is EMPC (estimated maximum possible concentration).
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M	Manual integrated compound.
Q	One or more quality control criteria failed.
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample ID: YTC-MTS-3-GW-020623

Date Collected: 02/06/23 10:06
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-1

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**1.5**	**J**	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluoroheptanoic acid	**0.50**	**J**	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorooctanoic acid	**1.3**	**J**	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorononanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorodecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorotridecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorotetradecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorobutanesulfonic acid	**2.5**		1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorohexanesulfonic acid	**14**		1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorooctanesulfonic acid	**3.4**		1.7	1.6	0.82	ng/L		02/21/23 06:48	1
NEtFOSAA	0.82	U	2.5	0.82	0.41	ng/L		02/21/23 06:48	1
NMeFOSAA	0.99	U	1.6	0.99	0.49	ng/L		02/21/23 06:48	1
Perfluoropentanesulfonic acid	**2.0**		1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluoroheptanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorononanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorodecanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorooctanesulfonamide	1.2	U	1.6	1.2	0.58	ng/L		02/21/23 06:48	1
Perfluorobutanoic acid	3.3	U	4.1	3.3	1.6	ng/L		02/21/23 06:48	1
Perfluoropentanoic acid	**0.99**	**J**	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluoroundecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
Perfluorododecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 06:48	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 06:48	1
4:2 Fluorotelomer sulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 06:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*115*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
M2-8:2 FTS	*100*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
M2-6:2 FTS	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C5 PFHxA	*114*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C4 PFHpA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C8 PFOA	*111*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C9 PFNA	*102*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C6 PFDA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C7 PFUnA	*107*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C2-PFDoDA	*101*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C2 PFTeDA	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C3 PFBS	*97*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C3 PFHxS	*94*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C8 PFOS	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
d3-NMeFOSAA	*115*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C8 FOSA	*94*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C4 PFBA	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*
13C5 PFPeA	*101*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:48*	*1*

Client Sample ID: YTC-TVR-6-GW-020623

Date Collected: 02/06/23 13:01
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-2

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**8.5**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluoroheptanoic acid	**3.2**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorooctanoic acid	**3.6**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorononanoic acid	**1.8**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorodecanoic acid	**2.8**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorotridecanoic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorotetradecanoic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorobutanesulfonic acid	**4.1**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorohexanesulfonic acid	**45**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorooctanesulfonic acid	**100**		1.8	1.7	0.83	ng/L		02/21/23 06:59	1
NEtFOSAA	0.83	U	2.5	0.83	0.42	ng/L		02/21/23 06:59	1
NMeFOSAA	1.0	U	1.7	1.0	0.50	ng/L		02/21/23 06:59	1
Perfluoropentanesulfonic acid	**7.2**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluoroheptanesulfonic acid	**1.4**	**J**	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorononanesulfonic acid	0.83	U M	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorodecanesulfonic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorooctanesulfonamide	1.2	U UJ	1.7	1.2	0.58	ng/L		02/21/23 06:59	1
Perfluorobutanoic acid	**4.0**	**J**	4.2	3.3	1.7	ng/L		02/21/23 06:59	1
Perfluoropentanoic acid	**7.0**		1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluoroundecanoic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
Perfluorododecanoic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1
6:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.83	ng/L		02/21/23 06:59	1
8:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.83	ng/L		02/21/23 06:59	1
4:2 Fluorotelomer sulfonic acid	0.83	U	1.7	0.83	0.42	ng/L		02/21/23 06:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*123*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
M2-8:2 FTS	*92*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
M2-6:2 FTS	*124*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C5 PFHxA	*102*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C4 PFHpA	*91*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C8 PFOA	*104*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C9 PFNA	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C6 PFDA	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C7 PFUnA	*95*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C2-PFDoDA	*90*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C2 PFTeDA	*62*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C3 PFBS	*85*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C3 PFHxS	*83*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C8 PFOS	*83*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
d3-NMeFOSAA	*97*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
d5-NEtFOSAA	*92*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C8 FOSA	*43*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C4 PFBA	*85*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*
13C5 PFPeA	*85*		*50 - 150*	*02/18/23 06:59*	*02/21/23 06:59*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**8.3**	**H M**	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluoroheptanoic acid	**2.8**	**H M**	1.7	0.86	0.43	ng/L		03/04/23 13:20	1

Client Sample ID: YTC-TVR-6-GW-020623

Lab Sample ID: 410-115009-2

Date Collected: 02/06/23 13:01
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	3.6	H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorononanoic acid	1.8	H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorodecanoic acid	2.8	H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorotridecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorotetradecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorobutanesulfonic acid	4.2	H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorohexanesulfonic acid	49	H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorooctanesulfonic acid	100	H	1.8	1.7	0.86	ng/L		03/04/23 13:20	1
NEtFOSAA	0.86	U H	2.6	0.86	0.43	ng/L		03/04/23 13:20	1
NMeFOSAA	1.0	U H	1.7	1.0	0.52	ng/L		03/04/23 13:20	1
Perfluoropentanesulfonic acid	6.4	H M	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluoroheptanesulfonic acid	1.5	J H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorononanesulfonic acid	0.86	U H M	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorodecanesulfonic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorooctanesulfonamide	1.2	U H	1.7	1.2	0.60	ng/L		03/04/23 13:20	1
Perfluorobutanoic acid	4.0	J H	4.3	3.5	1.7	ng/L		03/04/23 13:20	1
Perfluoropentanoic acid	6.9	H M	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluoroundecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
Perfluorododecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1
6:2 Fluorotelomer sulfonic acid	1.7	U H	2.6	1.7	0.86	ng/L		03/04/23 13:20	1
8:2 Fluorotelomer sulfonic acid	1.7	U H	2.6	1.7	0.86	ng/L		03/04/23 13:20	1
4:2 Fluorotelomer sulfonic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 13:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*121*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
M2-8:2 FTS	*62*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
M2-6:2 FTS	*120*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C5 PFHxA	*120*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C4 PFHpA	*111*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C8 PFOA	*108*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C9 PFNA	*81*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C6 PFDA	*38*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C7 PFUnA	*8*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C2-PFDoDA	*0.7*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C2 PFTeDA	*0.02*	*Q M*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C3 PFBS	*125*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C3 PFHxS	*123*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C8 PFOS	*83*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
d3-NMeFOSAA	*53*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
d5-NEtFOSAA	*47*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C8 FOSA	*40*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C4 PFBA	*129*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*
13C5 PFPeA	*115*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:20*	*1*

Client Sample ID: YTC-FB-1-020623

Lab Sample ID: 410-115009-3

Date Collected: 02/06/23 16:30
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1

Client Sample ID: YTC-FB-1-020623

Date Collected: 02/06/23 16:30
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-3

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorooctanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorononanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorodecanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorotridecanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorotetradecanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorobutanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorohexanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorooctanesulfonic acid	1.7	U	1.7	1.7	0.83	ng/L		02/14/23 14:15	1
NEtFOSAA	0.83	U	2.5	0.83	0.41	ng/L		02/14/23 14:15	1
NMeFOSAA	0.99	U	1.7	0.99	0.50	ng/L		02/14/23 14:15	1
Perfluoropentanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluoroheptanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorononanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorodecanesulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorooctanesulfonamide	1.2	U	1.7	1.2	0.58	ng/L		02/14/23 14:15	1
Perfluorobutanoic acid	3.3	U	4.1	3.3	1.7	ng/L		02/14/23 14:15	1
Perfluoropentanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluoroundecanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
Perfluorododecanoic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1
6:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.83	ng/L		02/14/23 14:15	1
8:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.83	ng/L		02/14/23 14:15	1
4:2 Fluorotelomer sulfonic acid	0.83	U	1.7	0.83	0.41	ng/L		02/14/23 14:15	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*124*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
M2-8:2 FTS	*122*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
M2-6:2 FTS	*113*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C5 PFHxA	*126*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C4 PFHpA	*117*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C8 PFOA	*128*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C9 PFNA	*112*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C6 PFDA	*110*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C7 PFUnA	*115*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C2-PFDoDA	*109*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C2 PFTeDA	*110*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C3 PFBS	*114*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C3 PFHxS	*115*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C8 PFOS	*113*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
d3-NMeFOSAA	*115*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
d5-NEtFOSAA	*121*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C8 FOSA	*106*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C4 PFBA	*118*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*
13C5 PFPeA	*116*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:15*	*1*

Client Sample ID: YTC-EB-1-020623

Date Collected: 02/06/23 16:35
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-4

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluoroheptanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorooctanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorononanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorodecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorotridecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorotetradecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorobutanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorohexanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorooctanesulfonic acid	1.7	U	1.8	1.7	0.84	ng/L		02/14/23 14:26	1
NEtFOSAA	0.84	U	2.5	0.84	0.42	ng/L		02/14/23 14:26	1
NMeFOSAA	1.0	U	1.7	1.0	0.51	ng/L		02/14/23 14:26	1
Perfluoropentanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluoroheptanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorononanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorodecanesulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorooctanesulfonamide	1.2	U	1.7	1.2	0.59	ng/L		02/14/23 14:26	1
Perfluorobutanoic acid	3.4	U	4.2	3.4	1.7	ng/L		02/14/23 14:26	1
Perfluoropentanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluoroundecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
Perfluorododecanoic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1
6:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.84	ng/L		02/14/23 14:26	1
8:2 Fluorotelomer sulfonic acid	1.7	U	2.5	1.7	0.84	ng/L		02/14/23 14:26	1
4:2 Fluorotelomer sulfonic acid	0.84	U	1.7	0.84	0.42	ng/L		02/14/23 14:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*145*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
M2-8:2 FTS	*148*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
M2-6:2 FTS	*122*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C5 PFHxA	*136*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C4 PFHpA	*123*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C8 PFOA	*131*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C9 PFNA	*115*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C6 PFDA	*116*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C7 PFUnA	*123*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C2-PFDoDA	*118*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C2 PFTeDA	*120*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C3 PFBS	*120*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C3 PFHxS	*126*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C8 PFOS	*118*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
d3-NMeFOSAA	*121*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
d5-NEtFOSAA	*131*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C8 FOSA	*112*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C4 PFBA	*123*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*
13C5 PFPeA	*121*		*50 - 150*	*02/13/23 18:19*	*02/14/23 14:26*	*1*

Client Sample ID: YTC-SOURCE-1-020723

Date Collected: 02/07/23 08:35
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-5

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluoroheptanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorooctanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorononanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorodecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorotridecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorotetradecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorobutanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorohexanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorooctanesulfonic acid	1.6	U	1.7	1.6	0.82	ng/L		02/21/23 07:10	1
NEtFOSAA	0.82	U	2.5	0.82	0.41	ng/L		02/21/23 07:10	1
NMeFOSAA	0.99	U	1.6	0.99	0.49	ng/L		02/21/23 07:10	1
Perfluoropentanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluoroheptanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorononanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorodecanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorooctanesulfonamide	1.2	U	1.6	1.2	0.58	ng/L		02/21/23 07:10	1
Perfluorobutanoic acid	3.3	U	4.1	3.3	1.6	ng/L		02/21/23 07:10	1
Perfluoropentanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluoroundecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
Perfluorododecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 07:10	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 07:10	1
4:2 Fluorotelomer sulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*122*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
M2-8:2 FTS	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
M2-6:2 FTS	*112*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C5 PFHxA	*120*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C4 PFHpA	*106*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C8 PFOA	*118*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C9 PFNA	*106*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C6 PFDA	*104*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C7 PFUnA	*111*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C2-PFDoDA	*101*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C2 PFTeDA	*91*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C3 PFBS	*100*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C3 PFHxS	*97*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C8 PFOS	*100*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
d3-NMeFOSAA	*125*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
d5-NEtFOSAA	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C8 FOSA	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C4 PFBA	*106*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*
13C5 PFPeA	*108*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:10*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluoroheptanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1

Client Sample ID: YTC-SOURCE-1-020723

Lab Sample ID: 410-115009-5

Date Collected: 02/07/23 08:35
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorononanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorodecanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorotridecanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorotetradecanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorobutanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorohexanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorooctanesulfonic acid	1.7	U H	1.8	1.7	0.85	ng/L		03/04/23 13:30	1
NEtFOSAA	0.85	U H	2.5	0.85	0.42	ng/L		03/04/23 13:30	1
NMeFOSAA	1.0	U H	1.7	1.0	0.51	ng/L		03/04/23 13:30	1
Perfluoropentanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluoroheptanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorononanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorodecanesulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorooctanesulfonamide	1.2	U H	1.7	1.2	0.59	ng/L		03/04/23 13:30	1
Perfluorobutanoic acid	3.4	U H	4.2	3.4	1.7	ng/L		03/04/23 13:30	1
Perfluoropentanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluoroundecanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
Perfluorododecanoic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1
6:2 Fluorotelomer sulfonic acid	1.7	U H	2.5	1.7	0.85	ng/L		03/04/23 13:30	1
8:2 Fluorotelomer sulfonic acid	1.7	U H	2.5	1.7	0.85	ng/L		03/04/23 13:30	1
4:2 Fluorotelomer sulfonic acid	0.85	U H	1.7	0.85	0.42	ng/L		03/04/23 13:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*118*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
M2-8:2 FTS	*119*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
M2-6:2 FTS	*125*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C5 PFHxA	*140*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C4 PFHpA	*118*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C8 PFOA	*126*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C9 PFNA	*122*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C6 PFDA	*111*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C7 PFUnA	*114*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C2-PFDoDA	*108*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C2 PFTeDA	*89*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C3 PFBS	*123*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C3 PFHxS	*130*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C8 PFOS	*115*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
d3-NMeFOSAA	*124*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
d5-NEtFOSAA	*122*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C8 FOSA	*100*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C4 PFBA	*129*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*
13C5 PFPeA	*127*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:30*	*1*

Client Sample ID: YTC-TVR-3-GW-020723

Lab Sample ID: 410-115009-6

Date Collected: 02/07/23 13:11
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**46**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1

Client Sample ID: YTC-TVR-3-GW-020723

Date Collected: 02/07/23 13:11
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-6

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroheptanoic acid	**8.8**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorooctanoic acid	**13**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorononanoic acid	**0.73**	**J**	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorodecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorotridecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorotetradecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorobutanesulfonic acid	**27**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1
NEtFOSAA	0.82	U	2.5	0.82	0.41	ng/L		02/21/23 07:32	1
NMeFOSAA	0.99	U	1.6	0.99	0.49	ng/L		02/21/23 07:32	1
Perfluoropentanesulfonic acid	**49**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluoroheptanesulfonic acid	**11**	~~J1~~ J+	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorononanesulfonic acid	**0.52**	**J M**	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorodecanesulfonic acid	**1.1**	~~J1~~ J	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorooctanesulfonamide	**0.80**	**J**	1.6	1.2	0.58	ng/L		02/21/23 07:32	1
Perfluorobutanoic acid	**11**		4.1	3.3	1.6	ng/L		02/21/23 07:32	1
Perfluoropentanoic acid	**21**		1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluoroundecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
Perfluorododecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 07:32	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 07:32	1
4:2 Fluorotelomer sulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 07:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*113*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
M2-8:2 FTS	*107*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
M2-6:2 FTS	*102*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C5 PFHxA	*103*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C4 PFHpA	*74*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C8 PFOA	*104*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C9 PFNA	*82*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C6 PFDA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C7 PFUnA	*108*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C2-PFDoDA	*104*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C2 PFTeDA	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C3 PFBS	*88*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C3 PFHxS	*73*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C8 PFOS	*75*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
d3-NMeFOSAA	*114*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
d5-NEtFOSAA	*115*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C8 FOSA	*91*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C4 PFBA	*77*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*
13C5 PFPeA	*88*		*50 - 150*	*02/18/23 06:59*	*02/21/23 07:32*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	**380**	**D**	16	8.2	4.1	ng/L		03/09/23 16:16	10
Perfluorooctanesulfonic acid	**410**	**D**	17	16	8.2	ng/L		03/09/23 16:16	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFHxS	*213*	*Q*	*50 - 150*	*02/18/23 06:59*	*03/09/23 16:16*	*10*
13C8 PFOS	*197*	*Q*	*50 - 150*	*02/18/23 06:59*	*03/09/23 16:16*	*10*

Client Sample ID: YTC-TVR-3-GW-020723

Date Collected: 02/07/23 13:11
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-6

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**44**	**H J1**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluoroheptanoic acid	**8.8**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorooctanoic acid	**12**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorononanoic acid	**0.73**	**J H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorodecanoic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorotridecanoic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorotetradecanoic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorobutanesulfonic acid	**28**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorohexanesulfonic acid	**310**	**J1 H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorooctanesulfonic acid	**370**	**J1 H**	1.7	1.6	0.82	ng/L		03/07/23 20:09	1
NEtFOSAA	0.82	U H	2.5	0.82	0.41	ng/L		03/07/23 20:09	1
NMeFOSAA	0.98	U H	1.6	0.98	0.49	ng/L		03/07/23 20:09	1
Perfluoropentanesulfonic acid	**51**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluoroheptanesulfonic acid	**9.6**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorononanesulfonic acid	**0.41**	**J H M**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorodecanesulfonic acid	0.82	U H M	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorooctanesulfonamide	**0.85**	**J H**	1.6	1.1	0.57	ng/L		03/07/23 20:09	1
Perfluorobutanoic acid	**11**	**H**	4.1	3.3	1.6	ng/L		03/07/23 20:09	1
Perfluoropentanoic acid	**20**	**H**	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluoroundecanoic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
Perfluorododecanoic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1
6:2 Fluorotelomer sulfonic acid	1.6	U H	2.5	1.6	0.82	ng/L		03/07/23 20:09	1
8:2 Fluorotelomer sulfonic acid	1.6	U H	2.5	1.6	0.82	ng/L		03/07/23 20:09	1
4:2 Fluorotelomer sulfonic acid	0.82	U H	1.6	0.82	0.41	ng/L		03/07/23 20:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*108*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
M2-8:2 FTS	*108*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
M2-6:2 FTS	*121*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C5 PFHxA	*105*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C4 PFHpA	*90*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C8 PFOA	*111*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C9 PFNA	*97*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C6 PFDA	*105*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C7 PFUnA	*108*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C2-PFDoDA	*91*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C2 PFTeDA	*64*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C3 PFBS	*99*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C3 PFHxS	*101*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C8 PFOS	*97*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
d3-NMeFOSAA	*88*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
d5-NEtFOSAA	*98*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C8 FOSA	*92*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C4 PFBA	*93*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*
13C5 PFPeA	*99*		*50 - 150*	*03/04/23 15:09*	*03/07/23 20:09*	*1*

Client Sample ID: YTC-FB-2-020723

Date Collected: 02/07/23 15:30
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-7

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluoroheptanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorooctanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorononanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorodecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorotridecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorotetradecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorobutanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorohexanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorooctanesulfonic acid	1.6	U	1.7	1.6	0.80	ng/L		02/21/23 08:05	1
NEtFOSAA	0.80	U	2.4	0.80	0.40	ng/L		02/21/23 08:05	1
NMeFOSAA	0.97	U	1.6	0.97	0.48	ng/L		02/21/23 08:05	1
Perfluoropentanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluoroheptanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorononanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorodecanesulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorooctanesulfonamide	1.1	U	1.6	1.1	0.56	ng/L		02/21/23 08:05	1
Perfluorobutanoic acid	3.2	U	4.0	3.2	1.6	ng/L		02/21/23 08:05	1
Perfluoropentanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluoroundecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
Perfluorododecanoic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.80	ng/L		02/21/23 08:05	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.4	1.6	0.80	ng/L		02/21/23 08:05	1
4:2 Fluorotelomer sulfonic acid	0.80	U	1.6	0.80	0.40	ng/L		02/21/23 08:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
M2-8:2 FTS	*100*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
M2-6:2 FTS	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C5 PFHxA	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C4 PFHpA	*98*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C8 PFOA	*108*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C9 PFNA	*97*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C6 PFDA	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C7 PFUnA	*105*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C2-PFDoDA	*98*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C2 PFTeDA	*86*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C3 PFBS	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C3 PFHxS	*95*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C8 PFOS	*95*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
d3-NMeFOSAA	*114*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
d5-NEtFOSAA	*108*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C8 FOSA	*94*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C4 PFBA	*98*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*
13C5 PFPeA	*100*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:05*	*1*

Client Sample ID: YTC-EB-2-020723

Date Collected: 02/07/23 15:35
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-8

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluoroheptanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorooctanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorononanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorodecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorotridecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorotetradecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorobutanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorohexanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorooctanesulfonic acid	1.6	U	1.7	1.6	0.82	ng/L		02/21/23 08:17	1
NEtFOSAA	0.82	U	2.5	0.82	0.41	ng/L		02/21/23 08:17	1
NMeFOSAA	0.98	U	1.6	0.98	0.49	ng/L		02/21/23 08:17	1
Perfluoropentanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluoroheptanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorononanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorodecanesulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorooctanesulfonamide	1.1	U	1.6	1.1	0.57	ng/L		02/21/23 08:17	1
Perfluorobutanoic acid	3.3	U	4.1	3.3	1.6	ng/L		02/21/23 08:17	1
Perfluoropentanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluoroundecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
Perfluorododecanoic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1
6:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 08:17	1
8:2 Fluorotelomer sulfonic acid	1.6	U	2.5	1.6	0.82	ng/L		02/21/23 08:17	1
4:2 Fluorotelomer sulfonic acid	0.82	U	1.6	0.82	0.41	ng/L		02/21/23 08:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
M2-8:2 FTS	*86*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
M2-6:2 FTS	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C5 PFHxA	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C4 PFHpA	*96*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C8 PFOA	*110*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C9 PFNA	*95*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C6 PFDA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C7 PFUnA	*104*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C2-PFDoDA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C2 PFTeDA	*84*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C3 PFBS	*94*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C3 PFHxS	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C8 PFOS	*94*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
d3-NMeFOSAA	*110*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
d5-NEtFOSAA	*103*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C8 FOSA	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C4 PFBA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*
13C5 PFPeA	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:17*	*1*

Client Sample Results

Client: Environmental Chemical Corp.
Project/Site: Yakima PFAS

Job ID: 410-115009-1
SDG: YTC-Baseline

Client Sample ID: YTC-SW-08-020723

Date Collected: 02/07/23 15:05
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-9

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluoroheptanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorooctanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorononanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorodecanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorotridecanoic acid	0.90	~~U cn~~ UX	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorotetradecanoic acid	0.90	~~U cn~~ UX	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorobutanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorohexanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorooctanesulfonic acid	1.8	U cn	1.9	1.8	0.90	ng/L		02/25/23 01:48	1
NEtFOSAA	0.90	U cn	2.7	0.90	0.45	ng/L		02/25/23 01:48	1
NMeFOSAA	1.1	U cn	1.8	1.1	0.54	ng/L		02/25/23 01:48	1
Perfluoropentanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluoroheptanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorononanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorodecanesulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorooctanesulfonamide	1.3	U cn	1.8	1.3	0.63	ng/L		02/25/23 01:48	1
Perfluorobutanoic acid	3.6	U M cn	4.5	3.6	1.8	ng/L		02/25/23 01:48	1
Perfluoropentanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluoroundecanoic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
Perfluorododecanoic acid	0.90	~~U cn~~ UX	1.8	0.90	0.45	ng/L		02/25/23 01:48	1
6:2 Fluorotelomer sulfonic acid	1.8	U cn	2.7	1.8	0.90	ng/L		02/25/23 01:48	1
8:2 Fluorotelomer sulfonic acid	1.8	U cn	2.7	1.8	0.90	ng/L		02/25/23 01:48	1
4:2 Fluorotelomer sulfonic acid	0.90	U cn	1.8	0.90	0.45	ng/L		02/25/23 01:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*171*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
M2-8:2 FTS	*92*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
M2-6:2 FTS	*145*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C5 PFHxA	*144*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C4 PFHpA	*122*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C8 PFOA	*139*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C9 PFNA	*115*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C6 PFDA	*96*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C7 PFUnA	*54*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C2-PFDoDA	*11*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C2 PFTeDA	*0.2*	*Q cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C3 PFBS	*137*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C3 PFHxS	*129*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C8 PFOS	*110*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
d3-NMeFOSAA	*74*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
d5-NEtFOSAA	*68*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C8 FOSA	*55*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C4 PFBA	*127*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*
13C5 PFPeA	*136*	*cn*	*50 - 150*	*02/20/23 07:09*	*02/25/23 01:48*	*1*

Client Sample ID: YTC-SED-01-020723

Date Collected: 02/07/23 09:05
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-10

Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	22.2		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-01-020723

Date Collected: 02/07/23 09:05
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-10

Matrix: Solid
Percent Solids: 77.8

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluoroheptanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorooctanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorononanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorodecanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorotridecanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorotetradecanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorobutanesulfonic acid	1.9	U	2.4	1.9	0.49	ng/g	☼	03/08/23 05:20	1
Perfluorohexanesulfonic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorooctanesulfonic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
NEtFOSAA	0.49	U	2.4	0.49	0.24	ng/g	☼	03/08/23 05:20	1
NMeFOSAA	0.49	U	2.4	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluoropentanesulfonic acid	0.49	U	3.6	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluoroheptanesulfonic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorononanesulfonic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorodecanesulfonic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorooctanesulfonamide	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorobutanoic acid	1.9	U	2.4	1.9	0.73	ng/g	☼	03/08/23 05:20	1
Perfluoropentanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluoroundecanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
Perfluorododecanoic acid	0.49	U	0.73	0.49	0.24	ng/g	☼	03/08/23 05:20	1
6:2 Fluorotelomer sulfonic acid	1.9	U	2.4	1.9	0.73	ng/g	☼	03/08/23 05:20	1
8:2 Fluorotelomer sulfonic acid	1.9	U	3.6	1.9	0.73	ng/g	☼	03/08/23 05:20	1
4:2 Fluorotelomer sulfonic acid	1.9	U	2.4	1.9	0.73	ng/g	☼	03/08/23 05:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
M2-8:2 FTS	*110*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
M2-6:2 FTS	*123*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C5 PFHxA	*121*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C4 PFHpA	*108*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C8 PFOA	*119*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C9 PFNA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C6 PFDA	*105*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C7 PFUnA	*118*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C2-PFDoDA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C2 PFTeDA	*100*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C3 PFBS	*109*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C3 PFHxS	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C8 PFOS	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
d3-NMeFOSAA	*73*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
d5-NEtFOSAA	*80*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*
13C8 FOSA	*104*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:20*	*1*

Client Sample ID: YTC-SED-01-020723

Lab Sample ID: 410-115009-10
Date Collected: 02/07/23 09:05
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 77.8

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	112		50 - 150	02/27/23 10:06	03/08/23 05:20	1
13C5 PFPeA	113		50 - 150	02/27/23 10:06	03/08/23 05:20	1

Client Sample ID: YTC-SED-02-020723

Lab Sample ID: 410-115009-11
Date Collected: 02/07/23 09:40
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	33.9		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-02-020723

Lab Sample ID: 410-115009-11
Date Collected: 02/07/23 09:40
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 66.1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluoroheptanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorooctanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorononanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorodecanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorotridecanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorotetradecanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorobutanesulfonic acid	2.3	U	2.9	2.3	0.58	ng/g	☼	03/08/23 05:31	1
Perfluorohexanesulfonic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorooctanesulfonic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
NEtFOSAA	0.58	U	2.9	0.58	0.29	ng/g	☼	03/08/23 05:31	1
NMeFOSAA	0.58	U	2.9	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluoropentanesulfonic acid	0.58	U	4.4	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluoroheptanesulfonic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorononanesulfonic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorodecanesulfonic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorooctanesulfonamide	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorobutanoic acid	2.3	U	2.9	2.3	0.87	ng/g	☼	03/08/23 05:31	1
Perfluoropentanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluoroundecanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
Perfluorododecanoic acid	0.58	U	0.87	0.58	0.29	ng/g	☼	03/08/23 05:31	1
6:2 Fluorotelomer sulfonic acid	2.3	U	2.9	2.3	0.87	ng/g	☼	03/08/23 05:31	1
8:2 Fluorotelomer sulfonic acid	2.3	U	4.4	2.3	0.87	ng/g	☼	03/08/23 05:31	1
4:2 Fluorotelomer sulfonic acid	2.3	U	2.9	2.3	0.87	ng/g	☼	03/08/23 05:31	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	108		50 - 150	02/27/23 10:06	03/08/23 05:31	1
M2-8:2 FTS	116		50 - 150	02/27/23 10:06	03/08/23 05:31	1
M2-6:2 FTS	115		50 - 150	02/27/23 10:06	03/08/23 05:31	1
13C5 PFHxA	117		50 - 150	02/27/23 10:06	03/08/23 05:31	1
13C4 PFHpA	104		50 - 150	02/27/23 10:06	03/08/23 05:31	1
13C8 PFOA	114		50 - 150	02/27/23 10:06	03/08/23 05:31	1
13C9 PFNA	111		50 - 150	02/27/23 10:06	03/08/23 05:31	1
13C6 PFDA	108		50 - 150	02/27/23 10:06	03/08/23 05:31	1

Client Sample ID: YTC-SED-02-020723

Lab Sample ID: 410-115009-11
Date Collected: 02/07/23 09:40
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 66.1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C7 PFUnA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C2-PFDoDA	*108*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C2 PFTeDA	*107*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C3 PFBS	*104*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C3 PFHxS	*110*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C8 PFOS	*103*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
d3-NMeFOSAA	*96*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
d5-NEtFOSAA	*100*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C8 FOSA	*103*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C4 PFBA	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*
13C5 PFPeA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:31*	*1*

Client Sample ID: YTC-SED-03-020723

Lab Sample ID: 410-115009-12
Date Collected: 02/07/23 10:00
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	**14.6**		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-03-020723

Lab Sample ID: 410-115009-12
Date Collected: 02/07/23 10:00
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 85.4

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluoroheptanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorooctanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorononanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorodecanoic acid	**0.24**	**J**	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorotridecanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorotetradecanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorobutanesulfonic acid	1.8	U	2.3	1.8	0.46	ng/g	☼	03/09/23 11:23	1
Perfluorohexanesulfonic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorooctanesulfonic acid	**1.0**		0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
NEtFOSAA	0.46	U	2.3	0.46	0.23	ng/g	☼	03/09/23 11:23	1
NMeFOSAA	0.46	U	2.3	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluoropentanesulfonic acid	0.46	U	3.4	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluoroheptanesulfonic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorononanesulfonic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorodecanesulfonic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorooctanesulfonamide	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorobutanoic acid	1.8	U	2.3	1.8	0.69	ng/g	☼	03/09/23 11:23	1
Perfluoropentanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluoroundecanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
Perfluorododecanoic acid	0.46	U	0.69	0.46	0.23	ng/g	☼	03/09/23 11:23	1
6:2 Fluorotelomer sulfonic acid	1.8	U	2.3	1.8	0.69	ng/g	☼	03/09/23 11:23	1
8:2 Fluorotelomer sulfonic acid	1.8	U	3.4	1.8	0.69	ng/g	☼	03/09/23 11:23	1
4:2 Fluorotelomer sulfonic acid	1.8	U	2.3	1.8	0.69	ng/g	☼	03/09/23 11:23	1

Client Sample ID: YTC-SED-03-020723

Date Collected: 02/07/23 10:00
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-12

Matrix: Solid
Percent Solids: 85.4

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	114	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
M2-8:2 FTS	130	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
M2-6:2 FTS	127	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C5 PFHxA	133	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C4 PFHpA	115		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C8 PFOA	122	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C9 PFNA	117	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C6 PFDA	115		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C7 PFUnA	123	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C2-PFDoDA	109	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C2 PFTeDA	111	cn	50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C3 PFBS	117		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C3 PFHxS	125		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C8 PFOS	117		50 - 150	02/26/23 12:40	03/09/23 11:23	1
d3-NMeFOSAA	83		50 - 150	02/26/23 12:40	03/09/23 11:23	1
d5-NEtFOSAA	96		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C8 FOSA	106		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C4 PFBA	145		50 - 150	02/26/23 12:40	03/09/23 11:23	1
13C5 PFPeA	121		50 - 150	02/26/23 12:40	03/09/23 11:23	1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluoroheptanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorooctanoic acid	0.45	U J1 Q cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorononanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorodecanoic acid	**0.31**	**J cn**	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorotridecanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorotetradecanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorobutanesulfonic acid	1.8	U cn	2.3	1.8	0.45	ng/g	☼	02/19/23 10:04	1
Perfluorohexanesulfonic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorooctanesulfonic acid	**0.83**	**cn**	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
NEtFOSAA	0.45	U cn	2.3	0.45	0.23	ng/g	☼	02/19/23 10:04	1
NMeFOSAA	0.45	U cn	2.3	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluoropentanesulfonic acid	0.45	U cn	3.4	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluoroheptanesulfonic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorononanesulfonic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorodecanesulfonic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorooctanesulfonamide	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorobutanoic acid	1.8	U cn	2.3	1.8	0.68	ng/g	☼	02/19/23 10:04	1
Perfluoropentanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluoroundecanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
Perfluorododecanoic acid	0.45	U cn	0.68	0.45	0.23	ng/g	☼	02/19/23 10:04	1
6:2 Fluorotelomer sulfonic acid	1.8	U cn	2.3	1.8	0.68	ng/g	☼	02/19/23 10:04	1
8:2 Fluorotelomer sulfonic acid	1.8	U cn	3.4	1.8	0.68	ng/g	☼	02/19/23 10:04	1
4:2 Fluorotelomer sulfonic acid	1.8	U cn	2.3	1.8	0.68	ng/g	☼	02/19/23 10:04	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	155	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
M2-8:2 FTS	155	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
M2-6:2 FTS	160	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1

Client Sample ID: YTC-SED-03-020723

Lab Sample ID: 410-115009-12
Date Collected: 02/07/23 10:00
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 85.4

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFHxA	155	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C4 PFHpA	137	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C8 PFOA	159	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C9 PFNA	153	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C6 PFDA	146	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C7 PFUnA	151	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C2-PFDoDA	163	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C2 PFTeDA	166	Q cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C3 PFBS	144	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C3 PFHxS	141	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C8 PFOS	145	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
d3-NMeFOSAA	121	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
d5-NEtFOSAA	119	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C8 FOSA	122	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C4 PFBA	144	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1
13C5 PFPeA	144	cn	50 - 150	02/13/23 12:10	02/19/23 10:04	1

Client Sample ID: YTC-SED-04-020723

Lab Sample ID: 410-115009-13
Date Collected: 02/07/23 10:25
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	22.7		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-04-020723

Lab Sample ID: 410-115009-13
Date Collected: 02/07/23 10:25
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 77.3

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.26	J M	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluoroheptanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorooctanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorononanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorodecanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorotridecanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorotetradecanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorobutanesulfonic acid	2.0	U	2.6	2.0	0.51	ng/g	☼	03/08/23 05:41	1
Perfluorohexanesulfonic acid	0.37	J	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorooctanesulfonic acid	5.2	J	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
NEtFOSAA	0.51	U	2.6	0.51	0.26	ng/g	☼	03/08/23 05:41	1
NMeFOSAA	0.51	U	2.6	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluoropentanesulfonic acid	0.51	U	3.8	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluoroheptanesulfonic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorononanesulfonic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorodecanesulfonic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorooctanesulfonamide	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorobutanoic acid	2.0	U	2.6	2.0	0.77	ng/g	☼	03/08/23 05:41	1
Perfluoropentanoic acid	0.59	J	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1

Client Sample ID: YTC-SED-04-020723

Lab Sample ID: 410-115009-13
Date Collected: 02/07/23 10:25
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 77.3

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluoroundecanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
Perfluorododecanoic acid	0.51	U	0.77	0.51	0.26	ng/g	☼	03/08/23 05:41	1
6:2 Fluorotelomer sulfonic acid	2.0	U	2.6	2.0	0.77	ng/g	☼	03/08/23 05:41	1
8:2 Fluorotelomer sulfonic acid	2.0	U	3.8	2.0	0.77	ng/g	☼	03/08/23 05:41	1
4:2 Fluorotelomer sulfonic acid	2.0	U	2.6	2.0	0.77	ng/g	☼	03/08/23 05:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*105*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
M2-8:2 FTS	*116*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
M2-6:2 FTS	*116*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C5 PFHxA	*121*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C4 PFHpA	*107*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C8 PFOA	*115*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C9 PFNA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C6 PFDA	*107*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C7 PFUnA	*117*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C2-PFDoDA	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C2 PFTeDA	*109*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C3 PFBS	*104*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C3 PFHxS	*108*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C8 PFOS	*108*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
d3-NMeFOSAA	*97*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
d5-NEtFOSAA	*106*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C8 FOSA	*98*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C4 PFBA	*118*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*
13C5 PFPeA	*112*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:41*	*1*

Client Sample ID: YTC-FD-01-SED-020723

Lab Sample ID: 410-115009-14
Date Collected: 02/07/23 00:00
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	**14.9**		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-FD-01-SED-020723

Lab Sample ID: 410-115009-14
Date Collected: 02/07/23 00:00
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 85.1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**0.47**	**J M**	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluoroheptanoic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorooctanoic acid	**0.25**	**J M**	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorononanoic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorodecanoic acid	**0.25**	**J**	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorotridecanoic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorotetradecanoic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorobutanesulfonic acid	1.8	U	2.2	1.8	0.44	ng/g	☼	03/08/23 05:52	1
Perfluorohexanesulfonic acid	**0.68**		0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorooctanesulfonic acid	**9.4**	J	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1

Client Sample ID: YTC-FD-01-SED-020723

Lab Sample ID: 410-115009-14

Date Collected: 02/07/23 00:00
Date Received: 02/09/23 10:25

Matrix: Solid
Percent Solids: 85.1

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
NEtFOSAA	0.44	U	2.2	0.44	0.22	ng/g	☼	03/08/23 05:52	1
NMeFOSAA	0.44	U	2.2	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluoropentanesulfonic acid	0.44	U	3.3	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluoroheptanesulfonic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorononanesulfonic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorodecanesulfonic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorooctanesulfonamide	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorobutanoic acid	1.8	U	2.2	1.8	0.66	ng/g	☼	03/08/23 05:52	1
Perfluoropentanoic acid	**1.1**		0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluoroundecanoic acid	0.44	U	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
Perfluorododecanoic acid	**0.39**	**J**	0.66	0.44	0.22	ng/g	☼	03/08/23 05:52	1
6:2 Fluorotelomer sulfonic acid	1.8	U	2.2	1.8	0.66	ng/g	☼	03/08/23 05:52	1
8:2 Fluorotelomer sulfonic acid	1.8	U	3.3	1.8	0.66	ng/g	☼	03/08/23 05:52	1
4:2 Fluorotelomer sulfonic acid	1.8	U	2.2	1.8	0.66	ng/g	☼	03/08/23 05:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*126*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
M2-8:2 FTS	*138*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
M2-6:2 FTS	*125*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C5 PFHxA	*132*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C4 PFHpA	*118*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C8 PFOA	*127*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C9 PFNA	*124*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C6 PFDA	*123*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C7 PFUnA	*128*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C2-PFDoDA	*128*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C2 PFTeDA	*124*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C3 PFBS	*121*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C3 PFHxS	*124*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C8 PFOS	*126*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
d3-NMeFOSAA	*104*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
d5-NEtFOSAA	*119*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C8 FOSA	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C4 PFBA	*129*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*
13C5 PFPeA	*131*		*50 - 150*	*02/27/23 10:06*	*03/08/23 05:52*	*1*

Client Sample ID: YTC-SW-04-020723

Lab Sample ID: 410-115009-15

Date Collected: 02/07/23 10:20
Date Received: 02/09/23 10:25

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**160**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluoroheptanoic acid	**59**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorooctanoic acid	**78**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorononanoic acid	**12**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorodecanoic acid	**11**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorotridecanoic acid	0.90	U	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorotetradecanoic acid	0.90	U	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorobutanesulfonic acid	**26**	**M**	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
NEtFOSAA	0.90	U	2.7	0.90	0.45	ng/L		02/21/23 08:28	1

Client Sample ID: YTC-SW-04-020723

Date Collected: 02/07/23 10:20
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-15

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
NMeFOSAA	1.1	U	1.8	1.1	0.54	ng/L		02/21/23 08:28	1
Perfluoropentanesulfonic acid	**39**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluoroheptanesulfonic acid	**41**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorononanesulfonic acid	**3.8**	**M**	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorodecanesulfonic acid	**2.5**	**M**	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorooctanesulfonamide	**11**	J+	1.8	1.3	0.63	ng/L		02/21/23 08:28	1
Perfluorobutanoic acid	**27**		4.5	3.6	1.8	ng/L		02/21/23 08:28	1
Perfluoropentanoic acid	**79**		1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluoroundecanoic acid	**2.3**	**M**	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
Perfluorododecanoic acid	**1.9**	**M** MJ	1.8	0.90	0.45	ng/L		02/21/23 08:28	1
4:2 Fluorotelomer sulfonic acid	**0.60**	**J M**	1.8	0.90	0.45	ng/L		02/21/23 08:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*99*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
M2-8:2 FTS	*97*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
M2-6:2 FTS	*95*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C5 PFHxA	*66*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C4 PFHpA	*58*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C8 PFOA	*68*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C9 PFNA	*47*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C6 PFDA	*75*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C7 PFUnA	*85*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C2-PFDoDA	*74*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C2 PFTeDA	*68*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C3 PFBS	*62*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C3 PFHxS	*58*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C8 PFOS	*37*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
d3-NMeFOSAA	*75*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
d5-NEtFOSAA	*80*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C8 FOSA	*41*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C4 PFBA	*50*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*
13C5 PFPeA	*53*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:28*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	**360**	**D**	18	9.0	4.5	ng/L		03/07/23 18:55	10
Perfluorooctanesulfonic acid	**2900**	**D**	19	18	9.0	ng/L		03/07/23 18:55	10
6:2 Fluorotelomer sulfonic acid	**180**	**D**	27	18	9.0	ng/L		03/07/23 18:55	10
8:2 Fluorotelomer sulfonic acid	**81**	**D**	27	18	9.0	ng/L		03/07/23 18:55	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-8:2 FTS	*122*		*50 - 150*	*02/18/23 06:59*	*03/07/23 18:55*	*10*
M2-6:2 FTS	*126*		*50 - 150*	*02/18/23 06:59*	*03/07/23 18:55*	*10*
13C3 PFHxS	*116*		*50 - 150*	*02/18/23 06:59*	*03/07/23 18:55*	*10*
13C8 PFOS	*108*		*50 - 150*	*02/18/23 06:59*	*03/07/23 18:55*	*10*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	**150**	**H**	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluoroheptanoic acid	**53**	**H**	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorooctanoic acid	**70**	**H J1**	1.8	0.88	0.44	ng/L		03/04/23 13:41	1

Client Sample ID: YTC-SW-04-020723

Lab Sample ID: 410-115009-15

Date Collected: 02/07/23 10:20
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorononanoic acid	12	H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorodecanoic acid	11	H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorotridecanoic acid	0.88	U H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorotetradecanoic acid	0.88	U H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorobutanesulfonic acid	27	H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorohexanesulfonic acid	290	H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorooctanesulfonic acid	2000	H J1	1.8	1.8	0.88	ng/L		03/04/23 13:41	1
NEtFOSAA	0.88	U H	2.6	0.88	0.44	ng/L		03/04/23 13:41	1
NMeFOSAA	1.1	U H	1.8	1.1	0.53	ng/L		03/04/23 13:41	1
Perfluoropentanesulfonic acid	36	H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluoroheptanesulfonic acid	36	H	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorononanesulfonic acid	2.6	H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorodecanesulfonic acid	0.86	J H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorooctanesulfonamide	12	H	1.8	1.2	0.61	ng/L		03/04/23 13:41	1
Perfluorobutanoic acid	22	H M	4.4	3.5	1.8	ng/L		03/04/23 13:41	1
Perfluoropentanoic acid	73	H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluoroundecanoic acid	2.2	H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
Perfluorododecanoic acid	1.7	J H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1
6:2 Fluorotelomer sulfonic acid	170	H J1	2.6	1.8	0.88	ng/L		03/04/23 13:41	1
8:2 Fluorotelomer sulfonic acid	71	H	2.6	1.8	0.88	ng/L		03/04/23 13:41	1
4:2 Fluorotelomer sulfonic acid	0.62	J H M	1.8	0.88	0.44	ng/L		03/04/23 13:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*103*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
M2-8:2 FTS	*87*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
M2-6:2 FTS	*97*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C5 PFHxA	*89*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C4 PFHpA	*89*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C8 PFOA	*90*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C9 PFNA	*62*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C6 PFDA	*68*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C7 PFUnA	*55*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C2-PFDoDA	*28*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C2 PFTeDA	*3*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C3 PFBS	*97*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C3 PFHxS	*101*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C8 PFOS	*53*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
d3-NMeFOSAA	*52*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
d5-NEtFOSAA	*54*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C8 FOSA	*34*	*Q*	*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C4 PFBA	*122*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*
13C5 PFPeA	*84*		*50 - 150*	*02/25/23 15:16*	*03/04/23 13:41*	*1*

Client Sample ID: YTC-FD-01-SW-020723

Lab Sample ID: 410-115009-16

Date Collected: 02/07/23 00:00
Matrix: Water
Date Received: 02/09/23 10:25

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	170		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluoroheptanoic acid	59		1.7	0.86	0.43	ng/L		02/21/23 08:39	1

Client Sample ID: YTC-FD-01-SW-020723

Date Collected: 02/07/23 00:00
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-16

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorooctanoic acid	**83**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
~~**Perfluorononanoic acid**~~	~~**12**~~		~~1.7~~	~~0.86~~	~~0.43~~	~~ng/L~~		~~02/21/23 08:39~~	~~1~~
Perfluorodecanoic acid	**11**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorotridecanoic acid	0.86	U	1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorotetradecanoic acid	0.86	U	1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorobutanesulfonic acid	**29**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
NEtFOSAA	0.86	U	2.6	0.86	0.43	ng/L		02/21/23 08:39	1
NMeFOSAA	1.0	U	1.7	1.0	0.52	ng/L		02/21/23 08:39	1
Perfluoropentanesulfonic acid	**41**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluoroheptanesulfonic acid	**43**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorononanesulfonic acid	**3.4**	**M**	1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorodecanesulfonic acid	**2.4**	**M**	1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorooctanesulfonamide	**12**	J+	1.7	1.2	0.60	ng/L		02/21/23 08:39	1
~~**Perfluorobutanoic acid**~~	~~**27**~~		~~4.3~~	~~3.4~~	~~1.7~~	~~ng/L~~		~~02/21/23 08:39~~	~~1~~
Perfluoropentanoic acid	**78**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluoroundecanoic acid	**2.4**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
Perfluorododecanoic acid	**1.9**		1.7	0.86	0.43	ng/L		02/21/23 08:39	1
4:2 Fluorotelomer sulfonic acid	**0.61**	**J**	1.7	0.86	0.43	ng/L		02/21/23 08:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*101*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
M2-8:2 FTS	*93*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
M2-6:2 FTS	*87*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C5 PFHxA	*64*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C4 PFHpA	*58*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C8 PFOA	*67*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C9 PFNA	*46*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C6 PFDA	*76*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C7 PFUnA	*79*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C2-PFDoDA	*70*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C2 PFTeDA	*58*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C3 PFBS	*63*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C3 PFHxS	*59*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C8 PFOS	*36*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
d3-NMeFOSAA	*72*	*Q cn*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
d5-NEtFOSAA	*73*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C8 FOSA	*38*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C4 PFBA	*49*	*Q*	*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*
13C5 PFPeA	*54*		*50 - 150*	*02/18/23 06:59*	*02/21/23 08:39*	*1*

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanesulfonic acid	**360**	**D**	17	8.6	4.3	ng/L		03/07/23 19:16	10
Perfluorooctanesulfonic acid	**2900**	**D**	18	17	8.6	ng/L		03/07/23 19:16	10
6:2 Fluorotelomer sulfonic acid	**200**	**D**	26	17	8.6	ng/L		03/07/23 19:16	10
8:2 Fluorotelomer sulfonic acid	**80**	**D**	26	17	8.6	ng/L		03/07/23 19:16	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-8:2 FTS	*115*		*50 - 150*	*02/18/23 06:59*	*03/07/23 19:16*	*10*
M2-6:2 FTS	*120*		*50 - 150*	*02/18/23 06:59*	*03/07/23 19:16*	*10*
13C3 PFHxS	*121*		*50 - 150*	*02/18/23 06:59*	*03/07/23 19:16*	*10*

Client Sample ID: YTC-FD-01-SW-020723

Date Collected: 02/07/23 00:00
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-16

Matrix: Water

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - DL (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 PFOS	108		50 - 150	02/18/23 06:59	03/07/23 19:16	10

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 - RE

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	170	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluoroheptanoic acid	54	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorooctanoic acid	70	H J1	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorononanoic acid	12	H M	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorodecanoic acid	10	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorotridecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorotetradecanoic acid	0.86	U H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorobutanesulfonic acid	31	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorohexanesulfonic acid	290	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorooctanesulfonic acid	1500	H J1	1.8	1.7	0.86	ng/L		03/04/23 14:02	1
NEtFOSAA	0.86	U H	2.6	0.86	0.43	ng/L		03/04/23 14:02	1
NMeFOSAA	1.0	U H	1.7	1.0	0.52	ng/L		03/04/23 14:02	1
Perfluoropentanesulfonic acid	41	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluoroheptanesulfonic acid	39	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorononanesulfonic acid	3.3	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorodecanesulfonic acid	1.9	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorooctanesulfonamide	11	H	1.7	1.2	0.60	ng/L		03/04/23 14:02	1
Perfluorobutanoic acid	21	H M	4.3	3.4	1.7	ng/L		03/04/23 14:02	1
Perfluoropentanoic acid	83	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluoroundecanoic acid	1.9	H	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
Perfluorododecanoic acid	1.5	J H M	1.7	0.86	0.43	ng/L		03/04/23 14:02	1
6:2 Fluorotelomer sulfonic acid	170	H J1	2.6	1.7	0.86	ng/L		03/04/23 14:02	1
8:2 Fluorotelomer sulfonic acid	63	H	2.6	1.7	0.86	ng/L		03/04/23 14:02	1
4:2 Fluorotelomer sulfonic acid	0.64	J H M	1.7	0.86	0.43	ng/L		03/04/23 14:02	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	115		50 - 150	02/25/23 15:16	03/04/23 14:02	1
M2-8:2 FTS	138		50 - 150	02/25/23 15:16	03/04/23 14:02	1
M2-6:2 FTS	118		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C5 PFHxA	87		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C4 PFHpA	92		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C8 PFOA	104		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C9 PFNA	78		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C6 PFDA	111		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C7 PFUnA	114		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C2-PFDoDA	91		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C2 PFTeDA	57		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C3 PFBS	100		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C3 PFHxS	112		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C8 PFOS	71		50 - 150	02/25/23 15:16	03/04/23 14:02	1
d3-NMeFOSAA	90	Q cn	50 - 150	02/25/23 15:16	03/04/23 14:02	1
d5-NEtFOSAA	99		50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C8 FOSA	45	Q	50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C4 PFBA	124	Q cn	50 - 150	02/25/23 15:16	03/04/23 14:02	1
13C5 PFPeA	80		50 - 150	02/25/23 15:16	03/04/23 14:02	1

Client Sample ID: YTC-SED-05-020723

Date Collected: 02/07/23 10:55
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-17

Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	**11.7**		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-05-020723

Date Collected: 02/07/23 10:55
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-17

Matrix: Solid
Percent Solids: 88.3

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.44	U M	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluoroheptanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorooctanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorononanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorodecanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorotridecanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorotetradecanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorobutanesulfonic acid	1.8	U	2.2	1.8	0.44	ng/g	☼	03/08/23 06:02	1
Perfluorohexanesulfonic acid	**0.29**	**J**	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorooctanesulfonic acid	**1.4**		0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
NEtFOSAA	0.44	U	2.2	0.44	0.22	ng/g	☼	03/08/23 06:02	1
NMeFOSAA	0.44	U	2.2	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluoropentanesulfonic acid	0.44	U	3.3	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluoroheptanesulfonic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorononanesulfonic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorodecanesulfonic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorooctanesulfonamide	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorobutanoic acid	1.8	U	2.2	1.8	0.67	ng/g	☼	03/08/23 06:02	1
Perfluoropentanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluoroundecanoic acid	0.44	U	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
Perfluorododecanoic acid	**0.30**	**J**	0.67	0.44	0.22	ng/g	☼	03/08/23 06:02	1
6:2 Fluorotelomer sulfonic acid	1.8	U M	2.2	1.8	0.67	ng/g	☼	03/08/23 06:02	1
8:2 Fluorotelomer sulfonic acid	1.8	U	3.3	1.8	0.67	ng/g	☼	03/08/23 06:02	1
4:2 Fluorotelomer sulfonic acid	1.8	U	2.2	1.8	0.67	ng/g	☼	03/08/23 06:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*110*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
M2-8:2 FTS	*126*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
M2-6:2 FTS	*117*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C5 PFHxA	*120*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C4 PFHpA	*113*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C8 PFOA	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C9 PFNA	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C6 PFDA	*110*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C7 PFUnA	*128*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C2-PFDoDA	*115*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C2 PFTeDA	*116*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C3 PFBS	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C3 PFHxS	*118*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C8 PFOS	*120*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
d3-NMeFOSAA	*88*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
d5-NEtFOSAA	*112*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C8 FOSA	*100*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*

Client Sample ID: YTC-SED-05-020723

Lab Sample ID: 410-115009-17
Date Collected: 02/07/23 10:55
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 88.3

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*127*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*
13C5 PFPeA	*124*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:02*	*1*

Client Sample ID: YTC-SED-06-020723

Lab Sample ID: 410-115009-18
Date Collected: 02/07/23 14:30
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	**18.8**		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-06-020723

Lab Sample ID: 410-115009-18
Date Collected: 02/07/23 14:30
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 81.2

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluoroheptanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorooctanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorononanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorodecanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorotridecanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorotetradecanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorobutanesulfonic acid	1.8	U	2.3	1.8	0.46	ng/g	☼	03/09/23 19:27	1
Perfluorohexanesulfonic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorooctanesulfonic acid	**0.27**	**J M**	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
NEtFOSAA	0.46	U	2.3	0.46	0.23	ng/g	☼	03/09/23 19:27	1
NMeFOSAA	0.46	U	2.3	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluoropentanesulfonic acid	0.46	U	3.4	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluoroheptanesulfonic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorononanesulfonic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorodecanesulfonic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorooctanesulfonamide	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorobutanoic acid	1.8	U	2.3	1.8	0.68	ng/g	☼	03/09/23 19:27	1
Perfluoropentanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluoroundecanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
Perfluorododecanoic acid	0.46	U	0.68	0.46	0.23	ng/g	☼	03/09/23 19:27	1
6:2 Fluorotelomer sulfonic acid	1.8	U	2.3	1.8	0.68	ng/g	☼	03/09/23 19:27	1
8:2 Fluorotelomer sulfonic acid	1.8	U	3.4	1.8	0.68	ng/g	☼	03/09/23 19:27	1
4:2 Fluorotelomer sulfonic acid	1.8	U	2.3	1.8	0.68	ng/g	☼	03/09/23 19:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*100*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
M2-8:2 FTS	*99*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
M2-6:2 FTS	*105*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
13C5 PFHxA	*124*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
13C4 PFHpA	*115*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
13C8 PFOA	*112*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
13C9 PFNA	*108*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*
13C6 PFDA	*110*		*50 - 150*	*02/27/23 10:06*	*03/09/23 19:27*	*1*

Client Sample ID: YTC-SED-06-020723

Lab Sample ID: 410-115009-18
Date Collected: 02/07/23 14:30
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 81.2

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C7 PFUnA	113		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C2-PFDoDA	107		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C2 PFTeDA	93		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C3 PFBS	112		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C3 PFHxS	117		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C8 PFOS	107		50 - 150	02/27/23 10:06	03/09/23 19:27	1
d3-NMeFOSAA	92		50 - 150	02/27/23 10:06	03/09/23 19:27	1
d5-NEtFOSAA	93		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C8 FOSA	129		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C4 PFBA	113		50 - 150	02/27/23 10:06	03/09/23 19:27	1
13C5 PFPeA	121		50 - 150	02/27/23 10:06	03/09/23 19:27	1

Client Sample ID: YTC-SED-07-020723

Lab Sample ID: 410-115009-19
Date Collected: 02/07/23 14:50
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	**29.4**		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-07-020723

Lab Sample ID: 410-115009-19
Date Collected: 02/07/23 14:50
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 70.6

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluoroheptanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorooctanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorononanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorodecanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorotridecanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorotetradecanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorobutanesulfonic acid	2.2	U	2.8	2.2	0.55	ng/g	☼	03/08/23 06:24	1
Perfluorohexanesulfonic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorooctanesulfonic acid	**4.0**		0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
NEtFOSAA	0.55	U	2.8	0.55	0.28	ng/g	☼	03/08/23 06:24	1
NMeFOSAA	0.55	U	2.8	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluoropentanesulfonic acid	0.55	U	4.1	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluoroheptanesulfonic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorononanesulfonic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorodecanesulfonic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorooctanesulfonamide	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorobutanoic acid	2.2	U	2.8	2.2	0.83	ng/g	☼	03/08/23 06:24	1
Perfluoropentanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluoroundecanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
Perfluorododecanoic acid	0.55	U	0.83	0.55	0.28	ng/g	☼	03/08/23 06:24	1
6:2 Fluorotelomer sulfonic acid	2.2	U	2.8	2.2	0.83	ng/g	☼	03/08/23 06:24	1
8:2 Fluorotelomer sulfonic acid	2.2	U	4.1	2.2	0.83	ng/g	☼	03/08/23 06:24	1
4:2 Fluorotelomer sulfonic acid	2.2	U	2.8	2.2	0.83	ng/g	☼	03/08/23 06:24	1

Client Sample ID: YTC-SED-07-020723

Lab Sample ID: 410-115009-19

Date Collected: 02/07/23 14:50
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 70.6

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	122		50 - 150	02/27/23 10:06	03/08/23 06:24	1
M2-8:2 FTS	135		50 - 150	02/27/23 10:06	03/08/23 06:24	1
M2-6:2 FTS	130		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C5 PFHxA	123		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C4 PFHpA	112		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C8 PFOA	115		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C9 PFNA	111		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C6 PFDA	106		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C7 PFUnA	121		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C2-PFDoDA	113		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C2 PFTeDA	110		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C3 PFBS	110		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C3 PFHxS	115		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C8 PFOS	115		50 - 150	02/27/23 10:06	03/08/23 06:24	1
d3-NMeFOSAA	95		50 - 150	02/27/23 10:06	03/08/23 06:24	1
d5-NEtFOSAA	103		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C8 FOSA	107		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C4 PFBA	134		50 - 150	02/27/23 10:06	03/08/23 06:24	1
13C5 PFPeA	113		50 - 150	02/27/23 10:06	03/08/23 06:24	1

Client Sample ID: YTC-SED-08-020723

Lab Sample ID: 410-115009-20

Date Collected: 02/07/23 15:10
Matrix: Solid
Date Received: 02/09/23 10:25

General Chemistry

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Percent Moisture (EPA Moisture)	40.2		1.0		1.0	%		02/14/23 09:45	1

Client Sample ID: YTC-SED-08-020723

Lab Sample ID: 410-115009-20

Date Collected: 02/07/23 15:10
Matrix: Solid
Date Received: 02/09/23 10:25
Percent Solids: 59.8

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorohexanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluoroheptanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorooctanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorononanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorodecanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorotridecanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorotetradecanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorobutanesulfonic acid	2.5	U	3.2	2.5	0.63	ng/g	☼	03/08/23 06:34	1
Perfluorohexanesulfonic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorooctanesulfonic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
NEtFOSAA	0.63	U	3.2	0.63	0.32	ng/g	☼	03/08/23 06:34	1
NMeFOSAA	0.63	U	3.2	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluoropentanesulfonic acid	0.63	U	4.7	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluoroheptanesulfonic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorononanesulfonic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorodecanesulfonic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorooctanesulfonamide	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1

Client Sample ID: YTC-SED-08-020723

Date Collected: 02/07/23 15:10
Date Received: 02/09/23 10:25

Lab Sample ID: 410-115009-20

Matrix: Solid
Percent Solids: 59.8

Method: DOD 5.4 QSM B15 - PFAS for QSM 5.4, Table B-15 (Continued)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Perfluorobutanoic acid	2.5	U	3.2	2.5	0.95	ng/g	☼	03/08/23 06:34	1
Perfluoropentanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluoroundecanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
Perfluorododecanoic acid	0.63	U	0.95	0.63	0.32	ng/g	☼	03/08/23 06:34	1
6:2 Fluorotelomer sulfonic acid	2.5	U	3.2	2.5	0.95	ng/g	☼	03/08/23 06:34	1
8:2 Fluorotelomer sulfonic acid	2.5	U	4.7	2.5	0.95	ng/g	☼	03/08/23 06:34	1
4:2 Fluorotelomer sulfonic acid	2.5	U	3.2	2.5	0.95	ng/g	☼	03/08/23 06:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*116*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
M2-8:2 FTS	*114*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
M2-6:2 FTS	*127*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C5 PFHxA	*112*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C4 PFHpA	*103*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C8 PFOA	*109*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C9 PFNA	*105*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C6 PFDA	*100*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C7 PFUnA	*111*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C2-PFDoDA	*98*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C2 PFTeDA	*108*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C3 PFBS	*100*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C3 PFHxS	*109*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C8 PFOS	*104*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
d3-NMeFOSAA	*91*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
d5-NEtFOSAA	*105*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C8 FOSA	*96*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C4 PFBA	*121*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*
13C5 PFPeA	*109*		*50 - 150*	*02/27/23 10:06*	*03/08/23 06:34*	*1*

Attachment 3

Basalt X-Ray Fluorescence Laboratory Results

	YTC_MW-02_110	YTC_MW-02_210	YTC_MW-03_189	YTC_MW-06_235
	GAL-JH-145-1	GAL-JH-145-2	GAL-JH-145-3	GAL-JH-145-4
Date	23-May-23	23-May-23	23-May-23	24-May-23
	Unnormalized Major Elements (Weight %):			
SiO2	51.50	60.37	51.80	50.16
TiO2	1.669	0.904	1.602	1.067
Al2O3	14.54	17.15	14.64	14.02
FeO*	10.99	5.83	10.69	7.98
MnO	0.180	0.108	0.173	0.099
MgO	6.90	2.60	6.71	4.83
CaO	10.61	5.73	10.16	5.34
Na2O	2.38	3.53	2.25	1.07
K2O	0.65	1.30	0.71	1.28
P2O5	0.238	0.182	0.215	0.165
Sum	99.67	97.70	98.95	86.01
LOI %	-0.08	2.17	1.04	13.95
	Normalized Major Elements (Weight %):			
SiO2	51.68	61.79	52.35	58.32
TiO2	1.67	0.92	1.62	1.24
Al2O3	14.59	17.55	14.80	16.30
FeO*	11.03	5.97	10.80	9.27
MnO	0.18	0.11	0.18	0.12
MgO	6.93	2.66	6.79	5.62
CaO	10.65	5.86	10.27	6.21
Na2O	2.39	3.62	2.28	1.24
K2O	0.65	1.33	0.72	1.49
P2O5	0.24	0.19	0.22	0.19
Total	100.00	100.00	100.00	100.00
	Unnormalized Trace Elements (ppm):			
Ni	52	18	47	31
Cr	101	39	98	61
Sc	36	17	35	26
V	282	132	273	181
Ba	275	427	255	199
Rb	15	29	17	45
Sr	235	465	225	132
Zr	139	120	139	137
Y	30	18	30	24
Nb	11.5	6.6	11.9	9.6
Ga	18	18	19	17
Cu	53	17	53	33
Zn	96	74	94	85
Pb	6	6	6	5
La	15	11	13	16
Ce	37	31	32	36
Th	3	3	3	4
Nd	21	17	19	19
U	0	1	1	1
sum tr.	1426	1449	1372	1061
in %	0.14	0.14	0.14	0.11
sum m+tr	99.81	97.84	99.09	86.11
M+Toxides	99.85	97.87	99.13	86.14
w/LOI	99.77	100.04	100.17	100.09
if Fe3+	100.99	100.69	101.35	100.98

Major elements are normalized on a volatile-free basis, with total Fe expressed as FeO.
® denotes a duplicate bead made from the same rock powder.

NiO	65.7	22.9	60.2	39.2
Cr2O3	147.1	56.9	142.7	89.0
Sc2O3	55.4	25.9	54.2	39.2
V2O3	414.6	193.5	401.6	265.7
BaO	307.3	476.8	285.1	221.7
Rb2O	16.8	31.5	18.9	48.8
SrO	278.2	549.9	266.5	156.0
ZrO2	188.0	161.4	188.1	185.4
Y2O3	37.9	23.2	37.6	30.3
Nb2O5	16.4	9.4	17.0	13.7
Ga2O3	24.7	24.8	25.6	23.1
CuO	66.7	21.1	66.3	41.8
ZnO	119.5	92.5	117.0	105.4
PbO	6.2	6.5	6.9	5.7
La2O3	18.0	13.3	15.5	19.3
CeO2	45.5	37.7	39.3	44.1
ThO2	2.9	3.3	3.9	4.8
Nd2O3	24.5	19.3	22.0	22.3
U2O3	0.4	1.1	0.6	1.6
sum tr.	**1836**	**1771**	**1769**	**1357**
in %	**0.18**	**0.18**	**0.18**	**0.14**

	USGS AGV-2	AGV-2 USGS CRM-1	USGS BCR-2	BCR-2 USGS CRM-2	USGS GSP-2	GSP-2 USGS CRM-3
Date	**PV**	23-May-23	**PV**	23-May-23	**GeoRem**	23-May-23
						Unnormalized Major Elements (Weight %):
SiO2	**59.14**	59.48	**54.00**	53.94	**66.60**	66.78
TiO2	**1.051**	1.047	**2.265**	2.265	**0.660**	0.678
Al2O3	**17.03**	17.03	**13.48**	13.46	**14.90**	14.96
FeO*	**6.10**	6.05	**12.39**	12.43	**4.41**	4.41
MnO	**0.100**	0.100	**0.197**	0.197	**0.041**	0.042
MgO	**1.80**	1.79	**3.60**	3.61	**0.96**	0.96
CaO	**5.15**	5.21	**7.11**	7.11	**2.10**	2.11
Na2O	**4.20**	4.22	**3.12**	3.14	**2.78**	2.80
K2O	**2.90**	2.88	**1.77**	1.76	**5.38**	5.42
P2O5	**0.483**	0.481	**0.359**	0.350	**0.290**	0.284
Sum	**97.96**	98.30	**98.30**	98.27	**98.12**	98.44
LOI %						
						Normalized Major Elements (Weight %):
SiO2	**60.37**	60.51	**54.93**	54.89	**67.88**	67.83
TiO2	**1.07**	1.07	**2.30**	2.30	**0.67**	0.69
Al2O3	**17.39**	17.33	**13.71**	13.70	**15.19**	15.20
FeO*	**6.23**	6.16	**12.60**	12.65	**4.49**	4.48
MnO	**0.10**	0.10	**0.20**	0.20	**0.04**	0.04
MgO	**1.84**	1.82	**3.66**	3.68	**0.98**	0.98
CaO	**5.26**	5.30	**7.24**	7.23	**2.14**	2.15
Na2O	**4.29**	4.30	**3.17**	3.20	**2.83**	2.84
K2O	**2.96**	2.93	**1.80**	1.79	**5.48**	5.50
P2O5	**0.49**	0.49	**0.37**	0.36	**0.30**	0.29
Total	**100.00**	100.00	**100.00**	100.00	**100.00**	100.00
						Unnormalized Trace Elements (ppm):
Ni	**19**	19	**13**	13	**17**	17
Cr	**16**	17	**16**	13	**20**	20
Sc	**13**	13	**34**	32	**6**	7
V	**119**	121	**418**	407	**52**	55
Ba	**1134**	1124	**684**	682	**1340**	1326
Rb	**68**	68	**46**	47	**245**	245
Sr	**660**	660	**337**	331	**240**	242
Zr	**232**	235	**187**	182	**550**	570
Y	**19**	21	**36**	35	**28**	26
Nb	**14.1**	13.9	**12.4**	13.0	**27.0**	26.0
Ga	**20**	20	**22**	21	**22**	23
Cu	**52**	54	**20**	21	**43**	44
Zn	**87**	89	**130**	132	**120**	113
Pb	**13**	14	**11**	10	**42**	43
La	**38**	37	**25**	23	**180**	184
Ce	**69**	73	**53**	48	**410**	436
Th	**6**	6	**6**	5	**105**	108
Nd	**30**	28	**28**	26	**200**	203
U	**2**	1	**2**	2	**2**	3
sum tr.	**2611**	2611	**2078**	2044	**3650**	3688
in %	**0.26**	0.26	**0.21**	0.20	**0.36**	0.37
sum m+tr	**98.22**	98.56	**98.51**	98.47	**98.49**	98.81
M+Toxides	**98.27**	98.61	**98.56**	98.52	**98.56**	98.88
w/LOI	**98.27**	98.61	**98.56**	98.52	**98.56**	98.88
if Fe3+	**98.95**	99.28	**99.93**	99.90	**99.04**	99.37
						Major elements are normalized on a volatile-free basis, with total Fe expressed as FeO.
						® denotes a duplicate bead made from the same rock powder.
NiO	**24.0**	23.9	**16.0**	16.7	**21.6**	21.0
Cr2O3	**23.7**	24.8	**23.2**	19.7	**29.2**	29.6
Sc2O3	**20.1**	19.4	**51.4**	49.7	**9.7**	10.1
V2O3	**174.3**	177.5	**614.3**	599.0	**76.5**	80.5
BaO	**1266.1**	1254.7	**763.6**	761.1	**1496.1**	1479.9
Rb2O	**74.1**	74.1	**50.3**	51.6	**267.9**	268.1
SrO	**779.9**	780.2	**399.0**	391.9	**283.8**	285.8
ZrO2	**313.4**	317.4	**251.9**	245.3	**742.9**	769.3
Y2O3	**24.3**	26.2	**45.8**	45.0	**35.6**	32.9
Nb2O5	**20.2**	19.8	**17.8**	18.5	**38.6**	37.1
Ga2O3	**27.4**	27.2	**29.7**	27.9	**29.6**	30.6
CuO	**64.5**	67.0	**24.6**	26.4	**53.8**	55.5
ZnO	**107.9**	110.5	**161.2**	163.9	**149.4**	140.6
PbO	**14.2**	15.2	**11.4**	10.9	**45.2**	45.8
La2O3	**44.8**	43.4	**29.4**	27.5	**211.1**	216.3
CeO2	**85.3**	89.1	**65.3**	58.5	**504.0**	536.5
ThO2	**7.0**	6.4	**6.6**	5.5	**119.5**	122.8
Nd2O3	**35.6**	33.1	**33.0**	30.2	**233.3**	236.5
U2O3	**2.1**	1.2	**1.9**	2.1	**2.6**	2.9

sum tr.	**3109**	**3111**	**2596**	**2551**	**4351**	**4402**
in %	**0.31**	**0.31**	**0.26**	**0.26**	**0.44**	**0.44**

sample_name	Formation	Member	Member (2)	Formation (2)	Member
YTC_MW-02_110	Saddle Mountains	Weippe-Pomona			
YTC_MW-02_210	Grande Ronde	Fields Spring	Mount Horrible		
YTC_MW-03_189	Saddle Mountains	Weippe-Pomona			
YTC_MW-06_235	Grande Ronde	Meyer Ridge	Sentinel Bluffs	Saddle Mountains	Buford

sample_name	Grande Ronde	Imnaha	Saddle Mountains	Wanapum	
YTC_MW-02_110	0.0247	0.0007	0.9935	0	
YTC_MW-02_210	1	0	0	0.0001	
YTC_MW-03_189	0.0678	0.0004	0.9945	0	
YTC_MW-06_235	1	0	1	0	

sample_name	Armstrong Canyon	Birch Creek	Brady Gulch	Buckhorn Springs	Buttermilk Canyon	Center Creek	China Creek	Cold Springs Ridge	Downey Gulch	Fields Spring
YTC_MW-02_210	0.0173	0.0001	0	0	0	0.707	0.9736	0.3765	0.0875	1
YTC_MW-06_235	0.0046	0.0005	0	0.0003	0	0.0003	0.0115	0.2334	0.1469	0.001

Frye Point	Grouse Creek	Hoskin Gulch	Kendrik Grade	Meyer Ridge	Mount Horrible	Ortley	Rogersburg	Sentinel Bluffs	Skeleton Creek	Slack Canyon	Teepee Butte	Wapshilla Ridge	Winter Water
0.002	0.0088	0.0411	0.0005	0	1	0.7088	0.9881	0	0.0011	0.0014	0.1384	0	0
0.0267	0.0679	0.0015	0	1	0	0.0496	0.007	1	0.0078	0.002	0.0001	0	0.0224

sample_name	Asotin-Wilbur Creek	Buford	Craigmont	Elephant Mountain	Esquatzel	Feary Creek	Ice Harbor	Lower Monumental	Swamp Creek	Tammany Creek	Umatilla	Weippe-Pomona	Weissenfels Ridge
YTC_MW-02_110	0.0755	0.0047	0.0001	0.0004	0.001	0.0002	0	0.0005	0.0007	0	0.0001	0.877	0.0168
YTC_MW-03_189	0.0865	0.0217	0.0001	0.0009	0.002	0.0002	0	0.0004	0.0007	0	0	0.9087	0.0067
YTC_MW-06_235	0.9449	0.9857	0	0.645	0.0027	0.0009	0	0	0	0	0.0001	0.9496	0